# PACIFIC SALMON COMMISSION JOINT CHINOOK TECHNICAL COMMITTEE 1993 ANNUAL REPORT <br> REPORT TCCHINOOK (94)-1 

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| ADF\&G | Alaska Department of Fish \& Game | NMFS | National Marine Fisheries Service |
| :---: | :---: | :---: | :---: |
| AEQ | Adult Equivalent | NOC | Oregon Coastal North |
| AWG | Analytical Working Group of the CTC | NPS | Migrating Stocks North Puget Sound |
| C\&S | Ceremonial \& Subsistence | NPS-S/F | North Puget Sound |
| CBC | Central British Columbia <br> Fishing area - Kitimat to Cape <br> Caution | NPS-Sp | Summer/Fall chinook stock North Puget Sound Spring chinook stock |
| CDFO | Canadian Department of Fisheries \& Oceans | NR NWIFC | Not Representative Northwest Indian Fisheries |
| CNR | Chinook Nonretention - all species except chinook fisheries | ODFW | Commission <br> Oregon Department of Fish \& Wildlife |
| CR | Columbia River | OTAC | Outside Troll Advisory |
| CRITFC | Columbia River Intertribal Fish Commission | PFMC | Committee <br> Pacific Fisheries Management |
| CTC | Chinook Technical Committee |  | Council |
| CUS | Columbia Upriver Spring chinook stock | PS PSC | Puget Sound <br> Pacific Salmon Commission |
| CWT | Coded Wire Tag | PSMFC | Pacific States Marine Fisheries |
| ESA | U.S. Endangered Species Act |  | Commission |
| est +fw | Estuary Plus Fresh Water Area | PST | Pacific Salmon Treaty |
| FR | Fraser River | QIN | Quinault Nation |
| GS | Strait of Georgia | SEAK | Southeast Alaska - Cape |
| IDFG | Idaho Department of Fish \& Game | SPS | Suckling to Dixon Entrance South Puget Sound |
| IDL | InterDam Loss (fishing mortalitiy) | SSRAA | Southern Southeast Region Aqualculture Association |
| LFR | Lower Fraser River | TBR | Transboundary Rivers |
| LGS | Lower Strait of Georgia | TBTC | Transboundary Technical Committee |
| mar | Marine Area | UFR | Upper Fraser River |
| mar +fw | Marine Plus Fresh Water Area | UGS | Upper Strait of Georgia |
| MRP | Mark-Recovery Program | USFWS | U.S. Fish \& Wildlife Service |
| MSY | Maximum Sustainable Yield for a stock, in adult equivalents | UW WA/OR | University of Washington Ocean areas off Washington |
| MSY ER | Exploitation Rate sustainable at the escapement goal for a stock, in adult equivalents | WAC | and Oregon North of Cape Falcon <br> North Washington Coastal |
| NA | Not Available |  | Area (Grays Harbor |
| NBC | Northern British Columbia Dixon Entrance to Kitimat including Queen Charlotte | WACO | northward) <br> Washington, Oregon, Columbia River chinook stock |
| NCBC | Islands <br> North Central British Columbia - Dixon Entrance to Cape Caution | WCVI WDF | West Coast Vancouver Island excluding Area 20 <br> Washington Department of Fisheries |

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## INTRODUCTION THE PACIFIC SALMON TREATY CHINOOK REBUILDING PROGRAM

The Pacific Salmon Treaty established a system of fishery-specific catch and harvest-rate restrictions intended to:
"halt the decline in spawning escapements of depressed stocks; and attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks, as represented by indicator stocks identified by the Parties, based on a rebuilding program begun in 1984".

The goal of the program is to rebuild depressed naturally-spawning stocks and restore production through progressive increases in spawning escapements achieved through a combination of catch ceilings in selected mixed-stock fisheries and harvest rate restrictions in nonceiling, passthrough fisheries. The Pacific Salmon Commission instructed the Chinook Technical Committee to "develop procedures to evaluate progress in the rebuilding of naturally spawning chinook stocks". The February 1987 Chinook Technical Committee Report, "Assessing Progress Toward Rebuilding Depressed Chinook Stocks", established an evaluation framework that documented an indicator stock program, identified information requirements, and recommended analytical procedures for the assessment of rebuilding. The Committee also identified a number of policy issues that had to be resolved before final conclusions could be reached regarding the status of rebuilding on a regional or coastwide basis. Agreement on those issues has not yet been reached.

In assessing the status of individual stocks under the rebuilding program, the Committee identified three main elements that must be examined: 1) spawning escapement levels; 2) fishery harvest and stock-specific exploitation rates; and 3) production responses to increases in spawning escapements. The Committee recommended that rebuilding assessment be stratified into 3 phases corresponding with three 5-year chinook life-cycles in the rebuilding period: 1984-1988; 1989-1993; and 1994-1998. The Committee felt that a three-phase approach to assessment would address the problems of changing data availability and quality over time.

This report provides an evaluation through the final year of the second phase of the rebuilding program using data through 1993. This report includes recent catch in fisheries of concern to the Pacific Salmon Commission (Chapter 1), assessment of spawning escapements for 44 escapement indicator stocks (Chapter 2), fishery-harvest and stock-specific-exploitation rates based on 35 exploitation rate indicator stocks (Chapter 3), a summary of the Chinook Model assessment (Chapter 4), and and an integration of results from Chapters 2-4 (Chapter 5).

## EXECUTIVE SUMMARY

This report contains the Chinook Technical Committee's (CTC) assessment of the chinook rebuilding program through 1993. Major conclusions of the assessment are:

- Through 1993, only $50 \%$ of the escapement indicator stocks are rebuilding.
- Declines in escapements have not been halted for 8 of the 18 stocks classified as "Indeterminate" or "Not Rebuilding."
- Harvest rates for all fisheries constrained by PSC ceilings have not been reduced to levels projected when the rebuilding program was established in 1984.
- Observed survivals for recent years have been below long-term averages.
- Under existing management regimes and depressed marine survival conditions, only one-third of the model stocks representing naturally spawning chinook stocks are projected to achieve their escapement goals by 1998.

Since the rebuilding program is scheduled for completion in 1995 for Southeast Alaska and Transboundary stocks and in 1998 for other stocks, options for completing the rebuilding program become more limited and potential management measures become more restrictive with each passing year.

Therefore, the CTC recommends that substantial reductions in total fishing mortality should be implemented, beginning in 1995. For example, a $50 \%$ reduction in fishing mortality rates for all fisheries from recent levels would rebuild additional major stocks, sustain stocks that have been rebuilding, and provide protection for stocks that have not responded positively to the rebuilding program. The level of harvest rate reduction examined does not represent a CTC recommendation. Rather, the actual reductions implemented would depend upon policy choices regarding the stocks to be rebuilt and the management objectives and constraints for particular fisheries.

The CTC, therefore, further recommends that the Parties explicitly state their objectives for the remaining years and:
i) identify the set of indicator stocks that are to be rebuilt by 1998; and
ii) establish management objectives and constraints (e.g., minimum catch levels for fisheries, target harvest rates, etc.) for individual fisheries.

After these policy determinations are made, the CTC can provide assistance in evaluating alternative means of accomplishing the rebuilding objectives of the Parties in the years remaining in the rebuilding program. Further delays in responding to reduced abundances would increase the potential for even more severe disruptions of future fisheries to successfully complete the rebuilding program.

Even with substantial reductions in fishing mortalities some stocks are not expected to rebuild by 1998. The highly variable status of stocks within geographic areas indicates that it will not be possible to rebuild all stocks by 1998 through management of mixed-stock ocean fisheries. The CTC recommends, therefore, additional stock-specific management or rehabilitation actions to achieve escapement goals for these stocks.

## Key Points in the 1993 Annual Report

## 1) Catch in Ceiling Fisheries and Exploitation Rates in Nonceiling Fisheries (Chapter 1)

In 1993, catch in fisheries with catch ceilings established by the PSC were either within the $+7.5 \%$ management range (SEAK and NCBC fisheries) or below the $-7.5 \%$ range (WCVI troll and Strait of Georgia troll and sport). Through 1993, the cumulative deviations in each fishery under these ceilings are all within the $7.5 \%$ management range, if the 1992 and 1993 add-ons presented by Canada are accepted (Chapter 1). In nonceiling fisheries, harvest rates were generally consistent with obligations for passthrough (as estimated by applying the nonceiling index suggested by the CTC, 1991) except for the stocks in the North Puget Sound summer/fall stock group in the southern U.S. marine fisheries (Chapters 3). However, in terminal fisheries, harvest rates have increased relative to the base period in eight of 24 escapement indicator stocks (Chapter 5).

## 2) Rebuilding Status of Escapement Indicator Stocks (Chapter 2)

This year's assessment of escapement trends included 44 naturally spawning escapement indicator stocks following the addition of the Deschutes fall stock and the splitting of coastal Oregon into two stock aggregates. Further, procedures for categorizing the rebuilding status of the escapement indicator stocks were revised, and resulted in a reduced number of stocks assessed as Indeterminate. Stocks that were assessed as Indeterminate or Not Rebuilding were further examined to determine if the decline in escapements had been stopped. As of $1993,50 \%$ of the 36 escapement indicator stocks with goals were assessed as being Above Goal or Rebuilding, 44\% were assessed as Not Rebuilding, and $6 \%$ were assessed as Indeterminate. Further, for eight of the 18 stocks that were assessed as Not Rebuilding or Indeterminate, we have apparently not stopped the decline in spawning escapements. Comparing escapement assessments through 1993 with previous years indicates that we are not progressively achieving the spawning escapement goals of the
 indicator stocks. Rather, the assessments have been very similar for the past four years and slightly poorer than during 1987-1990. The above figure was based on the 1993 assessment methods, data, and escapement goals and only accounts for CTC re-categorization of Indeterminate stocks in 1993. Explanation of these changes (5 Indeterminate stocks changed to Rebuilding) is presented in Chapter 2. Among the eight indicator stocks without escapement goals, six stocks were assessed as having 1989-1993 average escapements above base level, one stock was assessed as having average escapements below base level, and one stock has not changed from the base level.

## 3) Exploitation Rate Indicator Stocks (Chapter 3)

Examination of coded-wire tag data for 35 exploitation rate indicator stocks indicated that:
a) Reductions in fishery indices did not meet the 1984 projected reduction in any of the four ceiling fisheries (SEAK troll, NCBC troll, WCVI troll, and GST troll and sport), and increased in three of four fisheries compared to 1992. The 1985 target harvest rate reduction used previously in the CTC Annual Reports was replaced by the time trend of harvest rate indices projected by the 1984 version of the CTC chinook model. The CTC replaced the 1985 target for the reasons detailed in Section 3.3.1 of this report. Across ceiling fisheries, the average harvest rate reduction, compared to the base period, was only $5 \%$ in 1993, compared to the longer term average (1985-1993) reduction of $18 \%$. Fishery indices calculated for 1993 fisheries were $-26 \%$ in SEAK troll, $-23 \%$ in NCBC troll, $-1 \%$ in WCVI troll, and $+29 \%$ for GS troll and sport fisheries.
b) In 1993, ocean total mortality exploitation rates were reduced from the base period in 13 of 17 stocks for which this comparison is possible (median reduction $10 \%$, range from $21 \%$ to $+9 \%$ ). Combined ocean and terminal fishery total exploitation rates were also reduced in 13 of 17 comparisons (median reduction $5 \%$, range from $-23 \%$ to $+23 \%$ ). However, incidental mortalities increased relative to the base period in 14 of these 17 comparisons (median increase $4 \%$, range $-1 \%$ to $+14 \%$ ).
c) The age 2-3 survival indices for broods contributing to fisheries in 1994 and 1995 indicate that survival rates will be well below the base period levels for all stock groups with the exception of the SEAK/TBR-I groups. The largest reductions are projected for the Lower GS Falls ( $-97 \%$ ), Upper GS Summer/Falls ( $-92 \%$ ), North PS Summer/Falls ( $91 \%$ ), and WCVI Falls ( $-90 \%$ ).

## 4) Model Projections for Rebuilding and Abundance (Chapter 4)

The CTC chinook model was used to estimate expected changes in chinook abundance in fisheries, and to project the status of the rebuilding program in 1998 under two marine survival and two harvest reduction scenarios. Chinook abundance in fisheries is expected to decline from the 1994 level in three of the four ceiling fisheries. In the SEAK and NCBC troll, the abundance is expected to return to base period levels (approximately a $50 \%$ decline in abundance from recent levels); in the WCVI troll, abundance is expected to continue decreasing to approximately $34 \%$ below the base period level. In contrast, in GS fisheries, abundance is expected to recover to base period levels by 1995. The rebuilding status of chinook stocks predicted by the model in 1998 is highly dependant on the marine survival rates assumed and the management actions taken in fisheries. For example, if future marine survivals are assumed to equal those of the most recent five years and existing management regimes are maintained, only one-third of the model indicator stocks representing naturally spawning chinook stocks would be predicted to rebuild by 1998. Previous modelling assessments have frequently assumed that future marine survivals would equal the long-term average survival rate. However, in almost every indicator stock, the more recent survivals are substantially less than this long-term average.

## 5) Variability in Response of Stocks (Chapter 5)

The integrated assessment continues to demonstrate the highly variable response of stocks to the rebuilding program. In only one of the 13 stock groups identified, were the component stocks assessed as having the same escapement rebuilding status (NPS-Summer/Fall, all three stocks categorized as Not Rebuilding). In all other stock groups, the component stocks ranged in escapement assessment categories from Above Goal to Not Rebuilding.

## 6) Deviations from Assumptions of Rebuilding Program

The PSC catch ceilings were established in 1984 (see PSC 1991 for details) with the expectation that the initial reduction of harvest rates associated with imposition of the ceilings would be followed by further progressive harvest rate reductions as chinook abundance increased during the rebuilding program. The initial reduction was expected to occur as a result of setting the ceiling for each fishery at a reduced level relative to recent catches, assuming that:
a) cohort survival rates would remain equal to the average rate observed in the base period;
b) the harvest rates in non-ceiling fisheries would not increase from base period values and would actually be reduced by $25 \%$ in Canadian net fisheries; and
c) that management actions would not alter the ratio of incidental fishing mortalities to reported catch observed in the base period used in the model analyses.

Further, in years in which abundance precluded harvesting the full ceiling without an increase in the harvest rate, the CTC recommended that further restrictions (e.g., restricting the season length) be implemented to restrict harvest.

The CTC's assessment through 1993 indicates that many of the assumptions used in developing the PSC chinook rebuilding program have been violated. These violations include reductions in survival rates, an increased ratio of incidental to reported catch mortalities, and the possible increase in exploitation rates in non-ceiling fisheries affecting the wild stocks in the North Puget Sound Summer/Fall stock group. As a consequence, exploitation rate reductions required to rebuild naturally spawning chinook stocks have been under-estimated and the fishery exploitation rates have exceeded those projected by the 1984 model. Under these survival and incidental mortality conditions, and the limited time remaining to rebuild, the exploitation rate reductions currently required for rebuilding will be substantially greater than originally predicted.

## Previous Recommendations

Unfortunately, many recommendations presented in previous CTC reports have not been addressed and continue to be appropriate. Given expected reductions in chinook abundance, the CTC recommends that the Parties:
a) Consider alternatives to fixed quotas for controlling harvest rates. The wide fluctuation observed in chinook abundance suggests that required reductions in harvest rates will not be achieved with fixed catch quotas. Alternatives include the use of catch levels linked to predictions of chinook abundance obtained from the chinook model and/or methods that can effectively control harvest rates through fishing effort limitations.
b) Reduce incidental fishing mortality or set allowable harvests based on total mortality. Reductions in stock exploitation rates for reported catch have been offset to a significant extent by increases in incidental mortality. Incidental mortality reductions would increase the number of chinook available for harvest and/or escapement.
c) Initiate stock-specific investigations to evaluate stocks assessed as Not Rebuilding and develop stock-specific actions that compliment harvest controls, including enhancement and the reduction of nonfishing related sources of mortality. The investigations may include evaluation of escapement goals, escapement monitoring programs, fisheries management, and non-fishing sources of mortality. The severely depressed status of some stocks and the lack of a positive response in escapements suggest that, to rebuild some stocks, management actions additional to the control of harvests in mixed stock ocean fisheries will be necessary.

To continue the development of chinook stock assessments and facilitate understanding of the factors affecting chinook production, the CTC continues to recommend the following (see CTC, 1992b):
i) Conduct research on factors affecting freshwater and marine survival of chinook stocks. Factors such as predation, El Nino events, habitat destruction, and enhancement practices can significantly affect chinook production and the rebuilding program. Examination of environmental factors may also improve our capacity to predict abundance of chinook.
ii) Provide data required by the CTC to complete the escapement and exploitation rate assessments, specifically:
a) Report estimated CWT recoveries to the PSMFC by July of the year following the fishery. In the past, the estimated recoveries for Puget Sound sport fisheries, tributary sport recoveries in the Columbia River, and escapement recoveries for most southern U.S stocks have not been available by July.
b) Collect and provide information on the age and sex composition of the spawning escapement. Age- and sex-specific escapement data are essential to evaluate brood production, stock productivity, and escapement goals. Age- specific data also improve the quality of the calibration of the CTC chinook model.
c) Tag representative exploitation rate indicator stocks at sufficient levels. The CTC is especially concerned about the lack of adequate representation of spring and summer stocks and the lack of an indicator stock (with escapement data) for the Harrison River stock.
d) Establish consistent and standardized recovery programs for CWT fish at hatcheries and on spawning grounds. Accurate estimates of escapement are essential for the Exploitation Rate Assessment.
e) Provide estimates of sublegal encounter rates in fisheries with size limits, and legal and sublegal encounter rates in chinook non-retention and net fisheries. The CTC has estimated that incidental fishing mortality is approximately $30-50 \%$ of the reported catch (CTC 1987). However, sampling programs to determine the magnitude and stock composition of the nonlanded catch mortality are virtually nonexistent.
f) Provide estimates of nonreported chinook catches by Canadian Native fisheries. The CTC is unable to fully evaluate impacts of these fisheries on chinook stocks and the rebuilding program until these data are provided.

## CHAPTER 1. 1993 CHINOOK CATCH

### 1.1 1993 CHINOOK SALMON CATCHES IN FISHERIES WITH CEILINGS

Estimates of 1993 catches for each fishery managed under a harvest ceiling established by the Pacific Salmon Commission (PSC) are presented below. These data are preliminary, but major changes are not expected. Catches in all chinook fisheries of interest to the PSC for the years 1990-1993 are documented in Table 1-1.

| Area/lishertesalal | Ceiling | Catcla | Difference |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | Numbers. | Percent |
| Southeast Alaska (T,N,S) b/ | 263 | 268.2 | +5.2 | +2.0\% |
| North/Central B.C. (T,N,S) c/, d/ | 263 | 256.5 | -6.5 | -2.5\% |
| West Coast Vancouver Island (T) | 360 | 273.7 | -86.3 | -24.0\% |
| Strait of Georgia (T,S) e/ | 275 | 152.3 | 122.7 | -44.6\% |

a/ T=Troll; N=Net; S = Sport
b/ The actual total catch was 304,100 chinook, including a hatchery add-on of 35,900 .
c/ Excludes 7,673 chinook caught in terminal areas.
d/ Canada has submitted a proposal to exclude hatchery add-ons from the 1993 northern troll fisheries, value of the exclusion would be 4,852 for 1993 but this catch is presently included in this table.
e/ Due to budget restraints, the catch in the Strait of Georgia recreational fishery was only estimated through September in 1993 (based on past averages, this period accounts for approx. $92 \%$ of the annual catch).

### 1.2 CUMULATIVE DEVIATIONS FROM CATCH CEILINGS

A 7.5\% cumulative management range was established by the PSC in 1987. Annual catches (without add-on) and deviations from catch ceilings since 1987 (in thousands of fish) are given in Table 1-2.

### 1.3 REVIEW OF FISHERIES WITH CATCH CEILINGS

### 1.3.1 Southeast Alaska (SEAK) Fisheries

In 1993, SEAK fisheries were managed under the following provisions established by the PSC:

1) An all-gear base-catch ceiling of 263,000 chinook salmon.
2) An Alaska hatchery add-on calculated on the basis of coded-wire-tag (CWT) sampling.
3) To maintain a total cumulative deviation in numbers of fish since 1987 within the $7.5 \%$ management range. For SEAK, the management range is equivalent to $+/-19,700$ chinook salmon for a ceiling of 263,000 .

Table 1-1. Summary of the 1990-1993 chinook catches in fisheries relevant to the U.S./Canada Pacific Salmon Treaty (numbers in thousands of fish).

|  | Troll |  |  |  | Net |  |  |  | Sport |  |  |  | Total |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Area | 1993 | 1992 | 1991 | 1990 | 1993 | 1992 | 1991 | 1990 | 1993 | 1992 | 1991 | 1990 | 1993 | 1992 | 1991 | 1990 |
| S.E. ALASKA a/ | 227 | 184 | 264 | 288 | 28 | 32 | 33 | 28 | 49 | 44 | 60 | 51 | 304 | 260 | 357 | 367 |
| BRITISH COLUMBIA b/c/ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| North/Cent. Coast | 182 | 182 | 221 | 179 | 45 | 54 | 57 | 47 | 37 | 38 | 32 | 31 | 264 | 274 | 310 | 257 |
| W. Vanc. Island d/ | 274 | 347 | 203 | 298 | 28 | 9 | 60 | 30 | 66 | 47 | 80 | 61 | 368 | 403 | 343 | 389 |
| Georgia St./Fraser e/ | 33 | 37 | 32 | 34 | 16 | 9 | 15 | 15 | 119 | 117 | 116 | 112 | 168 | 163 | 163 | 161 |
| Johnstone St. |  | 3 | 1 | 2 | 15 | 9 | 13 | 18 | 12 | 15 | 10 | 10 | 31 | 27 | 24 | 30 |
| Juan de fuca Strait | 0 | 0 | 0 | 0 | 2 | 10 | 8 | 7 | - | - | - | - | 2 | 10 | 8 | 7 |
| subtotal | 493 | 569 | 457 | 513 | 106 | 91 | 153 | 117 | 234 | 217 | 238 | 214 | 833 | 877 | 848 | 844 |
| WASHINGTON INSIDE f/ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| San Juans (mar) h/ |  | 0 | 0 | 1 | 14 | 14 | 12 | 9 | 7 | 7 | 5 | 7 | 21 | 21 | 17 | 17 |
| Other PS ( $\quad$ ar +fW ) $\mathrm{i} /$ | 0 | 0 | 0 | 0 | 55 | 63 | 89 | 180 | NA | 55 | 49 | 71 | NA | 118 | 138 | 251 |
| Coastal (mar+fw) i/ | 0 | 0 | 0 | 0 | 59 | 64 | 54 | 58 | NA | 7 | 6 | 5 | NA | 71 | 59 | 63 |
| subtotal | 10 | 31 | 37 | 48 | 129 | 142 | 158 | 252 | NA | 107 | 100 | 134 | NA | 277 | 294 | 434 |
| columbia river j/k/ | - | - | - | - | 51 | 53 | 107 | 148 | 83 | 68 | 83 | 95 | 134 | 121 | 190 | 243 |
| WA/OR N OF FALCON I/ | 55 | 69 | 51 | 65 | 0 | 0 | 0 | 0 | 14 | 19 | 17 | 30 | 69 | 88 | 68 | 95 |
| OREGON <br> Inside Waters m/ | <1 | <1 | 0 | 0 | - | - | - | - | 52 | 39 | 45 | 38 | 52 | 39 | 45 | 38 |
| GRAND TOTAL | 786 | 854 | 809 | 914 | 314 | 318 | 451 | 545 | NA | 494 | 543 | 562 | NA | 1662 | 1802 | 2021 |

NA Data not available.
a/ Southeast Alaska troll chinook catches shown for Oct. 1 - Sept. 30 catch counting year.
b/ British Columbia net catches includes only fish over 5 lb . round weight. Native food fishery catches are not included. N/Cent. Coast 1989, 1990, 1991 and 1992 exclude catch from terminal gillnet fisheries (4 year total of 22,495 which are excluded from the catch ceiling).
c/ Sport catches are for tidal waters only.
d/ Estimates of WCVI tidal sport catches are from creel surveys in Barkley Sound only. Survey times and areas may vary from year to year.
e/ GS sport catches include Juan de Fuca Strait sport catches.
f/ All WA inside sport numbers adjusted for punch card bias. See " 1988 WA State Sport Catch Report" for details.
g/ Strait troll catch includes all catch in areas 5 and 6C and catch in area 4B outside of the PFMC management period (Jan.-May and Oct.-Dec.).
h/ San Juan net catch includes catch in areas 6, 6A, 7 and 7A; sport catch includes area 7.
i/ Coastal and Puget Sound sport catches include marine and freshwater, but only adults in freshwater.
j/ Columbia River net catches include Oregon, Washington and treaty catches, but not ceremonial.
k/ Columbia River sport catches include adults only, for Washington, Oregon, Idaho and Buoy 10 anglers.
1/ North of Falcon troll catch includes catch in area 4B during the PFMC management period (May-Sept.), and area 2.2 (Grays Harbor) when area 2 is open.
$\mathrm{m} /$ Troll = late season troll off Elk River mouth (Cape Blanco); sport = estuary and inland (preliminary for 1993).

Table 1-2. Annual catches and cumulative deviations from catch ceilings since 1987.

|  | SEAK (, N, |  |  | NCBC(TINSS) |  |  | WCMII |  | GS(ISS) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Ceiling | Catch | Ada-On | Ceiling | Catch | Proposed <br> Terminal <br> Exclusion <br> \& Add-ol |  | Catch | Ceiling | Catch |
| 1987 | 263 | 265.2 | 16.7 | 263 | 282.8 |  | 360 | 379.0 | 275 | 159.7 |
| 1988 | 263 | 255.2 | 23.7 | 263 | 247.1 |  | 360 | 408.7 | 275 | 139.6 |
| 1989 | 263 | 264.4 | 26.7 | 263 | 301.2 | 4.8 | 360 | 203.7 | 275 | 161.3 |
| 1990 | 302 | 313.2 | 53.7 | 302 | 253.0 | 5.5 | 360 | 298.0 | 275 | 146.3 |
| 1991 | 273 | 295.6 | 61.4 | 273 | 304.3 | 6.1 | 360 | 202.9 | 275 | 147.8 |
| 1992 | 263 | 221.7 | 38.3 | 263 | 267.5 | $\begin{gathered} 6.7 \& \\ 15.8 \end{gathered}$ | 360 | 346.8 | 275 | 153.9 |
| 1993 | 263 | 268.2 | 35.9 | 263 | 256.5 | \% 11848 | 360 | 273.7 | 275 | $152.3 \mathrm{~d} /$ |
| Cumulative a/ Deviation (Fish) |  | -6.5 |  |  | +22.7 |  |  | -27.0 a/ |  | -20.6 a/ |
| Cumulative a/ Deviation (\%) |  | $-2.5 \% \mathrm{c} /$ |  |  | +8.6\% c/ |  |  | -7.5\% b/ |  | -7.5\% b/ |

a/ Cumulative deviations calculated since 1987.
b/ Negative deviations below the $7.5 \%$ management range are not accumulated.
c/ Percent deviation calculated from a ceiling of 263,000 , and before adjustment for add-on in NCBC troll fisheries.
d/ Due to budget restraints, the catch in the Strait of Georgia recreational fishery was only estimated through September in 1993 (based on past averages, this period accounts for approx. $92 \%$ of the annual catch).
4) To comply with requirements of the U.S. Endangered Species Act (ESA).

Catch data for 1993 indicate the following:

1) The 1993 all gear harvest (commercial and recreational) of 304,100 , including a hatchery addon of 35,900 , consisted of a commercial catch of 254,900 and a recreational catch of 49,200 .
2) The total estimated catch of Alaska hatchery produced chinook salmon was $42,900(14.1 \%$ of the total catch). The add-on was calculated by reducing this by 5,000 for the estimated preTreaty harvest of Alaska hatchery chinook and by 2,068 for risk adjustment.
3) The deviation of the 1993 SEAK chinook salmon catch from the catch ceiling was $+5,200$. The cumulative deviation since 1987 is $-6,500$.

Troll Fisheries: The troll fishery harvested a total of 226,800 chinook salmon of which 18,300 ( $8.1 \%$ ) were of Alaska hatchery origin. Catches were as follows:

| Fishery | Total Catch | AK <br> Hatchery Catch | AK <br> Hatchery <br> Percent |
| :---: | :---: | :---: | :---: |
| Winter Fishery (October 11, 1992 - April 14, 1993) | 62,700 | 3,900 | 6.2\% |
| Hatchery Access (did not occur) | 0 | 0 | 0.0\% |
| Experimental and Terminal | 18,700 | 9,400 | 50.3\% |
| Summer Fishery (July 1-6, August 21-25, Sept. 12-20) | 145,400 | 5,000 | 3.4\% |
| Total Troll | 226,800 | 18,300 | 8.1\% |

The start of the winter troll fishery was delayed 10 days to begin on October 11. The fishery operated as in past years and continued through April 14. The total winter harvest was 62,700 chinook, with 3,900 from Alaska hatcheries.

Following the winter fishery, consultation occurred with NMFS in order to comply with the listing of Snake River Fall chinook salmon under the ESA. As a result of the consultation, the spring hatchery access fishery did not occur so that the chinook from this fishery could instead be harvested in the summer fishery. The experimental and terminal fisheries did occur and harvested 18,700 chinook, of which 9,400 were Alaska hatchery fish.

The general summer troll fishery opened on July 1 for six days. Beginning on July 7, the troll fishery was then closed for five days, in order to comply with the results of the NMFS consultation. The fishery reopened on July 12, with chinook nonretention (CNR). During this period, areas of high chinook abundance were closed. The fishery closed in August for coho management. The fishery reopened on August 21, with CNR allowed for five days. There was poor weather during this period and it appeared that the total catch would be low. The chinook retention fishery again opened on September 12 and remained open until the close of the season on September 20. There were a total of 20 days of chinook fishing and 49 days of CNR.

Net Fisheries: The SEAK net fisheries have a guideline harvest of 20,000 non-Alaska hatchery chinook. The 1993 commercial net catch was 28,000 chinook, of which 15,600 were from Alaska hatcheries. Of these hatchery chinook, 8,900 were taken in terminal area fisheries. Net harvest of chinook salmon in the purse seine fishery is limited by a 28 " ( 70 cm ) size limit and the use of CNR regulations. In addition, chinook between $21^{\prime \prime}$ and $28^{\prime \prime}$ may never be retained, while chinook below 21 " may be retained at all times. Gillnet harvest of chinook is limited by a delayed season opening.

Recreational Fisheries: The recreational fishery harvested 49,200 chinook, of which 9,000 were from Alaska hatcheries. There was a one fish bag limit beginning June 16. In addition, the use of downriggers was banned from June 16 through August 16. This fishery also has a $28^{\prime \prime}$ size limit.

### 1.3.2 Canadian Fisheries

The minimum size limit for troll fisheries remained at 62 cm ( 24.5 inches) fork length in the Strait of Georgia and at 67 cm ( 26.5 inches) fork length in all other areas. Catch statistics for commercial fisheries are still preliminary for 1993, but no major changes are expected.

North/Central British Columbia (NCBC): The 1993 NCBC fisheries were managed under the following provisions:

1) An all-gear base-catch ceiling of 263,000 chinook salmon.
2) A $7.5 \%$ management range, with cumulative deviations calculated since 1987. Based on preliminary 1992 catch estimates, and terminal exclusion calculation procedures; the cumulative deviation at the beginning of the 1993 season was estimated as $+28,900(+11.0 \%)$.

The estimated 1993 all-gear catch was 256,520 excluding terminal exclusions of 7,673 . These preliminary catch statistics indicate a 1993 catch deviation of $-5,844$ and a cumulative deviation through 1993 of $+22,382$ chinook ( $+8.5 \%$ of the catch ceiling). However, if the add-on estimated for the catch of Canadian hatchery production in the 1992 NCBC troll fishery is accepted $(15,800$ chinook), the cumulative deviation through 1993 would be reduced to $+6,838$ fish $(+2.6 \%$ of the catch ceiling). Canada also proposes to exclude a further 4,852 chinook for add-on estimated in the 1993 NCBC troll fishery.

Terminal exclusions, as allowed in the Letter of Transmittal, are calculated as follows:

| A. Area | Base | $\begin{aligned} & 1993 \\ & \text { Catch } \end{aligned}$ | $1993$ <br> Exclusion |
| :---: | :---: | :---: | :---: |
| Skeena | 2,900 | 9,283 | 6,383 |
| Bella Coola | 2,950 | 4,240 | 1,290 |
| Kitimat | 2,400 |  | 0 |
| Total |  |  | 7,673 |

Troll Fisheries: The 1993 troll fishery opened for all species on July 1. The following management actions were taken throughout the season:

1) From August 2-4, all North coast areas were closed to retention and possession of chinook salmon as the catch ceiling was estimated to have been achieved.
2) For August 5 and 6, all North coast areas were closed for all salmon fishing pending the start of fishing for Fraser River sockeye.
3) Closure for chinook retention continued August 7-15, followed by another closure to all species (August 16-18).
4) Troll fishing in northern B.C. re-opened August 19, with nonretention for chinook and sockeye. Nonretention continued through August 28.
5) Chinook and sockeye fishing re-opened August 29, following an increase in the estimated return of Fraser River sockeye and determination that 16,000 chinook remained in the ceiling.
6) Area closures were used to pace chinook catch rates to avoid further periods of CNR.
7) The fishery closed to all salmon fishing on September 12th, with the exception of Areas 11 and 111; CNR was implemented in these areas.
8) Fishing in Areas 11 and 111 closed for the season on September 30th.

The reported catch in NCBC troll fisheries was 182,480 and involved 32 days of CNR.
Net Fisheries: Catch of chinook in NCBC areas was 44,701 . Catches by fishery were 3,272 in the Queen Charlotte Islands, 30,934 for the Skeena/Nass and 10,495 in Central British Columbia (CBC). These catches are the preliminary total catches of chinook greater than 5 pounds, including the catch eligible for terminal exclusion.

Recreational Fisheries: The tidal water sport fishery catch of chinook was 37,330 . Catch by fishery was 24,395 for the Queen Charlotte Islands, 3,279 for the Skeena/Nass and 9,656 for the Central Coast.

West Coast Vancouver Island (WCVI) Troll: In 1993, the WCVI troll fishery was managed under the following provisions:

1) A catch ceiling of 360,000 .
2) A $7.5 \%$ management range about the catch ceiling with cumulative deviations calculated since 1987.
3) To manage the fishery consistent with the spirit and intent of the Pacific Salmon treaty and the chinook rebuilding program.

The 1993 troll season started on July 1 and continued until September 30 with no CNR fisheries. The conservation areas F1, S, G and H were closed at the start of the season (Fig. 1-1). On July 24th areas $\mathrm{F} 1, \mathrm{~S}, \mathrm{G}$ and H were opened for the remainder of the season.

When trolling closed on September 30, it was estimated that 36,170 boat days had been expended during the troll season. This compares to 50,500 boat days for the 1985-1987 average. Chinook catch in 1993 for the WCVI troll fishery was $273,749$.

Strait of Georgia (GS): Chinook catch in 1993 for the combined GS troll and recreational fisheries was 152,257 but this total only accounts for recreational catch through September, 1993. Monitoring of this recreational fishery was limited due to continued budget reductions.

Troll: The management objective was a domestic catch ceiling of 31,000 chinook. The ceiling was reduced to this level in 1988 to achieve a $20 \%$ harvest rate reduction, relative to 1987 levels, as part of a conservation plan for lower GS chinook.

The troll fishery was opened for chinook retention on June 28 and continued until July 22 without interruption. After July 22, CNR was in effect until August 31. The chinook fishery resumed on September 1st and closed again on September 18. In order to reduce chinook shaker mortalities, a regulation for single barbless hooks was implemented for part of the CNR period. The 1993 GS troll catch was 33,412 with 52 days of CNR.

Recreational: The 1993 management objective for the GS recreational fishery was to maintain a $20 \%$ harvest rate reduction, relative to 1987 levels, on lower GS chinook. Consequently, the management plan implemented in 1989 was continued in 1992. This plan consists of the following management actions:

| Fishing Area | Daily Bas Limit |  | Minal Bi8 Limil |  |  | Sizelimil (cm) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & 19899 \\ & 1 \text { lresint } \end{aligned}$ | $\begin{aligned} & 19898 \\ & 11888 \end{aligned}$ | 1989. <br> Present | $1988$ | $\begin{aligned} & 1985 . \\ & 1987 . \end{aligned}$ | $\varliminf_{\text {Iresent }}^{10899}$ | 1985 1988 |
| Strait of Georgia <br> (S.A. 13-18, 19B, 28 \& 29) | 2 | 2 | 15 | 8 | 20 | 62 | 45 |
| Juan de Fuca (S.A. 19A) | 2 | 2 | 20 | 8 | 20 | 45 | 45 |
| Johnstone Strait (S.A. 12) | 2 | 4 | 15 | 30 | 30 | 62 | 45 |

The 1993 catch in the creel survey area (including the Victoria area, but excluding Johnstone Strait) was 118,845 through September. Fishing through September would be expected to account for approximately $92 \%$ of the total year's catch, based on past creel survey data. The estimated total annual catch for 1993 would therefore have been 129,200. Effort through September 1993 totalled 498,026 boat trips, which is very similar to 1989-1992 average effort levels $(488,706)$.

### 1.4 REVIEW OF OTHER FISHERIES

### 1.4.1 Canadian Fisheries

Transboundary Rivers: Chinook catches in the Canadian gillnet fisheries were: Taku River, 1619 chinook adults and 171 jacks, and Stikine River, 874 chinook adults and 166 jacks. The catch of chinook in these rivers is limited to incidental catch during fisheries targeting on sockeye salmon.

## Southern British Columbia Fisheries:

Commercial Net: The catch of chinook in the net fisheries is limited to incidental catch during fisheries targeting on sockeye, pink, or chum, with the exception of the August/September gillnet fishery in Alberni Inlet (Area 23). This fishery is a terminal gillnet fishery for returns to the Robertson Creek Hatchery. Small numbers of chinook may also be harvested incidentally during gillnet and seine fisheries on sockeye salmon in Barkley Sound in July. Catches for 1992 are given below.

| Area (Statistical Area) |  |
| :---: | :---: |
| Johnstone Strait (11-13) | 14,878 |
| Strait of Georgia (14-19) and Fraser R. $(28,29)$ | 15,761 |
| Juan de Fuca Strait (20) | 2,136 |
| Barkley Sound (23) | 22,476 |
| Other WCVI (21,22,24-27) | 6,029 |

The management objective of southern B.C. net fisheries is to reduce the base period harvest rate on chinook by $25 \%$ (an obligation in the PSC chinook rebuilding program). Further, the Johnstone Strait net fisheries have the added objective of reducing harvest rates since 1987 by an additional $20 \%$ as part of the conservation program for chinook stocks in the lower Strait of Georgia.

In all the fisheries, regulations and research programs are attempting to limit the incidental mortality of juvenile chinook and coho. Fishing time, location, and gear are limited in southern B.C. net fisheries to conserve juvenile and adult chinook salmon. In Johnstone and Juan de Fuca straits, known areas of high chinook vulnerability are closed and minimum depth strata are set to reduce the catch of juvenile chinook and coho. In Juan de Fuca, a maximum number of juvenile chinook and coho salmon per set has been established, beyond which the fishing area is further restricted or even closed. Chinook catch in the Fraser River area is usually limited to gillnet fishing and chinook catch is incidental. Also, in recent years gillnet fishing in the Fraser River has been restricted to limit fishing time during September in order to restrict catch of Harrison River chinook returning to spawn.

Area 12 Troll: Catch is reported as 4,056 chinook for 1993. This fishery is a small localized group of trollers at the southern limit of Queen Charlotte Sound. The fishery is limited to a catch ceiling of 5,000 chinook, which is included in the overall WCVI catch ceiling of 360,000 .

Tidal Recreational: The catch estimate for the 1993 Barkley Sound recreational fishery is 59,635 , of which 10,187 were taken in the terminal fishery inside Alberni Canal and 49,448 in Barkley Sound. The survey period covered July 15 -September 30 . The early to midsummer fishery primarily occurs in outer Barkley Sound and is limited by size limit, catch per day, and possession limits. The Alberni Canal portion occurs primarily in August and is directed on returns to the Robertson Creek Hatchery. A separate creel survey was conducted for Clayoquot Sound in 1993 and a catch of 6,375 was recorded. A creel survey was conducted in Johnstone Strait in 1993 covering the period April through August. The estimated chinook catch in the Johnstone Strait area was 12,363.

Non-tidal Recreational: Non-tidal recreational fisheries occur in most B.C. rivers, including the Alsek, Skeena, Nass, Kitimat, Bella Coola, Somass and Fraser Rivers and various streams on the east coast of Vancouver Island. Most of these are small, localized fisheries to provide the local public with some access to salmon fishing. Recent fisheries in the Fraser River have been limited to the larger chinook populations that have responded well to the chinook rebuilding program and most are limited by catch ceilings.

Chinook catch was estimated at 171 in the Alsek, 10,693 in northern B.C. rivers (Areas 1-10). Eleven small sport fisheries operate in the upper Fraser but the 1993 catch estimate has not been prepared. Past catches have been small, about 1,000 to 1,500 chinook. Sport fisheries also occur in the Vedder-Chilliwack River and lower Fraser mainstem but were not assessed.

## Indian Fisheries:

| Iishing Areas | Adull Catel | Jack catch |
| :---: | :---: | :---: |
| North/Central B.C. | 24,628 | - |
| Somass River | 32,632 | - |
| Fraser River | 19,522 | - |
| Stikine | 929 | 130 |
| Alsek | 152 | - |
| Taku | 25 | - |
| Cowichan | 650 | - |
| Squamish | NA* | - |

* NA indicates that a 1993 catch estimate is not available.

Each of these fisheries involves directed chinook fishing periods and the incidental catch of chinook during fisheries on other species. Small portions of the catch may be taken in marine waters, with the exception of the Stikine and Alsek catches. Catch in these fisheries is mostly limited by fishing time, but allocation to meet food fishing requirements is the first priority use of allowable catches. The Fraser River fisheries were managed to fixed allocations with the sale of catch permitted.

### 1.4.2 Southern U.S. Fisheries

Strait of Juan de Fuca: As in previous years, management measures were taken in the Strait of Juan de Fuca and other mixed stock areas to protect depressed spring chinook stocks. No directed spring fisheries were permitted and no commercial fisheries were permitted during the spring chinook management period (April 16-June 15). Recreational fisheries were also restricted by a maximum size limit of $30^{\prime \prime}$ during the spring chinook management period.

Further actions were taken in all mixed stock areas to protect depressed summer/fall stocks from Puget Sound. Purse seine and reef net fisheries were restricted by a $28^{\prime \prime}$ chinook minimum size limit. Most seine fisheries were required to have a 5 " net strip to reduce the catch of small chinook. Gillnet fisheries had no chinook minimum size, but mesh size restrictions were used to reduce chinook catch. It was recognized that the combined actions for chinook salmon would also serve to protect depressed Canadian-origin chinook stocks (primarily Fraser River runs).

Preliminary estimates of 1993 net catch in the Strait of Juan de Fuca total 1,500 chinook, compared to 900 in 1992. These fisheries take chinook incidental to the harvest of other species. Preliminary estimates of 1993 tribal troll catch in the Straits (Areas 4B, 5, and 6C) total 9,800 chinook, down substantially from the 31,000 caught in 1992 . This is a chinook directed fishery. Note that tribal troll catch estimates from this area do not include tribal catch in Area 4B during the May 1-September 30 PFMC management period; catches during this period are included in the North of Cape Falcon troll summary.

In 1993, about 200 chinook were caught in the Area 4B state waters fishery, after the PFMC fishery, compared to 30 in 1992. Preliminary estimates of 1993 recreational chinook catch for Areas 5 and 6 total 32,400 , compared to 38,400 in 1992. For the second consecutive year, a creel census was conducted in Area 5. The 1993 census was conducted between July 16 and September 6. Chinook catch during this time is estimated at 6,700 for Area 5 only, compared to 22,300 in 1992 for Areas 5 and 6.

Preliminary 1993 estimates of chinook net catch in the San Juan Islands total 14,000, compared to 14,000 in 1992. Preliminary 1993 estimates of recreational chinook catch for Area 7 total 6,900 , compared to 6,800 in 1992.

Puget Sound: The status of many Puget Sound chinook stocks continued to be poor in 1993. As in past years, recreational and commercial fisheries in Puget Sound were regulated by time and area closures to avoid direct harvest and minimize incidental harvest of these depressed stocks. Some directed harvest was allowed on a few Puget sound summer/fall stocks. However, no directed chinook net fisheries were allowed in the Skagit and Stillaguamish/Snohomish terminal areas, in order to protect depressed summer/fall stocks. As in the Strait of Juan de Fuca, purse seine fisheries were restricted by a 28 " chinook minimum size limit. Most seine fisheries were required to use a $5^{\prime \prime}$ net strip to reduce the catch of small chinook. Gillnet fisheries had no chinook minimum size, but mesh restrictions were used to reduce chinook catch.

Net catch of chinook was down again in 1993 due to a combination of poor catch rates (in part due to low abundance) and management actions taken to protect both chinook and coho. Preliminary estimates of 1993 net catch in Puget Sound marine areas total 42,800 chinook, compared to 52,000 in 1992. Preliminary estimates of 1993 net catch in Puget Sound freshwater areas total 12,200 chinook, compared to 11,300 in 1992.

Total Puget Sound recreational catch estimates for 1993 are not available at this time. Recreational fisheries were managed in the same general manner as in recent years. Preliminary Puget Sound marine (Areas 8-13) recreational chinook catch for 1993 is estimated at 41,000 , compared to 53,000 in 1992. The 1992 Puget Sound freshwater recreational catch was 1,649 adult chinook and 1,074 jack chinook.

Washington Coast: Preliminary 1993 estimates of Grays Harbor and Willapa Bay net catch total 47,100 chinook, compared to 51,200 in 1992.

The 1993 commercial net fisheries in north coastal rivers have harvested an estimated 12,000 chinook, compared to 13,100 in 1992. The pre-season spring/summer chinook estimate for the Queets River just met the escapement floor. Consequently, a limited harvest of only 48 fish was taken to maintain the age structure database, to allow estimation of brood year contributions.

Spring chinook comprised $69 \%(1,117)$ of the 1993 chinook catch on the Quillayute River. On the Hoh River, roughly $50 \%$ of the total chinook catch (approximately 520) were spring chinook, although 139 of these were considered "dip-ins."

Washington coastal recreational catch estimates for 1993 are not available at this time. Chinook catch for coastal rivers in 1992 is estimated at 6,600, compared to 6,000 in 1991.

Ocean Fisheries North of Cape Falcon: In 1993, ocean commercial and recreational fisheries operating in the Pacific Fisheries Management Council (PFMC) region north of Cape Falcon were regulated by domestic quotas for both chinook and coho salmon. Separate quotas were established for the tribal troll and non-tribal fisheries.

Under PFMC quota management, ocean fisheries are terminated either when coho or chinook quotas are achieved or when seasons expire. In 1993, coho quotas were set based upon conservation concerns for Skagit and Stillaguamish wild coho stocks. The allowable chinook harvest was set at 34,400 ( 35,000 total allowable harvest minus 600 estimated hooking mortality in the pink-only fishery). Preliminary non-tribal troll chinook catches are estimated at 30,400 (400 Oregon and 30,000 Washington), about $88 \%$ of the 34,400 allowable chinook harvest and substantially down from the 45,900 landed in 1992. Approximately 25,400 of these non-tribal troll-caught chinook were taken during the early season chinook fishery, May 1 through June 15, 1993.

Preliminary recreational catches are estimated at 13,700 (900 Oregon and 12,800 Washington), about $55 \%$ of the 25,000 chinook quota and down from 18,900 in 1992. In 1993, an all salmon except coho fishery was conducted in Area 4B during May. The catch of 200 chinook counted against the ocean chinook quota. This fishery landed 100 chinook in 1992.

Preliminary 1993 tribal troll chinook catch is estimated at $24,700,73 \%$ of the 33,000 chinook quota and up slightly from 22,500 in 1992.

As of September 23, 1993, all on-going non-tribal ocean fisheries north of Cape Falcon (Westport, llwaco, La Push, and 4B recreational fisheries and the all-salmon troll fishery) were closed. This action was taken because of strong conservation concerns for Puget Sound and Washington Coastal natural coho stocks.

Columbia River: Since 1988, all in-river management of Columbia River fish runs and fisheries has been based on the Columbia River Fish Management Plan (CRFMP). "The purpose of this management plan is to provide a framework....to protect, rebuild, and enhance upper Columbia River fish runs while providing harvest for both treaty Indian and non-Indian fisheries" (CRFMP, 1988, p.2). The CRFMP specifies management goals, season timing, catch limits, and maximum incidental impacts for all depressed upriver runs of anadromous fish in the Columbia River.

The 1993 in-river commercial catch of chinook was 50,800 , compared to 53,200 in 1992 and 106,900 in 1991. Preliminary freshwater recreational catch estimates for 1993 total 82,500 (including a Buoy 10 catch of 5,300 ) compared to 68,300 in 1992 and 82,700 in 1991.

The 1993 total catch of upriver spring chinook was 8,970 fish, consisting of 662 caught in the nonIndian sport and commercial fisheries, 7,256 caught in Zone 6 Ceremonial and Subsistence (C\&S) fisheries, and 1,052 caught in C\&S fisheries in Idaho. The Idaho C\&S catch of 1,052 includes both spring and summer chinook. The CRFMP provides that for run sizes between 50,000 and 128,800 , the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average impact ( $4.1 \%$ ) on the upriver run. However, due to ESA concerns, the Columbia River Compact chose to limit the lower river impact to a maximum of $3.4 \%$ of the run. Under the CRFMP, treaty C\&S fisheries in Zone 6 are limited to $7 \%$ of the run. Postseason estimates of 1993 impacts of lower river and treaty C\&S fisheries are $0.6 \%$ and $6.5 \%$ respectively.

There has not been a mainstem fishery targeting upriver summer chinook since 1964. In the past, incidental harvest of summer chinook occurred during commercial sockeye fisheries. However, no commercial sockeye fisheries have occurred below McNary Dam since 1988. There is a very small catch of summer chinook in the mainstem treaty C\&S sockeye fishery. The total 1993 catch of summer chinook in this fishery was 369 fish.

Commercial catch of Columbia River fall chinook in 1993 totaled 48,441 (17,000 in lower river nontreaty fisheries and 31,078 in treaty fisheries). An additional 2,150 fish were caught in treaty C\&S fisheries. Management constraints included achieving the Spring Creek Hatchery escapement goal of 8,200 adult chinook, and an adult management goal of 45,000 Upriver Bright chinook over McNary Dam. By agreement of the CRFMP parties in 1990, the Upriver Bright management goal at McNary Dam was increased from 40,000 to 45,000 adults, to account for increased broodstock hatchery needs and to provide additional protection for Snake river fall chinook.

Ocean Fisheries Cape Falcon to Humbug Mountain: Ocean troll and sport fisheries off Oregon's central coast harvest predominantly southern stocks not involved in the PSC rebuilding program; these stocks do not migrate north into PSC jurisdiction to any great extent. Some stocks that spawn in Oregon coastal rivers do migrate into PSC fisheries, including the stocks comprising the North Oregon Coastal (NOC) and Mid Oregon Coastal (MOC) groups. Less than $5 \%$ of the harvest of the NOC group occur in this catch area, while the MOC group is harvested more intensively in this area. We can presently best account for the MOC harvest in the late-season near-shore troll fishery off the mouth of the Elk River. In 1993, this fishery caught an estimated 649 chinook, compared to a catch of 384 in 1992. In both 1990 and 1991, the near shore fishery was not conducted due to conservation concerns.

Both stock groups are harvested intensively in estuarine and freshwater terminal sport fisheries. Preliminary 1993 catch is estimated as 52,391 chinook, this compares to a catch of 39,302 in 1992.


Figure 1-1. West Coast of Vancouver Island conservation areas for chinook and coho salmon in 1992.

## CHAPTER 2. ESCAPEMENT ASSESSMENT OF REBUILDING THROUGH 1993

### 2.1 INTRODUCTION

The Pacific Salmon Treaty (PST) established a system of fishery specific catch and harvest rate restrictions intended to:
"...halt the decline in spawning escapements of depressed stocks; and attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks, as represented by indicator stocks identified by the Parties, based on a rebuilding program begun in 1984." (Annex IV, Chapter 3)

In this chapter, our objective is to use escapement data to evaluate the rebuilding status of naturally spawning chinook stocks with respect to these stated PST objectives of: 1) halting escapement declines, and 2) attaining escapement goals by 1998. It should be recognized that while coastwide chinook stocks were generally depressed before PST implementation, not all individual stocks were declining.

Because it was hoped that the decline in escapements would be quickly halted, previous CTC analyses focused on evaluating the rate at which stocks were rebuilding to their escapement goals. However, as we near the end of the rebuilding program, it becomes clear that some chinook stocks are not going to achieve their escapement goals by their rebuilding target dates. For these stocks, it is appropriate to ask, "Has the decline in spawning escapements at least been halted?" This question can also be asked of stocks without established escapement goals, even though rebuilding progress of these stocks can not be measured.

Escapement information has been compiled for a set of indicator stocks representing the majority of naturally spawning chinook stocks from central Oregon to Southeast Alaska (SEAK). Spawning escapements were assessed as one measure of rebuilding progress since implementation of management actions under the PST. Because escapements are a product of brood year adult abundance, freshwater and marine survival rates, and fishery harvest rates, the escapement assessment alone is not sufficient to determine if management actions since PST implementation have been effective in rebuilding chinook stocks. For a more complete picture, the results of this assessment should be considered together with the Exploitation Rate Assessment in Chapter 3, the Chinook Model Assessment in Chapter 4 and the Integrated Assessment in Chapter 5.

The CTC used several methods to assess escapement declines and rebuilding progress for the indicator stocks. For stocks with escapement goals, the escapement assessment first identified stocks with escapements in recent years greater than their goals. For the remaining stocks with escapement goals, the assessment focused on: 1) comparison of recent escapements and the recent 5-year average escapement to a linear trend from the base period to the goal at the rebuilding target date, and 2) trends in recent escapements. This first portion of the assessment identified stocks that are and are not expected to rebuild by their target dates. For those not on schedule to rebuild, recent 5 -year average escapements were compared to base period escapements to see if escapement declines have been halted. Escapement declines were also evaluated for stocks without escapement goals.

Two different rebuilding schedules are recognized in the PST. For SEAK and Transboundary River (TBR) stocks, conservation actions began in 1981 as part of a 15 -year rebuilding program initiated by

Alaska. The PST stipulates that the TBR Stikine and Taku stocks should achieve their escapement goals by 1995. For all other chinook stocks, the PST establishes a 15 -year rebuilding program beginning in 1984 with a rebuilding target date of 1998. Although not specified by the PST, for all SEAK and TBR stocks, the target date of 1995 has always been used for analytical purposes, to allow direct comparison among stocks in the same region.

Caution should be used when comparing escapement levels or goals among stocks since escapements are measured in different units. Annual escapement estimates used were measures of total escapement where available or indices of escapement. Differences in escapements may not represent differences among stocks in population abundance, but trends in escapement should reflect population changes.

### 2.2 FRAMEWORK

### 2.2.1 Escapement Indicator Stocks

Indicator Stocks: This year's assessment included 44 naturally spawning escapement indicator stocks. This is an increase of two stocks over recent years due to the addition of the Deschutes fall stock and the splitting of the Oregon Coast group into two stock aggregates (see section 2.2.2). These 44 stocks represent distinct populations or management groups that originate from individual rivers or watersheds. Some stocks represent several populations aggregated by region and life history type. Distribution of the indicator stocks by run timing and area of origin is shown in Table 2-1.

Table 2-1. Distribution of escapement indicator stocks by run timing and area of origin.

| ARUA OF ORIGIA | RUN ILMING |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Sbring | Springt Sinmmer | Simmer | Simmer Tall | Ial | Total |
| Southeast Alaska | 5 |  |  |  |  | 5 |
| Transboundary | 5 |  |  |  |  | 5 |
| North/Central B.C. | 1 | 3 | 3 |  |  | 7 |
| Southern B.C. | 1 | 1 | 1 | 1 | 3 | 7 |
| Washington/Oregon/Idaho | 3 | 2 | 2 | 3 | 10 | 20 |
| TOTALS | 15 | 6 | 6 | 4 | 13 | 44 |

${ }^{1}$ These run timings are determined by management agencies; criteria used for categorization may differ among agencies.

### 2.2.2 Escapement and Terminal Run Data

Data Sources: The escapement and terminal run data used in this report were provided by management agencies in each jurisdiction. Data for each stock are presented in Appendix A tables and Appendix B graphs. For each stock with terminal harvest or broodstock removal, Table 2-2 lists the sources of mortality included in estimates of terminal run size.

Estimation Methods: Methods of estimating escapement varied depending on river characteristics and agency resources. Most escapement estimates were measures of actual spawner abundance,

Table 2-2. Terminal run composition for those stocks with terminal fisheries, broodstock removal, or rack sales.

$\checkmark$ : A fishery occurs or broodstock is collected, and the take is included in the terminal run size estimate.
NI: A fishery occurs or broodstock is collected, but the take is not included in the terminal run size eatimate.
1 Because this report only presents unexpanded index escapement estimates for TBR rivers, tenminal run size estimates are not reported; terminal catch estimates ean be found in TBTC (1993). Sport catch is Canadian only.
Includes catch from the River/Gap/Slough gillnet fishery.
WCVI temminal run size is not estimated.
Puget Sound estimates include reconstructed, stock-specific catches from Areas 8, 8a, 10, and 10a.
Escapement eatimates include fish taken for brood stock.
where available, or estimates (or indices) of abundance measured at a point of migration beyond the effect of major fisheries. Estimates were made using weirs and counting fences, aerial or foot surveys, dam passage counts, electronic counting devices, or mark-recapture studies.
Escapements of the two Oregon Coast stock aggregates are estimates of the density of spawners per river mile for standard survey areas. For some stocks, estimates of natural spawners are adjusted to make them a more representative measure of natural stock escapements:

1) Many of the Canadian escapement indicator stocks are influenced, to some degree, by enhanced production. In most cases, this enhancement is an integral part of the rebuilding program and may increase the rate of rebuilding compared to a natural population. However, to account for this enhanced production during assessment of chinook rebuilding, the Canadian Department of Fisheries and Oceans (CDFO) has employed two procedures:
a) Some streams with major enhancement programs are excluded from the escapement indices (e.g., Kitimat River in Area 6, Atnarko River in Area 8).
b) In streams with more limited enhancement, collected broodstock is excluded from the natural spawners recorded, although enhanced returns are included in these numbers (e.g., Yakoun, Lower Strait of Georgia, and Harrison).
2) For the Columbia upriver spring stock, mainstem dam counts adjusted for hatchery fish were used. Annual estimates of the total number of hatchery fish returning to the Columbia River were deducted from the total return in order to estimate the natural return.
3) For the North Oregon Coast (NOC) and Mid-Oregon Coast (MOC) aggregates, surveys conducted in areas influenced by enhancement have been excluded.

## Stock-specific Notes:

Chilkat: This stock was removed from the 1990 rebuilding assessment when it was discovered through a 1991-1992 radio-tagging study that the previous index was not representative of the escapement to the entire Chilkat drainage. ADF\&G has estimated total escapement to the Chilkat drainage since 1991. It is anticipated that these estimates will continue and that, despite the lack of base period data, the Chilkat will be included in future assessments when sufficient new data are available. Available data for this stock are included in Appendix A.

Area 6 Index: In 1993, as in recent years, poor visibility during the escapement survey prevented estimation of escapement for the main contributor to the Area 6 indicator stock group, the Kemano River. This resulted in a very low escapement estimate for the Area 6 indicator stock. It is the opinion of the local CDFO staff that escapement enumeration for this stock is too inconsistent for use in the escapement assessment. Future inclusion of this stock is currently under review.

Stillaguamish River: All harvest of the Stillaguamish and Snohomish stocks occurs incidental to the harvest of other species (see Section 1.4.2). Run reconstruction methods are used to allocate incidental harvest between the two stocks. Management actions taken in the terminal area to protect the Stillaguamish stock have been in effect since 1985, but run reconstruction methods do not reflect these management changes. As such, reported Stillaguamish terminal run sizes (and thus terminal catches) for 1985-1993 are likely overestimated, while those for Snohomish are likely underestimated.

Quillayute summers: For this stock, escapements represent a composite of naturally spawning fish from the summer stock and strays from enhancement. The designation "summer" is used to distinguish this native stock from an earlier nonnative enhanced spring run. While the summer run is managed for natural production, run timing of the two stocks overlaps to some extent.

Oregon Coast (NOC and MOC): River-specific spawner density indices (peak fish/mile) are calculated from observations made at several survey sites. A simple unweighted average across all rivers in the aggregate is then used as the annual measure for this analysis.

Changes Relative to the 1992 Annual Report: There were four notable changes from the 1992 report (CTC 1993). Minor updates to catch and escapement data, including updates to preliminary estimates for the most recent years, are not described.

Behm Canal: In 1994, ADF\&G adopted new escapement goals for the Behm Canal stocks (Unuk, Chickamin, Blossom, and Keta), following a stock-recruitment analysis by ADF\&G staff (McPherson and Carlile, in prep.). After review of the stock-recruit analysis (CTC 1994), the CTC decided to use index escapements, rather than total escapements, to evaluate the four stocks in this year's escapement assessment. It is hoped that questions about system expansion factors will soon be resolved and that total escapement estimates will be used in the 1994 CTC Annual Report.

Green River: Changes made in the run reconstruction database affected the allocation of catch to this stock. This resulted in minor changes to all Green River historical terminal run estimates.

Deschutes Falls: This Columbia River bright fall chinook stock was added as a stock without goal. Deschutes River fall chinook spawn in the lower 100 miles of the Deschutes River below the PeltonRound Butte hydroelectric project. The ocean distribution of the stock appears to differ from that of the Upriver Bright stock and it is harvested primarily in the WCVI area. Terminal run and spawning escapement data are available from 1977-1993. The CTC recommends that the management entities develop an escapement goal so that the rebuilding status of this stock can be assessed.

Oregon Coast Falls: In previous years, chinook salmon originating from 17 Oregon coastal rivers were aggregated into a single escapement indicator stock group. Recent analysis of catch distribution and age at maturity of these 17 populations has shown that two distinct groups exist. Stocks from 12 rivers along the north Oregon coast are harvested mainly in the far northern PSC fisheries, and are composed of older age classes. Populations from five rivers along the mid-coast are caught mainly in Oregon and Washington ocean fisheries or off WCVI and are an earlier-maturing group. The 12 north coast rivers have been grouped as the North Oregon Coast (NOC) indicator stock aggregate while the five mid-coast river populations are designated the Mid-Oregon Coast (MOC) aggregate.

### 2.2.3 Escapement Goals

Origin of Goals: The escapement goals provided by each management agency define long-term stock rebuilding objectives. Most of these goals were established by the managing agencies for each stock. The Transboundary Technical Committee (TTC) jointly determined goals for the three major transboundary rivers in 1991 (TBTC 1991) based on an index system; the goals are not expanded to represent the river-wide drainages. Where possible, agency goals were based on estimates of stock productivity, usable spawning habitat, or other factors, and represent estimates of escapement levels that produce maximum average production or sustained harvest.

For most stocks, interim escapement goals were developed recognizing the uncertainty in data used for establishing goals. For example, Canadian goals are interim targets based on a doubling of base period average escapements. Some goals have changed since 1984 and other goals may change as new information is acquired. The CTC has recently adopted guidelines for the acceptance of new indicator stocks and the revision of existing escapement goals for use in the CTC rebuilding assessment (CTC 1994b).

Eight of the indicator stocks have no specific escapement goals: NOC, MOC, Deschutes, Quillayute fall, Hoh spring/summer, Hoh fall, Queets spring/summer and Queets fall. These eight stocks, referred to as stocks without goals, are discussed separately in this chapter. The Washington coastal stocks are managed for escapement floors and inriver harvest rates; when terminal runs are predicted to exceed the escapement floor, terminal fisheries are managed on the basis of stepped harvest rates.

Changes Relative to the 1992 Annual Report: In 1994, ADF\&G adopted new escapement goals for the Unuk, Chickamin, Blossom, and Keta stocks. For this year's escapement assessment, the CTC used index goals rather than total escapement goals to evaluate the four stocks (see Section 2.2.2).

### 2.2.4 Assessment Period

For assessment purposes, a base period and a rebuilding assessment period were established for each stock. Base and rebuilding assessment periods differ among stocks:

SEAK and TBR Stocks: For SEAK and TBR stocks, a 15 -year rebuilding program was initiated in 1981, prior to implementation of the PST. The target date for completion of rebuilding is 1995. For these stocks, the base period includes the years 1975-1980 and the rebuilding assessment period includes the years 1981-1993.

Harrison Stock: Since data pre-1984 are unavailable for the Harrison stock, the Harrison base period is defined as 1984 and the rebuilding assessment period includes the years 1985-1993.

All Other Stocks: For all other stocks, a 15 -year rebuilding program was established for the years 1984-1998. For these stocks, the base period includes the years 1979-1982 and the rebuilding assessment period includes the years 1984-1993.

### 2.3 METHODS

### 2.3.1 Stocks Without Escapement Goals

While it is not possible to assess rebuilding progress for stocks without escapement goals, in this report, these stocks were included in the evaluation of escapement declines. Halting escapement declines is a stated PST objected; however, a review of escapement data shows that, in 1985, some indicator stocks did not have declining escapements. For such stocks, the CTC interpreted the PST language to mean that escapements should not decline after the start of the rebuilding program. Thus, the evaluation of escapement declines includes some stocks with stable escapements prior to 1985.

Evaluating escapement declines. To determine if escapement declines have been halted, recent 5 -year average escapement was compared to the average base period escapement. The standard error of the mean was calculated for each stock, based on the stock's 1975-1993 escapements (or
all available escapements within this period). The standard error was used as a measure of stock specific escapement variability. For stocks with recent average escapements more than one standard error below the base period average, it was concluded that escapement declines have not been halted. For stocks with escapement increases more than one standard error above the base period average, it was concluded that escapement declines have been halted. For stocks with recent average escapements within one standard error of the base period average, escapement variation was too great and/or the change in escapements was too small to determine if declines have been halted. Plus or minus one standard error was used as an arbitrary cut off, since the lack of independence among years of escapement data precluded use of significance testing.

Other stock characteristics. The results of the escapement decline evaluation are reported, as well as: base period average escapements; recent 5 -year average escapements; and recent 5 -year average escapements, expressed as a percent of the base period average. These are included to provide some information about where stock escapements are now, relative to where they were before implementation of the rebuilding program.

### 2.3.2 Stocks With Escapement Goals

For this report, the CTC developed a new approach for evaluating chinook rebuilding that is designed to: 1) separate those stocks that are on or ahead of their rebuilding schedules from those stocks that are behind schedule, 2) determine if spawning escapement declines have been halted for stocks that are behind schedule, and 3 ) provide information to facilitate evaluation of the stocks behind schedule.

The new approach has three levels of evaluation. First, stocks that are above goal are identified in a manner similar to previous years. Second, stocks that are meeting their rebuilding schedule are identified using short term criteria that assess rebuilding progress. Finally, for those stocks not judged to be meeting their rebuilding schedules, a third level of evaluation is performed to determine if escapement declines have been halted and to summarize attributes of these stocks.

The new three-level system was implemented as follows:

1. Stocks above goal were identified. These were stocks with at least four of the last five escapements at or above goal and recent 5 -year average escapements equal to or greater than the goal.
2. For those stocks not above goal, those that were rebuilding were identified. This determination was made using the following three criteria based on data from the last five years.

Modified Mean Criterion. A test value was calculated as the average of the 1989-1993 data points from the stock's base to goal line. This test value was then compared to the average observed escapement for the last five years. If the observed average was greater than or equal to the test value, a score of +1 was assigned. Otherwise, a score of -1 was assigned.

Modified Line Criterion. Observed escapements were compared with the base to goal line. If, in three or more of the last five years, the actual escapements were on or above the base to goal line, then a score of +1 was assigned. Otherwise, a score of -1 was assigned.

Short Term Trend Criterion. If in at least four of the last five years an escapement exceeded the previous year's escapement, then a score of +1 was assigned. If in at least four of the last
five years an escapement was equal to or below the previous year's escapement, then a score of -1 was assigned. Otherwise, a score of 0 was assigned.

The scores of these three criteria were then added, resulting in a total score ranging from +3 to -3 . Rebuilding classifications were assigned as follows:

| Total Score | Classification |
| :---: | :---: |
| +3, +2, | Rebuilding |
| +1, 0 | Indeterminate |
| -1, -2, -3 | Not Rebuilding |

Stocks were classified into four categories under the new assessment system: Above Goal, Rebuilding, Indeterminate, and Not Rebuilding. Indeterminate stocks were further reviewed by the CTC and considered for a status change. After this review, all stocks classified as Rebuilding were considered to be on their rebuilding schedules, and no further assessment was performed. Those stocks classified as Indeterminate or Not Rebuilding were considered in the third level of assessment.
3. Those stocks that were classified as Indeterminate of Not Rebuilding were further characterized. The third level consisted of an evaluation of whether or not escapement declines have been halted, and a tabulation of some stock characteristics.

Evaluating escapement declines. Escapement declines were evaluated in the same manner as for stocks without escapement goals (see Section 2.3.1).

Other stock characteristics. All of the stock characteristics presented for stocks without goals are also presented for stocks with goals (see Section 2.3.1). Also included are recent 5-year average escapements expressed as a percent of goal.

### 2.3.3 Effects of 1993 Methods Change

In this year's assessment, the criteria used in the first two levels of evaluation are modified from those used in previous years. The CTC investigated the development of new criteria due to problems found in the performance of the old criteria that had become increasingly troublesome as the rebuilding program progressed. Before the decision was made to change the methods, however, hindcasting was used to assess the performance of the new methods. Based on the hindcasting results, the CTC was satisfied that the modified methods represented an improvement. This is principally because the new criteria focus on comparing recent data to a stock's base to goal line. Complete hindcasting methods and results will be reported in an upcoming CTC Technical Note.

To identify how the new methods used in this report affect the outcome of the rebuilding assessment, assessment results for the years 1989-1992 were compared using both the old and new methods. Assessments from 1987 and 1988 were excluded because of data problems with several indicator stocks. The evaluation of the old methods used actual assessment results (as reported in the 19891992 CTC Annual Reports), except for the five SEAK stocks with escapement goal changes (Situk, Unuk, Chickamin, Blossom, and Keta) and the Quillayute summer stock (which had an incorrect goal
prior to 1991). For all years in this evaluation, rebuilding status of these six stocks was recalculated using the old methods and the new escapement goals. For comparison, the 1989-1992 data were reassessed using the new methods, new escapement goals, and corrected escapement data.

### 2.4 RESULTS

### 2.4.1 Effects of 1993 Methods Change

Fig. 2-1 documents the change resulting from the use of new methods in this report. Fig. 2-1(a) shows the proportions of stocks in the rebuilding categories based on actual CTC assessments done in 1989-1992. For comparison, Fig. 2-1(b) shows the proportion of stocks in the rebuilding categories when assessment results are recalculated for 1989-1992 using the new 1993 assessment methods.

Both figures show a similar pattern across the years, with the proportion of stocks in the upper categories declining and the proportion of stocks in the lower categories increasing. One notable difference is that, under the new methods, fewer stocks fall into the Indeterminate category.

(b)


Figure 2-1. Distribution of stocks among rebuilding categories for the years 1989-1992, (a) based on actual CTC assessment results corrected for new escapement goals, and (b) when assessment results are recalculated using 1993 assessment methods. In Fig. (a), Probably Not Rebuilding has been included with Not Rebuilding and Probably Rebuilding has been included with Rebuilding.

### 2.4.2 Stock Assessment

Stocks Without Escapement Goals: Escapement and terminal run data for stocks without goals are graphed and tabled in the Appendices. Recent escapements and results from the evaluation of escapement declines are shown in Table 2-3. Escapement declines have been halted for the five Washington Coastal stocks and the NOC stock, but not for the MOC stock. For the Deschutes stock, it is not currently possible to conclude if escapement declines have been halted.

Stocks With Escapement Goals: Individual stock results for the rebuilding criteria are shown in Table 2-4, assessment scores and status are shown in Table 2-5. Stock escapements in 1993 ranged from 8\% (Area 6 Index) to $226 \%$ (Andrew Creek) of escapement goals (Table 2-5).

Table 2-3. Summary of recent escapement data and analysis of escapement declines for natural chinook stocks without escapement goals. SE $=$ Standard Error of the mean for 1975-1993 escapements.

|  |  |  |  |  | \# Base月月4. |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Decline Halted: Stocks With Current Escapements Above Base |  |  |  |  |  |  |  |  |
| Quillayute | WAC | fall | 3000 | 6000 | 5925 | 8460 | 143\% | 866 |
| Hoh Spr/sum | WAC | spr/sum | 900 | 1400 | 1325 | 2420 | 183\% | 249 |
| Hoh Fall | WAC | fall | 1200 | 2300 | 2875 | 3400 | 118\% | 291 |
| Queets Spr/sum | WAC | spr/sum | 700 | 700 | 925 | 1220 | 132\% | 129 |
| Queets Fall | WAC | fall | 2500 | 3600 | 3875 | 6320 | 163\% | 577 |
| North Oregon Coast ${ }^{2}$ | NOC | fall | NA | 42 | 50 | 70 | 140\% | 3 |
| Inconclusive: Stocks With Current Escapements Not Distinguishable From Base |  |  |  |  |  |  |  |  |
| Deschutes | CR | fall | NA | 8239 | 3477 | 3118 | 90\% | 421 |
| Continued Decline: Stocks With Current Escapements Below Base |  |  |  |  |  |  |  |  |
| Mid-Oregon Coast ${ }^{2}$ | MOC | fall | NA | 66 | 62 | 50 | 81\% | 3 |

[^0]Table 2-4. Summary of recent escapement data (1989-1993) for natural chinook indicator stocks with escapement goals, for evaluation of the mean, line, and trend criteria used to assess rebuilding status.

|  |  |  |  |  | MEAN CRITERION |  |  |  | LINE CRITERION |  | TREND CRITERION |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Stock Name | Region | Run Type | Esc. <br> Goal | $\begin{aligned} & 1993 \\ & \text { Esc. } \end{aligned}$ | $\begin{aligned} & 1993 \text { \% } \\ & \text { of Goal } \end{aligned}$ | Mean Base Period Escapement | $\begin{array}{r} \text { Mean } \\ 1989-93 \\ \text { Test Value } \end{array}$ | apement <br> 1989-93 <br> Average | Comp with \# Above | arison <br> line <br> \# Below | Number <br> $>$ Year <br> Before | $\begin{aligned} & \text { Number } \\ & <\text { or = Year } \\ & \text { Before } \end{aligned}$ |
| Situk | SEAK | spring | 600 | 790 | 132\% | 1299 |  | 883 |  |  |  |  |
| King Salmon | SEAK | spring | 250 | 280 | 112\% | 92 | 208 | 187 | 2 | 3 | 2 | 3 |
| Andrew Creek | SEAK | spring | 750 | 1696 | 226\% | 379 |  | 1098 |  |  |  |  |
| Blossom (index) | SEAK | spring | 300 | 303 | 101\% | 102 | 247 | 259 | 3 | 2 | 1 | 4 |
| Keta (index) | SEAK | spring | 300 | 362 | 121\% | 255 | 288 | 522 | 3 | 2 | 2 | 3 |
| Alsek | TBR | spring | 4700 | 3302 | 70\% | 2697 | 4166 | 2165 | 0 | 5 | 3 | 2 |
| Taku | TBR | spring | 13200 | 13204 | 100\% | 4582 | 10902 | 11229 | 2 | 3 | 4 | 1 |
| Stikine | TBR | spring | 5300 | 11449 | 216\% | 1945 | 4405 | 6338 | 5 | 0 | 3 | 2 |
| Unuk (index) | TBR | spring | 875 | 1068 | 122\% | 918 | 875 | 869 | 3 | 2 | 3 | 2 |
| Chickamin (index) | TBR | spring | 525 | 389 | 74\% | 314 | 469 | 544 | 3 | 2 | 2 | 3 |
| Yakoun | NBC | summer | 1580 | 1000 | 63\% | 788 |  | 1940 |  |  |  |  |
| Nass | NBC | spr/sum | 15890 | 9715 | 61\% | 7944 | 12182 | 9138 | 2 | 3 | 3 | 2 |
| Skeena | NBC | spr/sum | 41770 | 66977 | 160\% | 20883 |  | 59260 |  |  |  |  |
| Area 6 Index | CBC | summer | 5520 | 462 | 8\% | 2761 | 4232 | 558 | 0 | 5 | 2 | 3 |
| Area 8 Index | CBC | spring | 5450 | 700 | 13\% | 2725 | 4178 | 2267 | 0 | 5 | 3 | 2 |
| Rivers Inlet | CBC | spr/sum | 4950 | 10610 | 214\% | 2475 | 3795 | 6910 | 4 | 1 | 4 | 1 |
| Smith Inlet | CBC | summer | 2110 | 500 | 24\% | 1055 | 1618 | 447 | 0 | 5 | 1 | 4 |
| W. Coast Van. Is. | WCVI | fall | 11040 | 4740 | 43\% | 5520 | 8464 | 6407 | 1 | 4 | 2 | 3 |
| Upper Geor. St. | GS | sum/fall | 5090 | 2216 | 44\% | 2546 | 3910 | 3913 | 2 | 3 | 3 | 2 |
| Lower Geor. St. | GS | fall | 21940 | 7100 | 32\% | 10968 | 16820 | 9071 | 0 | 5 | 2 | 3 |
| Upper Fraser | FR | spring | 24460 | 17534 | 72\% | 12229 |  | 25983 |  |  |  |  |
| Middle Fraser | FR | spr/sum | 18430 | 25926 | 141\% | 9216 |  | 22602 |  |  |  |  |
| Thompson | FR | summer | 55710 | 30880 | 55\% | 22059 | 42711 | 38468 | 2 | 3 | 2 | 3 |
| Harrison | FR | fall | 241670 | 118974 | 49\% | 120837 | 185297 | 118417 | 1 | 4 | 3 | 2 |
| Skagit spring | PS | spring | 3000 | 788 | 26\% | 1247 | 2182 | 1261 | 0 | 5 | 1 | 4 |
| Skagit sum/fall | PS | sum/fall | 14900 | 5916 | 40\% | 13265 | 14137 | 8717 | 1 | 4 | 2 | 3 |
| Stillaguamish | PS | sum/fall | 2000 | 928 | 46\% | 817 | 1448 | 999 | 1 | 4 | 4 | 1 |
| Snohomish | PS | sum/fall | 5250 | 4019 | 77\% | 5028 | 5146 | 3371 | 0 | 5 | 2 | 3 |
| Green | PS | fall | 5800 | 2479 | 43\% | 5723 | 5764 | 7368 | 3 | 2 | 2 | 3 |
| Quillayute sum. | WAC | summer | 1200 | 1300 | 108\% | 1250 |  | 1480 |  |  |  |  |
| Grays Hrb. spr. | WAC | spring | 1400 | 1300 | 93\% | 450 | 957 | 1600 | 5 | 0 | 1 | 4 |
| Grays Hrb. fall | WAC | fall | 14600 | 14200 | 97\% | 8575 | 11788 | 17580 | 5 | 0 | 1 | 4 |
| Col. Upr. spring | CR | spring | 84000 | 28350 | 34\% | 28050 | 57890 | 23490 | 0 | 5 | 2 | 3 |
| Col. Upr. sum. | CR | summer | 85000 | 21600 | 25\% | 23100 | 56113 | 21820 | 0 | 5 | 1 | 4 |
| Col. Upr. bright | CR | fall | 40000 | 52500 | 131\% | 28325 |  | 58760 |  |  |  |  |
| Lewis | CR | fall | 5700 | 7025 | 123\% | 13021 |  | 12219 |  |  |  |  |

Table 2-5. Assessment scores and status through 1993 of natural chinook indicator stocks with escapement goals.

| Stock Name | Region | Run type | Assessment Scores |  |  |  | Rebuilding Status Through 1993 | Status Change from 1992 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Mean | Line | Trend | Total |  |  |
| Situk | SEAK | spring |  |  |  |  | Above Goal |  |
| King Salmon | SEAK | spring | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Andrew Creek | SEAK | spring |  |  |  |  | Above Goal |  |
| Blossom | SEAK | spring | 1 | 1 | -1 | 1 | Indeterminate | Improvement |
| Keta | SEAK | spring | 1 | 1 | 0 | 2 | Rebuilding | Improvement |
| Alsek | TBR | spring | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Taku | TBR | spring | 1 | -1 | 1 | 1 | Rebuilding 1/ |  |
| Stikine | TBR | spring | 1 | 1 | 0 | 2 | Rebuilding |  |
| Unuk | TBR | spring | -1 | 1 | 0 | 0 | Rebuilding 1/ | Improvement |
| Chickamin | TBR | spring | 1 | 1 | 0 | 2 | Rebuilding | Improvement |
| Yakoun | NBC | summer |  |  |  |  | Above Goal |  |
| Nass | NBC | spr/sum | -1 | -1 | 0 | -2 | Not Rebuilding | Decline |
| Skeena | NBC | spr/sum |  |  |  |  | Above Goal |  |
| Area 6 Index | NBC | summer | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Area 8 Index | CBC | spring | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Rivers Inlet | CBC | spr/sum | 1 | 1 | 1 | 3 | Rebuilding |  |
| Smith Inlet | CBC | summer | -1 | -1 | -1 | -3 | Not Rebuilding |  |
| W. Coast Van. Is. | WCVI | fall | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Upper Geor. St. | GS | sum/fall | 1 | -1 | 0 | 0 | Indeterminate |  |
| Lower Geor. St. | GS | fall | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Upper Fraser | FR | spring | 1 | 1 | -1 | 1 | Above Goal 1/ |  |
| Middle Fraser | FR | spr/sum |  |  |  |  | Above Goal |  |
| Thompson | FR | summer | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Harrison | FR | fall | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Skagit spring | PS | spring | -1 | -1 | -1 | -3 | Not Rebuilding |  |
| Skagit sum/fall | PS | sum/fall | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Stillaguamish | PS | sum/fall | -1 | -1 | 1 | -1 | Not Rebuilding |  |
| Snohomish | PS | sum/fall | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Green | PS | fall | 1 | 1 | 0 | 2 | Rebuilding |  |
| Quillayute summer | WAC | summer |  |  |  |  | Above Goal |  |
| Grays Harbor spring | WAC | spring | 1 |  | -1 | 1 | Rebuilding 1/ | Decline |
| Grays Harbor fall | WAC | fall | 1 | 1 | -1 | 1 | Rebuilding 1/ | Decline |
| Col. UpR. spring | CR | spring | -1 | -1 | 0 | -2 | Not Rebuilding |  |
| Col. UpR. summer | CR | summer | -1 | -1 | -1 | -3 | Not Rebuilding |  |
| Col. UpR. bright | CR | fall |  |  |  |  | Above Goal |  |
| Lewis River | CR | fall |  |  |  |  | Above Goal |  |

1/ The status of these stocks was changed from Indeterminate due to stock-specific circumstances.

Additional stock assessment information can be found in Fig. 2-2, Table 2-6, and Table 2-7. Fig. 2-2 summarizes 1993 escapements, expressed as a percent of goal, to provide a snapshot of rebuilding progress. In 1993, 19 stocks had escapements less than $76 \%$ of goal and 13 stocks had escapements above goal. Table 2-6 summarizes the distribution of stocks among the four rebuilding categories. A combined summary across all stocks is provided, as well as separate summaries for SEAK and TBR stocks and for other stocks. A stock specific list of final rebuilding status is shown in Table 2-7.


Figure 2-2. Summary of escapements in 1993, expressed as a percent of the escapement goal, for the 36 escapement indicator stocks with escapement goals.

Table 2-6. Distribution of chinook escapement indicator stocks among the four rebuilding categories, based on data through 1993.

|  | SEAK, IHISIBR |  | Otherstocks |  | Total |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | \#: | $\%$ | \#\# | \% | \#, | \% |
| Above Goal | 2 | 20\% | 7 | 27\% | 9 | 25\% |
| Rebuilding | 5 | 50\% | 4 | 15\% | 9 | 25\% |
| Indeterminate | 1 | 10\% | 1 | 4\% | 2 | 6\% |
| Not Rebuilding | 2 | 20\% | 14 | 54\% | 16 | 44\% |
| TOTAL | 10 | 100\% | 26 | 100\% | 36 | 100\% |

Additional information about those 18 stocks classified as Indeterminate or Not Rebuilding is shown in Table 2-8. Escapement declines have been halted for 7 ( $39 \%$ ) of these 18 stocks, while $8(44 \%)$ have shown continued escapement declines. For the remaining 3 stocks ( $17 \%$ ), it is not currently possible to determine if escapement declines have been halted. Ten ( $56 \%$ ) of the 18 stocks had recent 5 -year average escapements that were $50 \%$ or less of their escapement goals and $10(56 \%)$ had recent 5 -year average escapements that were below base period averages.

Table 2-7. Rebuilding status through 1993 of natural chinook indicator stocks with escapement goals.

## STOCKS IN 13TH YEAR OF REBUILDING

| ABOVE GOAL | REGION | RUN TYPE | CHAPTER 5 GROUP |
| :---: | :---: | :---: | :---: |
| Situk | SEAK | spring | SEAK/TBR-O |
| Andrew Creek | SEAK | spring | SEAK/TBR-I |
| REBUILDING |  |  |  |
| Keta | SEAK | spring | SEAK/TBR-I |
| Taku 1/ | TBR | spring | SEAK/TBR-O |
| Stikine | TBR | spring | SEAK/TBR-O |
| Unuk 1/ | TBR | spring | SEAK/TBR-I |
| Chickamin | TBR | spring | SEAK/TBR-I |
| INDETERMINATE |  |  |  |
| Blossom | SEAK | spring | SEAK/TBR-I |
| NOT REBUILDING |  |  |  |
| King Salmon | SEAK | spring | SEAK/TBR-I |
| Alsek | TBR | spring | SEAK/TBR-O |
| STOCKS IN 10TH YEAR OF REBUILDING |  |  |  |
| ABOVE GOAL |  |  |  |
| Yakoun | NBC | summer | NCBC |
| Skeena | NBC | spring/summer | NCBC |
| Upper Fraser 1/ | FR | spring | UFR |
| Middle Fraser | FR | spring/summer | UFR |
| Quillayute summer | WAC | summer | WACO |
| Col. Upriver Bright | CR | fall | WACO |
| Lewis River | CR | fall | WACO |
| REBUILDING |  |  |  |
| Rivers Inlet | CBC | spring/summer | NCBC |
| Green | PS | fall | SPS |
| Grays Harbor spring 1/ | WAC | spring | WACO |
| Grays Harbor fall 1 / | WAC | fall | WACO |
| INDETERMINATE |  |  |  |
| Upper Georgia Strait | GS | summer/fall | UGS |
| NOT REBUILDING |  |  |  |
| Nass | NBC | spring/summer | NCBC |
| Area 6 Index | NBC | summer | NCBC |
| Area 8 Index | CBC | spring | NCBC |
| Smith Inlet | CBC | summer | NCBC |
| W. Coast Vancouver Island | WCVI | fall | WCVI |
| Lower Georgia Strait | GS | fall | LGS |
| Thompson | FR | summer | UFR |
| Harrison | FR | fall | LFR |
| Skagit spring | PS | spring | NPS-Sp |
| Skagit summer/fall | PS | summer/fall | NPS-S/F |
| Stillaguamish | PS | summer/fall | NPS-S/F |
| Snohomish | PS | summer/fall | NPS-S/F |
| Col. Upriver spring | CR | spring | CUS |
| Col. Upriver summer | CR | summer | CUS |

1/ Status of these stocks was altered from Indeterminate (see text for details).

Table 2-8. Level three assessment for natural chinook indicator stocks with escapement goals, that were classified as Indeterminate or Not Rebuilding. SE $=$ Standard Error of the mean for 1975-1993 escapements.


## Decline Halted: Stocks With Current Escapements Above Base

| King Salmon | SEAK | spring | 250 | 92 | 187 | 75\% | 204\% | 17 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Blossom ${ }^{1}$ | SEAK | spring | 300 | 102 | 247 | 82\% | 242\% | 86 |
| Nass | NBC | spr/sum | 15890 | 7944 | 9138 | 58\% | 115\% | 707 |
| W. Coast Van. Is. | WCVI | fall | 11040 | 5920 | 6407 | 55\% | 116\% | 427 |
| Upper Geor. St. ${ }^{1}$ | GS | sum/fall | 5090 | 2546 | 3913 | 77\% | 154\% | 794 |
| Thompson | FR | summer | 55710 | 22059 | 38468 | 69\% | 174\% | 2231 |
| Stillaguamish | PS | sum/fall | 2000 | 817 | 999 | 50\% | 122\% | 101 |

Inconclusive: Stocks With Current Escapements Not Distinguishable From Base

| Harrison | FR | fall | 241670 | 120837 | 118417 | 49\% | 98\% | 14866 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Skagit spring | PS | spring | 3000 | 1247 | 1261 | 42\% | 101\% | 147 |
| Col. UpR. summer | CR | summer | 85000 | 23100 | 21820 | 26\% | 94\% | 1361 |

Continued Decline: Stocks With Current Escapements Below Base

| Alsek | TBR | spring | 4700 | 2697 | 2165 | 46\% | 80\% | 182 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Area 6 Index | CBC | summer | 5520 | 2761 | 558 | 10\% | 20\% | 270 |
| Area 8 Index | CBC | spring | 5450 | 2725 | 2267 | 42\% | 83\% | 323 |
| Smith Inlet | CBC | summer | 2110 | 1055 | 447 | 21\% | 42\% | 106 |
| Lower Geor. St. | GS | fall | 21940 | 10968 | 9071 | 41\% | 83\% | 666 |
| Snohomish | PS | sum/fall | 5250 | 5028 | 3371 | 64\% | 67\% | 294 |
| Skagit sum/fall | PS | sum/fall | 14900 | 13265 | 8717 | 59\% | 66\% | 962 |
| Col. UpR. spr. | CR | spring | 84000 | 28050 | 23490 | 28\% | 84\% | 4442 |

${ }^{1}$ Stocks with an Indeterminate rebuilding status. Blossom escapements and goal are index numbers.

### 2.4.3 Results Relative to 1992

Five of the 36 stocks with escapement goals ( $14 \%$ ) showed status declines relative to the 1992 assessment, while four stocks ( $11 \%$ ) showed improvement (Table 2-5). The four status improvements resulted from the four Behm Canal escapement goal changes. Three of the status declines were from Above Goal to Rebuilding. Table 2-9 shows the actual 1992 and 1993 assessment as well as the assessment that would have resulted if current methods had been used in 1992.

Table 2-9. Comparison of 1992 and 1993 assessment results for escapement indicator stocks with escapement goals.


### 2.5 STOCKS CONSIDERED FOR STATUS CHANGES

After the initial assessment, seven stocks were Classified as Indeterminate. The CTC examined each of these stocks and considered whether to change its status. The Blossom and Upper Strait of Georgia stocks remain in the Indeterminate category. A decision was made to change the status of the following five stocks:

### 2.5.1 Taku

The CTC revised the Taku stock classification to Rebuilding because: 1) the stock has been closely following its base to goal line, 2) the three points that fall below the base to goal line are all very close to the line; recent escapements have been near the escapement goal.

### 2.5.2 Unuk

The CTC revised the Unuk stock classification to Rebuilding. Although average recent escapements have been below the escapement goal, they have been fairly close to the goal and have increased over the past three years.

### 2.5.3 Upper Fraser

The CTC revised the Upper Fraser stock classification to Above Goal. Although escapements were below goal in two of the last five years (1992 and 1993) the 1992 escapement did not include an estimate for the Stuart River, because an overflight count was not conducted. A 1992 ground survey
recovered several thousand carcasses in the river. Although there is currently no method for using the ground survey data to adjust the escapement count, the CTC believed the survey provided sufficient evidence that 1992 escapement was above goal.

### 2.5.4 Grays Harbor spring and fall

The CTC revised the classification of both the Grays Harbor spring and fall stocks to Rebuilding. A -1 score for the modified trend criterion is responsible for their classification as Indeterminate. While extended declines may be cause for concern, for these two stocks the declines that caused the negative scores began from levels well above goal. Escapements of both stocks remain near goal.

### 2.6 SUMMARY

The CTC examined the escapement histories of 44 natural chinook salmon indicator stocks to evaluate the effectiveness of management actions, since PST implementation, in attaining the two Treatydefined objectives of: 1) halting escapement declines; and 2) attaining escapement goals by 1998. It should be noted that although natural chinook stocks coastwide were generally in a state of decline during negotiation of the PST, not all stocks were declining or below their respective goals at the time. The 44 indicator stocks were chosen in part to give a reasonable representation of coastwide natural chinook escapements at the time of PST implementation.

The CTC used a hierarchical approach to assess whether or not the two Treaty objectives had been met. First, stocks with escapement goals were assessed. Stocks above goal and stocks on schedule to rebuild by their target dates were identified. For all of these stocks, escapement declines were also considered to be halted. Next, the Not Rebuilding stocks, the Indeterminate stocks, and the stocks without escapement goals were directly assessed to determine if escapement declines have been halted.

Of the 44 escapement indicator stocks, only the 36 stocks with escapement goals could be assessed for rebuilding status. Of these, $18(50 \%)$ were classified as Above Goal or Rebuilding, two (5\%) as Indeterminate, and 16 (45\%) as Not Rebuilding.

All 44 indicator stocks were assessed to determine if spawning escapement declines have been halted. Declines are considered halted for $31(70 \%)$ of the stocks, and continued decline was indicated for 9 (20\%) of the stocks. The CTC judged that the information on the remaining four stocks ( $10 \%$ ) was inconclusive for determining whether or not declines have been halted.

### 2.6.1 Stocks Without Escapement Goals

Escapement declines have been halted for all five Washington Coastal stocks: Hoh spring/summer, Hoh fall, Queets spring/summer, Queets fall and Quillayute fall. The recent 5-year average escapements of all five stocks were above their escapement floors and above base period levels. These stocks all showed steady terminal run increases during the early years of the rebuilding program. This pattern of increase peaked in the late 1980s and was followed by sharply reduced terminal runs and escapements over the last several years. For all coastal stocks, 1993 escapements were at or above their escapement floors.

The 1993 escapement of the Queets spring/summer stock was at its escapement floor, despite restricted terminal catch. This followed two years of returns below the escapement floor. While it is
not possible to assess the rebuilding status of stocks without escapement goals, the Queets stock should be carefully monitored to determine if additional management actions are needed.

The Oregon Coast stock groups have shown a mixed response during the rebuilding period. Escapements of the NOC group increased rapidly after initiation of PST management and remain well above the base period average. Escapements of the MOC group have been highly variable during the rebuilding assessment period, and the recent 5 -year average is $20 \%$ below the base period average. Because neither stock group has a defined goal and neither was considered severely depressed during the base period, it is difficult to fit them into the present assessment scheme. Clearly, any decline in escapements of the NOC group has been halted. For the MOC group, however, the situation is less clear. Although the evaluation criterion suggests that MOC escapement declines have not been halted, until pre-Treaty stock status is defined, it will be difficult to discern any change in escapement status for this stock group.

During the rebuilding assessment period, escapements of the Deschutes fall stock have generally been below the base period average. The recent 5 -year average is approximately $10 \%$ below the base period average, although the 1993 escapement was more than double the base period average. It is not currently possible to conclude if this stock's escapement decline has been halted.

### 2.6.2 Stocks With Escapement Goals

The number of stocks classified as Above Goal or Rebuilding increased from 15 in 1992 to 18 in 1993. This increase is due to the improved status of the four Behm Canal stocks that resulted from their escapement goal changes. The proportion of stocks in these categories has declined from $60 \%$ in 1989 to $50 \%$ in 1993. The stocks in these categories have all shown a positive response during the rebuilding period and are currently meeting the rebuilding objectives. Their positive response is likely the combined result of PSC actions, local management actions, and periods of favorable marine survival.

The remaining 18 stocks are classified Indeterminate (2) and Not Rebuilding (16). Under current survival conditions (both ocean and inriver) and management regimes, none of the Indeterminate or Not Rebuilding stocks is expected to rebuild by the rebuilding target dates. For both Indeterminate stocks and five of the Not Rebuilding stocks, escapement declines have been halted. Escapement patterns for these stocks indicate that, although they are not on schedule to rebuild by their target dates, they have at least shown some positive response since implementation of the rebuilding program. For three of the 18 stocks, it is not currently possible to conclude if escapement declines have been halted.

For eight of the 18 Indeterminate and Not Rebuilding stocks, escapement declines have not been halted. All of these stocks are classified as Not Rebuilding and have shown either no positive response during the rebuilding program or an initial positive response followed by a decline. These stocks are now further from their escapement goals and the outlook for them is worse than when the rebuilding program started. Under recent survival conditions, management regimes have not been effective in rebuilding these stocks or even in halting their escapement declines.

## CHAPTER 3. EXPLOITATION RATE ASSESSMENT

 Based on CWT Recovery Data Through Calendar Year 1993
### 3.1 INTRODUCTION

The Exploitation Rate Assessment relies on CWT release and recovery data from a set of indicator stocks to estimate: 1) harvest rate indices for the ceiling fisheries and the U.S. South ocean sport and troll fishery, 2) exploitation rate indices for depressed wild stocks harvested in nonceiling fisheries, 3) brood year exploitation rates and indices, 4) age 2-3 and cohort survival rate indices, 5) stock indices for ceiling and nonceiling fisheries, and 6) the distribution of catch and total mortality among fisheries. With the exception of the cohort survival indices and the brood exploitation indices, the statistics presented are similar to those reported in the 1992 annual report (CTC 1993). Additional information on the rationale for all of the statistics is provided below.

Most of the statistics reported in the Exploitation Rate Assessment are derived from an analytical procedure called cohort analysis. Cohort analysis simply reconstructs the production of a CWT group by starting with the escapement, catch, and incidental mortality of the oldest age class and working backwards in time to calculate the total abundance of ocean age 2 chinook at the beginning of fishing. These reconstructions are based on CWT recoveries by stock, age, and fishery.

### 3.1.1 Fishery Indices

It was expected when the PST was negotiated that catch ceilings and increases in stock abundance would reduce harvest rates in fisheries managed under PST catch ceilings. The fishery index provides a means to assess this expectation. The fishery index is the ratio of stock and age-specific exploitation rates in a fishery in the current year to the 1979-1982 base period. An index can also be computed for a specific stock and age class by dividing the exploitation rate in a given year by the average exploitation rate in the base period. In either case, an index less than 1.0 represents a decrease from base period harvest rates while an index greater than 1.0 represents an increase. The relative magnitude of the change is the difference of the index from 1.0.

Fishery indices are presented for both reported catch and total mortalities (reported catch plus estimated incidental mortality). Both are expressed as adult equivalents (AEQ), where the AEQ factor is used as an adjustment to reflect the proportion of fish of a given age that would, in the absence of fishing, subsequently leave the ocean to spawn. The total mortality index provides a consistent means of representing changes in reported catch and incidental mortalities, including those associated with regulatory measures such as minimum size limits and chinook nonretention (CNR) periods. Direct estimates of incidental mortality cannot be obtained from CWT recoveries; mortality estimates are computed using estimates of the proportion of fish less than the size limit, the relative contributions of indicator stocks during periods of chinook retention, and estimates of the total number of encounters with chinook during CNR periods.

In the SEAK and NCBC fisheries, indices are presented for troll gear only although the ceilings are applicable to net and sport gear as well. Only the recoveries from the troll fishery have been used in past years because the majority of the catch, and the most reliable CWT sampling, occurred in these fisheries. Because the allocation of the catch among gear types has changed in some fisheries (e.g., the proportion of the catch harvested by the sport fishery has increased in the SEAK and NCBC
fisheries), the indices may not represent the harvest impact of all gear types. The CTC is evaluating how to include other gear types in the indices for the SEAK and NCBC fisheries.

### 3.1.2 Nonceiling Fishery Indices

The passthrough provision of the PST requires that "the bulk of depressed stocks preserved by the conservation program ... principally accrue to escapement." The ambiguity of the passthrough definition, and the lack of direction from the PSC, has prevented the CTC from analytically assessing if this provision of the PST has been satisfied. As an interim measure, this report includes a nonceiling index previously suggested by the CTC (CTC 1991) as a measure of passthrough. The index compares the expected AEQ mortalities (assuming base period exploitation rates and current abundance) with the observed AEQ mortalities, by calendar year, over all nonceiling fisheries of a Party. Index values greater than 1.0 for nonceiling fisheries indicate that the exploitation rates have increased relative to the base period. Consistent with Canadian commitments to reduce harvest rates by $25 \%$ for Canadian nonceiling net fisheries, the index should be evaluated with respect to 0.75 for the Canadian nonceiling net fisheries. The CTC is unable to include the WCVI sport fishery in the index at this time because of the absence of base period data.

The wild stocks subject to the passthrough provision were identified from the list of escapement indicator stocks provided in Chapter 2. A stock was included in the analysis if the following three conditions were met: 1) the escapement goal was not achieved, 2) the stock was harvested in nonceiling fisheries (the same criteria were used as for the fishery indices), and 3) an exploitation indicator stock with base period tagging and estimates of escapement existed in the stock group.

### 3.1.3 Brood Exploitation Rates and Indices

Brood year exploitation rates provide the best measure of the cumulative impact of fisheries upon all age classes of a stock. The rates are computed as the ratio of AEQ total mortality to AEQ total mortality plus escapement. The numerator may be partitioned into components for AEQ reported catch and AEQ incidental mortality, with each component occurring in either ocean fisheries (generally marine sport, troll, and recoveries of ages 2 and 3 chinook in nonterminal net fisheries) or all fisheries. In order to simplify the interpretation of trends in the estimates of brood exploitation rates, this report also includes a new index that relates the brood exploitation rate in each year to the average rate in the base period. The base period in this instance is defined in terms of the primary brood years that contributed to fisheries in 1979-1982 (see Section 3.2.1).

The productivity function of a stock determines an optimal brood exploitation rate at which the stock should be exploited if the maximum sustainable yield (MSY) is to be maintained. If the escapement of a stock is less than the MSY level, escapements can be increased by reducing the brood exploitation rates. If the brood exploitation rate is reduced to the MSY level, the escapement of the stock will eventually increase until the MSY escapement level is reached. However, a reduction to a level less than that at the maximum sustainable yield (the MSY ER) may be required if the rebuilding is to be achieved within a specified period of time. For example, brood exploitation rates would need to be reduced by a greater extent if the stock is to achieve its escapement goal in 5 years rather than 15 years. The extent of the reduction necessary to achieve the exploitation rate sustainable at the escapement goal will depend upon the productivity of the stock, current escapement relative to the goal, and the target rebuilding date.

### 3.1.4 Stock Indices

Stock indices provide information on the annual impact of fisheries for a specific stock relative to the 1979-1982 base period. The index is computed by dividing the age-specific total mortality exploitation rates expressed relative to the initial cohort of that age (the cohort size prior to fishing) in one or more selected fisheries in a given year by the average total age-specific exploitation rate during the base period. Since exploitation rates used to compute the stock index are expressed relative to the initial cohort, values of 1.0 or more would be expected for the nonceiling fisheries if harvest rates remained equal to the base period level and exploitation rates declined in the ceiling fisheries. Indices less than 1.0 are expected for the ceiling fisheries. The stock indices computed in the Exploitation Rate Assessment are reported in Chapter 5.

### 3.1.5 Survival Indices

Two types of survival measures, a cohort survival rate and an age 2-3 survival rate, are included in the Exploitation Rate Assessment. The cohort survival rate provides the best estimate of the overall survival for a brood. It includes the estimated CWT recoveries in catch and escapement, the estimated incidental mortality, and the estimated natural mortality of the ocean age 2 and older age classes. Although it provides the best estimate, it has little direct use in predicting future contributions, since all ages must be accounted for before the cohort survival rate can be computed.

Alternatively, the ocean age 2-3 survival rate can be estimated when catch recoveries of these age classes are available. For example, an age 2-3 survival rate for the 1991 brood could be computed when catch and escapement recoveries became available after the 1994 season. The age 2-3 survival rate could then be used to predict the survival rates for age classes of the 1991 brood contributing to fisheries in 1995 and 1996.

To simplify presentation of both the cohort and age 2-3 survival rates, they were converted to indices by dividing the rate for each brood by the brood year base period average.

The CTC has frequently been asked how well the age 2-3 index predicts the cohort survival rate. In order to assist in evaluating that question, this year's report includes graphs with each index and the correlation of the age 2-3 and cohort survival indices. These results are provided in Section 3.6.

### 3.1.6 Stock Catch Distribution

The distributions of reported catch and total mortalities for each indicator stock are presented for nine fishery categories: one for each set of fisheries operating under a PSC ceiling and one for each gear type of Canadian and U.S. fisheries that do not operate under PSC ceilings. Distributions are presented as percentages of both the reported catch and the total fishing mortality (expressed in AEQ). Distributions were computed only for calendar years in which CWT recovery data were present for at least three brood years for a given exploitation rate indicator stock.

### 3.2 ESTIMATION OF EXPLOITATION RATES

Analyses in this chapter are specific to the 35 exploitation rate indicator stocks: 1 from Southeast Alaska, 9 from British Columbia, 13 from Puget Sound, 2 from the Washington Coast, 9 from the Columbia River, and 1 from the Oregon Coast (Table 3-1). Extrapolation of results to similar stocks

Table 3-1. List of exploitation rate indicator stocks, the stock name, the run type, and the age of smolts at release.

| Stock Name | Location | Run Type | Smolt Age |
| :---: | :---: | :---: | :---: |
| Alaska Spring | Southeast Alaska | Spring | Age 1 |
| Kitsumkalum | North/Central BC | Spring/Summer | Age 0 |
| Snootli Creek | North/Central BC | Spring/Summer | Age 0 |
| Kitimat River | North/Central BC | Spring/Summer | Age 0 |
| Robertson Creek | WCVI | Fall | Age 0 |
| Quinsam | Georgia Strait | Fall | Age 0 |
| Puntledge | Georgia Strait | Summer | Age 0 |
| Big Qual icum | Georgia Strait | Fall | Age 0 |
| Chehalis (Harrison Stock) | Lower Fraser River | Fall | Age 0 |
| Chilliwack (Harrison Stock) | Lower Fraser River | Fall | Age 0 |
| South Puget Sound Fall Yearling | South Puget Sound | Summer/Fall | Age 1 |
| Squaxin Pens Fall Yearling | South Puget Sound | Summer/Fall | Age 1 |
| University of Washington Accelerated | Central Puget Sound | Summer/Fall | Age 0 |
| Samish Fall Fingerling | North Puget Sound | Summer/Fall | Age 0 |
| Stillaguamish Fall Fingerling | Central Puget Sound | Summer/Fall | Age 0 |
| George Adams Fal! Fingerling | Hood Canal | Summer/Fall | Age 0 |
| South Puget Sound Fall Fingerling | South Puget Sound | Summer/Fall | Age 0 |
| Kalama Creek Fall Fingerling | South Puget Sound | Summer/Fall | Age 0 |
| Elwha Fall Fingerling | Strait of Juan de Fuca | Summer/Fall | Age 0 |
| Hoko Fall Fingerling | Strait of Juan de Fuca | Summer/Fall | Age 0 |
| Skagit Spring Yearling | Central Puget Sound | Spring | Age 1 |
| Nooksack Spring Yearling | North Puget Sound | Spring | Age 1 |
| White River Spring Yearling | South Puget Sound | Spring | Age 1 |
| Sooes Fall Fingerling | North Washington Coast | Fall | Age 0 |
| Queets Fall Fingerling | North Washington Coast | Fall | Age 0 |
| Cowlitz Tule | Columbia River (WA) | Fall Tule | Age 0 |
| Spring Creek Tule | Columbia River (WA) | Fall Tule | Age 0 |
| Bonneville Tule | Columbia River (OR) | Fall Tule | Age 0 |
| Stayton Pond Tule | Columbia River (OR) | Fall Tule | Age 0 |
| Upriver Bright | Upper Columbia River | Fall Bright | Age 0 |
| Hanford Wild | Upper Columbia River | Fall Bright | Age 0 |
| Leavenworth Spring 1/ | Upper Columbia River | Spring | Age 1 |
| Lewis River Wild | Lower Columbia River | Fall Bright | Age 0 |
| Lyons Ferry | Snake River | Fall Bright | Age 0 |
| Willamette Spring | Lower Columbia River | Spring | Age 1 |
| Salmon River | North Oregon Coast | Fall | Age 0 |
|  | Idaho | Spring |  |
| Rapid River Spring 1/ | 1 daho | Spring | Age 1 |
| McCal 1 Summer 1/ | Idaho | Summer | Age 1 |

1/ Tagged PSC indicator stocks with too few recoveries for analysis.

Table 3-2. Indicator stocks, associated stock group, analyses in which each indicator stock was used, and the availability of quantitative escapement recoveries and base period tagging data. All of these stocks are used in the distribution analysis. The brood exploitation rate column lists the appropriate statistic to use (Tot = Total; Ocn = Ocean) when using the exploitation rate indicator stock as a representative for the regional stock group. (NC Index = CTC recommended index for nonceiling fisheries; Brood Exp = brood exploitation rates; Esc $=$ quantitative estimates of escapement.)

| Stock Name | Stock Group ${ }^{1 /}$ | Fishery Index | $\begin{gathered} \text { NC } \\ \text { Index } \end{gathered}$ | Brood Exp | Survival Index | Esc | $\begin{aligned} & \text { Base } \\ & \text { Tagging } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Alaska Spring | SEAK/TBR-I | yes | - - | Tot | yes | yes | yes |
| Kitsumkalum | NCBC | -- |  | - |  |  | yes |
| Snootli Creek | NCBC |  |  |  |  |  | - - |
| Kitimat River | NCBC | - - | - - | - - | - - | - - | - - |
| Robertson Creek | WCVI | yes | - - | Ocn | yes | yes ${ }^{2 /}$ | yes |
| Quinsam | UGS | yes | yes | Tot | yes | yes | yes |
| Punt ledge | LGS | yes | yes | Tot | yes | yes | yes |
| Big Qualicum | LGS | yes | yes | Tot | yes | yes | yes |
| Chehalis $3 /$ | LFR | - - | - - | -- | - - | - - | - - |
| Chilliwack ${ }^{3 /}$ | LFR | - - | $-$ | - | - - |  | - - |
| South Puget Sound Fall Yearling |  | yes | $4 /$ |  | yes | yes ${ }^{2 /}$ | yes |
| Squaxin Pens Fall Yearling |  | -- | $4 /$ | 41 | yes | yes ${ }^{2 /}$ | -- |
| Univ of Washington Accelerated |  | yes | 4/ | 4/ | yes | yes ${ }^{2 /}$ | yes |
| Samish Fall Fingerling | NPS-S/F | yes | yes | Ocn | yes | yes ${ }^{2 /}$ | yes |
| Stillaguamish Fall Fingerling George Adams Fall Fingerling | NPS-S/F | - - | -4] | 47 | yes | yes ${ }^{-21}$ | yes |
| South Puget Sound Fall Fnglg | SPS | yes |  | Ocn | yes | yes ${ }^{2 /}$ | yes |
| Kalama Creek Fall Fingerling | SPS | - - | - - | - - | - - |  | yes |
| Elwha Fall Fingerling |  | - - | - - | -- | - - | - - | - - |
| Hoko Fall Fingerling |  |  |  | Tot | yes | yes ${ }_{21}$ |  |
| Skagit Spring Yearling | NPS-Sp |  |  | Tot | yes | yes ${ }^{2 /}$ |  |
| Nooksack Spring Yearling | NPS-Sp |  |  | Tot | yes | yes ${ }^{2 /}$ |  |
| White River Spring Yearling |  | yes |  | Tot | yes | yes ${ }^{2 /}$ | yes |
| Sooes Fall Fingerling | WACO | - - |  | Ocn | yes | yes | - - |
| Queets Fall Fingerling | WACO | - - | 47 | 47 | - - | - - | yes |
| Cowlitz Tule | CRT | yes |  |  | yes | yes | yes |
| Spring Creek Tule | CRT | yes | 41 |  | yes | yes |  |
| Bonneville Tule | CRT | yes | 41 | 41 | yes | yes | yes |
| Stayton Pond Tule | CRT | yes | 4/ | $4 /$ | yes | yes | yes |
| Upriver Bright | WACO | yes | yes | Ocn | yes | yes | yes |
| Hanford Wild | WACO | yes | -- | Ocn | yes | yes | - - |
| Lewis River Wild | WACO | yes | yes | Ocn | yes | yes | yes |
| Lyons Ferry | WACO | -- | -- | $0{ }^{\circ} \mathrm{n}$ | yes | yes | -- |
| Willamette Spring |  | yes |  |  | yes | yes | yes |
| Salmon River | WACO | yes | yes | Ocn | yes | yes | yes |

[^1]and/or generalizations about fishery impacts will only be appropriate to the extent that these indicator stocks are representative of the array of stocks harvested in the fisheries or the stock groupings which they represent. As in previous years, these indicators are dominated by fall stocks (adult migration to terminal areas during the fall months). The analysis includes 5 spring stocks, 3 spring/summer stocks, 1 summer stock, 10 summer/fall stocks, and 16 fall stocks. In addition, 3 stocks in Idaho (Sawtooth Spring, Rapid River Spring, and McCall Summer) and 1 in Washington (Leavenworth Spring) are tagged as PSC indicator stocks but are not included in the analysis because of the limited number of recoveries in ocean fisheries.

Since the types of data collected for each indicator stock vary, all indicator stocks are not used in all of the analyses (Table 3-2). For example, some stocks do not have base period data (recoveries in the years 1979-1982), or lack estimates of escapement. Additional information on the indicator stocks and tag codes used in the analysis may be found in Appendix C.

### 3.2.1 Theory and Procedures

Theory and procedures employed in the Exploitation Rate Assessment are consistent with those used in previous years (CTC 1988; CTC 1989; CTC 1990; CTC 1991; CTC 1992) except as noted below:

1) The cohort survival rate was computed by dividing the estimated age 2 cohort size by the number of tagged fish released. An index was computed by dividing the estimated cohort survival rate for each brood by the average of the cohort survival rates during the base period. A regional index was computed as the average of the indices for stocks within the stock group. Brood years used in the base period are given in Table 3-3.
2) A brood exploitation rate index was computed by dividing the brood exploitation rate in each year by the average brood exploitation rate in the base period. A regional index was computed as the average of the indices for stocks within the stock group. Brood years used in the base period are given in Table 3-3.

Table 3-3. Brood years used in the brood exploitation and survival indices for the base period and projected period.

| Time Period | SEAKITBR InSIde. Migrating | Ouinsam. | All Other Stocks |
| :---: | :---: | :---: | :---: |
| Base | 1978 | 1976-1980 | 1976-1979 |
| Projected (1992 Analysis) | 1988-1989 | 1989-1990 | 1989-1990 |
| Projected (1993 Analysis) | 1989-1990 | 1990-1991 | 1990-1991 |

Many of the exploitation rate indicator stocks are of hatchery origin and subject to terminal fisheries directed at harvesting surplus hatchery production. As a result, the exploitation rate on the indicator stock may differ from the exploitation rate on the wild stock that it represents because the stocks are subjected to different fisheries. This concern is most evident when attempting to compute the
nonceiling fishery index and brood exploitation rates, two statistics that may include terminal fisheries.

In order to address this concern, the nonceiling fishery indices excluded terminal fisheries if the exploitation rate indicator stocks were subject to different fishing patterns than the associated wild stocks. Nonceiling fisheries included in the analysis are given in Table 3-4 and fisheries that were excluded are listed on a stock specific basis in Section 3.4. Additional information on terminal fishery harvest rates on wild stocks is presented in Chapter 5.

A similar concern regarding representation existed for the brood exploitation rates, since some terminal fisheries might be included that harvested the exploitation indicator stock at a greater rate than the wild stock it represents. In the case of the brood exploitation rate, this was addressed by computing a rate for ocean fisheries and a total for all fisheries. Ocean fisheries were defined to include marine sport and troll fisheries, and CWT recoveries of ocean ages 2 and 3 fish in all nonterminal net fisheries. By partitioning the fisheries in this way, the most appropriate measure of brood exploitation rates on wild stocks could be selected. The method selected for each exploitation rate indicator stock is given in Table 3-2.

Table 3-4. Fisheries included in the nonceiling fishery index.

| Fisheries Included in Nonceiling Inder. |  |
| :---: | :---: |
| United States | Canada |
| Washington/Oregon/California Ocean Troll | West Coast Vancouver Island Net |
| Puget Sound Northern Net | Juan de Fuca Net |
| Puget Sound Other Net | Johnstone Net |
| Washington Coastal Net | Fraser Net |
| Washington/Oregon/California Ocean Sport | Strait of Georgia Net |
| Puget Sound Northern Sport |  |
| Puget Sound Southern Sport |  |

### 3.2.2 Assumptions of the Analyses

Assumptions for the cohort analysis and other procedures used in the Exploitation Rate Assessment are summarized below. Detailed discussions of assumptions and parameter values have been reported previously (CTC 1988).

Cohort Analysis: The primary assumptions of the cohort analysis are:

1) CWT recovery data are obtained in a consistent manner from year to year or can be adjusted to make them comparable. Many of the analyses rely upon indices that are computed as the ratio of a statistic in a particular year to the value associated with a base period. Use of ratios may reduce or eliminate the effect of data biases that are consistent from year to year.
2) For ocean age 2 and older fish, natural mortality varies by age but is constant across years.
3) All stocks within a fishery have the same size distribution for each age and the size distribution at age is constant among years.
4) The catch distribution of sublegal-sized fish is the same as legal-sized fish.
5) Incidental mortality rates per encounter are constant and are equal to $30 \%$ for troll and sport fisheries and $90 \%$ for net fisheries.
6) In the absence of an independent estimate of incidental mortality during nonretention periods, the procedure for estimating the mortality of CWT fish of legal size assumes that the stock distribution remains unchanged from the period of legal catch retention. Gear and/or area restrictions during the CNR fishery are believed to reduce the number of encounters of legalsized fish. To account for this, the number of legal encounters during the nonretention fishery was adjusted by a selectivity factor. A factor of 0.34 was used for the WCVI and GS troll fisheries. This value is the average selectivity factor calculated from 3 years of observer data in the Alaska troll fishery (Mel Seibel, pers. comm.). A factor of 0.20 is used in the NCBC troll fishery. This factor corresponds to the proportion of fishing areas that remain open during nonretention periods. Note that this parameter in itself is not used to estimate the number of encounters during the CNR period; instead, the selectivity parameter is used in conjunction with the gear days data presented in Appendix C. A selectivity factor is not required for the SEAK troll fishery since an independent estimate of encounters is used.
7) Maturation rates for broods for which all ages have not matured (incomplete broods) are equal to the average of the available estimates.

Fishery Indices: The temporal and spatial distributions of stocks in and between fisheries are assumed to be stable from year to year.

Age 2-3 Survival Indices: The age 2-3 survival indices will provide accurate estimates of cohort survival rates if the following assumptions hold: 1) Variations in natural mortality occur primarily before ocean age 2 and 2) variation in natural mortality is large in comparison to variation in fishery exploitation rates and maturation rates.

### 3.2.3 Reported Catch Versus Total Mortalities

Fishery indices are presented for both reported catch and total mortality. The difference between reported catch and total mortality is incidental mortality, which includes the mortality of legal-sized fish in CNR fisheries and the mortality of sublegal-sized fish in retention and CNR fisheries. Management strategies have changed considerably for fisheries constrained by PSC catch ceilings. Regulatory changes that have been implemented include size limit changes and extended periods of CNR. Estimates of incidental mortality are crucial for assessment of total fishery impacts, yet they cannot be determined directly from CWT recovery data. Procedures to estimate these incidental mortality losses and incorporate them into the Exploitation Rate Assessment have been previously described (CTC 1988).

### 3.3 FISHERY INDICES FOR CEILING FISHERIES

### 3.3.1 Overview

Successful completion of the rebuilding program requires a substantial initial reduction in the harvest rates in ceiling fisheries combined with further reductions over time. The initial reduction was expected to occur as a result of implementing a ceiling for each fishery that would reduce catches below pretreaty levels. Hence, if abundance remained stable or increased, the harvest rate would decline. Further reductions in harvest rates for PSC ceiling fisheries were expected as the rebuilding program progressed, due to decreases in harvest rates in previous years and increases in production resulting from higher spawning escapements.

Fishery indices provide a means to assess the effectiveness of the PSC ceilings in reducing harvest rates. The fishery indices were computed for both reported catch and total mortality. The total mortality index includes the mortality of legal-sized fish from CNR fisheries and from sublegal sized fish in the retention and CNR periods. Given a stable age structure, the fishery index for reported catch and the index for total mortality index should give similar results in the absence of regulatory changes that alter the ratio of reported catch to incidental fishing mortality (e.g., size limit changes, CNR fishing periods).

As in the CTC briefing at the postseason plenary session in 1993, the graphs presented in this section also include the time trend of harvest rate indices projected by the 1984 version of the CTC chinook model. Previous annual reports compared the estimates with the 1985 target reduction, which was simply the reduction in the harvest rate that would have occurred in 1985, when the PST ceilings were implemented, if abundance was equal to the average in the base period. The CTC has elected to replace the 1985 target reduction for the following reasons:

1) the 1985 target reduction was only applicable to the first year of ceiling management, since further reductions were expected in subsequent years;
2) the indices from the 1984 chinook model provide an indication of the relative change in harvest rates that were required to rebuild the 1984 model stocks by 1998; and
3) comparison of the estimated indices with the 1984 model projections provides a means to evaluate the assumptions used in the model, and hence, the original technical basis for the analysis used to develop the chinook rebuilding program.

Table 3-5 provides a summary of the fishery indices for reported catch and total fishing mortality for each year since 1985 as well as the 1985-1993 average. In addition, graphs of the index for total mortality are included for each fishery with a PST ceiling. In the graphs, the heavy black line indicates the estimated fishery index for total mortality, the dashed line indicates the fishery index for reported catch, and the light line indicates the 1984 projection of the fishery index.

Detailed stock and age specific information on the fishery indices are provided in appendices D and E. Large variability is often evident when comparing indices of several stocks. This variation may be due to sampling, departures from assumptions, and differential harvest rates. The appendices also include indices for components of two of the PST ceiling fisheries and the U.S. South ocean sport and
troll fishery. These additional indices are provided when the information can be of assistance in evaluating the fishing regimes.

The NCBC troll fishery was partitioned into the NBC and CBC components. Analysis of CWT data has indicated that the stock composition of these fisheries differs substantially, with the LGS and Harrison stocks more prevalent in the CBC fishery. Since 1984, a substantial shift in the relative catch in these fisheries has occurred with a reduced proportion of the catch now occurring in CBC. For example, $24 \%$ of the 1979-1982 catch occurred in CBC versus an average of $9 \%$ in the period 1989 through 1992.

The GS ceiling fishery was partitioned into the sport and troll components. CWT data indicates that the stock composition of these fisheries differs, with the Harrison stock contributing more to the troll fishery. Since the implementation of the PST, the catch in the troll fishery has been reduced to a greater extent than that in the sport fishery. Although a fishery index is presented for the GS troll fishery, the CTC is concerned about the general applicability of the index, since the estimates are primarily dependent upon only a single stock (Big Qualicum).

The reliability of the fishery indices for the CBC and GS troll fisheries for years after 1985 may be reduced because of the limited number of CWT recoveries that are now obtained. Although the CTC inclusion criteria are designed to screen out stocks that have an insufficient number of CWT recoveries to be included in the fishery index, it is based on the average number of recoveries in all years for which recovery data are available. Since catches in the GS and CBC troll fishery have declined substantially from pretreaty levels, it is likely that some stocks now included in the index would be excluded if the average was over a more recent time period.

Estimates of the indices presented in this report for years prior to 1993 may differ from previous estimates, particularly for more recent years, due to a number of factors including: 1) addition of new stocks in the index, 2) revised estimates of nonretention mortality, 3) revised estimates of CWT recoveries, or 4 ) revised estimates of the cohort size for broods that were previously incomplete.

Table 3-5. Percent change from the 1979-1982 base period in the fishery index for reported AEQ catch, total AEQ mortality, and the 1979-1984 and 1985-1993 averages for these statistics.

| Year | SEAK Troll |  | NCBC Troll |  | WCYITroll |  | GS SportITroll |  | USS. South Ocean Sportirioll |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | CollunharR. Stheks, | Puget Sound Stocks |  |  |  |
|  | Reported | Total |  |  | Reported | Total | Reported | Total | Reported | Total | Reported | Total | Reported | Total |
| 1979 | 5\% | 2\% | -1\% | 0\% |  |  | 1\% | 1\% | - 10\% | - 10\% | - $20 \%$ | - $22 \%$ | - 30\% | -30\% |
| 1980 | 2\% | -1\% | 8\% | 8\% | -1\% | - 1\% | 8\% | 8\% | 2\% | 1\% | 5\% | 5\% |
| 1981 | 11\% | 9\% | 21\% | 20\% | -17\% | -17\% | 36\% | 36\% | -6\% | -5\% | 11\% | 10\% |
| 1982 | -14\% | -9\% | - $25 \%$ | -25\% | 12\% | 12\% | - $26 \%$ | -26\% | 15\% | 15\% | 16\% | 16\% |
| 1983 | 32\% | 37\% | -9\% | -9\% | 22\% | 21\% | -24\% | -24\% | -34\% | -35\% | 13\% | 11\% |
| 1984 | -6\% | 0\% | -1\% | -3\% | 45\% | 43\% | 11\% | 12\% | -76\% | -77\% | -21\% | - $22 \%$ |
| $\begin{aligned} & 19791984 \\ & \text { Average } \\ & \text { and } \end{aligned}$ | $5 \%$ | 6\% | I\% | $\text { \% } 1 \%$ | 1\%\% | 10\% | .1\% | 0\%. | 20\% | 20\% | \%\%\% | 1\% |
| 1985 | -3\% | 11\% | - $11 \%$ | - $12 \%$ | - $12 \%$ | -11\% | -37\% | - 37\% | -39\% | -36\% | - 51\% | -51\% |
| 1986 | -33\% | - $28 \%$ | -21\% | -20\% | - $2 \%$ | -3\% | -1\% | 3\% | -44\% | -46\% | $1 /$ | $1 /$ |
| 1987 | -16\% | 2\% | - $22 \%$ | -18\% | - 34\% | -26\% | - $31 \%$ | - 30\% | - 36\% | - 36\% | 9\% | 18\% |
| 1988 | - $32 \%$ | - $27 \%$ | -47\% | -44\% | -13\% | -4\% | - 41\% | -40\% | - $37 \%$ | - $36 \%$ | 356\% | 356\% |
| 1989 | -43\% | -33\% | - $33 \%$ | -32\% | - 57\% | -55\% | - 36\% | -22\% | -12\% | - 10\% | 362\% | 372\% |
| 1990 | - $24 \%$ | -16\% | -31\% | -28\% | - $22 \%$ | - 16\% | - $38 \%$ | -29\% | -35\% | -36\% | 398\% | 418\% |
| 1991 | - $31 \%$ | -14\% | - 30\% | -28\% | -34\% | -31\% | -17\% | -1\% | -49\% | -49\% | 364\% | 374\% |
| 1992 | -50\% | -35\% | - $23 \%$ | -21\% | -13\% | -9\% | -1\% | 20\% | -31\% | -26\% | 346\% | 373\% |
| 1993 | -34\% | - $26 \%$ | 26\% | \% $23 \%$ | 7\% | 1\% | 0\% | 29\% | 27\% | 28\% | 202\% | 196\% |
| $\begin{aligned} & 1985-1993 \\ & \text { Average } \end{aligned}$ | 29\% | $\because 18 \%$ | 27\% | 25\% | 22\% | .17\% | 22\% | \%12\% | 34\% | 34\% | 248\% | 257\% |

$1 /$
No stocks satisfied CTC inclusion criteria.

### 3.3.2 Southeast Alaska

## Southeast Alaska Troll



Figure 3-1. The estimated fishery indices for reported catch and total mortality in the SEAK troll fishery, and the projected indices from the 1984 CTC chinook model.

The fishery indices for the SEAK troll fishery indicate that the harvest rate for total AEQ mortality has been reduced since 1985 by an average of $18 \%$ from the base period, and was $26 \%$ below the base period in 1993. However, the harvest rate reductions for the years 1990-1993 have not been as great as the projections by the 1984 CTC chinook model (Fig. 3-1).

Reductions for the reported catch index have been greater than for total fishing mortality (Table 3-5). The 1985-1993 average index for the reported catch shows a reduction that is 11 percentage points greater than the index for total mortality. The disparity in the indices is due to the SEAK management regime and the high chinook availability and/or abundance in the SEAK fisheries. The result has been a reduction in the number of days of directed chinook fishing in the summer and an increase in the number of CNR days.

The proportion of the harvest occurring in the SEAK sport fishery has increased from an average of $7 \%$ in the base period to $21 \%$ in 1993. Since the fishery index currently includes only recoveries from the troll fishery, the reduction in the fishery index for all gear types included in the SEAK ceiling may not be as great as for the troll fishery. The CTC is evaluating the potential for including additional gear types in the index.

### 3.3.3 North/Central B.C.



Figure 3-2. The estimated fishery indices for reported catch and total mortality in the NCBC troll fishery, and the projected indices from the 1984 CTC chinook model.

The fishery indices for total AEQ mortality in the NCBC troll fishery indicate that harvest rates have been reduced in the range of $12 \%$ to $44 \%$ from 1985 to 1992 , with an average reduction of $25 \%$. In 1993, the index was reduced by $23 \%$ from the base period. As in the SEAK troll fishery, the reductions in harvest rates were not as great as the projections of the 1984 CTC chinook model for the years 1990 through 1993 (Fig. 3-2).

The reduction has been disproportionate between the NBC and CBC troll fisheries (Appendix D), with reductions in the CBC fishery averaging $63 \%$ for 1985-1993. In contrast, the indices in the NBC troll fishery were estimated to have decreased by an average of $8 \%$ for the period 1985-1993. The greater reduction in the harvest rate in the CBC troll fishery may have benefitted the Lower Strait of Georgia (LGS) and Harrison stocks, since analysis of CWT data has indicated that these stocks are more prevalent in the CBC troll fishery than in the NBC troll fishery.

As in all of the ceiling fisheries, the reduction in the harvest rate for reported catch exceeds the reduction for total mortality. However, the differential in the NCBC troll fishery ( 2 percentage points on average since 1985) is relatively small for three reasons: 1) the change in the minimum size limit in 1987 had a relatively small effect since the fishery primarily harvests ocean ages 4 and 5 year old fish, 2) fishery managers have attempted to manage catch rates to minimize CNR periods, and 3) areas with a high incidence of legal-sized chinook have been closed during CNR periods.

### 3.3.4 West Coast Vancouver Island

## WCVI Troll

Fishery Index


Figure 3-3. The estimated fishery indices for reported catch and total mortality for the WCVI troll fishery, and the projected indices from the 1984 CTC chinook model.

Since the inception of the PST, the fishery indices indicate that harvest rates for total AEQ mortality in the WCVI troll fishery have been reduced by an average of $17 \%$ from the base period. A greater reduction has been achieved for reported catch than for total mortality (Table 3-5) due to the increase in the minimum size limit instituted in 1987 and CNR fisheries in 1985, 1987, and 1988. Reductions in harvest rates in this fishery have varied about the 1984 projection but were less than projected for 1992 and 1993.

Since 1990, catch in the WCVI troll fishery has been controlled primarily through restrictions in fishing areas and by limitations on total effort. Fishing effort, both in terms of days open and total boat days, was restricted to the average 1985-1987 level in each year. This strategy appears to be effectively reducing the exploitation rate on most stocks with the exception of the Robertson Creek stock in 1992 and 1993. In those years, the fishery remained open until the end of September. CWT recovery data indicate that during late August and September many of the fish harvested originated from the Robertson Creek Hatchery. As a result, the indices for the Robertson Creek stock were 4.24 in 1992 and 2.84 in 1993. If the WCVI wild stock has a similar temporal and geographic distribution as Robertson Creek, rebuilding will be retarded if this fishing pattern persists. The fishery index for total AEQ mortality for all other stocks in 1992 and 1993 was 0.71 and 0.89 , respectively.

### 3.3.5 Strait of Georgia

## GS Sport and Troll



Figure 3-4. The estimated fishery indices for reported catch and total mortality for the GS sport and troll fishery, and the projected indices of the 1984 CTC chinook model.

Although the fishery indices for the GS sport and troll fishery indicate that the harvest rate has been reduced by an average of $12 \%$ since the inception of the PST, the indices have increased in each year since 1990. The fishery index for 1993 indicated that harvest rates exceeded the base period average by $29 \%$. Estimated reductions in the GS sport and troll fishery harvest rates have not been as great as the projections from the 1984 CTC chinook model in any year following 1985.

The increase in 1993 resulted primarily from the GS sport fishery, for which the 1993 index exceeded the base period by $74 \%$ (Appendix D). Management actions that have been taken in the sport fishery are summarized in Chapter 1. Despite these actions, the fishery indices for the sport fishery from 1991 through 1993 indicates that the harvest rate was an average of $54 \%$ greater than the base period.

Incidental mortalities in the sport and troll fisheries also contribute to the maintenance of the indices near the base period level. In 1993, a 29 percentage point difference existed between the indices for reported catch and for total mortality (Table 3-5). This difference has resulted from changes in minimum size limits and CNR fisheries. However, even the reported catch index was near the base period level in the years 1992-1993.

### 3.4 NONCEILING FISHERIES

Estimates of the nonceiling fishery indices for U.S. and Canadian fisheries are presented in Figs. 3-5 through 3-8. Each figure provides the estimated indices for wild stocks represented by an exploitation rate indicator stock. For example, the LGS wild stock is represented by two exploitation rate indicator stocks (Puntledge and Big Qualicum; Table 3-2). Although the passthrough provision applies to all depressed wild stocks harvested in a nonceiling fishery, insufficient CWT recoveries were available to estimate the index for Canadian stocks in U.S. nonceiling fisheries and U.S. stocks in Canadian nonceiling fisheries. Nonceiling fishery indices could not be estimated for the Skagit Spring, Columbia Upriver Spring, and Harrison River stocks because of the absence of a suitable exploitation rate indicator stock.

For U.S. nonceiling fisheries, indices that are less than 1.0 indicate that exploitation rates have been reduced relative to the base period. All U.S. nonceiling fisheries are included in the indices with the exception of freshwater sport and freshwater net fisheries for all stocks, marine terminal net fisheries in Puget Sound for stocks in the NPS-S/F and SPS stock groups, and marine Washington Coastal net fisheries for stocks in the WACO stock group. Harvest rate indices for terminal fisheries may be found in Chapter 5.

The nonceiling fishery indices for depressed stocks in the NPS-S/F group (Skagit Summer/Fall, Stillaguamish Summer/Fall, and Snohomish Summer/Fall) harvested in U.S. fisheries have exceeded 1.0 in each year since 1990. The index for 1993 indicated that exploitation rates in the fisheries included in the index have increased by $26 \%$ from the base period. For the years 1987-1993, the base period exploitation rates were exceeded by an average of $7 \%$. Estimates of the index are not possible for the years 1985 and 1986 because of the absence of CWTs representing this stock group. The passthrough provision was not applicable to the Skagit stock in 1985-1986 and 1990, since the escapement goal was exceeded. The escapement for the Green River stock failed to achieve the objective only in 1993; the nonceiling index for that year was 0.66 .

The nonceiling index for depressed wild stocks in the WACO group (Grays Harbor Fall and Columbia River Summer) was less than 1.0 in each year with the exception of 1990, and the average value of the nonceiling fishery index was 0.67 . The passthrough provision was not applicable to the Grays Harbor Fall stock in 1987-1990 and 1992, since the escapement goal was achieved.

For the Canadian nonceiling fisheries, indices that are 0.75 or less indicate that exploitation rates in nonceiling net fisheries have been reduced to the target of $25 \%$ below the base period. The WCVI sport fishery is not included in the index since estimated recoveries during the base period are not available. Since this fishery has grown since the base period, failure to include it may lead to an underestimate of the index.

Mean values of the indices for Canadian stocks were less than 0.75 , and year-specific indices exceeded the target value in only two of the 16 stock-year combinations when the passthrough provision would apply. Indices were not computed for the UGS stock in 1987 and 1989 because escapement exceeded the escapement goal.

Since the CTC is frequently asked questions about the U.S. South ocean sport and troll fisheries (including the Strait of Juan de Fuca troll), the indices for these fisheries are presented separately in Figs. 3-9 and 3-10. These fisheries are one component of the aggregate of U.S. nonceiling fisheries
to which the passthrough provision is applicable, and are included in the nonceiling index discussed above. The indices for the U.S. South ocean sport and troll fishery are presented separately for Columbia River and Puget Sound stocks, since these stocks are harvested in different areas. Columbia River stocks are primarily harvested in fisheries off the coasts of Washington and Oregon while the Puget Sound stocks are primarily harvested in the Strait of Juan de Fuca.

The fishery indices for the Columbia River stocks (Fig. 3-9) indicate that harvest rates have been reduced by an average of $34 \%$ since 1985, and the index for 1993 remained $28 \%$ below the base period level. In contrast, the indices for the Puget Sound stocks (Fig. 3-10) indicate that harvest rates on these stocks have increased. The average increase since the 1985 is estimated as $257 \%$.


Figure 3-5. The estimated nonceiling fishery indices for the UGS stock in Canadian fisheries. Indices not computed for 1987 and 1989 as escapement exceeded goal.

## LGS Stock <br> Canadian Nonceiling Fishery Index



Figure 3-6. The estimated nonceiling fishery indices for the LGS stock in Canadian fisheries.


Figure 3-7. The estimated nonceiling fishery indices for the Skagit, Stillaguamish, and Snohomish summer/fall stocks in U.S. fisheries. Not applicable to Skagit in 1990 as escapement exceeded goal.

## WACO Stocks <br> U.S Nonceiling Fishery Index



Figure 3-8. The estimated nonceiling fishery indices for the Grays Harbor fall and Columbia River summer stock in U.S. fisheries. Not applicable to Grays Harbor in 1987-1990 and 1992 as escapement exceeded goal.

## U.S. South Ocean Sport \& Troll Columbia River Stocks



Figure 3-9. The estimated fishery indices for reported catch and total fishing mortality for the U.S. South ocean sport and troll fishery for Columbia River stocks.

## U.S. South Ocean Sport \& Troll Puget Sound Stocks



Figure 3-10. The estimated fishery indices for reported catch and total fishing mortality for the U.S. South ocean sport and troll fishery for Puget Sound stocks.

### 3.5 BROOD EXPLOITATION RATES

Estimates of the brood year exploitation rates for each of the exploitation indicator stocks are tabulated in Appendix G and graphed in Appendix H. The tables in Appendix G provide estimates of the average brood exploitation rates during the base period and annual and average exploitation rates for broods contributing to fisheries since 1985. Changes from base period levels are expressed both in terms of percentage point reductions and percent reductions (e.g., if the brood year exploitation rates during the base period and 1987 were estimated at $50 \%$ and $45 \%$ respectively, the percentage point change would be -5 and the percent change would be $-10 \%$ ). Although Appendix G provides estimates of the brood year exploitation rates in both ocean fisheries and in total for all fisheries, the total brood exploitation rate for an exploitation rate indicator stock may not always be indicative of the exploitation rate on the wild stock group that it represents (see Section 3.2.1). In particular, the wild stocks may not always be subject to the same terminal fisheries as the exploitation rate indicator stocks, which are typically of hatchery origin. The appropriate statistic to use for each stock, ocean or total brood exploitation rates, is listed in Table 3-2.

Sections 3.5.1-3.5.7 provide estimates of the brood exploitation indices for each of the seven stock groups with an exploitation rate indicator stock. Also included, where available, are the projected brood year indices from the 1984 CTC chinook model. Projected indices are not available for all stock groups because the 1984 model included only four stocks.

### 3.5.1 Southeast Alaska/Transboundary Rivers Inside Stock Group (SEAK/TBR-I)

The indices for the total mortality brood exploitation rate for the SEAK/TBR-I stock group were near the base period average of $55 \%$ for the 1982-1985 broods. For the $1986-1988$ broods, the indices indicated that total mortality brood exploitation rates had increased by $22 \%$ relative to the base period average.

The indices for reported catch were less than 1.0 in each year with the exception of the 1986 brood. The disparity between the indices for reported catch and total mortality has resulted primarily from periods of CNR in the SEAK troll and net fisheries. For the 1981-1988 broods, incidental mortality has contributed an average of $40 \%$ of the total mortality for the brood exploitation rate.

### 3.5.2 West Coast Vancouver Island Stock Group (WCVI)

Brood exploitation rates on the WCVI stock group in ocean fisheries have increased for each brood year since 1984. The index for the 1989 brood was $8 \%$ above the base period and well above the projection of the 1984 CTC chinook model.

The increases in the indices can be attributed to increases in both the reported catch and incidental mortality. The detailed stock specific fishery indices presented in Appendix D indicate that much of the increase in the exploitation rate for the 1989 brood may have resulted from the WCVI troll fishery. Harvest of the Robertson Creek Hatchery stock in that fishery in 1992 and 1993 is discussed in greater detail in Section 3.3.4.

The 1982 and 1983 broods were not included in Fig. 3-8 due to difficulties in estimating incidental mortality. Current CTC procedures do not estimate incidental mortality well when survival rates are near zero, as was the case with the 1983 brood of the Robertson Creek indicator stock.

SEAK Brood Total Exploitation Index


Figure 3-11. Estimated brood total exploitation indices for the SEAK/TBR-I stock group.

WCVI Brood Ocean Exploitation Index


Figure 3-12. Estimated brood ocean exploitation indices for the WCVI stock group and the projected indices from the 1984 CTC chinook model.

### 3.5.3 Upper Strait of Georgia Summer/Fall Stock Group (UGS)

The total mortality indices for the UGS stock group have declined since the base period, but have been relatively constant for the 1980 and subsequent broods. For the 1982-1988 broods, brood exploitation rates were reduced by an average of $15 \%$ from the base period. Beginning with the 1983 brood, a more substantial reduction occurred in the brood exploitation rates associated with reported catch. For the 1983-1988 broods, the rate was reduced by an average of $27 \%$ from the base period.

### 3.5.4 Lower Strait of Georgia Fall Stock Group (LGS)

The indices for the LGS stock group indicate that brood exploitation rates have been reduced by an average of $9 \%$ from the base period for the 1982-1989 broods. However, the indices have been greater than the 1984 CTC chinook model projections for 5 of the last 7 broods.

Brood exploitation rates for reported catch have shown a more substantial reduction. For the 19821989 broods, brood exploitation rates for reported catch have been reduced by an average of $29 \%$. However, the reduction in the exploitation rates associated with reported catch has been offset by a $\mathbf{2 8 3 \%}$ increase in incidental mortality. Since this stock group is primarily harvested within GS, changes in the minimum size limit in the GS sport and troll fisheries and periods of CNR in the troll fishery have resulted in a substantial increase in incidental mortality. For the 1989 brood, incidental mortality was estimated to comprise $36 \%$ of the total fishing related mortality.

### 3.5.5 North Puget Sound Summer/Fall Stock Group (NPS-S/F)

Since only the 1975 and 1980 broods of the NPS-S/F were tagged prior to the start of consistent tagging beginning with the 1985 brood, it is difficult to develop an understanding of the time trend in exploitation rates and changes in incidental mortality. However, the total mortality indices have increased for each brood since 1985, and was greater than the base period average for the 1988 brood. This is likely a result of both increases in exploitation rates in the GS sport and troll fisheries and in the U.S. nonceiling fisheries. As shown in Appendix F, the proportion of the mortality of this stock that occurred in the GS fisheries increased from an average of $20 \%$ in the years 1989-1991 to $37 \%$ in 1993.

### 3.5.6 South Puget Sound Summer/Fall Stock Group (SPS)

The indices for the total mortality in ocean fisheries showed a declining trend from 1978 to 1985, and increased from 1986-1988. In 1988, the index indicated that brood exploitation rates in ocean fisheries had declined by $13 \%$ from the base period average. The indices for reported catch have shown a greater decline, and in 1988 the index was $24 \%$ below the base period average.

## UGS Brood Total Exploitation Index



Figure 3-13. Estimated brood total exploitation indices for the UGS stock group.


Figure 3-14. Estimated brood total indices for the LGS stock group and the projected indices from the 1984 CTC chinook model.


Figure 3-15. Estimated brood ocean exploitation indices for the SPS-S/F stock group.


Figure 3-16. Estimated brood ocean exploitation indices for the NPS-S/F stock group.

## WACO Brood Ocean Exploitation Index

Exploitation Index


Figure 3-17. Estimated brood ocean exploitation indices for the WACO stock group in ocean fisheries and the projected indices from the 1984 CTC chinook model.

### 3.5.7 Washington Coastal Spring/Summer/Fall, Columbia River Summer/Fall, and North Oregon Coast Stock Group (WACO)

The index for the 1989 brood of the WACO stock group was $1 \%$ above the base period level and well above the projection of the 1984 CTC chinook model. Results for the 1989 brood were similar to those of the 1986 and 1988 broods, for which the indices averaged only $3 \%$ less than the base period. As with the other stocks, reductions in the brood exploitation rate associated with reported catch have been offset by increases in incidental mortality. For the 1982-1989 broods, incidental mortality increased by an average of $33 \%$ over the base period.

Of the wild stocks included within this stock group, the increasing ocean brood exploitation rates are of greatest concern for the Columbia River Summer stock. This stock is assessed as Not Rebuilding, with escapements indistinguishable from the base period (see Chapter 2). Continued increases in brood exploitation rates coupled with declines in survival rates may also retard the rebuilding progress of stocks currently assessed as Rebuilding.

### 3.6 SURVIVAL RATE INDICES

The age 2-3 survival indices for broods contributing to fisheries in 1994 and 1995 indicate that survival rates will be well below the base period level for all stock groups except SEAK/TBR-I. The largest reductions are for Lower GS Falls ( $-97 \%$ ), Upper GS Summer/Falls ( $-92 \%$ ), North PS Summer/Falls ( $-91 \%$ ), and WCVI Falls ( $-90 \%$ ).

Projections of the changes in survival rates from the base are provided in Fig. 3-18 for each of the ceiling fisheries. For each fishery, a stock group is included within the graph if at least $10 \%$ of that stock group's total fishing mortality occurs in the fishery. For comparative purposes, the graphs include the 1987-1988 broods reported in the 1992 annual report and new projections based on the 1988-1989 broods (brood years included for spring yearlings were 1986-1987 and 1987-1988).

Graphs of the age 2-3 and cohort survival rate indices are presented in Appendix I. With the exception of the White River stock ( $\mathrm{r}=-.23$ ), correlation coefficients for the two indices were generally high: $71 \%$ of the stocks had correlation coefficients between $0.90-1.00,17 \%$ had correlation coefficients between $0.80-0.89$, and $8 \%$ of the stocks had correlation coefficients between $0.70-0.79$. These correlations indicate that the age 2-3 indices are generally a good predictor of the cohort survival rate for a brood, and that the assumptions listed in Section 3.2.2 generally hold. Those assumptions were that 1) variations in natural mortalities occur primarily before ocean age 2 and 2) variations in natural mortalities are large in comparison to variations in fishery exploitation rates and maturation rates.

The age 2-3 indices include only recoveries from ocean age 2 fish for the most recent brood included in the index. Since the predictive capability of the age 2-3 index might decline when only a single age class is available, the correlation analysis was repeated using only ocean age 2 recoveries. For this comparison, $48 \%$ of the stocks had correlation coefficients between $0.90-1.00,13 \%$ had correlation coefficients between $0.80-0.89,9 \%$ of the stocks had correlation coefficients between $0.70-0.79$, and the remainder of stocks had smaller correlation coefficients. These correlations indicate that even when only one age class is available, the correlation between indices generally remains strong.

Since these projections for the survival indices are from the exploitation rate indicator stocks, their applicability to associated wild stocks is uncertain. However, at the very least, reduced abundance of hatchery stocks contributing to fisheries operating under PSC ceilings suggests that exploitation rates on co-mingling wild stocks would be expected to increase in the short term.

Projections of the relative abundance of chinook in the ceiling fisheries are also available from the CTC chinook model (see Section 4.3.1). The model projections for 1994 and 1995 rely upon preseason forecasts of abundance provided by the management agencies. Since the agency estimates are generally derived independently from CWT recovery data, the model projections provide a second source of information for evaluating trends in abundance. Unlike the CWT survival projections, the model predictions 1) use the base period distributions of the model stocks to predict abundance by fishery; 2) include multiple stocks and broods; and 3) tend to show less variability since the survival variations are averaged over a number of stocks.

(c) Stocks in GS Fisheries


Figure 3-18. Percent change from the base period for the age 2-3 survival indices for selected stock groups contributing to the SEAK and NCBC fisheries (a), WCVI fisheries (b), and GS fisheries (c) in 1994 and 1995.

### 3.7 STOCK CATCH DISTRIBUTION

The annual distributions of reported catch and total fishing mortality for the exploitation rate indicator stocks can be found in Appendix F and are summarized on a stock group basis in Chapter 5. Results presented in Appendix F will differ from Appendix J, in which the estimates are obtained from the CTC chinook model. Estimates of the mortality distribution obtained from the model are based upon the base period (1979-1981) exploitation pattern adjusted for changes in stock abundance and fishery exploitation rates. In contrast, the Exploitation Rate Assessment uses annual CWT recoveries to estimate yearly distributions. Since actual recovery data are used, the exploitation rate analysis responds to changes in the ocean distribution of stocks and changes in fishing patterns within major fisheries.

### 3.8 SUMMARY AND CONCLUSIONS

The objectives of the PST chinook rebuilding program are to halt the decline of depressed stocks and attain by 1998 the escapement goals of naturally spawning chinook stocks. In order to achieve these objectives, the PST established two types of fishery management measures, which together were designed to reduce fishery exploitation rates on depressed wild stocks: 1) fixed catch ceilings were established for the all gear catch in SEAK and NCBC, the WCVI troll fishery, and the GS sport and troll fisheries; and 2) passthrough requirements were identified for the remainder of the fisheries.

The catch ceilings were established with the expectation that the initial reduction of harvest rates associated with imposition of the ceilings would be followed by a further progressive reduction of the harvest rates as chinook abundance increased during the rebuilding program. The initial reduction was expected to occur as a result of setting the ceiling for each fishery at a reduced level relative to recent catches, assuming that abundance would remain stable or increase. Further reductions in harvest rates in PSC ceiling fisheries were expected in subsequent years as a result of the increased production resulting from the rebuilding escapements. In years in which abundance precluded harvesting the full ceiling without an increase in the harvest rate relative to the base period, the CTC recommended that further restrictions (e.g., the length of the season) designed to limit harvest rates should be implemented (PSC 1991). Since 1985, the SEAK and NCBC all gear fisheries and GS troll fishery have been managed through the use of ceilings. GS sport fisheries (since 1989) and WCVI troll (since 1990) have implemented additional restrictions related to area closures and effort or bag limits to control harvest rates.

The passthrough provision of the PST applies to the remainder of the fisheries. It requires that "the bulk of depressed stocks preserved by the conservation program...principally accrue to escapement." Although variations exist in the interpretation of this provision, it is evident that the intent was to prevent the harvest of depressed wild stocks in the nonceiling fisheries from offsetting the benefits accruing from the harvest restrictions in the ceiling fisheries.

The primary technical basis of the PST chinook rebuilding program was provided by the 1984 version of the chinook model developed by the ad hoc CTC. The model, which included only 4 stocks and 11 fisheries, implicitly or explicitly included a number of important assumptions regarding incidental mortality and survival rates. The Exploitation Rate Assessment provides a means to assess these assumptions and model projections, and hence, the technical basis for the analysis used to develop the PST chinook management regime. (See PSC (1991) for a more complete description of the model, assumptions, and assessments completed during the development of the chinook rebuilding program).

One crucial assumption of the 1984 model was that survival rates would remain equal to the average rate observed during the base period. Early reports of the CTC indicated that the model projections were extremely sensitive to variations from this assumption. One example provided by the CTC was for a three cycle rebuilding program. The committee noted that with base period survival rates and stock productivity parameters, a stock could be rebuilt with a $25 \%-30 \%$ reduction in exploitation rates in all fisheries. However, if survival rates dropped by only $10 \%$, a $45 \%-55 \%$ reduction in fishery exploitation rates would be required to rebuild the stock in three cycles (see Fig. 6, CTC 1984).

The Exploitation Rate Assessment indicates that survival rates have varied substantially from year to year, and more importantly, have generally been well below the base period. With the exception of SEAK/TBR-I, all stocks groups are projected to have substantial reductions in survival rates in 1994
and 1995, ranging from $-65 \%$ for the SPS group to $-97 \%$ for the LGS group. Although most of the indicator stocks are of hatchery origin, wild stocks will display a similar trend if factors regulating survival are similar to those affecting hatchery stocks. Further, reduced contributions of hatchery fish to fisheries operating under PSC ceilings will increase harvest rates on all co-mingled stocks.

The 1984 analyses also assumed management measures would not be instituted that altered the ratio of incidental fishing mortality to reported catch, relative to the base period used in the model analyses. Hence, the effect of a ceiling on the reported catch was assumed equal to the effect of a ceiling on total mortality.

The assumption of a constant ratio between incidental mortality and reported catch has not been borne out by subsequent events. The expansion of CNR fisheries and increases in minimum size limits have both resulted in increased incidental fishing mortality. On average, since 1985, indices for harvest rates which include incidental mortality have not decreased to as great an extent as the indices computed only for landed catch. The proportion of the reduction for reported catch achieved for total mortality has averaged only $54 \%$ for the GS sport and troll fisheries, $62 \%$ for the SEAK troll fishery, $77 \%$ for the WCVI troll fishery, and $93 \%$ for the NCBC troll fishery.

Since the 1984 model assumed that survival rates would be constant, that the ceiling levels were fixed, and that a constant ratio existed between reported catch and incidental mortality, harvest rates in the ceiling fisheries were projected to decline each year until 1998. Although year to year variation has been evident, the estimated fishery indices for total mortality showed a trend similar to the projections through 1989 in the northern ceiling fisheries, 1990 in the WCVI fishery, and 1988 in the GS sport and troll fishery. Subsequently, the estimated indices for the ceiling fisheries have remained constant or increased. This is most evident for the GS sport and troll fishery, where the index has increased by 69 percentage points relative to 1988. As a result, the harvest rate reductions estimated for the ceiling fisheries in 1993 are all substantially less than the reductions projected in 1984.

An additional assumption of the model was that exploitation rates in the nonceiling fisheries would not increase relative to the base period, or in the case of the Canadian nonceiling net fisheries, would be reduced by $25 \%$. In effect, this was the interpretation by the CTC of the passthrough provision included in the PST Chinook Annex.

The nonceiling indices included in this chapter indicate that exploitation rates in the nonceiling fisheries have been consistent with the projections in 1984 for three out of the four stock groups evaluated. Exploitation rates in Canadian nonceiling fisheries have generally been reduced below target values and, on average, are twice the target value. The analysis indicates that exploitation rates in nonceiling fisheries harvesting depressed wild stocks in the WACO stock group have generally been reduced. However, from 1990 to 1993, the U.S nonceiling fishery index for the North Puget Sound Summer/Fall stock group increased by $25 \%$ from the base period. Although additional information presented in Chapter 5 suggests that this increase may have been offset by reductions in harvest rates in terminal net fisheries, further analysis of the nonceiling fisheries affecting this stock group would be helpful.

Brood exploitation rates provide the best measure of the combined effect of the ceiling and nonceiling fisheries upon a particular stock. They also provide a link between the fishery exploitation rates and the productivity of a stock. CTC analyses in 1983 and 1984 suggested that brood exploitation rates
exceeded the MSY level by 9 to 16 percentage points (PSC 1991). Thus, for the stocks to eventually rebuild, brood exploitation rates would need to be reduced by at least this amount. However, to rebuild by 1998, the reductions would have to be more substantial. For example, the 1984 CTC chinook model estimate of the 1980 brood exploitation rate for the LGS stock exceeded the MSY ER by 16 percentage points, but the exploitation rate on the 1994 brood was predicted to be reduced by 25 percentage points. Similarly, by 1998, ocean brood exploitation rates were expected to be reduced by 31 percentage points for a stock represented by Robertson Creek Hatchery and by 18 percentage points for the Columbia Upriver Bright stock.

Consistent with the previous discussion of exploitation rates in the ceiling and nonceiling fisheries, the Exploitation Rate Assessment indicates that brood exploitation rates have declined, but not to the extent expected in 1984. Significant deviations from the 1984 projections were apparent for the three wild stocks in the 1984 CTC chinook model, and the most recent brood exploitation rates were greater than or equal to the base period average for $50 \%$ of the stock groups.

The Exploitation Rate Assessment indicates that many of the assumptions used in the development of the PSC chinook rebuilding program have been violated. These violations include reductions in survival rates from the base period, an increased ratio of incidental mortality to reported catch, and the potential increase in exploitation rates in nonceiling fisheries affecting the wild stocks in the North Puget Sound Summer/Fall stock group. Violations of the assumptions have generally led to exploitation rates that have exceeded the 1984 projections and are likely to delay the rebuilding of wild stocks.

The potential for departures from the assumptions of the model, and the risks to the rebuilding program, were apparent to the CTC in 1984. When discussing the model projections, the committee noted that the "...primary management implication is that progress toward rebuilding will require periodic assessment and correction to keep on schedule. It will be especially important to establish firm schedules rather than to attempt to institutionalize harvest levels for lengthy periods of time" (CTC 1984). Those recommendations are equally valid at this juncture in the PST chinook rebuilding program.

## CHAPTER 4. CHINOOK MODEL ASSESSMENT

### 4.1 INTRODUCTION

The PSC chinook model is the primary tool employed by the CTC to evaluate how proposed fishery regimes and enhancement could impact the rebuilding program. Model predictions are based on biological information (e.g., productivity, escapement goals, age at maturity, catch distribution patterns, survival rates, enhancement levels) for representative stocks, estimates of fishing mortalities, and observed and projected management actions. At present, the model incorporates 30 stocks and 25 fisheries and is capable of assessing past impacts and predicting future impacts of changing size limits, catch ceilings, enhancement programs, and harvest rate strategies.

The model may be thought of as a book-keeping tool in which production from stocks is distributed among fisheries based on stock-age-fishery exploitation rates and specified fishing strategies. Fishing mortalities for past seasons are estimated according to regulations then in effect (e.g., size limits and CNR). For future years, fishing mortalities are predicted using expectations of stock production and algorithms that model impacts of fishing regimes. The model operates on an annual time step, with the following sequence of events: 1) natural mortality, 2) preterminal fisheries, 3) maturation, 4) terminal fisheries, 5) spawning escapement, and 6) production of progeny (wild and hatchery). Fish that are not harvested, do not die from natural mortality, or do not mature to spawn are recruited to the next age in the cohort for the following year. During the annual model calibration, parameters of the model are re-estimated using new information on the conduct of fisheries (e.g., catch levels, CNR), escapements, survival, and abundance projections. Through the calibration process, the model estimates brood year survivals for each stock represented in the model.

Model predictions can be used both for comparison with and supplementation of the CTC evaluations presented in the previous chapters. For example, model predictions of the fishery indices and stock mortality distributions can be compared with estimates derived from the Exploitation Rate Assessment. A more powerful feature of the model is its ability to integrate information on the abundance and productivity of stocks and provide estimates of the abundance indices for the fisheries and predicted rebuilding schedules for wild stocks. For short-term (1-2 year) predictions, estimates of stock abundance may be obtained directly from the calibration. Long-term predictions are less certain since they depend upon projected management actions, estimates of stock production, and assumptions regarding future brood year survival rates.

### 4.2 METHODS

Abundance indices, fishery indices, and incidental mortality estimates were calculated using methods presented in the 1992 Annual Report (Sections 4.2.2-4.2.4 of Report TCCHINOOK (93)-2). Model estimates of the stock composition and distribution of AEQ total mortality were computed based upon model estimates of stock mortality.

### 4.2.1 Model Calibration and Prediction

All model assessments presented in this report rely on the October, 1994 calibration of the chinook model (Calibration 1094). Data used in the calibration were similar in most cases to the data used in the April 1994 calibration, including estimates of fishery harvest rates through 1992, estimates of
terminal runs or escapements through 1993, and predictions of terminal runs in 1994. For most stocks, future brood survivals (generally brood years 1992 to 1996) were set to the long term average survival of each stock. Specific changes to the April 1994 calibration are noted below.

Ocean catch updates:

1) In SEAK, preliminary estimates of actual 1994 catches, adjusted for add-on, were used for troll, net and sport fisheries.
2) Preliminary 1994 catch in the WCVI troll fishery was used. The WCVI sport catch was assumed to be 50 percent of the 1993 catch.
3) Preliminary 1994 catch estimates in the GS troll and sport fisheries were included.
4) Preliminary 1994 catch estimates for NCBC troll, net and sport fisheries were used.
5) The Washington/Oregon troll catch (North of Cape Falcon) was set to 5,500, and the ocean sport catch was set to zero.

Terminal run updates:
The 1994 terminal run sizes (ocean escapement) for all Columbia River stocks (except Snake River Wild) were updated with preliminary 1994 return estimates.

Future brood survivals:

1) Upper Georgia Strait: The projected survival of the 1991 brood was estimated by multiplying the model estimate of the survival rate of the 1990 brood by the ratio of the age 2-3 index for the 1991 brood to the age 2-3 index for the 1990 brood.
2) WCVI Natural and Hatchery: The projected survival of the 1992 brood was set equal to the 1983 brood, due to abnormal oceanographic conditions and associated mackerel predation.
3) Columbia River stocks: All changes to projected survivals were based on jack returns. The brood 1991 survival of the Willamette spring stock was set equal to the 1990 brood survival. The projected survival of 1992 brood Spring Creek, Bonneville, Cowlitz Falls, and Mid-Columbia Brights was set equal to the 1991 brood survival of each stock. The projected 1991 brood survival of the Upriver Bright stock was set equal to the 1987 brood survival based on record low jack counts in 1993. The 1992 brood survival was set to the average survival of the 1989 and 1990 broods.

Maturity Schedules:
Future brood year maturity schedules were modified to reflect the results of the Exploitation Rate Assessment.

Model projections assumed no changes in future size limits and the following fishery regimes for the
ceiling fisheries:

1) Ceilings of 263,000 in the SEAK and NCBC ceiling fisheries.
2) A $24 \%$ reduction in harvest rates from the 1979-1982 base period for the WCVI troll fishery (the 1985 target reduction).
3) Harvest rates from the 1979-1982 base period for the GS sport fishery (the average reduction estimated by the Exploitation Rate Assessment for the period 1983 through 1991).
4) A catch of 31,000 in the GS troll fishery (Canadian domestic ceiling).

Escapement Goals:
The escapement goals used by ADF\&G through 1993 for the Alaska South Southeast stock were used in the model analysis.

### 4.2.2 Rebuilding Response to Survival and Harvest Assumptions

Given the limited time remaining in the rebuilding program and recent poor marine survivals, the CTC evaluated the sensitivity of the rebuilding projections to the reduced survival rates observed for many stocks in recent years. To determine if large exploitation rate reductions could compensate for reduced survivals and the lack of rebuilding by some stocks, the CTC also evaluated the effect of a $50 \%$ reduction in total mortality exploitation rates. Other harvest reductions could be explored to find a blend of harvest restrictions and rebuilding responses that is acceptable to the Parties.

The chinook model was used to estimate rebuilding status in 1998, using current harvest management regimes, first using long term average survivals for future years, and then using recent five-year average survivals for future years. For comparison, rebuilding status in 1998 was estimated, for both survival scenarios, using a $50 \%$ reduction (relative to the 1990-1993 average) in total mortality exploitation rates in all fisheries.

### 4.2.3 Assumptions of the Analyses

Since the model uses cohort analysis, assumptions of that analysis apply to the model as well, particularly assumptions 2 through 6 (Chapter 3, Section 3.2.2). The following additional assumptions apply to the model assessment:

1) The distribution of the stocks across fisheries is unchanged from the base period.
2) Estimates of escapement and/or terminal run are unbiased.
3) Current escapement goals are equal to the escapement at MSY.
4) For fisheries with ceilings in the model, the proportion of the catch contributed by stocks not included in the model remains constant.

### 4.3 RESULTS

### 4.3.1 Model Estimates of Fishery Abundance Indices

In the SEAK troll fishery, the model estimates that fishery abundance has been greater than the base period level in each year from 1982 through 1994 (Fig. 4-1 and Appendix M). Abundance is estimated to have increased from 1981-1988 to a level over twice the base period average. Abundance remained greater than twice the base period level through 1993, but is projected to drop to near the base period level by 1995.

The abundance trend in the NCBC troll fishery mirrors that in SEAK, although the magnitude of the increase over the base period abundance was roughly half as large (Fig. 4-1 and Appendix M). Abundance in NCBC is expected to decrease to near the base period level by 1995.

In contrast, the model estimates that fishery abundance in the WCVI troll fishery has been equal to or less than the base period level in all but one year since 1985 (Fig. 4-2 and Appendix M). Abundance began declining steadily in 1987 and is projected to be $34 \%$ below the base period in 1995.

Of the ceiling fisheries, the abundance index for the GS troll and sport showed the greatest 1985-1993 reduction from the base (Fig. 4-2 and Appendix M). However, the index has shown an increasing trend in recent years, with 1995 abundance projected to be nearly equal to base period levels.

### 4.3.2 Model Estimates of Fishery Indices

Model estimates of the fishery indices for the ceiling fisheries are shown in Figs. 4-3 through 4-6. For comparative purposes, the indices obtained from the Exploitation Rate Assessment (Chapter 3, Section 3.3) and the 1984 projection lines are also included. The results of the Exploitation Rate Assessment are labeled CWT-based, since results come from annual CWT recoveries. The 1984 projection lines indicate the time series of harvest rate reductions anticipated when the rebuilding program was initiated (introduced in Section 3.3.1).

The model-based fishery index for the SEAK troll fishery indicates that the harvest rate in the fishery has been reduced by $40 \%-55 \%$ since 1988 . The model-based fishery index follows the same year to year trend as the CWT-based index, although the model-based index is lower in all years. Since 1990, the model-based index has been below the 1984 projection line, and the CWT-based index has been above the projection line.

The model estimates that harvest rates have been reduced in the NCBC troll fishery as well. Since 1985, the reduction in the harvest rate from the base period has ranged from $16 \%$ to $43 \%$. The model-based and CWT-based indices have been similar in each year, and both indices for 1991-1993 are above the 1984 projection line.

Similar to the CWT-based index, the model estimates of the fishery indices suggest that harvest rates in the WCVI fishery have been highly variable since 1985. Both indices show a similar trend in most years, with indices falling above and below the 1984 projection line. One difference between the two indices came in 1992, when the model-based index showed a sharp decline while the CWT-based index increased. The increase in the CWT-based index for this year is partially due to an unusually large catch of Robertson Creek chinook (Section 3.3.4). The CWT-based indices for WCVI,

## SEAK TROLL AND NCBC TROLL FISHERY ABUNDANCE INDEX



Figure 4-1. Fishery abundance indices for the SEAK and NCBC troll fisheries.


Figure 4-2. Fishery abundance indices for the WCVI troll and GS sport and troll fisheries.

## SEAK TROLL FISHERY INDICES



Figure 4-3. Model and CWT estimates of the fishery indices for the SEAK troll fishery.

NCBC TROLL FISHERY INDICES


Figure 4-4. Model and CWT estimates of the fishery indices for the NCBC troll fishery.

## WCVI TROLL <br> FISHERY INDICES



Figure 4-5. Model and CWT estimates of the fishery indices for the WCVI troll fishery.

## GS SPORT/TROLL <br> FISHERY INDICES



Figure 4-6. Model and CWT estimates of the fishery indices for the GS sport and troll fishery.
excluding the Robertson Creek stock, were 0.71 and 0.89 in 1992 and 1992, respectively. The exclusion of Robertson Creek substantially reduces the differences between the two indices.

The CWT-based and model-based fishery indices for the GS sport and troll fisheries have been greater than the 1984 model projection in every year since 1985. Both indices indicate that harvest rates increased in 1991-1993 relative to 1985-1990. However, the CWT-based estimates indicate a larger increase in 1992-1993 than the model-based estimates. This divergence may result from biased estimates of the abundance of the Harrison River stock in 1992 and 1993 and/or from the limited number of exploitation rate indicator stocks included in the CWT-based fishery index for the GS fisheries.

### 4.3.3 Model Estimates of Incidental Mortality

Model estimates of total AEQ incidental mortalities for the ceiling and nonceiling fisheries are provided in Appendix K. The ratios of AEQ incidental mortality to AEQ catch (incidental mortality ratio) are presented in Figs. 4-7a and 4-7b for the following six fisheries: SEAK troll, NCBC troll, WCVI troll, GS troll, GS sport, and nonceiling U.S. troll fisheries. The incidental mortality ratio may be simply interpreted as the number of fish that die from incidental mortality for every fish reported caught, where both quantities are expressed in AEQ. For example, a ratio of 0.5 would indicate that one AEQ fish died from incidental mortality for every two AEQ fish landed.

The six fisheries can be divided into two groups. Incidental mortality ratios have been fairly stable for fisheries grouped in Fig. 4-7a (NCBC troll, WCVI troll, and South US troll); the relative proportion of incidental mortality has neither increased or decreased over the time period. Fisheries grouped in Fig. 4-7b (SEAK troll, GS troll, and GS sport) show increased incidental mortality ratios since the base period. For GS sport and GS troll fisheries, the highest ratio values were reached in 1993.

Fig. 4-8a shows total AEQ incidental mortalities by regions. Incidental mortalities in the Southern U.S. have a decreasing trend over time. Canadian incidental mortalities have usually been greater than SEAK or Southern U.S. values. Since 1990, total AEQ incidental mortality has ranged from 411,130 to 479,104 chinook in the U.S. and Canada combined.

Fig. 4-8b illustrates total AEQ incidental mortalities for select Canadian fishery groups. Incidental mortalities remained small for nonceiling fisheries but showed an increasing trend from 1987 for the Georgia Strait sport fishery. Incidental mortalities for Canadian ceiling fisheries (without the GS sport) varied widely, although large increases occurred in 1987 and 1988. Size limits increased in 1987 and CNR fisheries occurred in 1987 and 1988.

### 4.3.4 Model Estimates of Stock Composition and Mortality Distribution

Model estimates of the stock composition in the ceiling fisheries and the proportion of the AEQ mortality that occurred in each fishery are presented in Appendix I.


Figure 4-7. Model estimates of the ratio of AEQ incidental mortalities to the AEQ reported catch for the NCBC troll, WCVI troll, and Southern U.S. troll fisheries (a) and the SEAK troll, GS troll, and GS sport fisheries (b).

## INCIDENTAL MORTALITIES


(a)
(b)

Figure 4-8. Model estimates of total AEQ incidental mortalities for regions (a) and for select Canadian fishery groups (b).

### 4.3.5 Rebuilding Response to Survival and Harvest Assumptions

Table 4-1 lists wild model indicator stocks (those that represent natural chinook stocks), associated escapement indicator stocks, and stock rebuilding results under the two survival and two management scenarios. When long term average survivals and current management regimes are assumed, six wild model stocks are not predicted to rebuild and one stock is predicted to be less than half of its escapement goal in 1998. With a $50 \%$ reduction in exploitation, four stocks are not predicted to rebuild and no stock is predicted to be less than half its escapement goal in 1998. Recent five-year average survivals were lower than the long term average for 13 of 15 wild model stocks (Table 4-2). When recent average survivals are used, eight wild model stocks are not predicted to rebuild and six stocks are predicted to be less than half of their escapement goals in 1998 (Table 4-1). Under this reduced survival assumption, if exploitation rates are decreased by $50 \%$, five stocks are not predicted to rebuild and three are predicted to be less than half of their escapement goals in 1998. The effects on rebuilding of the survival and management assumptions are summarized in Table 4-3.

Table 4-1. Responses of wild model stocks to survival and harvest assumptions. The table reports the year the stock rebuilds or the percent of goal achieved in 1998.

| STOCK YAMES |  | Long Tern, Ayg Sinvivalin Siture |  | Recent 5 yea, 4 y , Survival in Guture |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Model Indicators | Escapment indicators | Current Mgmi. | $50 \% \mathrm{ER}$. <br> Reduction | Current Mgnit. | $50 \% \mathrm{EL}, \mathrm{R}$ <br> Redirtion |
| Alaska South SE ${ }^{1}$ | King Salmon, Andrew Cr., Blossom, Keta, Unuk, Chickamin | NA | NA | NA | NA |
| NCBC | Yakoun, Nass, Skeena, Areas 6 \& 8 Indices, Rivers \& Smith Inlets | 1992 | 1992 | 1997 | 1992 |
| Fraser Early | Upper and Middle Fraser, Thompson R. | 1994 | 1994 | 84\% | 1995* |
| Fraser Late | Harrison River | 1998 | 1995 | 1998 | 1995 |
| WCVI Natural | WCVI Index (7 streams) | 69\% | 1997 * | 45\% | 1997 * |
| Georgia Strait Upper | UGS Index (6 streams) | $59 \%$ | $79 \%$ | 17\% | 27\% |
| Georgia St. Lower Wild | LGS Index (3 streams) | 1998 | 1995 | 1998 | 1995 |
| Skagit Wild | Skagit summer/fall | 58\% | 83\% | 28\% | 42\% |
| Stillaguamish Wild | Stillaguamish | $56 \%$ | 81\% | 40\% | 60\% |
| Snohomish Wild | Snohomish | 62\% | 1996 * | 37\% | 66\% |
| WA Coastal Wild ${ }^{1}$ | Quillayute summer \& fall, Grays Harbor spring \& fall, Hoh spr/sum \& fall, Queets spr/sum \& fall | NA | NA | NA | NA |
| Upriver Brights | Col. Upriver Bright | 1996 | 1995 | 77\% | 1995 * |
| Lewis Wild | Lewis River | 1996 | 1994 | 1997 | 1996 |
| Col. River Summer | Col. Upriver summer | 48\% | 58\% | 28\% | 36\% |
| Oregon Coast ${ }^{1}$ | NOC \& MOC | NA | NA | NA | NA |

[^2]Table 4-2. Comparison of recent five-year average survival to long term average survival for 15 wild model indicator stocks.

| Molel Indicator Stock | Syear Aym. Simyinal is a Proportion of long Tem. hys. Survival | Model Indicator Stock | SMear a ye Sumyival as a Proportion of liong Term. Ays. Suryival |
| :---: | :---: | :---: | :---: |
| Alaska South SE | 0.43 | Stillaguamish Wild | 0.77 |
| NCBC | 0.83 | Snohomish Wild | 0.64 |
| Fraser Early | 0.66 | WA Coastal Wild | 0.96 |
| Fraser Late | 1.17 | Upriver Brights | 0.28 |
| WCVI Natural | 0.91 | Lewis Wild | 0.49 |
| Georgia Strait Upper | 0.35 | Col. River Summer | 0.63 |
| Georgia St. Lower Wild | 1.07 | Oregon Coast | 0.56 |
| Skagit Wild | 0.62 |  |  |

Table 4-3. Summary of rebuilding responses to survival and harvest assumptions by 12 wild model indicator stocks.

| Surinal Irifiection | \#oi Stocl Not Rebuil in 1998 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Current Haryes Meme. | 50\% L.R. <br> Reduction | \% Change | Cument Hismes Mgmt. | $50 \%$ E. R. Reduction | \% Change |
| Long Term Average | 6 | 4 | -33\% | 1 | 0 | -100\% |
| Recent 5-Year Average | 8 | 5 | -38\% | 6 | 3 | -50\% |

### 4.4 DISCUSSION

Since the early 1980s, the CTC chinook model has been the primary tool employed by the CTC to evaluate impacts of proposed fishery regimes and enhancement upon the rebuilding program. The model estimates fishery abundance indices and incidental mortality by fishery, quantities not provided by any other tool. The model also provides some alternative assessments that can be compared with results from other chapters. For example, model predictions of the fishery indices and stock mortality distributions can be compared with estimates derived from the CWT-based Exploitation Rate Assessment.

Analysis of alternative management strategies using an early version of the CTC chinook model formed the foundation for the coast wide chinook conservation program adopted by the Parties in 1984. That model was conceptually much less complex than the current model. It included data for only four stock types: 1) Columbia Upriver Brights (represented by Priest Rapids Hatchery stock), an indicator for far-north migrating fall-type stocks originating in Washington and Oregon; 2) Columbia River Tule (represented by Spring Creek hatchery stock), an indicator for early-maturing chinook stocks harvested off the coast of WCVI and Washington; 3) WCVI fall (represented by Robertson Creek Hatchery stock), an indicator for far-north, fall-type stocks originating in Canada;
and 4) GS fall (represented by the Big Qualicum Hatchery stock), an indicator for fall-type stocks that contribute primarily to GS fisheries.

This early version of the model was used to develop a set of management actions that would rebuild depressed natural stocks by 1998 in a manner acceptable to the Parties. The challenge of rebuilding WCVI and GS stocks was most critical in the development of initial management regimes, since the Upriver Bright stock was close to its escapement goal and the Columbia River tule stock primarily represented hatchery production. The response of individual stocks represented by the indicators was expected to vary depending upon stock-specific attributes, including distribution and productivity.

### 4.4.1 Predictions for Fishery Abundance

The chinook model is the only method that the CTC currently has to predict the relative abundance of chinook available to fisheries. Estimates of stock productivity and forecasts of abundance may be integrated with expectations for management regimes to predict future stock abundance and rebuilding schedules. For short-term (1-2 year) predictions, estimates of changes in chinook abundance by fisheries may be obtained directly from the model calibration. However, recall that fishery-specific estimates assume base-period stock distributions. Since abundance in a given fishery may vary with stock distribution, our best estimate of abundance will be by stock and age across fisheries.

Fishery abundance predictions are highly dependent on the availability of key information, such as stock specific forecasts. In October and November, the months during which this report is prepared, few 1995 forecasts are available. As this information becomes available, the reliability of fishery abundance estimates increases. Abundance estimates made in November provide a preliminary projection of abundance for the upcoming year. Predictions made in November are most useful for predicting trends of abundance in the fisheries.

For SEAK, NCBC, and WCVI, abundance is expected to decrease in 1994 and 1995. If fishery regimes are unchanged, fishery indices in these years can be expected to increase.

It should be noted that there are early indications of abnormally low survivals for several stocks. Consequently, it is recommended that data available through 1994, and forecasts of abundance for 1995, be incorporated into the model before future management regimes are established.

### 4.4.2 Model Estimates of Fishery Indices

Fishery indices estimated from the model show similar patterns to CWT-based fishery indices, but the values differ for some fisheries. These differences have four primary causes:

1) The CWT based estimates may be biased if not all stock types are proportionately represented and changes in exploitation rates have differentially affected the stocks. Although the model includes more stocks, analyses generally assume that changes in the harvest rates in a fishery affect all stocks equally.
2) Unlike the model-based fishery indices, which are calculated using a fixed set of stocks, the set of stocks included in the CWT-based fishery indices may differ from year to year. This is because the index calculation relies on criteria for including stocks, based on yearly CWT recoveries. If the index for a particular stock is biased, then inclusion or
exclusion of this stock would affect the fishery index estimate.
3) The model employs CWT data collected during the 1979-1982 base period (for most stocks) as an average representation of the harvest pattern of each stock. These average data mask year to year variations in both the spatial distribution of stocks and harvest patterns within a fishery. The CWT-based index captures the variability by using tags recovered annually from fisheries.
4) Procedures used to develop input data and calibrate the model may result in fishery indices that are similar in pattern but different in magnitude from the estimates obtained from the CWT-based assessment. These procedures include the following:
a) Aggregation of tag groups during the model base period.
b) Scaling of stock abundance in the initial year represented in the model (1979).
c) Scaling of exploitation rates for the years between the base period and 1985, when ceilings were imposed.

While model-generated patterns of fishery indices are consistent with those produced by the CWT analysis, the index values differ substantially for some fisheries. For example, the model-based indices for the SEAK fishery are consistently lower than the CWT-based indices. The CTC believes that the fishery index generated by the CWT-based Exploitation Rate Assessment is the best available estimate of the fishery index for the stocks represented in the analysis. Conversely, the model estimates are useful for examining trends within a fishery since 1985, for predicting the effect of future changes in stock abundance upon the fishery indices, and for examining fisheries where few exploitation rate indicator stocks have sufficient recovery data to be used in the fishery index, such as the Georgia Strait sport and troll fisheries.

### 4.4.3 Incidental Mortality

Although the theory underlying estimation of incidental mortalities is similar for both model representation and CWT-based exploitation rate assessment, the methods do not provide identical information. The CWT-based methods provide estimates of incidental mortality for a CWT group, while the model estimates incidental mortalities on a fishery basis and then distributes those mortalities across all stocks harvested by the fishery. For this reason, only the model can estimate total fishing mortalities by stock and fishery.

In construction of the initial chinook model, assumptions were necessary to represent processes that were not fully understood or for which data were not currently available. One such process involved the estimation of impacts of incidental fishing mortalities. The 1984 model projected impacts of PSC management regimes assuming that the ratio between reported catch and incidental mortality would remain constant. As the Parties implemented catch ceilings, a number of new regulatory measures increased incidental mortalities, e.g., CNR and size limit increases. Algorithms were incorporated into the model to estimate and account for these sources of incidental mortality.

The yearly magnitude of incidental mortalities is a function of fish abundance and management actions. Increasing size limits and conducting CNR fisheries will increase the number of incidental
mortalities regardless of abundance. Since 1985, total incidental mortalities in the PSC management area have ranged from 380,000 to 460,000 . This compares to a 1979-1981 average of 330,000 . The incidental mortality increase since 1982 in SEAK fisheries is due to increased abundance in the SEAK ceiling fishery and increased CNR days. This is in spite of a delay in the starting date for the SEAK troll fishery that has partially offset the increase in CNR days. In Canadian fisheries, only NCBC has been affected by high abundance. Canadian incidental mortality increases have been primarily due to changes in size limits (Table 4-4), with CNR fisheries (Appendix J) making a limited contribution. The increase is particularly apparent in the GS fishery. The incidental mortality decrease in Southern fisheries has been primarily due to an abundance decrease in hook and line fisheries.

Table 4-4. Changes in minimum size limits in troll and sport fisheries since 1979.

| Fislieny | Base Mininum Siye Linit |  |  |
| :---: | :---: | :---: | :---: |
|  |  | Yearor Change | New Minimini. Size Linil |
| NBC and CBC Troll WCVI Troll | 62 cm Fork Length | 1987 | 67 cm Fork Length |
| Georgia Strait Troll | 48 cm Fork Length | $\begin{aligned} & 1983 \\ & 1986 \end{aligned}$ | 54 cm Fork Length 62 cm Fork Length |
| Georgia Strait Sport | 30 cm Fork Length | $\begin{aligned} & 1981 \\ & 1989 \end{aligned}$ | 45 cm Fork Length 62 cm Fork Length |
| Puget Sound Sport | 51 cm Total Length | 1982 | 56 cm Total Length |

### 4.4.4 Rebuilding Response to Harvest Reductions

Survival rates, in general, have been decreasing over time and show no indication of improving in the near future. As such, it may be more realistic to model future years using recent five-year average survivals. When recent survivals and current harvest management regimes are assumed, eight stocks are not predicted to rebuild by 1998 . With a $50 \%$ exploitation rate reduction, three of these eight stocks are predicted to rebuild: Fraser Early, WCVI, and Upriver Brights. It is important to note that these three stocks are major contributors to both ceiling and nonceiling fisheries. When a $50 \%$ exploitation rate reduction is modelled, the number of stocks predicted to be less than $50 \%$ of their escapement goal in 1998 also decreases, from six to three.

However, even with a $50 \%$ exploitation rate reduction, some natural stocks are not predicted to rebuild by 1998. For some stocks this is because too little time remains in the rebuilding program for this level of exploitation reduction to be effective. For other stocks, it is likely because factors other than harvest are limiting rebuilding. For all of these stocks, additional harvest and non-harvest management actions will be required to achieve rebuilding goals.

The level of exploitation rate reduction examined by the CTC ( $-50 \%$ ) does not represent a recommendation. Rather, it was chosen as a large magnitude change implemented equally over all stocks, to investigate rebuilding success under selected survival assumptions. Actual reductions will depend upon policy choices regarding the stocks to rebuild by 1998 and constraints on the management actions that can be taken in the fisheries.

## CHAPTER 5. INTEGRATED ASSESSMENTS

### 5.1 INTRODUCTION

This chapter integrates information from all of the CTC assessments and presents the information in a summarized form for 1) groups of naturally spawning chinook stocks (Section 5.3) and for 2) the four ceiling fisheries and the U.S. nonceiling fisheries (Section 5.4).

Stock groups used in the integrated assessments include wild and hatchery populations that are considered representative of wild chinook stocks in an area. Hatchery populations that are not representative of wild stocks (e.g., Columbia River Tules) are not evaluated in this chapter. Stock groups were defined based on geographic proximity, run timing, and similarity of catch distributions. Grouping stocks is advantageous in that: 1) the consistency of responses within the group may be evaluated; 2) data gaps for a stock may be covered by other stocks within the group; 3) multiple observations within a stock group may reduce errors; 4) results are easier to present and summarize; and 5) appropriate management actions may be more readily discernable. If the stock groupings are appropriate, the variation in the rebuilding response of stocks within a group is likely due to factors other than fishing mortality in the ceiling fisheries.

### 5.2 METHODS

Analytical methods used in the integrated assessments were described in detail in the 1989 Annual Report (CTC 1990). The following sections provide a brief description of the information presented in this chapter and note changes that have occurred since the 1992 assessment.

Information contained in the summary tables is divided into four major parts:
Part A - Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Dates;
Part B - MSY Exploitation Rates and Brood Exploitation Rates;
Part C - Distribution of Fishing Mortality and Fishery Exploitation Rates; and
Part D - Abundance and Survival Indices.
Note that in the summary tables, the notation NA indicates that the data are not available while NR indicates that the data are not representative of the naturally spawning stocks associated with each group.

## Part A - Assessments of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Dates

Escapement Indicator Stocks. The stocks in each group are ordered by rebuilding status (column 3) for stocks with escapement goals and in alphabetical order for those without defined spawning escapement goals.

The indicator stock name is followed by an index of the average harvest rate in the terminal area during the rebuilding period. The annual terminal harvest rate estimates are converted to an index by dividing the observed harvest rate for each year by the average harvest rate during the 1979-1982 base period used in the Exploitation Rate Assessment (Chapter 3). These annual indices are then averaged for years with valid data during the 1985-1993 period. The terminal harvests reported in Part A of the summary tables are not included in the nonceiling fishery indices computed in Part C of the summary tables. This is because the stocks used to calculate the nonceiling fishery index are typically hatchery stocks and do not necessarily represent the terminal harvest rates of wild stocks.

The third column contains the indicator stock rebuilding status (from Chapter 2) and the fourth contains the escapement goal for the stock. Next are two columns with the escapements averages for the base period and for the last five years (1989-1993), both expressed as a percentage of the escapement goal. Base periods used in this calculation differ among stocks (see Chapter 2, Section 2.2.4).

PSC Chinook Model. The first column lists stocks included in the PSC chinook model that are associated with the stock group.

The second column reports the year in which the stock is predicted to rebuild or the percentage of the escapement goal achieved in 1998. The year rebuilt is defined as the earliest year in which the spawning escapement goal is predicted to be achieved and met in each subsequent year through 1998 . The rebuilding predictions were developed using procedures discussed in Chapter 4.

## Part B - MSY Exploitation Rates and Brood Exploitation Rates.

Part B presents information on both the estimated MSY and brood year exploitation rates. Both rates are calculated as actual proportions.

PSC Chinook Model. The first column lists the stocks included in the PSC chinook model (as in Part A). The next column reports the model estimated MSY ER which is the exploitation rate (using AEQ) that is sustainable when spawning escapement is maintained at the stock's established escapement goal. Estimates of the MSY ER are dependent upon the stock-specific productivity estimate used in the chinook model, adjusted for survival patterns estimated through calibration procedures. These productivity estimates were derived using the following procedure:

1) An estimate was made of the stock specific intrinsic rate of increase (Ricker A value) for a Ricker type stock/recruitment function. A procedure was developed for estimating the relative stock productivity using available information on harvest rates and trends in abundance (CTC-AWG Model Documentation 1989). This approach relies on the following key assumptions:
a) harvest rates (as estimated from CWT recovery data on the stock group of interest) and annual survivals were constant during the base period and the four years prior to the base period;
b) escapements are estimated in a consistent manner and without bias;
c) the escapement goals supplied by the agencies are optimum goals and are expressed in units consistent with spawning escapement estimates; and
d) assumptions used in the calibration procedure are valid.
2) During the calibration phase of the model, the productivity function was adjusted (by brood year) by fitting it to observed stock abundance data. This provided an annual time series of correction factors for the initial productivity estimate and that incorporates variations in year to year survival.

The MSY ER was computed using the following formulas. First, the AEQ returning run size $\left(\mathrm{R}_{\mathrm{o}}\right)$ at
optimum escapement was estimated as:

$$
R_{o}=O * s * \exp ^{\left(A *\left(1-\frac{O}{B}\right)\right)}
$$

where :
$O$ : optimum escapement
$A, B \quad$ Ricker stock productivity parameters
$s$ : average productivity adjustment factor
The MSY ER was then computed as:

$$
M S Y E R=1-\frac{O}{R_{o}}
$$

Exploitation Rate Assessment. This section of Part B lists the estimated brood year exploitation rates, presented as an average for the stock group. The exploitation indicator stocks used in each group are shown in Table 3-2 (Chapter 3).

The average brood exploitation rates for the stock group are partitioned into ocean and total mortality. The exploitation rate is reported for brood years contributing to the base period and the rebuilding period. Comparing the exploitation rates for each period gives an indication of the change under PSC management regimes. The amount by which the total value exceeds the estimate of MSY ER for the associated model stocks indicates the minimum reduction required if the escapement goal is ever to be achieved. However, to achieve rebuilding within a specified time, reductions in total exploitation may have to be substantially below the estimated MSY ER.

## Part C - Distribution of Fishing Mortality and Fishery Exploitation Rates.

Part C presents results from the Exploitation Rate Assessment (Chapter 3), including distribution of total fishing mortality and indices of total exploitation rates (i.e., stock, fishery and nonceiling indices).

Fisheries included in the total fishing mortality distribution and the fishery index for each ceiling fishery are given in Table 5-1. For the SEAK and NCBC fisheries, all gear types are included in the distribution calculations but the fishery index is reported for the troll gear only. Therefore, caution should be used when comparing the fishery index with the catch distribution information.

Table 5-1. Fisheries included in the total mortality distribution and in the fishery index for each ceiling fishery.

| Ceiling Fistiery | Pisheries Included in Distribution of Total Mortality | Eisheries Included in Fishery Index |
| :---: | :---: | :---: |
| Southeast Alaska | Troll, Net, Sport | Troll |
| North/Central British Columbia | Troll, Net, Sport | Troll |
| West Coast Vancouver Island | Troll | Troll |
| Strait of Georgia | Troll, Sport | Troll, Sport |

Terminal catches are not included in the summary tables when the exploitation rate indicator stock (generally a hatchery stock) was subject to terminal fisheries from which the associated natural stock was not subjected. Fisheries excluded from the total fishing mortality distribution, nonceiling index and from the stock index are identified in Table 5-2. The total fishing mortality distribution data presented in the summary tables differ from those presented in Appendix F due to this exclusion.

Table 5-2. Exploitation indicator stocks and associated fisheries excluded from the total mortality distribution, nonceiling index, and stock indices.

| Explorition Indieator. Stocks | Fisheries Excluded |
| :---: | :---: |
| Robertson Creek | WCVI net and sport fisheries. |
| Samish, Stillaguamish, South Puget Sound Fall Fingerling | Puget Sound terminal net fisheries. |
| Queets, Sooes Fall Fingerling | Washington coastal net fisheries. |
| Upriver Bright, Lewis River Wild, Lyons Ferry, Hanford Wild | Columbia River net and sport fisheries. |

Distribution of Total Fishing Mortality. The first column lists the ceiling and nonceiling fisheries. The second column reports the 1985-1993 average distribution of total AEQ fishing mortality for the exploitation rate indicator stocks in each stock group.

Stock Index. The first column lists the 1993 stock index for the ceiling and nonceiling fisheries. The second column lists the 1985-1993 average stock index. A stock index was not calculated for fisheries in which the stock group had a low incidence of occurrence (equal to or less than $1 \%$ of the total fishing mortality).
Fishery Index. The first column lists the 1993 fishery index for the ceiling fisheries. The second column lists the 1985-1993 mean total mortality fishery index for each ceiling fishery. Values in this portion of
the summary tables are extracted from Table 3-5.
Nonceiling Index. The remaining columns of this section list the nonceiling fishery index. Values are obtained from the exploitation rate assessment (Chapter 3).

Part D - Abundance and Survival Indices.
Survival. The survival indices are based upon CWT release and recovery data for the exploitation rate indicator stocks. The brood year survival indices for individual stocks in each stock group are computed as described in Section 3.1.1 and then are averaged and indexed to the base period. If survival of the exploitation rate indicator stocks is representative of the survival of the stock group, the 1990 and 1991 brood year indices should be an indicator of the brood abundance expected to contribute to fisheries in 1994 and 1995.

Abundance. Abundance indices represent chinook model estimates of age 2 abundance for CTC model stocks associated with the stock group. The index is created by dividing the model estimates of annual abundance of age 2 cohort (age 3 for spring type stocks) by the average initial cohort size during the base period. If the estimated abundance of the chinook model stocks is representative of the abundance of the associated stock group, the 1990 and 1991 brood indices should be an indicator of the brood abundance expected to contribute to fisheries in 1994 and 1995.

### 5.3 STOCK GROUP SUMMARIES

The remainder of this section contains the stock group summaries as described in part 5.2.

### 5.3.1 Southeast Alaska/ Transhoundary Rivers Inside (SEAK/TBR-I)

Synopsis. Among the six stocks, rebuilding status ranges across the full spectrum, but ònly one stock (King Salmon) was classified as Not Rebuilding. These stocks are harvested predominantly in SEAK fisheries, with a minor proportion taken in NCBC. Although the fishery index has declined in both SEAK and NCBC, the stock index has not. The stock index has increased 20\% (1985-1993 mean) over the base period, but the stock index may not be indicative of wild stock harvest rates because of limited base period data from sport and net fisheries. The estimated net gear exploitation rate was very small ( $0.5 \%$ ) during the base period and any small increase in net catch affects the estimate. For example, the 1993 stock index ( $25 \%$ increase over base) was composed of an estimated $36 \%$ decrease in the troll, a $4 \%$ decrease in the sport, and a $1,493 \%$ increase in the gillnet components of the stock index.
A. Assessments of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks PSC Chinook Model

| Indicator Stocks | 1985-1993 Terminal HR Index | Status | Goal | $\frac{\%}{\text { Base }}$ | $\frac{\text { f Goal }}{1989-1993}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Andrew Creek | NA | Above Goal | 750 | 51\% | 146\% | Alaska South SE | 1997 |
| Keta Index | NA | Rebuilding | 300 | 85\% | 174\% |  |  |
| Chickamin Index | NA | Rebuilding | 525 | 60\% | 104\% |  |  |
| Unuk Index | NA | Rebuilding | 875 | 105\% | 99\% |  |  |
| Blossom Index | NA | Indeterminate | 300 | 34\% | 86\% |  |  |
| King Salmon | NA | Not Rebuilding | 250 | 37\% | 75\% |  |  |

B. HSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (SEAK/TBR-I Stock Group)

| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | $\begin{aligned} & \text { Rebuilding } \\ & 1981-1989 \end{aligned}$ |
| Alaska South SE | NA* | Ocean <br> Total | $\begin{aligned} & 0.54 \\ & 0.55 \end{aligned}$ | $\begin{aligned} & 0.54 \\ & 0.60 \end{aligned}$ |

* New escapement goals were not included in the October, 1994 recalibration of the Chinook Model. MSY ER for this stock group will be included in the 1994 assessment.



## D. Abundance and Survival Indices




Comments. Results from ADF\&G tagging studies of four of these escapement indicator stocks indicate that ocean rearing of fish from stocks in this group occurs primarily in SEAK inside waters (Pahlke in press, ADF\&G unpublished data). Prior to rebuilding, it was hypothesized that these stocks had excessive exploitation rates in SEAK fisheries. Large-scale time and area reductions during spring SEAK troll and gillnet fisheries contributed to the high escapements in the mid-1980s in the four Behm Canal stocks. These conservation measures remain in place. The recent declines in Behm Canal escapements appear to be due to a combination of reduced marine survival and density dependent freshwater mortality (McPherson and Carlile in prep.). The 1990 brood year survival index has increased from .328 in 1989 to 2.23 for the 1990 brood. Results from a 1994 study on the Unuk River to estimate escapement and spawning distribution indicate that exploitation on the Unuk River is between $13 \%$ and $20 \%$ in all sampled SEAK fisheries. This study indicates that current exploitation rates are not excessive. ADF\&G believes that a similar study needs to be performed for the Chickamin stock to determine if exploitation rates are excessive. Of the other two stocks in this group, Andrew Creek has consistently been Above Goal since the mid-1980s and King Salmon River has remained relatively static.

### 5.3.2 Southeast Alaska/ Transboundary Rivers Outside (SEAK/TBR-O)

Synopsis. The Situk is Above Goal and the Taku and Stikine are Rebuilding. The Alsek is classified as Not Rebuilding. These stocks are harvested as mature fish in SEAK fisheries and (with the exception of the Situk) in Canadian inriver fisheries. Exploitation rates of these stocks cannot be directly measured at this time because no indicator stocks are currently marked. This situation may be remedied in future years because the Taku stock has been tagged beginning with the 1991 brood.
A. Assessments of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks
PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status | Goal | $\frac{\% ~}{\text { Base }}$ | $\frac{f \text { Goal }}{1989-1993}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Situk | 0.78 | Above Goal | 600 | 217\% | 147\% | None |  |
| Stikine(TBR) | NA | Rebuilding | 5,300 | 37\% | 120\% |  |  |
| Taku (TBR) | NA | Rebuilding | 13,200 | 35\% | 85\% |  |  |
| Alsek (TBR) | NA | Not Rebuild | 4,700 | 57\% | 46\% |  |  |

Tables B, C, D. No model or exploitation rate indicator stocks.
Comments. Results from ADF\&G and NMFS tagging of all four escapement indicator stocks indicate that these stocks are not harvested as immature fish in SEAK fisheries (Kissner 1986; Hubartt and Kissner 1987; NMFS unpublished data). The Taku and Stikine Rivers support the largest chinook stocks in SEAK. Both have responded well during the rebuilding period. Prior to 1976, these stocks were targeted primarily in SEAK troll and terminal gillnet fisheries in April through early July. Data from fishwheels operated at mile 12 of the Taku River indicate that $10 \%$ of the spawning migration is inriver by May 14 and $90 \%$ by June 26 (McGregor et al. 1991); timing in the Stikine is similar. In the late 1970s and early 1980s, increasing time restrictions eliminated most of the spring troll fishery. The troll fishery in the outside area presently does not begin until July 1. Since 1975, the spring SEAK terminal gillnet fisheries have been delayed until late June. The harvest has been reduced to small numbers in the SEAK June troll hatchery access fishery (last conducted in 1992), terminal gillnet and sport fisheries, and in the Canadian inriver fisheries.

The Alsek and Situk are located on the outside coast in the northwest corner of SEAK. Harvest of Situk fish is primarily by inriver SEAK fisheries; tags show little exploitation by the troll fishery. Harvest of Alsek fish is primarily by Canadian and SEAK inriver fisheries. The SEAK gillnet fishery at the river mouth is restricted in the spring to reduce incidental catch of chinook salmon. Neither stock initially responded to rebuilding efforts, even though fisheries in both rivers underwent restrictions to protect returning adults. ADF\&G examined spawner-recruit data for the Situk (which is the most complete set of data of any SEAK stock) and found that harvest rates were below the MSY level and revised the escapement goal downward to 600 (from 2100). It is not obvious why the Alsek has not met the rebuilding schedule, but it is apparent that harvest rates are low. One explanation is that rearing habitat may be reduced, since over the last century much of Dry Bay, at the Alsek river mouth, has filled with sediment.

ADF\&G analysis of information on run timing and distribution from past tagging studies on the Taku, Stikine, and Situk indicates that current ocean harvest of these stocks is probably low. Preliminary indications from a current tagging study on the Alsek suggest that harvest in SEAK salmon fisheries may have little effect on the Alsek rebuilding (ADF\&G, CDFO, unpublished data).

### 5.3.3 North/Central B.C. Spring/Summer (NCBC)

Synopsis. The rebuilding status of NCBC stocks is similar to last year, with the north coast stocks remaining Above Goal, and the central coast stocks still not rebuilding. One exception is the Nass River which dropped this year to a Not Rebuilding status. The 1985-1993 average terminal harvest rates on the Nass stock were about double the base period level. Although escapements to the Central Coast escapement indicator stocks continue to be depressed (with the exception of Rivers Inlet), the trends in their escapements are highly uncertain. Exploitation rates on central coast stocks can not be estimated due to a lack of quantitative escapement data on tagged stocks. Further, there is increasing concern that the escapements reported have not been monitored with consistent methods.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks
PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status | Goal | $\frac{\%}{\text { Base }}$ | $\frac{\text { f Goal }}{1989-1993}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Yakoun | NA | Above Goal | 1,580 | 50\% | 123\% | North/Cent BC | 1992 |
| Skeena | 0.75 | Above Goal | 41,770 | 50\% | 142\% |  |  |
| Rivers Inlet | NA | Rebuilding | 4,950 | 50\% | 140\% |  |  |
| Area 6 Index | NA | Not Rebuilding | 5,520 | 50\% | 10\% |  |  |
| Area 8 Index | NA | Not Rebuilding | 5,450 | 50\% | 42\% |  |  |
| Nass | 2.00 | Not Rebuilding | 15,900 | 50\% | 57\% |  |  |
| Smith Inlet | NA | Not Rebuilding | 2,110 | 50\% | 21\% |  |  |

B. MSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (NCBC Stock Group)

|  |  | Brood Exploitation Rates <br> Indicator Stocks | MSY ER |
| :--- | :---: | :---: | :---: |

C. Fishing Mortalities and Catch Distribution

Exploitation Rate Assessment (NCBC Stock Group)


## D. Abundance and Survival Indices



Comments. Terminal area exclusion catches have been included in terminal run and harvest rate estimates. Terminal runs to the Nass River have increased since the base period but increased terminal catches, particularly between 1991-1993, have resulted in reduced spawning escapements.

Interpretation of the NCBC escapement trends are further complicated by inconsistency in escapement monitoring programs. The Yakoun and Skeena data are considered to provide consistent indices of escapement since the base period. However, changes in methods, and annual variation in which streams were surveyed, have complicated each of the other NCBC indices. In the Nass, CDFO monitoring effort has been reduced and monitoring through Native programs increased. The comparability of these data is uncertain. In Area 6, assessments in three of the past four years have not included the largest chinook population, the Kemano River, due to inaccessibility and the glacial nature of that river. In Area 8 escapement monitoring is now largely limited to the Dean River but the monitoring has been quite consistent. The Dean does comprise the vast majority of the Area 8 Natural index. In Smith Inlet, the methods used are poorly documented but recent observations are not considered to be comparable to past observations. Staff presently conducting escapement counts do not expand to total escapement estimates since past methods for expansion are not known. Escapement to Rivers Inlet has been estimated by adult mark-recapture programs since 1991. Frequently, such programs over-estimate stock size due to tag loss and/or tagging mortality. Such an error, however, is difficult to detect and measure. CDFO will review the historical data and stock status of this stock.

In spite of these inconsistencies, CDFO agrees that the escapements to most naturally spawning chinook stocks in central B.C. continue to be depressed. The reason for the lack of rebuilding may be associated with the lower productivity in these populations, or interception of these stocks in local net fisheries. However, due to a lack of tagging or stock identification programs, these alternatives can not be evaluated.

### 5.3.4 West Coast Vancouver Island Fall (WCVI)

Synopsis. The WCVI populations have recently experienced very rapid declines in marine survivals (brood years 1990 through 1992) and are not expected to meet rebuilding goals by 1998. Total exploitation rates are not presented for this stock since the intensive terminal fisheries on the exploitation rate indicator stocks (Robertson Creek hatchery) are not considered representative of these smaller WCVI populations. Terminal fisheries do impact these populations, but the catches are reported to be small.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks
PSC Chinook Model

B. HSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (WCVI Stock Group)

|  |  |  | Brood Exploitation Rates <br>  <br> Indicator Stocks |  |
| :--- | :---: | ---: | :---: | :---: |
| WCVI Hild | MSY ER | Type | Rebuilding <br> 1976-1979 | 1982-1989 |

C. Fishing Mortalities and Catch Distribution

Exploitation Rate Assessment (WCVI Stock Group)



Comments. No terminal harvest rate data are available for these natural populations but terminal catch does occur by both Native and recreational fisheries. The ocean exploitation rate estimated for this stock is less than the MSY ER value, but catch in these terminal fisheries will increase the exploitation rates.

Escapement trends for the stock group do not show continued declines (Chapter 2) but these values are confounded by returns from enhancement programs in many of these rivers.

The lack of response in spawning escapement and recent sharp declines in marine survival is of significant concern to the CTC. This stock group and associated hatchery stocks make important contributions to ocean troll fisheries and their reduced production will change stock compositions in these fisheries. Poor survival and recent ocean exploitation rates will also result very poor terminal runs. This problem will be compounded if exploitation of the stock by the WCVI troll fishery does not decline from the 1992 and 1993 levels.

Marine survival of the exploitation rate indicator stock has now been observed to vary by over two orders of magnitude!

Returns of age 2 males to the Somass River in 1994 were consistent with the poor survival rate assumed during the 1094 model calibration.

### 5.3.5 Upper Strait of Georgia Summer/Fall (UGS)

Synopsis. While the brood exploitation rates have been substantially reduced, rates remain above MSY levels and this stock continues to be assessed as Indeterminate. This assessment is largely the result of highly variable escapement returns (Appendix A and B). In 1993 the escapement was less than half the goal while in 1992 the escapement was above goal. The average total exploitation rate remains higher than the MSY ER value largely due to the exploitation in SEAK (Stock Index $+41 \%$ ). It is of particular concern that continued poor survival of the exploitation rate indicator stock is projected. If the poor survival and exploitation levels are representative of the natural stocks, it is unlikely that this stock group will rebuild by 1998.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapenent Indicator Stocks
PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status | Goal | $\frac{\% ~ o}{\text { Base }}$ | $\frac{f \text { Goal }}{1989-1993}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Upper Geor St | NA | Indeterminate | 5,090 | 50\% | 77\% | Upper Geor St | 59\% |

B. MSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (UGS Stock Group)

|  |  |  | Brood Exploitation Rates <br> Indicator Stocks |  |
| :--- | :---: | :---: | :---: | :---: |
| MSY ER | Type | Rebuilding <br> $1976-1979$ |  |  |
| Upper Geor St | 0.66 | Ocean | 0.71 | 0.62 |
|  |  | Total | 0.8689 | 0.73 |

C. Distribution of Fishing Mortality and Fishery Exploitation Rates

Exploitation Rate Assessment (UGS Stock Group)

|  | Distrib Total <br> AEQ Mortality <br> Fishery | 1985-1993 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |




Comments. While no terminal harvest rate information is available for these indicator stocks, the terminal harvest is believed to be very low. Total exploitation on the exploitation rate indicator stock, Quinsam Hatchery, remains above the MSY ER value but fishery indices for the major fisheries harvesting this stock are estimated to have been reduced (SEAK, NCBC, and Johnstone St. nets). The apparent reasons for the total exploitation rate value could be: stock specific impacts in SEAK fisheries ( $+41 \%$ stock index), harvest in GS fisheries (GS fishery index $-12 \%$ ), and/or reduced productivity of the stock due to poor marine survival. Since the harvest in GS fisheries is limited on this stock, the other two are more likely explanations. The major concern for this stock is the continued recent poor marine survival, particularly for returns to the exploitation rate indicator stock.

Past reports have noted that the use of Quinsam as the exploitation rate indicator stock could misrepresent the natural stocks. There is no other tagged stock to use as the indicator. The Quinsam/Campbell system is located on the mid-east coast of Vancouver Island. Major components of the natural stock group are located north of Johnson Strait on Vancouver Island (Nimpkish River) and in the mainland inlets.

### 5.3.6 Lower Strait of Georgia Fall (LGS)

Synopsis. The escapement indicator stock was assessed as Not Rebuilding and the 1993 escapement is below the base period level. Terminal harvest rates are double base period values contributing to the reduction in spawning escapements. Contrary to the escapement assessment the model projects that the stock will rebuild in 1998. This apparent inconsistency results from brood exploitation rates that are below MSY ER levels (due to increased enhancement in this stock group) and model assumptions about longer term survival trends (long term average survivals are substantially greater than recently observed survival rates). Given the recent low survival of the exploitation rate indicator stock and limited reductions in brood total exploitation rate, it seems unlikely that this suite of stocks will rebuild by 1998 without additional management actions to reduce exploitation rates.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks
PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status Goal | $\frac{\% \text { of Goal }}{\text { Base 1989-1993 }}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Lower Geor St | 2.06* | Not Rebuilding 21,940 | 50\% 41\% | Lower Geor St | 1998 |

* includes Native inriver harvest but not brood stock removals as included in the terminal run data in Appendix A
B. MSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model Exploitation Rate Assessment (LGS Stock Group)

| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{gathered} \text { Base } \\ 1976-1979 \end{gathered}$ | $\begin{aligned} & \hline \text { Rebuilding } \\ & \text { 1982-1989 } \end{aligned}$ |
| Lower Geor St | 0.76 | Ocean | 0.75 | 0.67 |
|  |  | Total | 0.79 | 0.72 |

C. Distribution of Fishing Mortality and Fishery Exploitation Rates

Exploitation Rate Assessment (LGS Stock Group)


## D. Abundance and Survival Indices




Comments. The rebuilding of this stock continues to be limited by poor survival rates and exploitation in the GS sport fishery (Appendix D). A large portion of the total mortality of the stock occurs in the GS sport fishery due to major incidental mortality increases in the fishery.

The increased MSY ER value in this assessment compared to the value in last year's report results from increased enhancement production. The objective of these increased enhancement releases was to increase chinook production and to supplement the number of natural spawners. Survival of the enhanced production is being monitored to determine whether the production required for rebuilding will be achieved.

### 5.3.7 Upper Fraser Spring/Summer (UFR)

Synopsis. Two of the indicator stocks in this group are classified as Above Goal and one as Not Rebuilding. The escapements of all three stocks have increased substantially from the base period, although the Thompson stock has remained relatively static for eight consecutive years. Rebuilding progress has likely been achieved through reductions in ocean exploitation and terminal harvest rates. This group is not represented by an exploitation rate indicator stock; therefore, direct measures of exploitation rate cannot be made.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status | Goal | $\frac{\%}{\text { Base }}$ | $\frac{f \text { Goal }}{1989-1993}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Upper Fraser | 0.50 | Above Goal | 24,460 | 50\% | 106\% | Fraser Early | 1994 |
| Middle Fraser | 0.50 | Above Goal | 18,430 | 50\% | 123\% |  |  |
| Thompson | 0.50 | Not Rebuilding | 55,710 | 50\% | 69\% |  |  |

B. HSY Exploitation Rates and Brood Exploitation Rates PSC Chinook Model

Exploitation Rate Assessment (UFR Stock Group)

|  |  | Brood Exploitation Rates <br> Indicator Stocks |  |
| :--- | :---: | :---: | :---: |
| MSY ER | Type | Rebuilding <br> 1976-1979 |  |
| Fraser early | 0.62 | Ocean <br> Total | No indicator stock |

C. Distribution of Fishing Mortality and Fishery Exploitation Rates

Exploitation Rate Assessment (UFR Stock Group)
(Note: distribution for this stock group is based on PSC model predictions)
$\left.\begin{array}{|lccccc|}\hline & \begin{array}{c}\text { Distrib Total } \\ \text { AEQ Mortality } \\ \text { 1985-1993 }\end{array} & \text { Stock Index }\end{array}\right)$

## D. Abundance and Survival Indices



Comments. Terminal harvest rates for this group declined by $52 \%$ from the base period, a result of management actions that reduced catches in the native and commercial gill net fisheries. Distribution estimates from the chinook model show that most fishing mortality for this group occurs in the SEAK and NCBC ceiling fisheries and in the Canadian nonceiling fisheries. It has not been possible to directly measure the impact of these fisheries on this group, however, because CWT's could not be recovered from the inriver native fishery. Recent changes under Canada's Aboriginal Fisheries Strategy may permit the development of several exploitation rate indicator stocks in the future.

### 5.3.8 Lower Fraser (Harrison) Fall (LFR)

Synopsis. The Harrison River stock is assessed as Not Rebuilding because escapements during the rebuilding period have been trendless and have averaged only $49 \%$ of the goal. The more optimistic model prediction is based on improved survivals for the brood years since 1990. Survivals are projected to improve from the poor levels early in the rebuilding program to levels above the longterm average.

Harrison chinook are harvested primarily in the GS and WCVI fisheries, fisheries that have not achieved the projected reductions in harvest rates. This stock is not represented by an exploitation rate indicator stock with escapement estimates. Direct measures of the exploitation rate are, therefore, not available.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks PSC Chinook Model

| Indi cator Stocks | 1985-1993 Terminal HR Index | Status Goal | $\frac{\% \text { of Goal }}{\text { Base 1989-1993 }}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Harrison | . 45 | Not Rebuilding 241,700 | 50\% 49\% | Fraser Late | 1998 |

* Indexed to 1984.
B. HSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (LFR Stock Group)

|  |  |  | Brood Exploitation Rates <br> Indicator Stocks |
| :--- | :---: | :---: | :---: |
| MSY ER | Type | Rasuilding <br> 1976-1979 |  |
| Fraser Late | 0.72 | Ocean <br> Total | No indicator stock |

C. Distribution of Fishing Hortality and Fishery Exploitation Rates

Exploitation Rate Assessment (LFR Stock Group)

| FisheryDistrib Total <br> AEQ Mortality |  | Stock Index |  | Fishery Index |  | $\frac{\text { Nonceiling_Index }}{1985-1993}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{gathered} 1985-1993 \\ \text { Mean } \end{gathered}$ | 1993 | $\begin{gathered} 1985-1993 \\ \text { Mean } \end{gathered}$ | Target | $\begin{gathered} 1985-1993 \\ \text { Mean } \end{gathered}$ |
| Ceiling Fisheries |  |  |  |  |  |  |  |
| SEAK | 1.4\% |  | indicator | -26\% | -18\% |  |  |
| NCBC | 3.0\% |  | indicator | -23\% | -25\% |  |  |
| WCVI | 29.0\% | No | indicator | -1\% | -17\% |  |  |
| GS | 40.3\% |  | indicator | 29\% | -12\% |  |  |
| Nonceil | isheries |  |  |  |  |  |  |
| Canada | 7.2\% |  | indicator |  |  | -25\% | No indicator |
| US | 19.1\% |  | indicator |  |  | 0\% | No indicator |

## D. Abundance and Survival Indices



Comments. Terminal harvest rates for this group declined by $50 \%$ from the base period, a result of management actions that reduced effort directed at chinook in the Indian fishery and by-catch in the commercial gill net fishery. Distribution estimates from the chinook model show that most fishing mortality for this group occurs in the GS and WCVI ceiling fisheries (neither of which have achieved target harvest rate reductions) and in the U.S. nonceiling fisheries. It has not been possible to directly estimate the impact of these fisheries, however, because of the lack of escapement estimates for the exploitation rate indicator stock. Exploitation rates can be developed if more CWT's are recovered on the spawning grounds, through either increased CWT group size, increased recovery effort, or both.

Exploitation rate trends for Harrison River chinook can be inferred from data for the LGS stock because a large proportion of each stock is harvested in GS and maturity rates are similar between these stocks. Big Qualicum ocean exploitation rates were $70 \%$ for the 1987 and 1988 brood years. Harrison River exploitation rates are likely to be at least as high because, outside of GS, exploitation on this stock occurs mainly in WCVI where harvest rates on average have not achieved target reduction levels. The Big Qualicum stock, on the other hand, occurs mainly in the NBC and CBC fisheries where the fishery index has declined substantially and the troll fisheries have moved north and outside, suggesting that impacts would be reduced in the inside waters where LGS are more prevalent. Current exploitation rates on Harrison River chinook, therefore, probably exceed the MSY exploitation rate for this stock.

Survival of this stock during the rebuilding period have been highly variable; however, future survival is predicted to exceed the long-term average. Further, of the stocks harvested in the GS and WCVI fisheries, the Harrison is the only stock where survivals are expected to improve substantially over recent levels. Reduced overall abundance in fisheries managed under catch ceilings may result in an increased harvest rate on the contributing stocks. Increased harvest rates would further limit the rebuilding progress of this stock.

### 5.3.9 North Puget Sound Spring (NPS-Sp)

Synopsis. Under current management and survival conditions, the Not Rebuilding status of the Skagit spring stock is not likely to improve. Recent year average escapements of this stock have been less than half of the escapement goal and similar to base period levels. The stock group is harvested primarily by GS fisheries and by U.S. nonceiling fisheries. During the rebuilding program, exploitation rates in GS fisheries have not declined as projected, but have actually increased above base period levels. Given its poor survival and low abundance, additional harvest restrictions and/or other measures will need to be taken to rebuild this stock group.

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status | Goal | $\frac{\% \text { of Goal }}{\text { Base 1989-1993 }}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Skagit Spr | NA | Not Rebuilding | 3,000 | 42\% 42\% | None |  |

B. MSY Exploitation Rates and Brood Exploitation Rates PSC Chinook Model

Exploitation Rate Assessment (NPS-Sp Stock Group)

| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{gathered} \hline \text { Base } \\ \text { 1976-1979 } \end{gathered}$ | $\begin{aligned} & \text { Rebuilding } \\ & \text { 1982-1989 } \end{aligned}$ |
| None |  | Ocean | NA | 0.59 |
|  |  | Total | NA | 0.68 |

C. Distribution of Fishing Mortality and Fishery Exploitation Rates

Exploitation Rate Assessment (NPS-Sp Stock Group)

D. Abundance and Survival Indices:No model indicator stock for abundance estimates; no base period data for survival estimates.

Comments. There is little information with which to evaluate this stock group. Lack of base period data precludes the use of the exploitation rate indicator stocks to estimate base period exploitation rates or to estimate the 1985-1993 average stock index.

For many years, conservation measures have been taken to minimize impacts on the maturing component of the spring run. Puget Sound recreational and commercial fisheries have been managed to avoid all direct harvest and minimize incidental harvest of depressed spring chinook stocks. In addition, there has been no terminal harvest of the Skagit spring stock except for 1989 when escapement was predicted (incorrectly) to be above goal.

The Skagit spring stock has not achieved its escapement for more than three consecutive years. This triggered a PFMC review that concluded that the "chronically depressed status...is likely due to a combination of exploitation rates which are too great and reduced productivity due to degradation of habitat" (PSSSRG 1992).

Like the other Puget Sound stock groups, this group is unusual in that a large proportion of its mortality occurs in U.S. nonceiling fisheries. Because of this, harvest reductions in ceiling fisheries benefit escapement less for this stock than for many other stock groups.

### 5.3.10 North Puget Sound Summer/Fall (NPS-S/F)

Synopsis. The current condition of this stock group is especially poor. All three escapement indicator stocks are classified as Not Rebuilding, with recent year average escapements $60 \%$ or less than goal. The model currently predicts that none of the three stocks will rebuild by 1998. For two of the three stocks, escapement declines have not been halted. Harvest rates in terminal fisheries have been reduced by $28-45 \%$. On average, the U.S. nonceiling index has increased by $7 \%$ and from 1990-1992 this index was $26 \%$ above base period levels. Brood exploitation rates in ocean fisheries alone remain near the MSY ER level. This stock group has experienced extremely poor survival, with recent brood survival less than $10 \%$ of base period levels. Abundance has been below base period levels since the early 1980s. Given its poor survival and low abundance, additional harvest restrictions and/or other measures will need to be taken to rebuild this stock group.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Dates

Escapement Indicator Stocks PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status | Goal | \% of Goal |  | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Skagit Sum/Fall | 0.55 | Not Rebuilding | 14,900 | 89\% | 59\% | Skagit | 58\% |
| Stillaguamish | 0.60 | Not Rebuilding | 2,000 | 41\% | 50\% | Stillaguamish | 56\% |
| Snohomish | 0.72 | Not Rebuilding | 5,250 | 96\% | 64\% | Snohomish | 62\% |

B. MSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (NPS-S/F Stock Group)

|  |  |  | Brood Exploitation Rates <br>  <br> Indicator Stocks | MSY ER |
| :--- | :---: | :---: | :---: | :---: |

C. Distribution of Fishing Mortality and Fishery Exploitation Rates

Exploitation Rate Assessment (NPS-S/F Stock Group)


## D. Abundance and Survival Indices




Comments. In this group, the Stillaguamish is the only stock for which the average escapement has increased relative to the base period. The increased escapement of the Stillaguamish may result from a natural stock supplementation program conducted in this system.

For this stock group, terminal harvest rates have declined since the base period, while the Nonceiling Index (which does not include terminal fisheries) has increased. Across all nonceiling U.S. fisheries, it is currently not possible to tell if impacts have increased or declined since the base period.

While terminal harvest rates have declined substantially for this group, base period levels were high, so actual harvest rates may still be quite high. Further, the run reconstruction method used to estimate terminal harvest of the Stillaguamish and Snohomish stocks probably does not provide a very accurate description of actual conditions. Better estimates of terminal and pre-terminal harvest of this stock group would be very useful.

The Stillaguamish and Snohomish summer/fall stocks have failed to achieve their escapement objectives for more than three consecutive years. This triggered a PFMC review that concluded that the "chronically depressed status... is likely due to a combination of exploitation rates which are too great and reduced productivity due to degradation of habitat" (PSSSRG 1992).

Like the other Puget sound stock groups, this group is unusual in that a large proportion of its mortality occurs in U.S. nonceiling fisheries. Because of this, exploitation rate reductions in ceiling fisheries benefit escapement less than for many other stock groups.

### 5.3.11 South Puget Sound Summer/Fall (SPS)

Synopsis. Average escapements of the Green River stock have increased substantially since the base period. Escapement declined dramatically in 1993 to less than $50 \%$ of the escapement goal. However, this stock is classified as Rebuilding. This stock has likely benefitted both from reduced exploitation rates in ceiling fisheries and from hatchery supplementation of the natural run. Ocean exploitation rates have been reduced by an average of 19 percentage points since the base period. The nonceiling index is not calculated for this stock because it is not considered depressed.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks
PSC Chinook Model

| Indicator <br> Stocks | 1985-1993 <br> Terminal <br> HR Index | Status | Goal | $\frac{\% \text { of Goal }}{\text { Base 1989-1993 }}$ | Indicator <br> Stocks | Year Rebuilt <br> or \% of Goal <br> in 1998 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Green | 1.19 | Rebuilding | 5,800 | $99 \% \quad 127 \%$ | None |  |

B. HSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model Exploitation Rate Assessment (SPS Stock Group)

|  |  |  | Brood Exploitation Rates <br> Indicator Stocks |  |
| :--- | :---: | :---: | :---: | :---: |
| MSY ER | Type | Rebuilding <br> 1976-1979 | 1982-1989 |  |

C. Distribution of Fishing Hortality and Fishery Exploitation Rates

Exploitation Rate Assessment (SPS Stock Group)

D. Abundance and Survival Indices


Comments. Because escapements of this stock were above goal from 1987 through 1991, harvest in nonceiling fisheries, including terminal fisheries, has averaged above base period levels. As predicted in the 1992 Annual Report, returns declined substantially in 1993, and escapement fell substantially below goal. Survival improved for the 1990 brood, which should lead to improved returns in 1994.

Like the other Puget Sound stock groups, this group is unusual in that a large proportion of its mortality occurs in U.S. nonceiling fisheries. Because of this, exploitation rate reductions in ceiling fisheries benefit escapement less than for many other stocks.

### 5.3.12 Columbia River Upriver Spring (CUS)

Synopsis. This stock group is classified as Not Rebuilding, and recent average returns have been below base period levels. The outlook for this stock is very poor. Preliminary data show that the 1994 adult wild spring chinook return was only 5,500, less than 7 percent of the escapement goal and a record low. The 1994 jack return was also a record low, suggesting another low adult return in 1995. Although the terminal harvest rate index has increased compared to base period levels, harvest is typically less than $10 \%$ of the river mouth run size. Given record low escapements and already low exploitation rates, rebuilding this stock will require actions to increase survival and productivity. The Snake River component of Columbia Upriver Springs was listed (with Snake River summers) as threatened under the U.S. Endangered Species Act (ESA) in 1992 and reclassified as endangered in 1994.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Date

Escapement Indicator Stocks PSC Chinook Model

| Indicator Stocks | $\begin{array}{r} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{array}$ | Status Goal | $\frac{\% \text { of Goal }}{\text { Base }} 1989-1993$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Col UpR Spr | 1.61 | Not Rebuilding 84,000 | 33\% 28\% | None |  |

Tables B, C, D. No model or exploitation rate indicator stocks.

Comments. There is very little information with which to evaluate this stock. Even though some components of the stock have been tagged at levels of 300,000 juveniles since 1984, no exploitation rate or model information is available due to very few tag recoveries in ocean fisheries.. Low numbers of ocean tag recoveries for this stock group suggest that harvest reductions in the PSC ceiling fisheries may not contribute to increased escapement of this stock.

### 5.3.13 Washington Coastal Spring/Summer/Fall, Columbia River Summer/Fall, and Oregon Coastal Fall North Migrating (WACO)

Synopsis. Except for the Columbia Upriver Summer stock, all stocks in this stock group with escapement goals are classified as Above Goal or Rebuilding. (Although the Columbia Upriver Brights are Above Goal, the Snake River component of this stock was listed as threatened under the U.S. ESA in 1992 and reclassified as endangered in 1994). These stocks benefitted from greater than average survivals during the early years of the rebuilding program. However, survival rates have declined substantially, and have been below base period levels since 1985. The 1991 brood group survival index is only 5 percent of the base period average. The terminal run size for most of these stocks has declined since the mid 1980s, even though the nonceiling fishery index shows harvest rates have been reduced $33 \%$ in preterminal fisheries. Terminal fishery harvest rates have also been significantly reduced. In spite of these harvest management measures, further management actions may be required to maintain rebuilding progress of some stocks in this group.

The escapement status of the Columbia Upriver Summer stock is of particular concern. Recent escapements are below base period levels, and extremely poor juvenile survival has contributed to poor recruitment. The chinook model predicts that the stock will achieve only $48 \%$ of its escapement goal by 1998 under the current management regime. Additional actions to increase survival and productivity will be required to rebuild the Columbia Upriver Summer stock by 1998. The Snake River component of the summer run has recently been reclassified as endangered (with Snake River springs) under the U.S. ESA.
A. Assessment of Escapements, Terminal Harvest Rates, and Predicted Rebuilding Dates

Escapement Indicator Stocks
PSC Chinook Model

| Indicator Stocks | $\begin{gathered} \text { 1985-1993 } \\ \text { Terminal } \\ \text { HR Index } \end{gathered}$ | Status | Goal | $\frac{\% ~ o}{\text { Base }}$ | $\frac{f \text { Goal }}{1989-1993}$ | Indicator Stocks | Year Rebuilt or \% of Goal in 1998 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Quillayute Sum | 0.61 | Above Goal | 1,200 | 104\% | 123\% | WA Coastal Wild | NA |
| Col UpR 8right | 1.70 | Above Goal | 40,000 | 71\% | 147\% | Col UpR Sum | 48\% |
| Lewis River | 1.03 | Above Goal | 5,700 | 228\% | 214\% | Col UpR Bright | 1996 |
| Grays Hbr Spr | 0.16 | Rebuilding | 1,400 | 32\% | 114\% | Lewis | 1996 |
| Grays Hbr Fall | 1.08 | Rebuilding | 14,600 | 59\% | 120\% | Oregon Coastal | NA |
| Col UpR Sum | 0.58 | Not Rebuilding | 85,000 | 27\% | 26\% |  |  |
| Deschutes Fall | 0.67 | NA | NA | NA | NA |  |  |
| Hoh Fall | 1.56 | NA | NA | NA | NA |  |  |
| Hoh Spr/Sum | 1.16 | NA | NA | NA | NA |  |  |
| Mid Ore Coast | NA | NA | NA | NA | NA |  |  |
| North Ore Coast | NA | NA | NA | NA | NA |  |  |
| Queets Fall | 0.70 | NA | NA | NA | NA |  |  |
| Queets Spr/Sum | 1.02 | NA | NA | NA | NA |  |  |
| Quillayute Fall | 1.10 | NA | NA | NA | NA |  |  |

B. MSY Exploitation Rates and Brood Exploitation Rates

PSC Chinook Model
Exploitation Rate Assessment (WACO Stock Group)

|  |  |  | Brood Exploitation Rates <br> Indicator Stocks | MSY ER |
| :--- | :---: | :---: | :---: | :---: |

C. Distribution of Fishing Mortality and Fishery Exploitation Rates Exploitation Rate Assessment (WACO Stock Group)


## D. Abundance and Survival Indices



Comments. No exploitation rate indicator stock is currently assessed for Columbia Upriver Summers. The Wells Hatchery indicator stock for the Mid-Columbia component of Columbia Upriver Summers has been contaminated with fall chinook broodstock. PSC indicator stock tagging at McCall Hatchery for the Snake River component of Columbia Upriver Summers can not be assessed due to very few CWT recoveries, despite annual releases of over 300,000 tagged fish.

The CTC uses Lyons Ferry Hatchery CWT releases of fingerling fall chinook to represent Snake River wild fall chinook in both the exploitation rate assessment and the PSC chinook model. The CTC encourages the tagging and release of Lyons Ferry fingerlings to allow continued evaluation of
this stock.

In the chinook model, a single stock is used to represent both Priest Rapids Hatchery production and natural stock production. Because of this, the MSY ER for the Columbia Upriver Bright stock is not representative of natural production.

The chinook model predicts that the Columbia Bright and Lewis Wild stocks will not reach their escapement goals in 1995. This may not be realistic. While ocean escapements of these stocks are predicted to be down considerably in 1995, inriver harvest rates were assumed to remain at a long term average in the model run. In fact, Columbia River fall fisheries are managed to achieve escapement goals, and reduced returns would result in reduced harvest rates.

With the addition of two stocks this year, this stock group has grown to include 14 escapement indicator stocks and seven exploitation indicator stocks. The CTC is considering splitting this group into two stock groups, perhaps based on geographic location of adult returns.

### 5.4 FISHERY SUMMARIES

Unlike all other sections of this report, Table 5.3 presents information from a fisheries perspective on the rebuilding status of contributing stocks. The four ceiling fisheries and the nonceiling U.S. fisheries are considered; Canadian nonceiling fisheries were excluded because of small catch magnitudes in the net fisheries and lack of data in the WCVI recreational fishery. For each fishery, a stock grouping is listed if at least $10 \%$ of its total fishing mortality occurs in that fishery, and model stocks are listed that cumulatively account for $90 \%$ of the total catch in the fishery. Rebuilding status of the escapement indicator stocks for the stock groupings listed for each fishery are presented in Table 5.3 with the fishery abundance index and fishery (exploitation) index for the fishery.

### 5.4.1 SEAK Fishery

Seven of the 13 stock groups have at least $10 \%$ of their harvest in the SEAK fishery. These stock groups originate from the Pacific Northwest (excluding Puget Sound) to Southeast Alaska, and include 33 of the escapement indicator stocks. Declines in escapement have not been halted for six ( $18 \%$ ) of these stocks. Of the 25 escapement indicator stocks in these stock groups that have escapement goals, $56 \%$ are Above Goal or Rebuilding, while $36 \%$ are Not Rebuilding.

Eight model stocks account for $90 \%$ of the catch, including stocks from the Oregon Coast to Northern British Columbia. Four of these are wild stocks for which model projections of future rebuilding status can be made: Upriver Brights, NCBC, Fraser Early, WCVI Natural. Three are projected to rebuild by 1998; the exception is WCVI Natural.

Overall abundance of stocks in the SEAK fishery has been substantially above pre-treaty levels, averaging double the base period from 1985-1993. Abundance has declined in recent years, however, and is projected to be near base period levels in 1995.

The SEAK fishery index has declined since 1984, although not to the extent projected by the 1984 model. On average since 1985 , the exploitation rate indices have decreased by $18 \%$, which is $38 \%$ above the projected average. The decrease in exploitation observed in 1993 was $26 \%$, which is $45 \%$ above the projection for 1993.

### 5.4.2 NCBC Fishery

Six of the 13 stock groups have at least $10 \%$ of their harvest in the NCBC fishery. These stock groups originate from the Pacific Northwest (excluding Puget Sound) to Northern British Columbia, and include 27 of the escapement indicator stocks. Declines in escapement have not been halted for six ( $22 \%$ ) of these stocks. Of the 19 escapement indicator stocks in these stock groups that have escapement goals, $53 \%$ are Above Goal or Rebuilding, while $42 \%$ are Not Rebuilding.

Eleven model stocks account for $90 \%$ of the catch, including stocks from the Oregon Coast to Northern British Columbia. Six of these are wild stocks for which model projections of future rebuilding status can be made: Upriver Brights, NCBC, Fraser Early, Fraser Late, Upper GS, and WCVI Natural. Four are projected to rebuild by 1998; the exceptions are WCVI Natural and Upper GS.

Table 5-3. Stock groups, escapement indicator stocks, model stocks, abundance indices, and fishery indices for the four ceiling fisheries and US nonceiling fisheries.

| \%月\&\%. L / Statistic | SEAK |  | NCBC |  | WCYI |  | GS |  | US Monceling |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Stock groups with at least $10 \%$ of their total mortality caused by the fishery The proportion of total fishing mortality caused by the fishery is in parenthesis. | SEAK/TBR-I <br> UGS <br> NCBC <br> WCVI <br> WACO <br> UFR <br> LGS | $\begin{aligned} & (98.2 \%) \\ & (50.7 \%) \\ & (47.4 \%) \\ & (42.2 \%) \\ & (32.7 \%) \\ & (32.0 \%) \\ & (18.3 \%) \end{aligned}$ | NCBC UGS UFR waco WCVI LGS | $\begin{aligned} & (42.7 \%) \\ & (34.7 \%) \\ & (30.5 \%) \\ & (22.8 \%) \\ & (21.6 \%) \\ & (19.6 \%) \end{aligned}$ | LFR <br> WACO <br> NPS-S/F <br> SPS <br> WCVI | $\begin{aligned} & (29.0 \%) \\ & (27.1 \%) \\ & (23.4 \%) \\ & (21.3 \%) \\ & (10.3 \%) \end{aligned}$ | LGS <br> LFR <br> NPS-Sp <br> NPS-S/F <br> SPS | $(50.5 \%)$ $(40.3 \%)$ $(39.4 \%)$ $(24.8 \%)$ $(11.1 \%)$ | SPS <br> NPS-S/F <br> NPS-Sp <br> LFR <br> WACO <br> UFR | $\begin{aligned} & (61.0 \%) \\ & (39.0 \%) \\ & (38.1 \%) \\ & (19.1 \%) \\ & (14.5 \%) \\ & (12.2 \%) \end{aligned}$ |
| Escapement Indicator Stocks Total Stocks with Goals Above Goal or Rebuilding Not Rebuilding Indeterminate Total Stocks Decline Not Halted | $\begin{array}{r} 25 \\ 14 \\ 9 \\ 2 \\ 33 \\ 6 \end{array}$ | (56\%) <br> (36\%) <br> (8\%) <br> (18\%) | $\begin{array}{r} 19 \\ 10 \\ 8 \\ 1 \\ 27 \\ 6 \end{array}$ | $\begin{aligned} & (53 \%) \\ & (42 \%) \\ & (5 \%) \\ & (22 \%) \end{aligned}$ | $\begin{array}{r} 12 \\ 6 \\ 6 \\ 0 \\ 20 \\ 4 \end{array}$ | (50\%) <br> (50\%) <br> (20\%) | $\begin{aligned} & 7 \\ & 1 \\ & 6 \\ & 0 \\ & 7 \\ & 3 \end{aligned}$ | (14\%) <br> ( $86 \%$ ) <br> (43\%) | $\begin{array}{r} 13 \\ 6 \\ 7 \\ 0 \\ 21 \\ 4 \end{array}$ | (46\%) <br> (54\%) <br> (19\%) |
| Model stocks that account for $90 \%$ percent of total catch in the fishery (listed in order of contribution) | WCVI Hatchery <br> Upriver Brights <br> NCBC <br> Oregon Coast <br> Fraser Early <br> WCVI Natural <br> WA Coastal Wild <br> Mid. Col. Brights |  | WCVI <br> NCBC <br> Upriver <br> Oregon <br> Fraser <br> Fraser <br> Upper <br> WCVI <br> Wa Coa <br> Willame <br> WA Co | y <br> Id chery atchery | WCVI Hatc <br> Fraser Late <br> Lower Bonn <br> Upriver Bri <br> Nooksack $F$ <br> PS Hatchery <br> WCVI Natu <br> Oregon Coa <br> PS Natural <br> Spr Creek <br> Mid. Col. B <br> WA Coastal | ry <br> Hatchery <br> ts <br> Fing <br> 1 <br> tchery <br> ghts <br> Wild | Fraser La <br> Nooksack <br> Lower GS <br> Lower GS <br> PS Hatcher <br> PS Yearlin <br> PS Natural <br> WCVI Ha <br> Lower Bo | tchery <br> Fing <br> ry <br> Hatchery | Varies by Fishery |  |
| Fishery Abundance Index (Base Period $=1.00$ ) 1985-1993 Average 1995 Projection | $\begin{aligned} & 2.00 \\ & 1.00 \end{aligned}$ |  | $\begin{aligned} & 1.45 \\ & 0.94 \end{aligned}$ |  | $\begin{aligned} & 0.88 \\ & 0.66 \end{aligned}$ |  | $\begin{aligned} & 0.67 \\ & 0.97 \end{aligned}$ |  | Varies by Fishery |  |
| Fishery Index Change from Base 1985-1993 Projection in 1984 1985-1993 CWT Estimated | $\begin{aligned} & -29 \% \\ & -18 \% \end{aligned}$ |  | $\begin{aligned} & -32 \% \\ & -25 \% \end{aligned}$ |  | $\begin{aligned} & -25 \% \\ & -17 \% \end{aligned}$ |  | $\begin{aligned} & -47 \% \\ & -12 \% \end{aligned}$ |  | $0 \%$ |  |
| 1993 Projection in 1984 <br> 1993 CWT Estimated | $\begin{aligned} & -47 \% \\ & -26 \% \end{aligned}$ |  | $\begin{aligned} & -51 \% \\ & -23 \% \end{aligned}$ |  | $\begin{aligned} & -27 \% \\ & -1 \% \end{aligned}$ |  | $\begin{aligned} & -61 \% \\ & 29 \% \end{aligned}$ |  | $0 \%$ |  |

Overall abundance of stocks in the NCBC fishery has been substantially above pre-treaty levels, averaging 1.45 of the base period from 1985-1993. Abundance has declined in recent years, however, and is projected to be near base period levels in 1995.

The NCBC fishery index has declined since 1984, although not to the extent projected by the 1984 model. On average since 1985, the exploitation rate has decreased $25 \%$, which is $22 \%$ above the projected average. The decrease in exploitation observed in 1993 was $23 \%$, which is $55 \%$ above the projection for 1993.

### 5.4.3 WCVI Fishery

Five of the 13 stock groups have at least $10 \%$ of their harvest in the WCVI fishery. These stock groups originate from the Pacific Northwest (including Puget Sound) and Southern British Columbia, and include 20 of the escapement indicator stocks. Declines in escapement have not been halted for four ( $20 \%$ ) of these stocks. Of the 12 escapement indicator stocks in these stock groups that have escapement goals, $50 \%$ are Above Goal or Rebuilding, while $50 \%$ are Not Rebuilding.

Twelve model stocks account for $90 \%$ of the catch, including stocks from the Oregon Coast to Southern British Columbia. Three of these are wild stocks for which model projections of future rebuilding status can be made: Upriver Brights, Fraser Late, and Upper GS. Three of these are projected to rebuild by 1998; the exception is WCVI Natural.

Overall abundance of stocks in the NCBC fishery has declined relative to pre-Treaty levels, averaging 0.88 of the base period from 1985-1993. Relative abundance in 1995 is projected to be $66 \%$ of the base period, which would be the lowest since 1979.

The WCVI fishery index has declined on average since 1984, although not to the extent projected by the 1984 model. On average since 1985, the exploitation rate indices have decreased by $17 \%$, which is $32 \%$ above the projected average. The exploitation rate has increased since 1991 , and was $1 \%$ below base in 1993. This is $96 \%$ above the 1984 model projection for 1993.

### 5.4.4 GS Fishery

Five of the 13 stock groups have at least $10 \%$ of their harvest in the WCVI fishery. These stock groups originate from Puget Sound and Southern British Columbia, and include seven of the escapement indicator stocks. Declines in escapement have not been halted for three (43\%) of these stocks. All seven of the escapement indicator stocks in these stock groups have escapement goals; $14 \%$ are Above Goal or Rebuilding, while $86 \%$ are Not Rebuilding.

Nine model stocks account for $90 \%$ of the catch, including stocks from the Columbia River to Southern British Columbia. Two of these are wild stocks for which model projections of future rebuilding status can be made: Fraser Late, Lower GS, and PS Natural. Both of these are projected to rebuild by 1998.

Overall abundance of stocks in the GS fishery has generally been below pre-treaty levels, averaging 0.67 of the base period from 1985-1993. Abundance has increased since 1991, however, and is projected to be close to base period in 1995.

The GS fishery index has declined on average since 1984, although not to the extent projected by the 1984 model. On average since 1985 , the exploitation rate indices have decreased $12 \%$, which is $74 \%$ above the projected average. The exploitation rate has increased since 1990 , and was $29 \%$ above base in 1993. This is $148 \%$ above the 1984 model projection for 1993.

### 5.4.5 U.S. Nonceiling Fisheries

Six of the 13 stock groups have at least $10 \%$ of their harvest in the suite of fisheries included in the US nonceiling fisheries. These stock groups originate from the Columbia River, Washington Coast, Puget Sound, and the Fraser River, and include 21 of the escapement indicator stocks. Declines in escapement have not been halted for four ( $19 \%$ ) of these stocks. Of the 13 escapement indicator stocks in these stock groups that have escapement goals, $46 \%$ are Above Goal or Rebuilding, while $56 \%$ are Not Rebuilding.

Model stocks that account for most of the catch vary widely among the different fisheries that comprise the US nonceiling fisheries; it was inappropriate to pool across the component fisheries to derive overall contribution or abundance estimates.

The fishery index for nonceiling fisheries also varies by fishery and by stock. For Puget Sound stocks, exploitation rates in the nonceiling fisheries have averaged $7 \%$ above base period since 1987, and $26 \%$ above base in 1993. In contrast, exploitation rates for WACO stocks have averaged $33 \%$ below base since 1985, and were $21 \%$ below base in 1993.

### 5.5 SUMMARY AND CONCLUSIONS

The Integrated Assessment of the stock groups indicates that the response of stocks to the PST management regime has been highly variable. Among the stock groups which included more than one escapement indicator stock, there is only one instance (NPS-S/F) in which the rebuilding status of all stocks is equivalent, and in some instances, the status ranges from Above Goal to Not Rebuilding. In general, any similarity in response of stock groups can be related to the fishing patterns shared by stock groups and brood year survival variation within the group.

In contrast, with the exception of the GS fishery, the Integrated Assessment by fishery indicates a degree of consistency among the ceiling and U.S. nonceiling fisheries:

1) the percentage of the escapement indicator stocks assessed as Decline Not Halted ranged from $18 \%$ in the SEAK fishery to $22 \%$ in the NCBC fisheries;
2) the percentage of the escapement indicator stocks assessed as Not Rebuilding ranged from $36 \%$ in SEAK to $54 \%$ in the U.S. nonceiling fishery;
3) abundance is projected to be near the base period level in 1995 in the SEAK, NCBC, and GS fisheries.

The status of stocks in the GS fishery is worse than for the other fisheries, with six of seven escapement indicator stock not rebuilding.

The projections for 1995 of abundance near or less than the base period level are of particular concern. With $44 \%$ of the escapement indicator stocks assessed as Not Rebuilding, and at most 4 years remaining in the rebuilding program, drops in abundance of this magnitude coupled with catches fixed at the current ceiling levels would make it unlikely that the objectives of the chinook rebuilding would be achieved. Further delays in responding to reduced abundances would increase the potential for even more severe disruptions of future fisheries to successfully complete the rebuilding program. More accurate projections of fishery abundance indices and analyses of fishery management options can be provided by the CTC when revised estimates of abunclance become available in January of 1995.

Rebuilding some specific stocks should be expected to require more detailed stock-specific investigations (e.g., examination of the biological basis of the escapement goal) and actions (e.g., habitat improvements, supplementation). Management of ocean fisheries using catch ceilings must be responsive to changes in abundance and stock productivities in order to achieve target harvest rate reductions but detailed stock-specific actions will likely also be required to rebuild all the indicator stocks.

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## APPENDIX A

## Tables of Escapements and Terminal Runs

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Southern B.C. ..... A-2
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Washington Coast ..... A-3
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Oregon ..... A-4

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1993.

| Year | Southeast Alaska |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | t.run | King Salmon esc. | Andrew esc. | Blossom (index) esc. | Keta (index) esc. |
| 1975 | 1510 | 2099 | 53 | 416 | 146 | 203 |
| 1976 | 1433 | 2676 | 81 | 404 | 68 | 84 |
| 1977 | 1732 | 2833 | 168 | 456 | 112 | 230 |
| 1978 | 814 | 1456 | 71 | 388 | 143 | 392 |
| 1979 | 1400 | 2735 | 89 | 327 | 54 | 426 |
| 1980 | 905 | 2284 | 88 | 282 | 89 | 192 |
| 1981 | 702 | 1752 | 113 | 536 | 159 | 329 |
| 1982 | 434 | 772 | 286 | 672 | 345 | 754 |
| 1983 | 592 | 1043 | 245 | 366 | 589 | 822 |
| 1984 | 1726 | 2439 | 250 | 389 | 508 | 610 |
| 1985 | 1521 | 2597 | 171 | 510 | 709 | 624 |
| 1986 | 2067 | 2393 | 245 | 1131 | 1278 | 690 |
| 1987 | 1884 | 2698 | 193 | 1261 | 1349 | 768 |
| 1988 | 885 | 1453 | 206 | 760 | 384 | 575 |
| 1989 | 652 | 1081 | 238 | 848 | 344 | 1155 |
| 1990 | 700 | 1214 | 168 | 1062 | 257 | 606 |
| 1991 | 875 | 1865 | 134 | 640 | 239 | 272 |
| 1992 | 1400 | 2912 | 117 | 1245 | 150 | 217 |
| 1993 | 790 | 2237 | 280 | 1696 | 303 | 362 |
| Goal | 600 |  | 250 | 750 | 300 | 300 |


|  | Transboundary Rivers |  |  |  |  |
| :---: | ---: | ---: | ---: | ---: | ---: |
| Year | Alsek <br> (Klukshu) <br> esc. | Taku <br> (6 stocks) <br> esc. | S Sikine <br> (L.Tahltan) <br> esc. | Unuk <br> (index) <br> esc. | Chickamin <br> (index) <br> esc. |
|  |  |  |  |  |  |
| 1975 |  | 2089 | 1400 |  | 370 |
| 1976 | 1153 | 4726 | 800 |  | 157 |
| 1977 | 2894 | 5671 | 1600 | 974 | 363 |
| 1978 | 2676 | 3305 | 1264 | 1106 | 308 |
| 1979 | 4274 | 4156 | 2332 | 576 | 239 |
| 1980 | 2487 | 7544 | 4274 | 1016 | 445 |
| 1981 | 1963 | 9786 | 6668 | 731 | 384 |
| 1982 | 1969 | 4813 | 5660 | 1351 | 571 |
| 1983 | 2237 | 2062 | 1188 | 1125 | 559 |
| 1984 | 1572 | 3909 | 2588 | 1837 | 1102 |
| 1985 | 1283 | 7208 | 3114 | 1184 | 956 |
| 1986 | 2607 | 7520 | 2891 | 2126 | 1745 |
| 1987 | 2491 | 5743 | 4783 | 1973 | 975 |
| 1988 | 1994 | 8626 | 7292 | 1746 | 786 |
| 1989 | 2289 | 9480 | 4715 | 1149 | 934 |
| 1990 | 1742 | 12249 | 4392 | 591 | 564 |
| 1991 | 2248 | 10153 | 4506 | 655 | 487 |
| 1992 | 1246 | 11058 | 6627 | 883 | 346 |
| 1993 | 3302 | 13204 | 11449 | 1068 | 389 |
| Goal | 4700 | 13200 | 5300 | 875 | 525 |

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1993 (continued).

| Year | Northern B.C. |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AREA 1 <br> Yakaun esc. |  | $\begin{aligned} & 3 \\ & \text { t.run } \end{aligned}$ | AREA Skeen esc. | t.run | AREA 6 Index | AREA 8 <br> Index | AREA 9 <br> Rivers Inlet | AREA 10 <br> Smith <br> Inlet |
| 1975 | 1500 | 6025 |  | 20319 |  | 2225 | 4425 | 3280 | 960 |
| 1976 | 700 | 5590 |  | 13078 |  | 2765 | 3550 | 1640 | 1000 |
| 1977 | 800 | 9060 | 11460 | 29018 | 39606 | 1820 | 3600 | 2225 | 1050 |
| 1978 | 600 | 10190 | 11975 | 22661 | 35055 | 3912 | 4000 | 2800 | 2100 |
| 1979 | 400 | 8180 | 9788 | 18488 | 28166 | 3455 | 4600 | 2150 | 500 |
| 1980 | 600 | 9072 | 11186 | 23429 | 38626 | 1935 | 2529 | 2325 | 1200 |
| 1981 | 750 | 7950 | 9443 | 24523 | 42018 | 1502 | 3550 | 3175 | 1020 |
| 1982 | 1400 | 6575 | 8426 | 17092 | 35185 | 4150 | 220 | 2250 | 1500 |
| 1983 | 600 | 8055 | 13949 | 23562 | 39510 | 2845 | 650 | 3320 | 1050 |
| 1984 | 300 | 12620 | 14380 | 37598 | 53516 | 1914 | 4700 | 1400 | 770 |
| 1985 | 1500 | 8002 | 11121 | 53599 | 76544 | 1509 | 4550 | 3371 | 230 |
| 1986 | 500 | 17390 | 22775 | 59968 | 87566 | 2615 | 3362 | 7623 | 532 |
| 1987 | 2000 | 11431 | 15849 | 59120 | 76349 | 1566 | 1456 | 5239 | 1050 |
| 1988 | 2000 | 10000 | 14140 | 68705 | 102563 | 3165 | 1650 | 4429 | 1050 |
| 1989 | 2800 | 12525 | 17526 | 57202 | 83439 | 998 | 2535 | 3265 | 225 |
| 1990 | 2000 | 12123 | 15607 | 55976 | 89447 | 281 | 2385 | 4039 | 510 |
| 1991 | 1900 | 4017 | 12162 | 52753 | 79343 | 709 | 2470 | 6635 | 500 |
| 1992 | 2000 | 7312 | 18003 | 63392 | 92184 | 340 | 3247 | 10000 | 500 |
| 1993 | 1000 | 9715 | 16850 | 66977 | 96018 | 462 | 700 | 10610 | 500 |
| Goal | 1580 | 15890 |  | 41770 |  | 5520 | 5450 | 4950 | 2110 |


| Year | Southem B.C. |  |  |  | Fraser River |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | W. Coast Vancouver 1. esc. | $\qquad$ | o. <br> t.run | Upper Geo. Strait esc. | Upper <br> Fraser esc. | Middle Fraser esc. | Thompson asc. | Fraser spr/sum t.run | Harr esc. | t.run |
| 1975 | 1675 | 9525 | 10940 | 11800 | 7028 | 15050 | 37035 | 119081 |  |  |
| 1976 | 1275 | 9240 | 10640 | 15150 | 7612 | 10975 | 14875 | 98691 |  |  |
| 1977 | 3875 | 10655 | 12665 | 3880 | 10135 | 13320 | 30321 | 132553 |  |  |
| 1978 | 6275 | 8035 | 8975 | 6150 | 14015 | 13450 | 28465 | 109119 |  |  |
| 1979 | 3058 | 12400 | 13271 | 3610 | 12495 | 8595 | 25145 | 104568 |  |  |
| 1980 | 6392 | 11530 | 13847 | 1367 | 15796 | 9625 | 19330 | 68973 |  |  |
| 1981 | 5108 | 10420 | 12980 | 1945 | 9021 | 8175 | 23375 | 65677 |  |  |
| 1982 | 7523 | 9520 | 10916 | 3260 | 11603 | 10470 | 20385 | 82820 |  |  |
| 1983 | 3824 | 9080 | 10102 | 3820 | 17185 | 15404 | 20381 | 72999 |  |  |
| 1984 | 5012 | 11150 | 12292 | 4600 | 21938 | 13957 | 29972 | 95878 | 120837 | 131757 |
| 1985 | 4900 | 5010 | 6518 | 4600 | 34527 | 17595 | 39997 | 124380 | 174778 | 179255 |
| 1986 | 4810 | 3038 | 4955 | 1630 | 41207 | 27349 | 45130 | . 145652 | 162596 | 176740 |
| 1987 | 3520 | 2630 | 4729 | 5700 | 39420 | 27330 | 36730 | 127582 | 79038 | 82025 |
| 1988 | 5500 | 7040 | 9353 | 3300 | 34400 | 25924 | 47103 | 128654 | 35116 | 39487 |
| 1989 | 8480 | 6830 | 9389 | 6607 | 25310 | 15095 | 37975 | 107136 | 74685 | 75090 |
| 1990 | 6760 | 7635 | 10117 | 2200 | 35902 | 26060 | 41995 | 134022 | 177375 | 180758 |
| 1991 | 5756 | 12895 | 16063 | 3276 | 27317 | 21150 | 36483 | 112527 | 90638 | 93472 |
| 1992 | 7300 | 10893 | 15165 | 5268 | 23853 | 24779 | 45008 | 111206 | 130411 | 132478 |
| 1993 | 4740 | 7100 | 9943 | 2216 | 17534 | 25926 | 30880 | 104975 | 118974 | 120340 |
| Goal | 11040 | 21940 |  | 5090 | 24460 | 18430 | 55710 |  | 241670 |  |

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1993 (continued).

| Year | Puget Sound |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Skagit spring esc. t.run |  | Skagit sum/fall |  | Stillaguamish osc. t.run |  | Snohomish |  | Green |  |
| 1975 | 803 | 803 | 11555 | 24625 | 1198 | 1635 | 4485 | 6123 | 3394 | 6238 |
| 1976 | 812 | 812 | 14479 | 23306 | 2140 | 4002 | 5315 | 9889 | 3140 | 7732 |
| 1977 | 1049 | 1049 | 9497 | 17693 | 1475 | 2549 | 5565 | 9618 | 3804 | 5366 |
| 1978 | 1220 | 1220 | 13209 | 20030 | 1232 | 1959 | 7931 | 12591 | 3304 | 4349 |
| 1979 | 968 | 968 | 13605 | 21243 | 1042 | 2366 | 5903 | 12706 | 9704 | 10730 |
| 1980 | 1803 | 1803 | 20345 | 28938 | 821 | 2647 | 6460 | 16688 | 7743 | 10608 |
| 1981 | 1250 | 1250 | 8670 | 19675 | 630 | 2783 | 3368 | 8968 | 3606 | 4912 |
| 1982 | 965 | 965 | 10439 | 21022 | 773 | 3058 | 4379 | 8470 | 1840 | 3850 |
| 1983 | 710 | 710 | 9080 | 14671 | 387 | 925 | 4549 | 10386 | 3679 | 13290 |
| 1984 | 747 | 747 | 13239 | 15005 | 374 | 883 | 3762 | 8480 | 3353 | 5381 |
| 1985 | 3249 | 3249 | 16298 | 25075 | 1409 | 2641 | 4873 | 9005 | 2908 | 7444 |
| 1986 | 1978 | 1978 | 18127 | 21585 | 1277 | 2416 | 4534 | 8267 | 4792 | 5784 |
| 1987 | 1979 | 1979 | 9647 | 13037 | 1321 | 1906 | 4689 | 6670 | 10338 | 11724 |
| 1988 | 2064 | 2064 | 11954 | 14647 | 717 | 1176 | 4513 | 7389 | 7994 | 9207 |
| 1989 | 1515 | 1924 | 6776 | 12787 | 811 | 1642 | 3138 | 6142 | 11512 | 15000 |
| 1990 | 1592 | 1627 | 17206 | 19172 | 842 | 1739 | 4209 | 8345 | 7035 | 15200 |
| 1991 | 1411 | 1448 | 6014 | 8425 | 1632 | 2913 | 2783 | 4964 | 10548 | 14965 |
| 1992 | 1001 | 1025 | 7671 | 9201 | 780 | 1254 | 2708 | 4319 | 5267 | 9941 |
| 1993 | 788 | 818 | 5916 | 6842 | 928 | 1298 | 4019 | 5622 | 2479 | 5237 |
| Goal | 3000 |  | 14900 |  | 2000 |  | 5250 |  | 5800 |  |


| Year | Washington Coast |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Quillayute summer |  | Quillayute fall |  | Hoh spr/sum |  | Hoh fall |  | Queets spr/sum |  | Queets fall |  | Grays Harbor spring |  | Grays Harbor fall |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1975 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1976 | 1300 | 1700 | 2500 | 4700 | 600 | 1300 | 2500 | 3100 | 500 | 700 | 1200 | 2500 | 600 | 1000 | 1800 | 8900 |
| 1977 | 3800 | 5300 | 3300 | 7600 | 1000 | 2000 | 2100 | 3800 | 700 | 1200 | 3600 | 5500 | 800 | 1700 | 5200 | 13200 |
| 1978 | 2300 | 2700 | 4700 | 6200 | 1400 | 2500 | 1900 | 2900 | 1100 | 1400 | 2200 | 3100 | 1000 | 1600 | 4600 | 10600 |
| 1979 | 2100 | 3900 | 3900 | 6600 | 1400 | 2300 | 1700 | 2200 | 900 | 1400 | 3900 | 4700 | 400 | 1100 | 9400 | 12100 |
| 1980 | 900 | 1500 | 6700 | 7600 | 800 | 1000 | 2200 | 2800 | 1000 | 1200 | 3200 | 5800 | 200 | 600 | 11700 | 22000 |
| 1981 | 800 | 1700 | 6000 | 7100 | 1500 | 2100 | 3100 | 4000 | 1000 | 1300 | 4300 | 8000 | 600 | 900 | 7600 | 12400 |
| 1982 | 1200 | 2700 | 7100 | 9700 | 1600 | 2300 | 4500 | 5800 | 800 | 1200 | 4100 | 6200 | 600 | 700 | 5600 | 13700 |
| 1983 | 1400 | 1800 | 3100 | 5500 | 1800 | 1800 | 2500 | 3300 | 1000 | 1200 | 2600 | 3800 | 800 | 900 | 5500 | 9100 |
| 1984 | 600 | 1000 | 9100 | 10400 | 1500 | 2400 | 1900 | 2600 | 1000 | 1200 | 3900 | 5300 | 1100 | 1100 | 21000 | 22600 |
| 1985 | 600 | 700 | 6100 | 8400 | 1000 | 1400 | 1800 | 2900 | 700 | 900 | 3700 | 5200 | 1200 | 1200 | 9400 | 15000 |
| 1986 | 600 | 1000 | 10000 | 13500 | 1500 | 2500 | 5000 | 6000 | 900 | 1200 | 7800 | 8900 | 2000 | 2000 | 10500 | 17500 |
| 1987 | 600 | 1600 | 12400 | 20700 | 1700 | 2600 | 4000 | 6100 | 600 | 1500 | 6500 | 10000 | 900 | 1100 | 18800 | 31200 |
| 1988 | 1300 | 2600 | 15200 | 22200 | 2600 | 3900 | 4100 | 6900 | 1800 | 2300 | 8400 | 11000 | 3500 | 3600 | 28200 | 39100 |
| 1989 | 2400 | 3400 | 10000 | 17100 | 4700 | 7000 | 5100 | 8700 | 2600 | 4000 | 8700 | 11200 | 2100 | 2400 | 26400 | 56000 |
| 1990 | 1500 | 1800 | 13700 | 16900 | 3900 | 5700 | 4200 | 6400 | 1800 | 2500 | 10100 | 12300 | 1600 | 1700 | 17500 | 39600 |
| 1991 | 1200 | 1500 | 6300 | 7700 | 1100 | 1800 | 1400 | 2600 | 600 | 800 | 4500 | 5900 | 1300 | 1500 | 13600 | 29500 |
| 1992 | 1000 | 1300 | 6300 | 7900 | 1000 | 1600 | 4000 | 5200 | 400 | 500 | 4700 | 6400 | 1700 | 1800 | 16200 | 30300 |
| 1993 | 1300 | 1500 | 6000 | 6800 | 1400 | 2000 | 2300 | 3700 | 700 | 800 | 3600 | 5300 | 1300 | 1400 | 14200 | 30500 |
| Goal | 1200 |  | NA |  | NA |  | NA |  | NA |  | NA |  | 1400 |  | 14600 |  |

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1993 (continued).

| Year | Columbia River |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Col. Uprivar spring |  | Col. Upriver summer |  | Col. Upriver bright |  | Lowis |  | Deschutes |  |
|  | esc. | t.run | esc. | t.run | esc. | t.run | esc. | t.run | esc. | t.run |
| 1975 |  |  | 33000 | 33000 | 29600 | 112500 | 13859 | 36800 |  |  |
| 1976 |  |  | 26600 | 26700 | 28800 | 115100 | 3371 | 14900 |  |  |
| 1977 | 64900 | 92700 | 33300 | 34300 | 37600 | 95100 | 6930 | 29800 | 5631 | 7492 |
| 1978 | 89600 | 95300 | 37600 | 38700 | 27300 | 85300 | 5363 | 18500 | 4154 | 6125 |
| 1979 | 22300 | 23300 | 26700 | 27800 | 31200 | 89200 | 8023 | 32700 | 3291 | 4883 |
| 1980 | 26700 | 27600 | 25800 | 27000 | 29900 | 76800 | 16394 | 38800 | 2542 | 4493 |
| 1981 | 31500 | 33700 | 21100 | 22400 | 21100 | 66600 | 19297 | 25000 | 3183 | 5020 |
| 1982 | 31700 | 34800 | 18800 | 20100 | 31100 | 79000 | 8370 | 13000 | 4890 | 6906 |
| 1983 | 23600 | 25200 | 17700 | 18000 | 48700 | 86100 | 13540 | 16800 | 3669 | 5165 |
| 1984 | 18600 | 20400 | 22100 | 22400 | 61000 | 131400 | 7132 | 13300 | 2025 | 2995 |
| 1985 | 27200 | 28800 | 22400 | 24200 | 90800 | 196400 | 7491 | 13300 | 2645 | 3452 |
| 1986 | 36500 | 39800 | 25500 | 26200 | 109900 | 281500 | 11983 | 24500 | 3801 | 4954 |
| 1987 | 41400 | 45000 | 30900 | 33000 | 149700 | 420600 | 12935 | 37900 | 4097 | 6154 |
| 1988 | 35100 | 40700 | 29000 | 31300 | 110400 | 340000 | 12059 | 41700 | 3520 | 5911 |
| 1989 | 27000 | 30000 | 28700 | 28800 | 92900 | 261100 | 21199 | 38600 | 3358 | 5088 |
| 1990 | 20100 | 22900 | 25000 | 25000 | 55200 | 153600 | 17606 | 20300 | 1399 | 2369 |
| 1991 | 15500 | 17300 | 18800 | 18900 | 44400 | 102100 | 9060 | 19900 | 906 | 1060 |
| 1992 | 26500 | 28700 | 15000 | 15100 | 48800 | 80600 | 6307 | 12600 | 1689 | 1726 |
| 1993 | 28350 | 30550 | 21600 | 22000 | 52500 | 102900 | 7025 | 13400 | 8239 | 8250 |
| Goal | 84000 |  | 85000 |  | 40000 |  | 5700 |  | NA |  |


| Year | Oregon |  |
| :---: | :---: | :---: |
|  | Density Index |  |
|  | North Oregon Coast | Mid-Oregon Coast |
| 1975 | 33 | 47 |
| 1976 | 25 | 28 |
| 1977 | 39 | 60 |
| 1978 | 40 | 58 |
| 1979 | 48 | 67 |
| 1980 | 51 | 68 |
| 1981 | 47 | 50 |
| 1982 | 54 | 64 |
| 1983 | 36 | 42 |
| 1984 | 68 | 41 |
| 1985 | 83 | 35 |
| 1986 | 94 | 37 |
| 1987 | 81 | 63 |
| 1988 | 138 | 76 |
| 1989 | 84 | 45 |
| 1990 | 66 | 34 |
| 1991 | 78 | 39 |
| 1992 | 80 | 67 |
| 1993 | 42 | 66 |
| Goal | NA | NA |

## APPENDIX B

## Stock Specific Chinook Escapement Figures

Situk ..... B-1
King Salmon ..... B-1
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Stillaguamish River ..... B-14
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Columbia River Summer ..... B-17
Columbia River Bright ..... B-18
Lewis River Fall ..... B-18
Deschutes R. Fall ..... B-19
Quillayute Fall ..... B-19
Hoh Spring/Summer ..... B-20
Hoh Fall ..... B-20
Queets Spring/Summer ..... B-21
Queets Fall ..... B-21
North Oregon Coastal ..... B-22
Mid Oregon Coastal ..... B-22

## Situk Chinook Escapements Above Goal



## King Salmon Chinook Escapements Not Rebuilding



## Andrew Creek Chinook Escapements Above Goal



## Blossom River Chinook Escapements Indeterminate



## Keta River Chinook Escapements Rebuilding



## Alsek R. Chinook Escapements Not Rebuilding



Taku Chinook Escapements Rebuilding


## Stikine River Chinook Escapements Rebuilding



## Unuk River Chinook Escapements Rebuilding



## Chickamin River Chinook Escapements Rebuilding



## Yakoun River Chinook Escapements Above Goal



## Nass River Chinook Escapements Not Rebuilding



## Skeena River Chinook Escapements Above Goal



## Area 6 Index Chinook Escapements

 Not Rebuilding

## Area 8 Index Chinook Escapements Not Rebuilding



## Rivers Inlet Chinook Escapements Rebuilding



## Smith Inlet Chinook Escapements Not Rebuilding



## WCVI Chinook Escapements Not Rebuilding



## Upper Georgla Str. Chinook Escapements Not Rebuilding



## Lower Georgia Str. Chinook Escapements Not Rebuilding



## Upper Fraser R. Chinook Escapements Above Goal

Numbers (Thousands)


## Middle Fraser R. Chinook Escapements Above Goal



## Thompson R. Chinook Escapements Not Rebuilding



## Harrison R. Chinook Escapements Not Rebuilding



## Skagit Spring Chinook Escapements Not Rebullding



## Skagit Sum./Fall Chinook Escapements Not Rebuilding



## Stillaguamish River Chinook Escapements Not Rebuilding



## Snohomish River Chinook Escapements Not Rebuilding

Numbers (Thousands)


- Escapement - Terminal Run - Base-to-Goal Line


## Green River Chinook Escapements Rebuilding



## Quillayute Summer Chinook Escapements Above Goal



## Grays Harbor Spring Chinook Escapement

 RebuildingNumbers (Thousands)

Escapement - Terminal Run -- Base-to-Goal Line

## Grays Harbor Fall Chinook Escapements Rebuilding



Columbia R. Spring Chinook Escapements Not Rebuilding


Columbia R. Summer Chinook Escapements Not Rebuilding


## Columbia R. Bright Chinook Escapements Above Goal



## Lewis R. Fall Chinook Escapements Above Goal



## Deschutes R. Fall Chinook Escapements



## Quillayute Fall Chinook Escapements



## Hoh Spr/Sum Chinook Escapements



Hoh Fall Chinook Escapements


## Queets Spr/Sum Chinook Escapements



## Queets Fall Chinook Escapements



## North Oregon Coastal Chinook Escapements



## Mid Oregon Coastal Chinook Escapements



## APPENDIX C

CWT Data Used

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SEAK Escapement ..... C-3
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## Introduction

The Exploitation Rate Assessment provided in Chapter 3 relies upon CWT release and recovery data and estimates of CNR mortality to estimate a variety of statistics for the exploitation rate indicator stocks. This appendix discusses the CWT groups used in the analysis, the brood years represented for each indicator stock, the sources of the recovery data, and the estimates of CNR mortality provided by the management agencies.

## CWT Groups Used and Brood Years Represented

The brood years for which CWT groups are available for the indicator stocks as well as the youngest age and oldest age are provided in Appendix Table 3.1. Tag codes used in the Exploitation Rate Assessment are listed by stock and brood in Appendix Table C-2.

## Sources of CWT Data Used

Sources of CWT recovery data and expansion procedures employed in the Exploitation Rate Assessment are summarized below. In a few cases, small samples from commercial fisheries have resulted in very large expansion factors. To avoid very large expansion factors associate with small samples, expansion factors were constrained to the range of 1 to 50 .

Canadian Commercial Fisheries: Estimated recoveries for commercial fisheries in Canada were obtained from the Mark-Recovery Database maintained by the CDFO at the Pacific Biological Station.

Canadian Sport Fisheries: Observed recoveries for sport fisheries in Canada were obtained from the Mark-Recovery Program (MRP) database maintained by the CDFO at the Pacific Biological Station. As in the analyses of the previous three years, expansion factors were computed using the following procedures. Starting in 1980, recoveries made in GS and the WCVI during the summer months (MaySeptember) were expanded as documented in Kuhn et al. (1988). Recoveries made in other months were expanded using the average expansion factor for the summer period in the same recovery year. Recoveries in areas outside of GS or WCVI used the corresponding expansion factor for the average of GS and WCVI, unless an expansion factor based on creel survey data was available. Recoveries made prior to 1980 in GS continued to be expanded by the default value of four.

GS sport recoveries were expanded using these procedures because of potential tag expansion biases associated with inadequate sampling and infrequent overflights of the sport fishery during winter months. The application of GS expansion factors to sport recoveries in other areas was necessary because reliable catch and mark incidence estimates are normally unavailable for these areas.

Terminal sport recoveries for the Big Qualicum Hatchery stock have been removed from the GSPT catch region. Examination of sport location files in the CDFO Mark-Recovery Database identified that tags from the Big Qualicum River recovery location had been inconsistently recorded as freshwater or marine recoveries. Further, during this examination, a consistent pattern of terminal marine recoveries, off the mouth of the Big Qualicum River in late August and September, was identified. Recoveries from this time/area stratum have been almost exclusively of $B Q R$ origin. $B Q R$ recoveries in this terminal stratum and from freshwater sport fisheries have been removed from the GSPT catch region. The effect of this correction is to reduce the GSPT exploitation rate on this indicator stock; particularly during the base period when this correction had its greatest effect. However, since the CTC Fishery Index is created by dividing annual exploitation rates by the base period average values, these corrections tend to increase
the Fishery Index values, for the BQR stock, compared to those previously reported.
Canadian Escapement: Escapement data for Canadian stocks were determined directly from hatchery records, from the Salmon Stock Assessment database at the Pacific Biological Station, and from documents prepared through the Canadian key stream program. Details regarding the source of escapement data for each of the three Canadian hatcheries used in the fishery index analysis are as follows:

Robertson Creek. A proportion of the tagged fish returning to the Robertson Creek Hatchery spawn in the Stamp River; however, fish in the river have been sampled only since 1984. These recoveries have not been included in the exploitation rate analysis because comparable sampling was not conducted in the base period. Because the exploitation rate analysis for this stock assumes that a consistent portion of the return enters the hatchery, the exploitation rate will be overestimated. Further, native catch in the Somass River has increased recently, but this fishery is not sampled for coded-wire tags or included in the exploitation rate analysis. This nonreported catch will result in an overestimation of ocean exploitation rates and an underestimation of the total exploitation.

Big Qualicum. Since 1971, escapement for the Big Qualicum River has been enumerated and checked for CWTs at a counting fence with two exceptions. First, the early part of the run, which was allowed to spawn naturally, was enumerated but not sampled for CWTs prior to 1988. This was accounted for by expanding the sampled fraction of the run to represent the total run (expansions were stratified by adult and jacks). Second, a few hundred fish which spawn below the fence (which is less than one kilometer above tidewater) were not enumerated or sampled. Fish in this latter group which had a CWT are excluded from the analysis.

Ouinsam Hatchery. The Quinsam Hatchery obtains brood stock primarily by seining spawning adults from both the Campbell River (the main river) and the Quinsam River (a relatively small tributary). Brood stock captures are examined for marks and are added to the estimates of CWT escapement to the rivers. These are also stratified by sex for the purposes of sample expansions and for adjustments for lost pins and no data recoveries. Chinook entering the hatchery have not been an important factor until 1989. In addition, hatchery staff have sampled the carcasses in the river for CWT from 1978 to 1983. Since 1984, escapement has been estimated by a mark recapture program (Andrew et al. 1988; Bocking et al. 1990; Bocking 1991; Firth et al., 1993; Shardlow et al. 1986). Estimates of the CWT escapement to each river were made by expanding the CWTs recovered during the dead pitch by the fraction of the estimated total escapement which was sampled. Both the escapement and the dead pitch were stratified by sex, combining adult and jack males into a single stratum. CWTs recovered during carcass recovery prior to 1984 were expanded by using the average fraction sampled from the period 1984 to 1990 , stratified by river with both sexes combined.

SEAK Fisheries: Recoveries from SEAK commercial fisheries were obtained from the MRP with the exception of recoveries in the fall of 1978 and all of 1979. The 1978 and 1979 commercial data and all estimated sport recoveries were obtained from ADF\&G.

Data anomalies were corrected using procedures discussed in Appendix II of the 1987 CTC Annual Report (CTC 1988). Two important adjustments are:

1) CWT recoveries from commercial fisheries were expanded to account for unsampled catches by multiplying by the ratio of the total catch to the sampled catch. For net and
trap gear, adjustments were computed for a district or group of districts by calendar year. For troll gear, a single adjustment factor was used for all time and area strata.
2) CWT recovery data for the SEAK sport fishery during the 1979-1982 base period are of poor quality due to very limited sampling. The sport fishery sampling program expanded from 1983 to 1986, resulting in more reliable estimates in recent years. To estimate CWT recoveries for this fishery in years prior to 1988, sport recoveries were estimated from troll recoveries and the relative size of the sport and troll catch (CTC 1990).

SEAK Escapement: Escapement data for the Alaska stock are provided by the following agencies: ADF\&G (Crystal Lake Hatchery and Deer Mountain Hatchery), National Marine Fisheries Service (NMFS) (Little Port Walter) and Southern Southeast Regional Aquaculture Association (SSRAA) (Carroll Inlet, Neets Bay, and Whitman Lake). Methods used to compute the escapement for SEAK tag groups are summarized below in instances in which modifications from the agency reported escapement data were necessary. The escapement to SSRAA facilities includes recoveries from cost recovery fisheries since the catch in these terminal area fisheries is not included in the Alaska ceiling.

Crystal Lake. The total return of CWTs was known for all years; however, returns from brood years 1979, 1983, 1984, 1985 (two of the three codes), 1987 and 1988 were not recorded by tag code. The recoveries by tag code were estimated in the following manner. For each return-year brood-year combination, the estimated escapement by tag code was the product of the total recoveries of the brood and the proportion of the tagged brood release that belonged to each tag code. This method assumes that all tag codes in a brood year had equal survival from release.

Deer Mountain. The total returns of CWTs was known for all years; however, returns from brood years 1978, 1979, and 1980 were not broken down by tag code in the return years 1980, 1982, and 1983. The recoveries by tag code were estimated in the same manner as the Crystal Lake recoveries.

SSRAA. Marks on fish returning to SSRAA hatcheries were sampled using one of two methods:

1) Random sampling of fish for marks was conducted throughout the return for defined time periods of variable length. The target number of marks in each time period was 200; however, the actual numbers varied and the number of fish examined for marks was not always recorded.
2) Marked fish were deliberately selected from the return during each time period. The number of fish examined to obtain this select sample was not recorded. These marked fish were then randomly sampled for approximately 200 CWTs.

Neither of these methods provides a usable estimate of mark incidence. Hence the recoveries by tag code for these hatcheries were estimated as follows:

1) The tagged recoveries in each sample were expanded by the marked to total release ratio and summed across tag codes.
2) The total return (tagged and untagged) during each time period was then multiplied by the proportion of the expanded sum which belonged to each tag code. These estimates were then summed for all the return periods to obtain a total estimated return for each
tag code.
3) As a result of this estimation procedure, the return estimates for each tag code include both the marked and unmarked portions of the release. To estimate the number of returning tags, this total estimate was divided by the release ratio.

This method assumes that the survival of marked and unmarked fish was equal.
Southern U.S. Fisheries: Recoveries by Washington, Oregon, and California fisheries were obtained from the MRP database with the following exceptions: 1993 tributary sport data and terminal sport recovery data for Columbia River basin and Oregon coastal stocks except Willamette Spring were obtained from ODFW and WDF; and 1993 Puget Sound sport catch/sample expansion factors were obtained from WDF.

Data were obtained directly from WDFW or ODFW only when those data had not yet been provided to CDFO through PSMFC. It should remain a high priority of all agencies to provide this information to PSMFC in a timely manner since the work of the CTC is slowed considerably when data must be sought and integrated from a number of individual agencies.

Southern U.S. Escapement: Escapement recovery data for southern U.S. stocks were obtained from the MRP database with the following exceptions:

1) Recoveries for WDFW facilities in Puget Sound for 1993 were obtained from WDFW;
2) Recoveries for tribal facilities in Puget Sound and the Washington Coast for 1993 were obtained from the NWIFC;
3) Recoveries to the U.S. Fish and Wildlife Service (USFWS) Makah National Fish Hatchery in 1993 were obtained from the USFWS; and
4) Columbia River Basin escapements for 1993 (except to USFWS facilities) were obtained from WDFW and ODFW.
5) Pre-1982 escapement data for the Stayton Pond and Willamette Spring stocks and escapement for the Bonneville stock through 1982 were obtained from ODFW.

Methods for calculating dam conversion rates and interdam loss (IDL, one minus the dam conversion rate) did not change from the 1991 annual report (CTC 1992). Currently, the conversion from Bonneville Dam to McNary Dam for Columbia Upriver Brights and Hanford Wild (URBs) is calculated for the exploitation rate analysis as:

## McNary Count

(Bonneville URBs)-(Zone 6 Comm Catch)-(Deschutes Turnoff)

Bonneville Upriver Bright counts are calculated by the WDFW by first calculating the stock composition (URBs vs. mid-Columbia brights or MCBs) of all brights above Bonneville Dam, and then applying the proportion of URBs in the upriver run to the Bonneville Dam counts of brights based on visual observation of skin color. Zone 6 commercial catches are taken from the Columbia River Status Report (ODFW \& WDFW 1993). Ceremonial, subsistence, and sport catches between Bonneville and McNary Dams were provided by Columbia River trealy tribes and WDFW. The number of fish returning to the Deschutes River is estimated annually by ODFW. Fish entering other tributaries below McNary Dam are not accounted for; this will again result in a slight overestimate of IDL.

The Lyons Ferry Hatchery conversion rate is the product of the conversion rate of URBs and an additional conversion rate for losses between McNary Dam (the last dam before the Snake River) and Ice Harbor Dam (the first dam on the Snake River and where Lyons Ferry escapement is measured for the exploitation analysis). Estimation of conversion between McNary Dam and Ice Harbor Dam is complicated by extensive straying and fallback over Ice Harbor Dam. An estimate was calculated by averaging the Columbia River per pool conversion rate (from Bonneville Dam to McNary Dam) and the Snake River per pool conversion rate (from Lower Monumental Dam to Lower Granite Dam). Escapements of tagged fish above Ice Harbor Dam, tag recovery rates and Snake River conversion rates were used to estimate total escapement of tagged Lyons Ferry Hatchery fish at Ice Harbor Dam.

## Estimates of Incidental Catch Mortality

Fishery-specific estimates of incidental mortality or parameters used to estimate incidental catch mortality have been provided by regional management agencies and are listed in appendix tables $\mathrm{C}-3$ through $\mathrm{C}-8$.

Appendix Table C-1. Brood years included by stock for Exploitation Rate Assessment (x=valid).

| Stock Name | Younge Age | ldest Age | 71 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Alaska Spring | 3 | 6 | - | - | - | - | - | - | - | X | X | X | X | X | X | X | X | X | X | X | X | X | - |
| Kitsumkalum | 3 | 7 | - | - | - | - | - | - | - | - | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Snootli Creek | 2 | 6 | - | - | - | - | x | X | $x$ | X | - | - | x | x | x | X | x | x | X | x | $x$ | x | x |
| Kitimat River | 2 | 6 | - | - | - | - | - | - | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Robertson Creek | 2 | 5 | - | X | X | x | X | $x$ | $x$ | x | X | $x$ | X | X | $x$ | X | X | X | X | X | X | X | X |
| Quinsam | 2 | 6 | - | - | - | x | x | x | $x$ | x | x | x | x | x | x | x | X | X | x | x | x | x | x |
| Puntledge | 2 | 5 | - | - | - | - | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Big Qualicum | 2 | 5 | X | X | X | X | x | $x$ | x | x | x | x | x | x | x | x | X | x | x | x | X | X | x |
| Chehal is | 2 | 5 | - | - | - | - | - | - | - | - | - | - | X | X | X | X | X | X | X | X | X | X | - |
| Chilliwack | 2 | 5 | - | - | - | - | - | - | - | - | - | - | X | X | X | X | X | X | X | X | X | X | - |
| South Puget Sound Fall Yearling | g 2 | 5 | - | - | - | - | - | - | - | x | x | x | x | - | - | - | - | x | x | x | x | - | X |
| Squaxin Pens Fall Yearling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | x | x | X | x | X | - |
| Univ of Washington Accelerated | 2 | 5 | - | - | - | - | x | $x$ | $x$ | x | $x$ | x | $x$ | X | X | X | - | - | - | - | - | - | - |
| Samish Fall Fingerling | 2 | 5 | - | - | - | - | x | - | - | - | x | - | - | - | - | - | X | X | X | X | X | X | X |
| Stillaguamish Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | - | x | x | X | X | - | - | X | x | x | x | x | X |
| George Adams Fall Fingerling | 2 | 5 | - | - | - | - | X | - | - | x | X | x | x | - | - | - | x | x | x | x | x | x | x |
| SPS Fall Fingerling | 2 | 5 | - | - | - | - | K | - | - | x | x | $x$ | X | X | X | x | x | X | x | x | x | x | x |
| Kalama Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | X | x | x | x | $x$ | x | X | X | X | x | x | x | X |
| Elwha Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | x | x | x | x | x | - | x | x | x | - |
| Hoko Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X | X | X | - | X | X | X |
| Skagit Spring Yearling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | x | x | X | X | X | x | x | - | - | x | - |
| Nooksack Spring Yearling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | X | X | - | X | - | X | X | X | X | X | - |
| White River Spring Yearling | 2 | 5 | - | - | - | - | - | - | - | - | X | X | X | x | X | X | X | X | x | x | X | x | x |
| Sooes Fall Fingerling | 2 | 6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X | X | X | - | X | X | X |
| Queets Fall Fingerling | 2 | 6 | - | - | - | - | - | - | X | X | X | X | X | X | X | - | x | x | x | x | x | x | - |
| Cowlitz Tule | 2 | 5 | - | - | - | - | - | - | X | x | X | x | X | X | X | X | x | x | X | x | x | x | X |
| Spring Creek Tule | 2 | 5 | - | X | X | X | X | X | X | X | X | X | x | X | X | X | X | X | X | X | X | X | X |
| Bonneville Tule | 2 | 5 | - | - | - | - | - | X | x | x | x | X | x | x | $x$ | x | - | - | - | - | - | - |  |
| Stayton Pond Tule | 2 | 5 | - | - | - | - | - | - | - | x | x | x | x | $x$ | $x$ | x | $x$ | $x$ | X | $x$ | $x$ | x | X |
| Upriver Bright | 2 | 5 | - | - | - | - | X | x | X | X | X | X | X | X | X | X | x | X | x | X | x | x | X |
| Hanford Wild | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | x | x | x | x | x | X |
| Lewis River Wild | 2 | 5 | - | - | - | - | - | - | X | X | X | - | - | X | X | X | X | X | X | X | X | X |  |
| Lyons Ferry | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | X | $x$ | $x$ | x | X | x | x |  |
| Willamette Spring | 3 | 6 | - |  | - | - | x | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Salmon River | 2 | 5 | - | - | - | - | - | - | X | X | X | x | - | x | X | x | x | x | x | x | X | X |  |

## Appendix Table C-2. Tag Codes Used for Exploitation Rate Assessment

Tag codes for Alaska Spring
 031661031716031753031761031655031826031901031957032027032037030116030218030227 031703031717031754031762031807031827031902031958032028032038030119030219030228 031704041917041944031763031808031828031903031959032029032039030121030220030229 031705041943042121031801031809031829031904031960032030032040030122030221030230 031706041945042202031802031810031830031905031961032031032041030125030222030231 031707042039044005031803031811031831031906031962032032032042030216030223030232 031708042040 031708042040 031709042042 031710042043 031711042045
031712
03171
031715
041932
041938
041938
041940 031804031812031832031907031963032033032043030217030224031618 036303031813031833031908032001032034032044031947030225032216 036304031814031834031909032002032113032045032138030226032217 036305031815031835031910032003032114032131032141032052032218 042222031816031836031911032004032116032132032201032203032219 042223031817031837031912032005032119032135032202032204032220 042227031818031838031913032006032121036226036237032205032221 042229031819031839031914032007032122036228036238032206032222 042230036306031843031915032008036213036231036329032207032223 B40907 036307031844031916032009036214036232036330032208032224 340908036308031845031917032010036216036319036331032209032225 041940

036309031846031918032011036219036321043247032210032226 042255031847031919032012036221036322043249032211032227 04254031849031921032014036225036324043252032213032229 042355031849031921032014036225036324043252032213032229 042356031850031922032015036310036325043255032214032230 $\begin{array}{lllllllllll}042430 & 031851 & 031923 & 032016 & 036311 & 036326 & 043303 & 032215 & 032231\end{array}$ 042431031852031924032017036312036327043304043232032232 031853031925032018036313036328043305043449036333 031854031926032019036314042737043306043450036334 031855031927032101036315042738043319043501042945 031856031928032102036316043027043320043502043701 031857031929032103036317043028043323043504043702 031858031930032104042754043029043324043507043704 031859031931042626042908043030043406043530043705 031860031932042628042909043031043407043531043706 031861031933042631042960043032 031862031934042632043101043058 031863031935042633043102043059 040321031936042634043104043141 042463031937042713043107043142 $\begin{array}{llllll}042463 & 031937 & 042713 & 043107 & 043142 \\ 042503 & 042731 & 043108 & 043144\end{array}$ $042511031939042732 \quad 043147$ 042512031940042733043149 042513031941042825

043532043707
043533043708 043606043745 043607043746 043608043747 043748 043749 043750 043821

## Appendix Table C-2. Continued

Tag codes for Alaska Spring (continued)
 031942
031943
031944
031945
031946
031948
040329
040330
040331
040332
040333
040336
040342
040343
040344
040345
040346
040347
040348
040349
040350
042321
042530
042531
042534
042535
042536
042537
042538
042539
042540

## Appendix Table C-2. Continued

Tag codes for Kitsumkalum
 021852021951022149022533022758023346023704024414024944026039020940021133023116 $022311022534 \quad 023347023705024413024941026040020941021134021010$ 022312 022313 023348023706024412024942026041020942021135021011 $\begin{array}{lllllll}023349 & 023707 & 024411 & 024943 & 026042 & 020943 & 021136 \\ 023350 & 024410 & 025060 & 026043 & 020944 & 021137\end{array}$ 023350 023351 023352
023353 025061026044020945021138 026045020946021139 026137
026138

Tag codes for Snootli creek


Tag codes for Kitimat River

 022048

0218440221370225270227430232540236290242110025152025529020433021518180432 022222022745023255 023631024220025153025530020434021519180431 02363202422102515525532020436021533180429 023633024222025156 020437021560020310 020438
020618

## Appendix Table C-2. Continued

Tag codes for Robertson
 020203020606020408021629022217021615021827021661022202022541022662023131023734024256024311025014020645021549180620 $020406020906020409021630022218021635021829 \quad 022405082225022663023132023735024257024802025836020646021550180621$ 020506021206021305021631 020602021406 022753023134023737024362024810025838020949021552180623 08224702313502373802436302495102583902094802155318080 08224702313502313602373902440102495202605502064802153818080 $023142023740 \quad 024958026056020647021209180804$ $\begin{array}{lllllll}023142 & 023740 & 024958 & 026056 & 020647 & 021209 & 180804 \\ 023143 & 023741 & 024959 & 026057 & 020153 & & 180805\end{array}$ $023143023741 \quad 024959026057020153$ $023145-024960020152$ $023151 \quad 025326$
023203
023206

Tag codes for Quinsam
 020403020108021916021736021759021757021657022303022518022631023322023522024152024419025814026062020956180422 $021737 \quad 021758021943022304022519022632023323023523024153024420025815026063020957180421$
 $\begin{array}{llllllll}023324 & 023524 & 024154 & 024421 & 025816 & 026101 & 020958 & 180420 \\ 023525 & 024155 & 024956 & 025817 & 026102 & 020959 & 180419\end{array}$ 023326023554024156025358025818020361021448180418 023327023555024157025359025819020360021450180417 023328023556024158025360025820020359021451180416 023329023557024159025361025821020358026019180415 023330023558024160025362025822020357

Tag codes for Puntledge
 021402020308021816021634021731021854021947022302022556022710023357023727024701023701026034020809180315180817 022557022711023358024702

020810180316180816
023359
180815
180814

## Appendix Table C-2. Continued

Tag codes for Big Qualicum
 021002020206021716021726021612021824021810022223022543022661023217023742024260024416026010020660021312180863 $021727021613021825021944022306 \quad 022747023320023743024261024742026047020661021313180862$ 021656021826 022748023321023744024262024761026048020662021314180861 022824023333023745024263024762026049020663021315021335 022825023334024047024357024957026050020727180253021334 022826023335024048024358024962026051020952180254021333 023336024049024359024963026052020953180255021332 $\begin{array}{llllllll}023336 & 024049 & 024359 & 024963 & 026052 & 020953 & 180255 \\ 023337 & 024050 & 024360 & 025001 & 026053 & 020954 & 180256\end{array}$ 023338002605050020250 $\begin{array}{lr}023338 & 026054 \\ 023345 & 026323\end{array}$

026324
Tag codes for Chehal is
 022205022520022655022819023754024402024738025761020641021547180336 022521022701022901023755024403024739025762020642021548180335 022523022702023041023756024404024740 020643 022525022725023042023757024405024741

022759023043023758024406
$022760 \quad 023759024407$
022761024051024408
024052024409
Tag codes for Chilliwack
 022163022422022658023414024101024547025542025747020242180330180334 022659023415 025748020243 180332 022660023416

023417
023418
023419

## Appendix Table C-2. Continued



## Appendix Table C-2. Continued

Tag codes for George Adams Fall Fingerling


Tag codes for South Puget Sound Fall Fingerling
 $150010151010151313011403130604 \quad 631935631943632233051047051346211622211657211901211961212542213137211831634024634339$ $\begin{array}{lllllllll}150010 & 151010 & 151313011403130604 & 631935631943632233051047 & 051346211622211657211901 & 211961212542213137 & 611831634024634339 \\ 150109 & 151012 & 011404 & 631936631944632253632256 & 63643634116635221635238630261212014212217\end{array}$

633643634116635221635238630261212014212217 633644634121635222
633645
633646
634104
150114
150200
150203
150806

| 631940 | 632158 | 633645 |
| :--- | :--- | :--- |
| 631945 |  | 633646 |
|  | 634104 |  |

Tag codes for Kalama Fall Fingerling
 050722050839051048051344211628211706211759211962212541213138211836211833212206 050840051049051345211629211707211761

Tag codes for Elwha Fall Fingerling
 $051363211616211658211919212208 \quad 213132211827212015$ 632721633038633419211920

211828 632722633039633420211921

633543
633544
633547
633548

Tag codes for Hoko Fall Fingerling
 211935212216211907 211829212018212218

## Appendix Table C-2. Continued

Tag codes for Skagit Spring Yearling


Tag codes for Nooksack Spring Yearling


Tag codes for White River Spring Yearling
 $130208131010 \quad 631834632047632136632341632853633049632508633131633246634702630161635542635908634224$ 632604633009633050633060633648634145634704630162 633108

Tag codes for Sooes Fall Fingerling
 051746 052355052824 052356052825

Tag codes for Queets Fall Fingerling
 $050361050520050661050830050962051425211621 \quad 211908212101212835213144211835212010$ 050522050833051016 050525

Tag codes for Cowlitz Tule
 $631802631942632154632156632462632503633019633235634108634126635231635250630452634056 \quad 634526$ 632255

633020633236
633124633237
633125633238

## Appendix Table C-2. Contimued

Tag codes for Spring Creek Tule
 050101050401050901050202054101055501050433050639050740051050051142051151051534 B50109 051855051445052013052207052106052127 050201050501051001050302054201055601050434050640050741051051051143051152051535 B50110 051856051449052015052208052109052129 050301050601051101050402054401055701050444050641050742051052

051201050502054501056001050446 050748
051301050602054601056201
050749
051401050702
050750
050802050751

051536 B50111 051857051450052016052209052110052130 051537 B50112 051858051451052017052210052112052544 051538 в50113 051859051659052018052211052115052545 051539 B50114 051860051660052019052212052117052553 B50114 051860051660052019052212052117052553 $\begin{array}{lllll}850115 & 051861051661 & 052020 & 052213 & 052118 \\ 850208 & 051862 & 051662 & 052021 & 052214 \\ 052123 & 052557\end{array}$ 850208051862051662052021052214052123052557 0205051863051912052023052216052124052558 051905051912052024052216 051906051913052025052217 051909051914052032052218 $051923052033052335 \quad 052562$ 051924052336 051925

052563 052605

Tag codes for Bonneville Tule
BY 71 BY 72 BY 73 BY $74 \quad$ BY 75 BY 76 BY 77 BY 78 BY 79 BY 80 091605071656071842072157072156072407072729073120073322

072163072329072408072730073121073323
072341072411
072342
Tag codes for Stayton Pond Tule
 071841072055072335072662072328073144073352073818074050074526075012075218075227071601 072830073145073353073819074051074527075015075219075228071602 072831073146073354073820074052074528075017075220075229071603 072832073147073355073821074053074529075018075221075230071604 072833073148073356073822074054074530075020075222075231075905 072834

Tag codes for Upriver Bright

 $\begin{array}{lllllllll}130713 & 631662631741 & 631821 & 631948 & 632155 & 632252 & 632611 & 632859 & 63322\end{array}$
131202

Appendix Table C-2. Continued
Tag codes for Hanford Wild

Tag codes for Lewis River Wild
 $\begin{array}{llllllllllll}631611631813 & 632123 & 632737 & 633126 & 633411633821634151635061 & 630456 & 631350634217634206\end{array}$ 631618631858632124
631618631858632124
631619631859632125
631902632207
631920632208
632002632214 632213

Tag codes for Lyons Ferry
 633226633638634259635214630226635544634143 633227633639634261635216630228635547634160 633228633640

## Appendix Table C-2. Continued

Tag codes for willamette Spring


Tag codes for Salmon River
 $071643071849072239072504 \quad 1 \quad 072647072726073051073329073342074629075131075458075705071559$ 071644071850072240072505 073052073330074321074635075132075459075706071560 074322074636075133075460075707071561 074323074637075134075461075708071562 074324074638075135075462075709071563 075136

Appendix Table C-3. Sources and estimates of legal and sublegal encounters in the SEAK troll fishery during chinook nonretention fisheries.

| Year | Legal CNR <br> Encounters | Sublegal CNR <br> Encounters | Source |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| 1981 | 18,225 | 18,578 | $\mathrm{a} /$ |
| 1982 | 89,100 | 90,827 | $\mathrm{a} /$ |
| 1983 | 74,925 | 76,378 | $\mathrm{a} /$ |
| 1984 | 87,075 | 88,763 | $\mathrm{a} /$ |
| 1985 | 118,191 | 131,011 | $\mathrm{~b} /$ |
| 1986 | 78,763 | 104,820 | $\mathrm{c} /$ |
| 1987 | 191,956 | 171,156 | $\mathrm{~d} /$ |
| 1988 | 60,930 | 91,200 | $\mathrm{e} /$ |
| 1989 | 150,600 | 162,900 | $\mathrm{f} /$ |
| 1990 | 117,807 | 116,523 | $\mathrm{~g} /$ |
| 1991 | 179,131 | 185,851 | $\mathrm{~g} /$ |
| 1992 | 135,735 | 198,456 | $\mathrm{~g} /$ |
| 1993 | 72,816 | 120,724 | $\mathrm{~g} /$ |
|  |  |  |  |

a/ Alaska Dept. Fish and Game and National Marine Fisheries Service. 1987. Associated fishing induced mortalities of chinook salmon in southeast Alaska. Alaska Dept. Fish Game, unpublished report.
b/ Davis, A., J. Kelley, and M. Seibel. 1986. Observations on chinook salmon hook and release in the 1985 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.
c/ Davis, A., J. Kelley, and M. Seibel. 1987. Observations on chinook salmon hook and release in the 1986 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.
d/ Seibel, M., A. Davis, J. Kelley, and J.E. Clark. 1988. Observations on chinook salmon hook and release in the 1987 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.
e/ Seibel, M., A. Davis, J. Kelley, and J.E. Clark. 1989. Observations on chinook salmon hook and release in the 1988 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.
f/ Data collected from a limited survey of the chinook nonretention fishery in 1989 indicated that encounter rates were similar to those which had occurred in previous years. For this reason, the number of encounters was estimated by multiplying the 1985-1988 average CNR encounters per gear day times the gear days for 1989. (Spreadsheet CNR90.WQ1, J. Carlile ADFG, 2/2/91)
g/ The number of encounters during the CNR fishery in 1990-1993 were estimated from a linear regression (see text for description).

Appendix Table C-4. Sources and estimates of legal and sublegal encounters in the SEAK net fishery during chinook nonretention fisheries.

| Legal CNR <br> Encounters |  | Sublegal CNR <br> Encounters | Source |
| :---: | ---: | :---: | :---: |
| 1985 | 12,352 | 60,506 | $\mathrm{a} /$ |
| 1986 | 13,773 | 26,850 | $\mathrm{~b} /$ |
| 1987 | 4,497 | 13,923 | $\mathrm{c} /$ |
| 1988 | 8,574 | 28,357 | $\mathrm{~d} /$ |
| 1989 | 8,557 | 28,301 | $\mathrm{~d} /$ |
| 1990 | 6,383 | 22,601 | $\mathrm{~d} /$ |
| 1991 | 7,443 | 24,615 | $\mathrm{~d} /$ |
| 1992 | 12,783 | 42,277 | $\mathrm{~d} /$ |
| 1993 | 4,696 | 15,532 | $\mathrm{~d} /$ |
|  |  |  |  |

${ }^{\text {a/ Van Alen, B.W. and M. Seibel. 1986. Observations on chinook salmon non-retention in the } 1985}$ Southeast Alaska purse seine fishery. In, 1985 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Service Auke Bay Laboratory for joint U.S./Canada interception studies. Final Report Contract No./ 85-ABC00142. Juneau, Alaska.
b/ Van Alen, B.W. and M. Seibel. 1987. Observations on chinook salmon non-retention in the 1986 Southeast Alaska purse seine fishery. In, 1986 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Service Auke Bay Laboratory for joint U.S./Canada interception studies. Final Report. Contract No. NA-87-ABH00025. Juneau, Alaska.
c/ Rowse, M.L. and S. Marshall. 1988. Estimates of catch and mortality of chinook salmon in the 1987 southeast Alaska purse seine fishery. Alaska Department of Fish and Game, Regional Information Report 1J88-18.
${ }^{\mathrm{d} /}$ Computed by multiplying 1985-1987 average ratio of legal (or sublegal) encounters by the reported catch.

Appendix Table C-5. Number of days (or gear days) of chinook retention, chinook nonretention fishery, and source of information for the NBC troll fishery.

| Year | Chinook <br> Retention | Chinook <br> Nonretention | Source |
| :---: | :---: | :---: | :---: |
| 1987 | 60 | 9 | $\mathrm{a} /$ |
| 1988 | 43 | 17 | $\mathrm{~b} /$ |
| 1989 | 66 | 9 | $\mathrm{c} /$ |
| 1990 | 18,964 | 6,431 | $\mathrm{~d} /$ |
| 1991 | 26,754 | 3,042 | $\mathrm{~d} /$ |
| 1992 | 15,798 | 5,778 | $\mathrm{~d} /$ |
| 1993 | 16,483 | 3,513 | $\mathrm{~d} /$ |

a/ Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, 1987 meeting of the Pacific Salmon Commission. Pacific Salmon Commission, TCCHINOOK (87)-5.
b/ Chinook Technical Committee. 1988. Preliminary review of 1988 fisheries. Pacific Salmon Commission, TCCHINOOK (88)-3.
c/ Chinook Technical Committee. 1990. 1989 annual report. Pacific Salmon Commission, TCCHINOOK (90)-3.
d/ Computed by multiplying the number of days during the chinook retention fishery by the ratio of the number of boat days during the nonretention fishery to the number of boat days during the chinook retention fishery.

Appendix Table C-6. Number of days or gear days of chinook retention, chinook nonretention fishery, and source of information for the CBC troll fishery.

| Year | Chinook <br> Retention | Chinook <br> Nonretention | Source |
| :--- | :---: | :---: | :---: |
| 1987 | 60 |  |  |
| 1988 | 43 | 17 | $\mathrm{a} /$ |
| 1989 | 66 | 9 | $\mathrm{~b} /$ |
| 1990 | 6,032 | 1,591 | $\mathrm{c} /$ |
| 1991 | 4,891 | 641 | $\mathrm{~d} /$ |
| 1992 | 5,739 | 1,070 | $\mathrm{~d} /$ |
| 1993 | 2,889 | 1,155 | $\mathrm{~d} /$ |
|  |  |  | $\mathrm{d} /$ |

a/ Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, 1987 meeting of the Pacific Salmon Commission. Pacific Salmon Commission, TCCHINOOK (87)-5.
${ }^{\text {b/ }}$ Chinook Technical Committee. 1988. Preliminary review of 1988 fisheries. Pacific Salmon Commission, TCCHINOOK (88)-3.
c/ Chinook Technical Committee. 1990. 1989 annual report. Pacific Salmon Commission, TCCHINOOK (90)-3.
${ }^{\mathrm{d} /}$ Computed by multiplying the number of days during the chinook retention fishery by the ratio of the number of boat days during the nonretention fishery to the number of boat days during the chinook retention fishery.

Appendix Table C-7. Number of days of chinook retention, chinook nonretention fishery, and source of information for the WCVI troll fishery.

| Year | Chinook <br> Retention | Chinook <br> Nonretention | Source |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| 1985 | 105 | 5 | $\mathrm{a} /$ |
| 1987 | 47 | 7 | $\mathrm{~b} /$ |
| 1988 | 55 | 15 | $\mathrm{c} /$ |
|  |  |  |  |

${ }^{\text {a/ Anonymous. 1986. } 1985 \text { Canadian agency report on chinook salmon. Canadian Department of }}$ Fisheries and Oceans, unpublished report.
${ }^{\text {b/ Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, } 19871020}$ meeting of the Pacific Salmon Commission. Pacific Salmon Commission, TCCHINOOK (87)-5.
c/ Chinook Technical Committee. 1988. Preliminary review of 1988 fisheries. Pacific Salmon Commission, TCCHINOOK (88)-3.

Appendix Table C-8. Sources and estimates of CNR parameters for the GS troll fishery.

| Year | Legal CNR | Sublegal CNR | Gear Days |  | Source |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Retention | Nonretention |  |
| 1985 | 12,412 | 12,184 |  |  | a/ |
| 1986 | 5,151 | 17,834 |  |  | a/ |
| 1991 |  |  | 4,589 | 1,867 | b/ |
| 1992 |  |  | 3,744 | 2,414 | b/ |
| 1993 |  |  | 4,177 | 3,028 | b/ |

${ }^{\text {a/ Anonymous. 1986. Data Report on Unaccounted for Sources of Fishing Associated Mortalities of }}$ Chinook Salmon in B.C. Fisheries (1977-1986). Canadian Department of Fisheries and Oceans, unpublished report. 47p. Data reported is number of encounters.
${ }^{\text {b/ }}$ Computed by multiplying the number of days during the chinook retention fishery by the ratio of the number of boat days during the nonretention fishery to the number of boat days during the chinook retention fishery.

## APPENDIX D

## Total Mortality Exploitation Rate and Fishery Index Data

Page
Southeast Alaska Troll ..... D-1
North/Central B.C. Troll ..... D-2
North B.C. Troll ..... D-3
Central B.C. Troll ..... D-4
West Coast Vancouver Island Troll ..... D-5
Strait of Georgia Troll and Sport ..... D-6
Strait of Georgia Troll ..... D-7
Strait of Georgia Sport ..... D-8
U.S. South Ocean Troll and Sport: Puget Sound Stocks ..... D-9
U.S. South Ocean Troll and Sport: Columbia River Stocks ..... D-10

## Fishery: Southeast Alaska Troll

| TOTAL Year | MORTALI AKS Age 4 |  |  | RATES <br> RBT <br> Age 3 | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | SRH <br> Age 3 | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 3 \end{array}$ | URB <br> Age 4 | $\begin{array}{r} \text { URB } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.000 | 0.097 | 0.070 | 0.274 | 0.562 | NA | NA | NA | 0.014 | 0.160 | NA | NA |
| 80 | NA | 0.108 | 0.065 | 0.077 | 0.280 | 0.328 | 0.040 | NA | NA | 0.043 | 0.142 | 0.266 | 0.143 |
| 81 | NA | 0.111 | 0.111 | 0.083 | 0.349 | 0.420 | 0.042 | 0.123 | NA | NA | 0.179 | 0.241 | 0.095 |
| 82 | 0.120 | 0.133 | 0.173 | 0.068 | 0.276 | 0.319 | 0.013 | 0.123 | 0.142 | 0.023 | 0.107 | 0.151 | 0.080 |
| 83 | 0.114 | 0.209 | 0.225 | 0.072 | 0.313 | 0.474 | 0.027 | 0.066 | 0.418 | 0.020 | 0.226 | NA | 0.120 |
| 84 | 0.093 | 0.114 | 0.214 | 0.100 | 0.292 | 0.227 | NA | 0.061 | 0.143 | 0.019 | 0.203 | 0.345 | 0.054 |
| 85 | 0.095 | 0.168 | 0.246 | 0.093 | 0.124 | 0.343 | 0.019 | NA | 0.256 | 0.016 | 0.159 | 0.261 | 0.183 |
| 86 | 0.105 | 0.104 | 0.154 | NA | 0.276 | 0.039 | 0.018 | 0.137 | NA | 0.016 | 0.105 | 0.177 | NA |
| 87 | 0.091 | 0.136 | 0.149 | 0.034 | NA | NA | 0.024 | 0.040 | 0.198 | 0.031 | 0.136 | 0.249 | 0.128 |
| 88 | 0.106 | 0.113 | 0.093 | 0.011 | 0.159 | NA | NA | 0.053 | 0.176 | 0.023 | 0.068 | 0.195 | 0.067 |
| 89 | 0.081 | 0.115 | 0.155 | 0.023 | 0.153 | 0.202 | 0.015 | 0.033 | 0.211 | NA | 0.043 | 0.172 | 0.039 |
| 90 | 0.183 | 0.179 | 0.117 | 0.059 | 0.190 | 0.260 | 0.023 | 0.055 | 0.164 | NA | 0.137 | 0.118 | 0.088 |
| 91 | 0.133 | 0.106 | 0.131 | 0.049 | 0.221 | 0.265 | 0.046 | 0.096 | 0.232 | NA | NA | 0.153 | 0.047 |
| 92 | 0.083 | 0.115 | 0.139 | 0.047 | 0.178 | 0.344 | 0.005 | 0.036 | 0.041 | NA | 0.044 | NA | 0.037 |
| 93 | 0.076 | NA | 0.173 | 0.057 | 0.163 | 0.258 | 0.013 | 0.059 | 0.164 | 0.045 | 0.088 | NA | 0.072 |
| Base | 0.120 | 0.088 | 0.112 | 0.075 | 0.295 | 0.407 | 0.032 | 0.123 | 0.142 | 0.027 | 0.147 | 0.219 | 0.106 |


| TOTAL <br> Year | MORTALI <br> AKS Age 4 |  | oitatio QUI Age 5 |  | INDEX RBT Age 4 | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | SRH Age 4 | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.000 | 0.868 | 0.940 | 0.930 | 1.380 | NA | NA | NA | 0.516 | 1.087 | NA | NA | 1.023 |
| 80 | NA | 1.221 | 0.586 | 1.031 | 0.951 | 0.805 | 1.256 | NA | NA | 1.629 | 0.969 | 1.212 | 1.350 | 0.990 |
| 81 | NA | 1.264 | 0.998 | 1.116 | 1.182 | 1.032 | 1.345 | 0.999 | NA | NA | 1.215 | 1.099 | 0.894 | 1.094 |
| 82 | 1.000 | 1.515 | 1.548 | 0.913 | 0.937 | 0.783 | 0.398 | 1.001 | 1.000 | 0.856 | 0.729 | 0.689 | 0.757 | 0.914 |
| 83 | 0.952 | 2.375 | 2.014 | 0.970 | 1.061 | 1.164 | 0.870 | 0.536 | 2.946 | 0.736 | 1.536 | NA | 1.130 | 1.366 |
| 84 | 0.778 | 1.290 | 1.919 | 1.336 | 0.989 | 0.557 | NA | 0.495 | 1.007 | 0.714 | 1.379 | 1.576 | 0.514 | 1.003 |
| 85 | 0.797 | 1.908 | 2.205 | 1.245 | 0.421 | 0.842 | 0.590 | NA | 1.801 | 0.597 | 1.081 | 1.194 | 1.725 | 1.110 |
| 86 | 0.878 | 1.178 | 1.379 | NA | 0.935 | 0.096 | 0.565 | 1.115 | NA | 0.612 | 0.717 | 0.810 | NA | 0.721 |
| 87 | 0.759 | 1.546 | 1.335 | 0.451 | NA | NA | 0.763 | 0.328 | 1.395 | 1.181 | 0.927 | 1.139 | 1.208 | 1.024 |
| 88 | 0.881 | 1.282 | 0.838 | 0.141 | 0.539 | NA | NA | 0.432 | 1.238 | 0.879 | 0.463 | 0.891 | 0.632 | 0.733 |
| 89 | 0.676 | 1.303 | 1.390 | 0.310 | 0.519 | 0.497 | 0.489 | 0.269 | 1.488 | NA | 0.294 | 0.787 | 0.368 | 0.667 |
| 90 | 1.525 | 2.035 | 1.047 | 0.791 | 0.643 | 0.640 | 0.740 | 0.445 | 1.153 | NA | 0.930 | 0.537 | 0.828 | 0.843 |
| 91 | 1.107 | 1.200 | 1.173 | 0.663 | 0.749 | 0.652 | 1.459 | 0.781 | 1.637 | NA | NA | 0.699 | 0.444 | 0.861 |
| 92 | 0.689 | 1.301 | 1.243 | 0.634 | 0.603 | 0.846 | 0.150 | 0.294 | 0.288 | NA | 0.297 | NA | 0.352 | 0.649 |
| 93 | 0.634 | NA | 1.554 | 0.766 | 0.553 | 0.634 | 0.402 | 0.480 | 1.156 | 1.682 | 0.602 | NA | 0.682 | 0.738 |

Stack Identifiers

| AKS = ALASKA SPRING | QUI $=$ QUINSAM | RBT $=$ ROBERTSON CREEK |
| :--- | :--- | :--- |
| SRH $=$ SALMON RIVER | URB $=$ COLUMBIA UPRIVER BRIGHT | WSH $=$ WILLAMETTE SPRING |

## Fishery: North/Central B.C. Troll

| TOTAL Year | MORTALI <br> AKS Age 4 |  |  |  | $\begin{array}{r} \text { QUI } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { QUI } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | SRH Age 3 | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB Age 3 | URB Age 4 | URB Age 5 | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.086 | 0.093 | 0.047 | 0.192 | 0.113 | 0.103 | 0.154 | 0.110 | NA | NA | NA | 0.011 | 0.091 | NA | NA |
| 80 | NA | 0.098 | 0.089 | 0.049 | 0.163 | NA | 0.087 | 0.149 | 0.154 | 0.077 | NA | NA | 0.027 | 0.070 | 0.073 | 0.138 |
| 81 | NA | 0.096 | 0.098 | 0.077 | 0.180 | 0.193 | 0.061 | 0.139 | 0.235 | 0.112 | 0.158 | NA | NA | 0.076 | 0.091 | 0.105 |
| 82 | 0.004 | 0.069 | 0.087 | 0.032 | 0.079 | 0.128 | 0.066 | 0.160 | 0.123 | 0.040 | 0.123 | 0.081 | 0.026 | 0.034 | 0.020 | 0.028 |
| 83 | 0.007 | NA | 0.099 | 0.062 | 0.141 | 0.218 | 0.073 | 0.114 | 0.076 | 0.034 | 0.091 | 0.098 | 0.035 | 0.077 | NA | 0.060 |
| 84 | 0.005 | 0.068 | NA | 0.011 | 0.063 | 0.078 | 0.036 | 0.135 | 0.227 | NA | 0.094 | 0.316 | 0.025 | 0.107 | NA | 0.024 |
| 85 | 0.003 | 0.034 | NA | 0.015 | 0.046 | 0.036 | 0.061 | 0.213 | 0.197 | 0.041 | NA | 0.230 | 0.024 | 0.082 | 0.075 | 0.023 |
| 86 | 0.003 | 0.062 | 0.193 | 0.047 | 0.079 | 0.081 | NA | 0.115 | NA | 0.017 | 0.063 | NA | 0.020 | 0.072 | 0.084 | NA |
| 87 | 0.002 | 0.015 | 0.075 | 0.026 | 0.074 | 0.122 | 0.044 | NA | NA | 0.026 | 0.056 | 0.191 | 0.039 | 0.102 | 0.143 | 0.027 |
| 88 | 0.008 | NA | NA | 0.016 | 0.048 | 0.021 | 0.029 | 0.083 | NA | NA | 0.044 | 0.131 | 0.018 | 0.057 | 0.095 | 0.038 |
| 89 | 0.004 | 0.024 | NA | 0.023 | 0.035 | 0.036 | 0.030 | 0.099 | 0.146 | 0.018 | 0.040 | 0.191 | NA | 0.054 | 0.196 | 0.015 |
| 90 | 0.009 | 0.030 | 0.106 | 0.027 | 0.095 | 0.047 | 0.030 | 0.104 | 0.096 | 0.021 | 0.035 | 0.242 | NA | 0.064 | 0.115 | 0.016 |
| 91 | 0.003 | 0.018 | NA | 0.033 | 0.116 | 0.084 | 0.040 | 0.103 | 0.193 | 0.021 | 0.056 | 0.196 | NA | NA | NA | 0.011 |
| 92 | 0.001 | 0.040 | 0.200 | NA | 0.155 | 0.168 | 0.033 | 0.104 | 0.138 | 0.016 | 0.036 | 0.102 | NA | NA | NA | 0.004 |
| 93 | 0.001 | 0.026 | NA | 0.014 | NA | NA | 0.028 | 0.095 | 0.140 | 0.019 | 0.125 | 0.227 | 0.009 | 0.078 | NA | 0.008 |
| Base | 0.004 | 0.087 | 0.092 | 0.051 | 0.154 | 0.145 | 0.079 | 0.150 | 0.156 | 0.076 | 0.140 | 0.081 | 0.021 | 0.068 | 0.061 | 0.090 |


| TOTAL <br> Year | MORTAL <br> AKS <br> Age 4 |  | BQR Age 4 |  | INDEX QUI Age 4 | $\begin{array}{r} \text { QUI } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB <br> Age 3 | $\begin{array}{r} \text { URB } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { USH } \\ \text { Age } 4 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.983 | 1.015 | 0.910 | 1.252 | 0.781 | 1.301 | 1.022 | 0.709 | NA | NA | NA | 0.520 | 1.346 | NA | NA | 0.997 |
| 80 | NA | 1.127 | 0.965 | 0.965 | 1.059 | NA | 1.095 | 0.990 | 0.990 | 1.004 | NA | NA | 1.270 | 1.034 | 1.189 | 1.529 | 1.080 |
| 81 | NA | 1.099 | 1.066 | 1.505 | 1.171 | 1.334 | 0.769 | 0.925 | 1.509 | 1.468 | 1.125 | NA | NA | 1.122 | 1.488 | 1.165 | 1.201 |
| 82 | 1.000 | 0.790 | 0.954 | 0.619 | 0.518 | 0.885 | 0.834 | 1.063 | 0.791 | 0.528 | 0.875 | 1.000 | 1.210 | 0.497 | 0.324 | 0.306 | 0.755 |
| 83 | 1.579 | NA | 1.082 | 1.204 | 0.918 | 1.510 | 0.928 | 0.758 | 0.487 | 0.445 | 0.647 | 1.213 | 1.638 | 1.137 | NA | 0.666 | 0.907 |
| 84 | 1.117 | 0.778 | NA | 0.217 | 0.411 | 0.541 | 0.459 | 0.899 | 1.457 | NA | 0.671 | 3.901 | 1.163 | 1.575 | NA | 0.271 | 0.970 |
| 85 | 0.702 | 0.392 | NA | 0.297 | 0.297 | 0.248 | 0.772 | 1.416 | 1.263 | 0.537 | NA | 2.841 | 1.127 | 1.219 | 1.232 | 0.258 | 0.883 |
| 86 | 0.634 | 0.713 | 2.101 | 0.923 | 0.513 | 0.561 | NA | 0.768 | NA | 0.218 | 0.447 | NA | 0.951 | 1.059 | 1.369 | NA | 0.796 |
| 87 | 0.590 | 0.177 | 0.821 | 0.506 | 0.479 | 0.844 | 0.557 | NA | NA | 0.338 | 0.399 | 2.357 | 1.817 | 1.511 | 2.338 | 0.305 | 0.821 |
| 88 | 1.865 | NA | NA | 0.309 | 0.310 | 0.144 | 0.372 | 0.555 | NA | NA | 0.310 | 1.616 | 0.839 | 0.836 | 1.548 | 0.425 | 0.562 |
| 89 | 0.917 | 0.280 | NA | 0.457 | 0.228 | 0.246 | 0.378 | 0.661 | 0.938 | 0.232 | 0.287 | 2.357 | NA | 0.799 | 3.201 | 0.163 | 0.679 |
| 90 | 2.109 | 0.346 | 1.155 | 0.530 | 0.620 | 0.323 | 0.385 | 0.689 | 0.619 | 0.279 | 0.249 | 2.990 | NA | 0.952 | 1.879 | 0.176 | 0.724 |
| 91 | 0.690 | 0.211 | NA | 0.650 | 0.755 | 0.584 | 0.504 | 0.687 | 1.239 | 0.272 | 0.401 | 2.419 | NA | NA | NA | 0.123 | 0.721 |
| 92 | 0.279 | 0.459 | 2.181 | NA | 1.006 | 1.164 | 0.414 | 0.691 | 0.884 | 0.212 | 0.257 | 1.259 | NA | NA | NA | 0.045 | 0.795 |
| 93 | 0.307 | 0.296 | NA | 0.264 | NA | NA | 0.359 | 0.634 | 0.899 | 0.247 | 0.889 | 2.801 | 0.429 | 1.149 | NA | 0.087 | 0.767 |

Stock Identifiers

| AKS $=$ ALASKA SPRING | BQR $=$ BIG QUALICUM | QUI $=$ QUINSAM |
| :--- | :--- | :--- |
| SRH $=$ SALMON RIVER | URB $=$ COLUMBIA UPRIVER BRIGHT | USH $=$ UILLAMETTE SPRING |

## Fishery: North B.C. Troll

| TOTAL Year | MORTAL <br> AKS Age 4 |  | OITATION <br> QUI <br> Age 4 | RATES <br> RBT Age 3 | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB <br> Age 3 | $\begin{array}{r} \text { URB } \\ \text { Age } 4 \end{array}$ | URB <br> Age 5 | $\begin{array}{r} \text { HSH } \\ \text { Age } 4 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.020 | NA | 0.054 | 0.074 | 0.078 | NA | NA | NA | 0.009 | 0.059 | NA | NA |
| 80 | NA | 0.028 | 0.057 | 0.048 | 0.072 | 0.079 | 0.070 | NA | NA | 0.021 | 0.053 | 0.062 | 0.134 |
| 81 | NA | 0.069 | 0.084 | 0.033 | 0.087 | 0.172 | 0.112 | 0.151 | NA | NA | 0.063 | 0.079 | 0.101 |
| 82 | 0.004 | 0.027 | 0.029 | 0.042 | 0.105 | NA | 0.033 | 0.123 | 0.081 | 0.023 | 0.034 | 0.020 | 0.028 |
| 83 | 0.007 | 0.041 | 0.080 | 0.043 | 0.059 | 0.055 | 0.034 | 0.085 | 0.098 | 0.030 | 0.065 | NA | 0.059 |
| 84 | 0.005 | 0.008 | 0.025 | 0.027 | 0.110 | 0.198 | NA | 0.083 | 0.259 | 0.017 | 0.092 | NA | 0.022 |
| 85 | 0.003 | 0.008 | 0.028 | 0.055 | 0.213 | 0.197 | 0.035 | NA | 0.230 | 0.021 | 0.080 | 0.075 | 0.021 |
| 86 | 0.003 | 0.029 | 0.038 | NA | 0.115 | NA | 0.010 | 0.063 | NA | 0.017 | 0.062 | 0.074 | NA |
| 87 | 0.002 | 0.015 | 0.033 | 0.030 | NA | NA | 0.024 | 0.056 | 0.191 | 0.030 | 0.092 | 0.132 | 0.023 |
| 88 | 0.008 | 0.010 | 0.035 | 0.021 | 0.076 | NA | NA | 0.044 | 0.109 | 0.016 | 0.052 | 0.091 | 0.033 |
| 89 | 0.004 | 0.016 | 0.024 | 0.025 | 0.095 | 0.133 | 0.018 | 0.040 | 0.191 | NA | 0.051 | 0.196 | 0.015 |
| 90 | 0.009 | 0.016 | 0.051 | 0.023 | 0.085 | 0.083 | 0.020 | 0.035 | 0.242 | NA | 0.059 | 0.108 | 0.014 |
| 91 | 0.003 | 0.018 | 0.034 | 0.030 | 0.080 | 0.153 | 0.021 | 0.055 | 0.191 | NA | NA | NA | 0.011 |
| 92 | 0.001 | NA | 0.097 | 0.026 | 0.070 | 0.098 | 0.014 | 0.036 | 0.095 | NA | NA | NA | 0.004 |
| 93 | 0.001 | 0.005 | NA | 0.023 | 0.072 | 0.116 | 0.019 | 0.124 | 0.221 | NA | 0.078 | NA | 0.008 |
| Base | 0.004 | 0.036 | 0.057 | 0.044 | 0.084 | 0.110 | 0.072 | 0.137 | 0.081 | 0.018 | 0.052 | 0.054 | 0.088 |


| TOTAL Year | MORTAL AKS Age 4 |  | oitation QUI Age 4 |  | I NDEX RBT Age 4 | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB Age 3 | URB Age 4 | URB Age 5 | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.565 | NA | 1.223 | 0.873 | 0.710 | NA | NA | NA | 0.539 | 1.132 | NA | NA | 0.856 |
| 80 | NA | 0.773 | 1.007 | 1.093 | 0.853 | 0.717 | 0.981 | NA | NA | 1.169 | 1.015 | 1.154 | 1.534 | 1.017 |
| 81 | NA | 1.907 | 1.474 | 0.739 | 1.027 | 1.572 | 1.563 | 1.103 | NA | NA | 1.208 | 1.477 | 1.151 | 1.296 |
| 82 | 1.000 | 0.754 | 0.519 | 0.945 | 1.247 | NA | 0.456 | 0.897 | 1.000 | 1.292 | 0.645 | 0.369 | 0.315 | 0.755 |
| 83 | 1.579 | 1.126 | 1.414 | 0.983 | 0.704 | 0.503 | 0.473 | 0.622 | 1.213 | 1.683 | 1.247 | NA | 0.677 | 0.840 |
| 84 | 1.117 | 0.232 | 0.439 | 0.611 | 1.304 | 1.810 | NA | 0.607 | 3.188 | 0.938 | 1.766 | NA | 0.257 | 1.191 |
| 85 | 0.702 | 0.220 | 0.501 | 1.240 | 2.520 | 1.793 | 0.485 | NA | 2.841 | 1.198 | 1.530 | 1.403 | 0.238 | 1.381 |
| 86 | 0.634 | 0.803 | 0.674 | NA | 1.366 | NA | 0.133 | 0.459 | NA | 0.994 | 1.188 | 1.379 | NA | 0.801 |
| 87 | 0.590 | 0.415 | 0.577 | 0.683 | NA | NA | 0.336 | 0.409 | 2.357 | 1.724 | 1.772 | 2.461 | 0.265 | 0.981 |
| 88 | 1.865 | 0.273 | 0.623 | 0.487 | 0.901 | NA | NA | 0.318 | 1.340 | 0.898 | 0.999 | 1.693 | 0.382 | 0.756 |
| 89 | 0.917 | 0.450 | 0.422 | 0.578 | 1.120 | 1.209 | 0.247 | 0.294 | 2.357 | NA | 0.975 | 3.645 | 0.167 | 0.987 |
| 90 | 2.070 | 0.450 | 0.894 | 0.526 | 1.004 | 0.760 | 0.282 | 0.256 | 2.990 | NA | 1.138 | 2.006 | 0.162 | 0.912 |
| 91 | 0.690 | 0.485 | 0.596 | 0.673 | 0.950 | 1.398 | 0.289 | 0.405 | 2.350 | NA | NA | NA | 0.127 | 0.836 |
| 92 | 0.279 | NA | 1.715 | 0.586 | 0.825 | 0.890 | 0.199 | 0.264 | 1.168 | NA | NA | NA | 0.046 | 0.652 |
| 93 | 0.307 | 0.149 | NA | 0.520 | 0.847 | 1.059 | 0.262 | 0.903 | 2.723 | NA | 1.492 | NA | 0.089 | 0.941 |

Stock Identifiers

| AKS = ALASKA SPRING | QUI $=$ QUINSAM | RBT $=$ ROBERTSON CREEK |
| :--- | :--- | :--- |
| SRH $=$ SALMON RIVER | URB $=$ COLUMBIA UPRIVER BRIGHT | WSH $=$ HILLAMETTE SPRING |

## Fishery: Central B.C. Troll

| TOTAL <br> Year | $\begin{gathered} \text { MORTALI } \\ \text { BQR } \\ \text { Age } 3 \end{gathered}$ | $\begin{gathered} \text { TY EXPL } \\ \text { QUUI } \\ \text { Age } 4 \end{gathered}$ | $\begin{gathered} \text { OITATIO } \\ \text { RBT } \\ \text { Age } 3 \end{gathered}$ | $\begin{gathered} \text { N RATES } \\ \text { RBT } \\ \text { Age } 4 \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: |
| 79 | 0.074 | NA | 0.049 | 0.080 |
| 80 | 0.051 | 0.106 | 0.038 | 0.077 |
| 81 | 0.086 | 0.096 | 0.028 | 0.052 |
| 82 | 0.036 | 0.050 | 0.024 | 0.054 |
| 83 | NA | 0.061 | 0.030 | 0.054 |
| 84 | 0.053 | 0.038 | NA | 0.025 |
| 85 | 0.018 | 0.017 | NA | NA |
| 86 | 0.057 | 0.041 | NA | NA |
| 87 | NA | 0.041 | 0.014 | NA |
| 88 | NA | 0.012 | 0.008 | 0.007 |
| 89 | 0.003 | 0.011 | 0.004 | 0.005 |
| 90 | NA | 0.045 | 0.007 | 0.019 |
| 91 | 0.010 | 0.082 | 0.010 | 0.023 |
| 92 | NA | 0.057 | 0.007 | 0.034 |
| 93 | 0.014 | NA | 0.005 | 0.024 |
| Base | 0.062 | 0.084 | 0.035 | 0.066 |


| total Year | $\begin{gathered} \text { MORTAL } \\ \text { BQR } \\ \text { Age } 3 \end{gathered}$ | $\begin{gathered} \text { TY EXPI } \\ \text { QuI } \end{gathered}$ | $\begin{gathered} \text { OITATIO } \\ \text { RBT } \\ \text { Age } 3 \end{gathered}$ | $\begin{gathered} \text { NRATE } \\ \text { RBT } \\ \text { Age } 4 \end{gathered}$ | IndEX Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 1.198 | NA | 1.399 | 1.212 | 1.247 |
| 80 | 0.819 | 1.257 | 1.099 | 1.166 | 1.101 |
| 81 | 1.401 | 1.147 | 0.807 | 0.795 | 1.068 |
| 82 | 0.581 | 0.596 | 0.694 | 0.826 | 0.668 |
| 83 | NA | 0.724 | 0.859 | 0.827 | 0.786 |
| 84 | 0.853 | 0.455 | NA | 0.378 | 0.547 |
| 85 | 0.297 | 0.205 | NA | NA | 0.244 |
| 86 | 0.921 | 0.483 | NA | NA | 0.669 |
| 87 | NA | 0.487 | 0.398 | NA | 0.461 |
| 88 | NA | 0.146 | 0.226 | 0.110 | 0.148 |
| 89 | 0.049 | 0.133 | 0.126 | 0.072 | 0.095 |
| 90 | NA | 0.531 | 0.209 | 0.285 | 0.382 |
| 91 | 0.165 | 0.979 | 0.290 | 0.350 | 0.510 |
| 92 | NA | 0.682 | 0.196 | 0.518 | 0.532 |
| 93 | 0.222 | NA | 0.157 | 0.361 | 0.264 |

Stock Identifiers

```
BQR = BIG QUALICUM RBT \(=\) ROBERTSON CREEK
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## Fishery: West Coast Vancouver Island Troll

| tOTAL Year | $\begin{aligned} & \text { MORTALITY } \\ & \text { BON } \\ & \text { AGE> } 3 \end{aligned}$ | EXPLO BON 4 | ITATION CWF 4 | $\begin{aligned} & \text { N RATES } \\ & \text { GAD } \\ & 3 \end{aligned}$ | GAD 4 | $\begin{gathered} \text { LRW } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 3 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 4 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 3 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 4 \end{gathered}$ | $\begin{aligned} & \text { URB } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { URB } \\ 4 \end{gathered}$ | $\begin{aligned} & \text { UWA } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { UWA } \\ 4 \end{gathered}$ | $\begin{gathered} \text { HSH } \\ 4 \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.23 | NA | NA | NA | NA | NA | 0.03 | 0.06 | NA | NA | 0.22 | 0.20 | 0.20 | 0.18 | NA | 0.26 | NA | NA | NA | NA | 0.04 | 0.08 | 0.07 | 0.17 | NA |
| 80 | 0.11 | 0.15 | NA | NA | NA | NA | 0.04 | 0.07 | NA | NA | NA | NA | 0.23 | 0.30 | NA | NA | 0.04 | NA | NA | NA | 0.04 | 0.05 | 0.14 | 0.12 | 0.06 |
| 81 | 0.18 | 0.16 | 0.13 | 0.04 | NA | 0.06 | 0.02 | 0.03 | 0.03 | NA | NA | NA | 0.18 | 0.15 | 0.06 | NA | NA | 0.02 | 0.26 | NA | 0.01 | 0.05 | 0.10 | 0.20 | 0.02 |
| 82 | 0.28 | 0.35 | 0.20 | 0.08 | 0.21 | 0.08 | 0.02 | 0.03 | NA | 0.06 | NA | NA | 0.19 | 0.26 | 0.10 | 0.21 | NA | NA | 0.25 | 0.30 | 0.03 | 0.02 | 0.14 | 0.23 | 0.05 |
| 83 | 0.33 | 0.29 | 0.23 | NA | 0.29 | 0.07 | 0.01 | 0.03 | 0.07 | NA | 0.20 | NA | 0.28 | 0.21 | 0.12 | 0.20 | 0.03 | 0.02 | 0.35 | 0.51 | 0.01 | 0.02 | 0.09 | 0.21 | 0.03 |
| 84 | 0.29 | 0.55 | 0.22 | 0.12 | NA | NA | 0.04 | 0.05 | 0.05 | NA | NA | 0.19 | 0.25 | 0.31 | 0.11 | 0.23 | NA | 0.02 | 0.44 | 0.53 | 0.02 | 0.06 | 0.20 | 0.16 | 0.02 |
| 85 | 0.26 | 0.29 | 0.15 | NA | 0.18 | NA | 0.02 | 0.00 | NA | NA | NA | NA | 0.11 | 0.23 | 0.06 | 0.16 | NA | NA | 0.22 | 0.20 | 0.02 | 0.05 | 0.10 | 0.22 | 0.01 |
| 86 | NA | NA | 0.21 | NA | NA | 0.03 | NA | NA | NA | NA | NA | NA | 0.24 | 0.20 | 0.07 | 0.27 | NA | 0.01 | 0.20 | 0.23 | 0.04 | 0.03 | 0.10 | 0.24 | NA |
| 87 | 0.22 | NA | 0.14 | NA | NA | 0.10 | 0.01 | NA | NA | NA | NA | NA | 0.09 | NA | 0.07 | 0.15 | 0.01 | 0.01 | 0.23 | NA | 0.03 | 0.05 | 0.06 | 0.10 | 0.02 |
| 88 | NA | 0.27 | 0.15 | 0.04 | NA | 0.08 | 0.02 | 0.04 | NA | 0.04 | NA | NA | 0.21 | NA | 0.03 | 0.18 | NA | 0.03 | 0.26 | 0.32 | 0.02 | 0.10 | NA | 0.17 | 0.02 |
| 89 | NA | NA | 0.09 | 0.03 | 0.11 | 0.04 | 0.01 | 0.02 | 0.00 | 0.02 | 0.14 | NA | 0.13 | 0.10 | 0.03 | 0.10 | 0.01 | NA | 0.06 | 0.11 | NA | 0.05 | NA | NA | 0.02 |
| 90 | NA | NA | 0.13 | 0.09 | 0.21 | 0.09 | 0.02 | 0.04 | 0.07 | 0.04 | 0.20 | NA | 0.18 | 0.17 | 0.08 | 0.22 | 0.02 | 0.02 | 0.22 | 0.09 | NA | 0.08 | NA | NA | 0.02 |
| 91 | NA | NA | NA | NA | 0.21 | 0.05 | 0.02 | 0.03 | 0.03 | 0.03 | 0.13 | 0.23 | 0.12 | 0.13 | 0.04 | 0.14 | 0.02 | 0.02 | 0.14 | NA | NA | NA | NA | NA | 0.00 |
| 92 | NA | NA | 0.19 | NA | 0.11 | 0.02 | 0.08 | 0.17 | 0.22 | 0.06 | 0.06 | NA | 0.10 | 0.18 | 0.05 | 0.17 | 0.04 | 0.13 | 0.14 | NA | NA | NA | NA | NA | 0.01 |
| 93 | NA | NA | NA | NA | 0.38 | NA | 0.06 | 0.15 | 0.10 | 0.08 | 0.10 | NA | 0.13 | 0.24 | 0.06 | 0.13 | 0.03 | 0.09 | 0.16 | 0.14 | 0.05 | 0.14 | NA | NA | 0.01 |
| Base | 0.20 | 0.22 | 0.17 | 0.06 | 0.21 | 0.07 | 0.03 | 0.05 | 0.03 | 0.06 | 0.22 | 0.20 | 0.20 | 0.22 | 0.08 | 0.23 | 0.04 | 0.02 | 0.25 | 0.30 | 0.03 | 0.05 | 0.11 | 0.18 | 0.04 |


| TOTAL Year | $\begin{aligned} & \text { MORTALITY } \\ & \text { BON } \\ & \text { AGE> } 3 \end{aligned}$ | EXPLO 4 | ITATION CWF 4 | $\begin{aligned} & \text { N RATE } \\ & \text { GAD } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { INDEX } \\ \text { GAD } \\ 4 \end{gathered}$ | $\begin{gathered} \text { LRW } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 3 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 4 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 3 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 4 \end{gathered}$ | $\begin{gathered} \text { URB } \\ 3 \end{gathered}$ | $\begin{gathered} \text { URB } \\ 4 \end{gathered}$ | $\begin{gathered} \text { UHA } \\ 3 \end{gathered}$ | $\begin{gathered} \text { UHA } \\ 4 \end{gathered}$ | $\begin{gathered} \text { WSH } \\ 4 \end{gathered}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 1.13 | NA | NA | NA | NA | NA | 1.18 | 1.29 | NA | NA | 1.00 | 1.00 | 0.98 | 0.81 | NA | 1.10 | NA | NA | NA | NA | 1.46 | 1.63 | 0.61 | 0.93 | NA | 1.01 |
| 80 | 0.55 | 0.69 | NA | NA | NA | NA | 1.37 | 1.47 | NA | NA | NA | NA | 1.15 | 1.37 | NA | NA | 1.00 | NA | NA | NA | 1.35 | 1.00 | 1.22 | 0.69 | 1.46 | 0.99 |
| 81 | 0.89 | 0.72 | 0.79 | 0.71 | NA | 0.83 | 0.67 | 0.56 | 1.00 | NA | NA | NA | 0.92 | 0.66 | 0.74 | NA | NA | 1.00 | 1.02 | NA | 0.22 | 0.96 | 0.91 | 1.09 | 0.36 | 0.83 |
| 82 | 1.42 | 1.59 | 1.21 | 1.29 | 1.00 | 1.17 | 0.77 | 0.68 | NA | 1.00 | NA | NA | 0.95 | 1.17 | 1.26 | 0.90 | NA | NA | 0.98 | 1.00 | 0.96 | 0.40 | 1.26 | 1.29 | 1.18 | 1.12 |
| 83 | 1.68 | 1.33 | 1.38 | NA | 1.39 | 0.96 | 0.38 | 0.65 | 2.34 | NA | 0.92 | NA | 1.41 | 0.96 | 1.47 | 0.87 | 0.62 | 0.75 | 1.40 | 1.66 | 0.35 | 0.43 | 0.76 | 1.16 | 0.63 | 1.21 |
| 84 | 1.47 | 2.49 | 1.31 | 1.90 | NA | NA | 1.51 | 0.94 | 1.69 | NA | NA | 0.95 | 1.23 | 1.42 | 1.37 | 0.99 | NA | 0.75 | 1.74 | 1.73 | 0.75 | 1.20 | 1.75 | 0.91 | 0.47 | 1.43 |
| 85 | 1.32 | 1.33 | 0.90 | NA | 0.84 | NA | 0.69 | 0.00 | NA | NA | NA | NA | 0.57 | 1.05 | 0.70 | 0.69 | NA | NA | 0.90 | 0.65 | 0.68 | 0.95 | 0.90 | 1.24 | 0.34 | 0.89 |
| 86 | NA | NA | 1.26 | NA | NA | 0.45 | NA | NA | NA | NA | NA | NA | 1.17 | 0.92 | 0.79 | 1.14 | NA | 0.40 | 0.80 | 0.75 | 1.30 | 0.67 | 0.87 | 1.35 | NA | 0.97 |
| 87 | 1.10 | NA | 0.83 | NA | NA | 1.44 | 0.38 | NA | NA | NA | NA | NA | 0.45 | NA | 0.87 | 0.64 | 0.15 | 0.53 | 0.92 | NA | 1.11 | 0.96 | 0.48 | 0.53 | 0.40 | 0.75 |
| 88 | NA | 1.21 | 0.92 | 0.57 | NA | 1.07 | 0.63 | 0.81 | NA | 0.73 | NA | NA | 1.03 | NA | 0.39 | 0.79 | NA | 1.41 | 1.06 | 1.05 | 0.54 | 1.91 | NA | 0.96 | 0.52 | 0.96 |
| 89 | NA | NA | 0.54 | 0.41 | 0.53 | 0.58 | 0.24 | 0.41 | 0.00 | 0.37 | 0.63 | NA | 0.64 | 0.45 | 0.38 | 0.43 | 0.20 | NA | 0.24 | 0.36 | NA | 0.90 | NA | NA | 0.37 | 0.45 |
| 90 | NA | NA | 0.77 | 1.38 | 0.99 | 1.22 | 0.84 | 0.76 | 2.24 | 0.72 | 0.91 | NA | 0.91 | 0.77 | 0.93 | 0.95 | 0.39 | 0.97 | 0.88 | 0.29 | NA | 1.59 | NA | NA | 0.46 | 0.84 |
| 91 | NA | NA | NA | NA | 1.02 | 0.75 | 0.84 | 0.68 | 1.03 | 0.45 | 0.60 | 1.18 | 0.58 | 0.58 | 0.44 | 0.61 | 0.52 | 0.83 | 0.56 | NA | NA | NA | NA | NA | 0.04 | 0.69 |
| 92 | NA | NA | 1.13 | NA | 0.54 | 0.33 | 2.56 | 3.32 | 7.44 | 0.96 | 0.28 | NA | 0.52 | 0.80 | 0.65 | 0.74 | 0.97 | 5.80 | 0.57 | NA | NA | NA | NA | NA | 0.34 | 0.91 |
| 93 | NA | NA | NA | NA | 1.82 | NA | 2.07 | 2.95 | 3.41 | 1.37 | 0.46 | NA | 0.64 | 1.07 | 0.78 | 0.57 | 0.72 | 3.99 | 0.65 | 0.47 | 1.49 | 2.69 | NA | NA | 0.31 | 0.99 |

Stock Identifiers



## Fishery: Strait of Georgia Troll and Sport

| TOTAL Year | MORTAL BQR Age 3 |  | PPS Age 3 | Age 3 | $\begin{array}{r} \text { SAM } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { UHA } \\ \text { Age } 3 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.226 | 0.155 | 0.234 | NA | 0.096 | NA | 0.061 | 0.041 |
| 80 | 0.276 | 0.192 | 0.263 | NA | NA | NA | NA | 0.059 |
| 81 | 0.307 | 0.372 | 0.290 | NA | NA | 0.068 | NA | 0.038 |
| 82 | 0.142 | 0.145 | 0.152 | 0.107 | NA | 0.056 | 0.096 | 0.023 |
| 83 | 0.183 | 0.164 | 0.177 | NA | 0.103 | 0.030 | 0.042 | 0.035 |
| 84 | 0.271 | 0.283 | 0.260 | NA | NA | 0.055 | 0.055 | 0.052 |
| 85 | 0.161 | 0.117 | 0.145 | NA | NA | NA | 0.054 | 0.032 |
| 86 | 0.243 | 0.177 | 0.308 | NA | NA | NA | NA | 0.025 |
| 87 | 0.151 | 0.221 | 0.081 | NA | NA | 0.065 | NA | 0.035 |
| 88 | 0.196 | 0.093 | NA | 0.056 | NA | 0.027 | NA | NA |
| 89 | 0.160 | 0.187 | 0.232 | 0.076 | 0.088 | 0.023 | 0.035 | NA |
| 90 | 0.188 | 0.144 | NA | 0.050 | 0.130 | 0.014 | 0.037 | NA |
| 91 | 0.262 | 0.296 | 0.269 | 0.119 | 0.058 | 0.011 | 0.012 | NA |
| 92 | 0.401 | 0.227 | 0.270 | 0.069 | 0.213 | 0.027 | 0.027 | NA |
| 93 | 0.346 | NA | NA | 0.162 | 0.114 | 0.023 | NA | NA |
| Base | 0.238 | 0.216 | 0.235 | 0.107 | 0.096 | 0.062 | 0.078 | 0.040 |


| total Year | MORTALI <br> BQR <br> Age 3 | $\begin{gathered} \text { TY EXPL } \\ \text { BQR } \\ \text { Age } 4 \end{gathered}$ | OITATION PPS Age 3 |  | INDEX SAM Age 4 | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { UWA } \\ \text { Age } 3 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.952 | 0.716 | 0.998 | NA | 1.000 | NA | 0.781 | 1.016 | 0.901 |
| 80 | 1.160 | 0.889 | 1.120 | NA | NA | NA | NA | 1.476 | 1.084 |
| 81 | 1.291 | 1.723 | 1.234 | NA | NA | 1.090 | NA | 0.934 | 1.358 |
| 82 | 0.597 | 0.671 | 0.648 | 1.000 | NA | 0.910 | 1.219 | 0.574 | 0.739 |
| 83 | 0.770 | 0.760 | 0.754 | NA | 1.075 | 0.491 | 0.535 | 0.878 | 0.762 |
| 84 | 1.138 | 1.309 | 1.106 | NA | NA | 0.890 | 0.701 | 1.304 | 1.122 |
| 85 | 0.677 | 0.543 | 0.617 | NA | NA | NA | 0.682 | 0.804 | 0.631 |
| 86 | 1.023 | 0.821 | 1.311 | NA | NA | NA | NA | 0.621 | 1.034 |
| 87 | 0.636 | 1.023 | 0.344 | NA | NA | 1.044 | NA | 0.877 | 0.699 |
| 88 | 0.823 | 0.432 | NA | 0.521 | NA | 0.442 | NA | NA | 0.597 |
| 89 | 0.673 | 0.864 | 0.989 | 0.709 | 0.917 | 0.365 | 0.449 | NA | 0.776 |
| 90 | 0.788 | 0.667 | NA | 0.472 | 1.365 | 0.219 | 0.466 | NA | 0.706 |
| 91 | 1.103 | 1.369 | 1.144 | 1.119 | 0.606 | 0.174 | 0.151 | NA | 0.995 |
| 92 | 1.686 | 1.051 | 1.149 | 0.642 | 2.229 | 0.441 | 0.350 | NA | 1.197 |
| 93 | 1.456 | NA | NA | 1.521 | 1.195 | 0.377 | NA | NA | 1.287 |

Stock Identifiers

| BQR $=$ BIG QUALICUM | PPS $=$ PUNTLEDGE SAM $=$ SAMISH FALL FING |
| :--- | :--- |
| SPS $=$ SO SOUND FALL FING UWA $=U O F W$ FALL ACCEL |  |

## Fishery: Strait of Georgia Troll

| TOTAL Year | MORTALI <br> BQR <br> Age 3 |  | oitation rates SAM <br> Age 3 |
| :---: | :---: | :---: | :---: |
| 79 | 0.147 | 0.154 | NA |
| 80 | 0.151 | 0.127 | NA |
| 81 | 0.120 | 0.119 | NA |
| 82 | 0.079 | NA | 0.017 |
| 83 | 0.112 | 0.102 | NA |
| 84 | 0.085 | NA | NA |
| 85 | 0.018 | NA | NA |
| 86 | 0.066 | NA | NA |
| 87 | 0.033 | NA | NA |
| 88 | 0.009 | NA | 0.003 |
| 89 | 0.011 | NA | 0.005 |
| 90 | 0.056 | NA | 0.024 |
| 91 | 0.050 | NA | NA |
| 92 | 0.116 | NA | NA |
| 93 | 0.024 | NA | 0.023 |
| Base | 0.124 | 0.133 | 0.017 |


| TOTAL MORTALITY EXPLOI TATION RATE INDEX <br> BQR |  |  |  |  |  | PPS <br> SAM |
| ---: | :---: | :---: | :---: | :--- | :---: | :---: |
| Year | Age 3 | Age 3 | Age 3 | Fishery |  |  |
| 79 | 1.182 | 1.155 | NA | 1.168 |  |  |
| 80 | 1.213 | 0.952 | NA | 1.078 |  |  |
| 81 | 0.968 | 0.892 | NA | 0.929 |  |  |
| 82 | 0.638 | NA | 1.000 | 0.681 |  |  |
| 83 | 0.900 | 0.770 | NA | 0.832 |  |  |
| 84 | 0.681 | NA | NA | 0.681 |  |  |
| 85 | 0.148 | NA | NA | 0.148 |  |  |
| 86 | 0.533 | NA | NA | 0.533 |  |  |
| 87 | 0.268 | NA | NA | 0.268 |  |  |
| 88 | 0.074 | NA | 0.193 | 0.088 |  |  |
| 89 | 0.090 | NA | 0.313 | 0.116 |  |  |
| 90 | 0.447 | NA | 1.416 | 0.563 |  |  |
| 91 | 0.401 | NA | NA | 0.401 |  |  |
| 92 | 0.930 | NA | NA | 0.930 |  |  |
| 93 | 0.193 | NA | 1.378 | 0.335 |  |  |

Stock Identifiers

[^3]
## Fishery: Strait of Georgia Sport

| TOTAL Year | MORTALI <br> BQR <br> Age 3 | $\begin{gathered} \text { TY EXPL } \\ \text { BQR } \\ \text { Age } 4 \end{gathered}$ | OITATION PPS Age 3 |  | $\begin{array}{r} \text { SAM } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | UWA Age 3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.080 | 0.097 | 0.081 | NA | 0.075 | NA | 0.052 | 0.027 |
| 80 | 0.125 | 0.111 | 0.136 | NA | NA | NA | NA | 0.057 |
| 81 | 0.187 | 0.295 | 0.171 | NA | NA | 0.062 | NA | 0.033 |
| 82 | 0.063 | 0.060 | 0.061 | 0.090 | NA | 0.052 | 0.060 | 0.022 |
| 83 | 0.071 | 0.118 | 0.075 | NA | 0.093 | 0.029 | 0.037 | 0.025 |
| 84 | 0.186 | NA | 0.150 | NA | NA | 0.046 | 0.055 | 0.047 |
| 85 | 0.143 | 0.117 | 0.145 | NA | NA | NA | 0.050 | 0.032 |
| 86 | 0.177 | 0.174 | 0.197 | NA | NA | NA | NA | 0.025 |
| 87 | 0.118 | 0.214 | 0.081 | NA | NA | 0.065 | NA | 0.026 |
| 88 | 0.187 | 0.073 | NA | 0.052 | NA | 0.026 | NA | NA |
| 89 | 0.149 | 0.187 | 0.232 | 0.070 | 0.088 | 0.022 | 0.033 | NA |
| 90 | 0.132 | 0.144 | NA | 0.026 | 0.105 | 0.011 | 0.035 | NA |
| 91 | 0.213 | 0.296 | NA | 0.099 | 0.049 | 0.009 | 0.012 | NA |
| 92 | 0.286 | 0.208 | 0.246 | 0.053 | 0.194 | 0.027 | 0.027 | NA |
| 93 | 0.322 | NA | NA | 0.139 | 0.102 | 0.019 | NA | NA |
| Base | 0.114 | 0.141 | 0.112 | 0.090 | 0.075 | 0.057 | 0.056 | 0.035 |


| TOTAL <br> Year | MORTALI <br> BQR <br> Age 3 | $\begin{gathered} \text { TY EXPL } \\ \text { BQR } \\ \text { Age } 4 \end{gathered}$ |  | RATE SAM Age 3 | INDEX SAM Age 4 | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | UWA Age 3 | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.700 | 0.688 | 0.719 | NA | 1.000 | NA | 0.932 | 0.766 | 0.772 |
| 80 | 1.103 | 0.788 | 1.215 | NA | NA | NA | NA | 1.635 | 1.069 |
| 81 | 1.645 | 2.098 | 1.524 | NA | NA | 1.089 | NA | 0.951 | 1.633 |
| 82 | 0.552 | 0.426 | 0.542 | 1.000 | NA | 0.911 | 1.068 | 0.649 | 0.675 |
| 83 | 0.628 | 0.841 | 0.666 | NA | 1.240 | 0.506 | 0.666 | 0.721 | 0.761 |
| 84 | 1.637 | NA | 1.332 | NA | NA | 0.807 | 0.979 | 1.351 | 1.293 |
| 85 | 1.256 | 0.834 | 1.292 | NA | NA | NA | 0.894 | 0.932 | 1.066 |
| 86 | 1.559 | 1.239 | 1.754 | NA | NA | NA | NA | 0.720 | 1.429 |
| 87 | 1.037 | 1.524 | 0.719 | NA | NA | 1.135 | NA | 0.753 | 1.099 |
| 88 | 1.641 | 0.521 | NA | 0.582 | NA | 0.458 | NA | NA | 0.843 |
| 89 | 1.310 | 1.326 | 2.069 | 0.783 | 1.174 | 0.383 | 0.586 | NA | 1.211 |
| 90 | 1.160 | 1.024 | NA | 0.294 | 1.414 | 0.186 | 0.621 | NA | 0.852 |
| 91 | 1.870 | 2.101 | NA | 1.102 | 0.650 | 0.153 | 0.210 | NA | 1.271 |
| 92 | 2.513 | 1.476 | 2.191 | 0.587 | 2.599 | 0.480 | 0.489 | NA | 1.615 |
| 93 | 2.836 | NA | NA | 1.548 | 1.372 | 0.335 | NA | NA | 1.739 |

Stock Identifiers

| BQR $=$ BIG QUALICUM | PPS $=$ PUNTLEDGE SAM $=$ SAMISH FALL FING |
| :--- | :--- |
| SPS $=$ SO SOUND FALL FING UHA $=U$ OF $W$ FALL ACCEL |  |

Fishery: U.S. South Ocean Troll and Sport: Puget Sound Stocks

| TOTAL <br> Year | MORTALI SAM Age 3 |  |  | RATES GAD Age 4 | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { UWA } \\ \text { Age } 3 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.017 | NA | 0.205 | NA | 0.021 | 0.012 |
| 80 | NA | NA | NA | NA | NA | NA | 0.024 |
| 81 | NA | NA | 0.013 | NA | 0.007 | NA | 0.027 |
| 82 | 0.009 | NA | 0.019 | 0.031 | 0.007 | 0.044 | 0.028 |
| 83 | NA | 0.039 | 0.012 | 0.015 | 0.005 | 0.027 | 0.017 |
| 84 | NA | NA | 0.019 | 0.000 | 0.007 | 0.025 | 0.008 |
| 85 | NA | NA | NA | 0.010 | 0.000 | 0.018 | 0.014 |
| 86 | NA | NA | NA | NA | 0.036 | 0.026 | 0.014 |
| 87 | NA | NA | NA | NA | 0.033 | 0.096 | 0.027 |
| 88 | 0.025 | NA | 0.043 | NA | 0.033 | 0.092 | NA |
| 89 | 0.028 | 0.055 | 0.069 | 0.123 | 0.052 | 0.077 | NA |
| 90 | 0.045 | 0.079 | 0.079 | 0.109 | 0.059 | 0.082 | NA |
| 91 | 0.072 | 0.069 | 0.033 | 0.085 | 0.042 | 0.090 | NA |
| 92 | 0.046 | 0.110 | 0.098 | 0.171 | 0.052 | 0.094 | NA |
| 93 | 0.013 | 0.091 | 0.000 | 0.081 | 0.017 | 0.068 | NA |
| Base | 0.009 | 0.017 | 0.016 | 0.118 | 0.007 | 0.033 | 0.023 |


| TOTAL <br> Year | MORTAL SAM Age 3 | $\begin{gathered} \text { TY EXPL } \\ \text { SAM } \\ \text { Age } 4 \end{gathered}$ | OITATION <br> GAD Age 3 | N RATE GAD Age 4 | INDEX SPS Age 3 | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { UHA } \\ \text { Age } 3 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 1.000 | NA | 1.740 | NA | 0.650 | 0.539 | 1.343 |
| 80 | NA | NA | NA | NA | NA | NA | 1.054 | 1.054 |
| 81 | NA | NA | 0.801 | NA | 0.960 | NA | 1.193 | 1.020 |
| 82 | 1.000 | NA | 1.199 | 0.260 | 1.040 | 1.350 | 1.213 | 0.672 |
| 83 | NA | 2.347 | 0.757 | 0.129 | 0.765 | 0.812 | 0.743 | 0.542 |
| 84 | NA | NA | 1.209 | 0.000 | 1.046 | 0.756 | 0.338 | 0.301 |
| 85 | NA | NA | NA | 0.089 | 0.000 | 0.564 | 0.595 | 0.236 |
| 86 | NA | NA | NA | NA | 5.316 | 0.778 | 0.598 | 1.209 |
| 87 | NA | NA | NA | NA | 4.874 | 2.918 | 1.176 | 2.496 |
| 88 | 2.903 | NA | 2.658 | NA | 4.840 | 2.794 | NA | 2.991 |
| 89 | 3.240 | 3.285 | 4.253 | 1.045 | 7.688 | 2.334 | NA | 2.031 |
| 90 | 5.201 | 4.733 | 4.921 | 0.929 | 8.584 | 2.499 | NA | 2.282 |
| 91 | 8.214 | 4.114 | 2.052 | 0.724 | 6.220 | 2.741 | NA | 1.967 |
| 92 | 5.237 | 6.588 | 6.093 | 1.453 | 7.560 | 2.876 | NA | 2.872 |
| 93 | 1.491 | 5.410 | 0.000 | 0.692 | 2.550 | 2.083 | NA | 1.362 |


| Stock Identifiers |
| :--- |
| SAM $=$ SAMISH FALLL FING GAD $=G$ G ADAMS FALL FING |
| SPS $=$ SO SOUND FALL FING UHA $=U$ OF W FALL ACCEL |

Fishery: U.S. South Ocean Troll and Sport: Columbia River Stocks

| total Year | MORTAL <br> BON Age 3 |  | OITATION CHF Age 4 | RATES SPR Age 3 | $\begin{array}{r} \text { SPR } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { STP } \\ \text { Age } 3 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.125 | NA | NA | 0.193 | 0.145 | NA |
| 80 | 0.208 | 0.121 | NA | 0.296 | 0.103 | NA |
| 81 | 0.206 | 0.095 | 0.162 | 0.274 | 0.214 | 0.201 |
| 82 | 0.182 | 0.157 | 0.272 | 0.322 | 0.106 | 0.357 |
| 83 | 0.118 | 0.075 | 0.183 | 0.116 | 0.040 | 0.202 |
| 84 | 0.073 | 0.011 | 0.040 | 0.072 | 0.000 | 0.055 |
| 85 | 0.174 | 0.087 | 0.042 | 0.162 | 0.021 | 0.218 |
| 86 | 0.086 | 0.114 | 0.052 | 0.066 | 0.044 | 0.248 |
| 87 | 0.154 | 0.066 | 0.116 | 0.207 | 0.000 | 0.143 |
| 88 | NA | 0.073 | 0.148 | 0.143 | 0.143 | 0.203 |
| 89 | NA | 0.064 | 0.272 | 0.221 | 0.118 | 0.258 |
| 90 | NA | 0.106 | 0.137 | 0.168 | 0.107 | 0.172 |
| 91 | NA | 0.056 | 0.070 | 0.190 | 0.027 | 0.143 |
| 92 | NA | 0.095 | 0.032 | 0.284 | 0.080 | 0.280 |
| 93 | NA | 0.041 | 0.450 | 0.239 | 0.171 | 0.138 |
| Base | 0.180 | 0.124 | 0.217 | 0.271 | 0.142 | 0.279 |


| TOTAL Year | MORTAL <br> BON <br> Age 3 |  |  |  | I NDEX SPR Age 4 | $\begin{array}{r} \text { STP } \\ \text { Age } 3 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.691 | NA | NA | 0.711 | 1.022 | NA | 0.780 |
| 80 | 1.156 | 0.973 | NA | 1.090 | 0.724 | NA | 1.014 |
| 81 | 1.145 | 0.763 | 0.746 | 1.011 | 1.508 | 0.719 | 0.949 |
| 82 | 1.008 | 1.264 | 1.254 | 1.188 | 0.746 | 1.281 | 1.150 |
| 83 | 0.656 | 0.604 | 0.845 | 0.428 | 0.284 | 0.723 | 0.605 |
| 84 | 0.403 | 0.092 | 0.185 | 0.266 | 0.000 | 0.197 | 0.207 |
| 85 | 0.963 | 0.699 | 0.196 | 0.596 | 0.148 | 0.782 | 0.580 |
| 86 | 0.479 | 0.917 | 0.241 | 0.244 | 0.308 | 0.888 | 0.503 |
| 87 | 0.855 | 0.533 | 0.534 | 0.764 | 0.000 | 0.511 | 0.565 |
| 88 | NA | 0.587 | 0.684 | 0.526 | 1.006 | 0.729 | 0.687 |
| 89 | NA | 0.516 | 1.255 | 0.816 | 0.828 | 0.926 | 0.903 |
| 90 | NA | 0.856 | 0.633 | 0.620 | 0.751 | 0.615 | 0.668 |
| 91 | NA | 0.453 | 0.324 | 0.699 | 0.188 | 0.514 | 0.471 |
| 92 | NA | 0.764 | 0.150 | 1.046 | 0.560 | 1.005 | 0.746 |
| 93 | NA | 0.335 | 2.075 | 0.883 | 1.207 | 0.496 | 1.007 |

Stock Identifiers
BON $=$ BONNEVILLE TULE $\quad$ CWF $=$ COWLITZ FALL TULE
SPR $=$ SPRING CREEK TULE STP $=$ STAYTON POND TULE

## APPENDIX E

## Reported Catch Exploitation Rate and Fishery Index Data

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## Fishery: Southeast Alaska Troll

| REPORT <br> Year | ED CATCH <br> AKS <br> Age 4 |  | ITATION QUI Age 5 | RATES RBT Age 3 | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 3 \end{array}$ | URB <br> Age 4 | $\begin{array}{r} \text { URB } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.000 | 0.095 | 0.036 | 0.273 | 0.562 | NA | NA | NA | 0.000 | 0.159 | NA | 0.024 |
| 80 | NA | 0.107 | 0.065 | 0.050 | 0.279 | 0.328 | 0.029 | NA | NA | 0.025 | 0.142 | 0.265 | 0.121 |
| 81 | NA | 0.108 | 0.108 | 0.057 | 0.340 | 0.412 | 0.026 | 0.119 | NA | 0.000 | 0.174 | 0.236 | 0.073 |
| 82 | 0.080 | 0.120 | 0.155 | 0.030 | 0.247 | 0.290 | 0.003 | 0.111 | 0.128 | 0.006 | 0.095 | 0.135 | 0.060 |
| 83 | 0.075 | 0.191 | 0.206 | 0.023 | 0.286 | 0.436 | 0.010 | 0.060 | 0.385 | 0.001 | 0.209 | 0.192 | 0.092 |
| 84 | 0.054 | 0.102 | 0.193 | 0.046 | 0.260 | 0.204 | NA | 0.053 | 0.129 | 0.004 | 0.182 | 0.310 | 0.040 |
| 85 | 0.058 | 0.142 | 0.210 | 0.039 | 0.104 | 0.292 | 0.002 | NA | 0.219 | 0.005 | 0.135 | 0.224 | 0.111 |
| 86 | 0.066 | 0.093 | 0.139 | 0.000 | 0.250 | 0.039 | 0.006 | 0.122 | NA | 0.005 | 0.095 | 0.161 | 0.045 |
| 87 | 0.031 | 0.109 | 0.119 | 0.018 | 0.196 | 0.525 | 0.004 | 0.032 | 0.157 | 0.004 | 0.108 | 0.199 | 0.082 |
| 88 | 0.046 | 0.103 | 0.087 | 0.003 | 0.146 | 0.375 | 0.000 | 0.048 | 0.163 | 0.000 | 0.061 | 0.180 | 0.045 |
| 89 | 0.040 | 0.094 | 0.129 | 0.010 | 0.127 | 0.169 | 0.001 | 0.026 | 0.176 | 0.003 | 0.035 | 0.143 | 0.026 |
| 90 | 0.117 | 0.157 | 0.101 | 0.032 | 0.166 | 0.229 | 0.009 | 0.048 | 0.145 | 0.000 | 0.119 | 0.103 | 0.060 |
| 91 | 0.039 | 0.085 | 0.105 | 0.015 | 0.178 | 0.214 | 0.009 | 0.076 | 0.188 | 0.000 | 0.034 | 0.126 | 0.031 |
| 92 | 0.013 | 0.090 | 0.109 | 0.005 | 0.140 | 0.275 | 0.002 | 0.029 | 0.033 | 0.000 | 0.035 | 0.150 | 0.016 |
| 93 | 0.026 | 0.052 | 0.157 | 0.008 | 0.145 | 0.233 | 0.004 | 0.052 | 0.148 | 0.021 | 0.080 | 0.106 | 0.055 |
| Base | 0.080 | 0.084 | 0.106 | 0.043 | 0.285 | 0.398 | 0.019 | 0.115 | 0.128 | 0.008 | 0.142 | 0.212 | 0.070 |


| REPORT <br> Year | $\begin{gathered} \text { ED CATCH } \\ \text { AKS } \\ \text { Age } 4 \end{gathered}$ |  | ITATION QUI Age 5 | RATE RBT 3 <br> Age 3 | NDEX <br> RBT Age 4 | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB <br> Age 3 | URB <br> Age 4 | URB Age 5 | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.000 | 0.895 | 0.826 | 0.957 | 1.412 | NA | NA | NA | 0.000 | 1.117 | NA | 0.342 | 1.011 |
| 80 | NA | 1.280 | 0.618 | 1.165 | 0.980 | 0.824 | 1.515 | NA | NA | 3.207 | 0.996 | 1.250 | 1.744 | 1.033 |
| 81 | NA | 1.289 | 1.025 | 1.317 | 1.195 | 1.035 | 1.352 | 1.037 | NA | 0.000 | 1.222 | 1.113 | 1.046 | 1.116 |
| 82 | 1.000 | 1.431 | 1.462 | 0.693 | 0.868 | 0.729 | 0.132 | 0.963 | 1.000 | 0.793 | 0.665 | 0.637 | 0.867 | 0.864 |
| 83 | 0.940 | 2.287 | 1.945 | 0.532 | 1.006 | 1.097 | 0.552 | 0.522 | 3.001 | 0.138 | 1.467 | 0.907 | 1.326 | 1.284 |
| 84 | 0.679 | 1.221 | 1.828 | 1.058 | 0.914 | 0.513 | NA | 0.465 | 1.007 | 0.540 | 1.278 | 1.462 | 0.580 | 0.945 |
| 85 | 0.729 | 1.701 | 1.984 | 0.913 | 0.366 | 0.734 | 0.130 | NA | 1.707 | 0.602 | 0.953 | 1.055 | 1.589 | 0.980 |
| 86 | 0.829 | 1.112 | 1.318 | 0.000 | 0.878 | 0.098 | 0.312 | 1.063 | NA | 0.682 | 0.668 | 0.761 | 0.645 | 0.655 |
| 87 | 0.383 | 1.303 | 1.125 | 0.423 | 0.689 | 1.320 | 0.235 | 0.275 | 1.223 | 0.574 | 0.760 | 0.941 | 1.183 | 0.939 |
| 88 | 0.581 | 1.234 | 0.817 | 0.079 | 0.513 | 0.943 | 0.000 | 0.417 | 1.269 | 0.000 | 0.432 | 0.851 | 0.651 | 0.745 |
| 89 | 0.499 | 1.125 | 1.216 | 0.233 | 0.446 | 0.424 | 0.035 | 0.223 | 1.367 | 0.404 | 0.243 | 0.674 | 0.377 | 0.579 |
| 90 | 1.470 | 1.877 | 0.956 | 0.749 | 0.583 | 0.576 | 0.469 | 0.415 | 1.133 | 0.000 | 0.834 | 0.486 | 0.863 | 0.762 |
| 91 | 0.486 | 1.018 | 0.997 | 0.355 | 0.624 | 0.539 | 0.484 | 0.661 | 1.465 | 0.000 | 0.240 | 0.595 | 0.439 | 0.652 |
| 92 | 0.168 | 1.079 | 1.029 | 0.118 | 0.492 | 0.691 | 0.083 | 0.254 | 0.254 | 0.000 | 0.246 | 0.708 | 0.233 | 0.531 |
| 93 | 0.331 | 0.624 | 1.488 | 0.187 | 0.511 | 0.587 | 0.193 | 0.456 | 1.155 | 2.789 | 0.566 | 0.500 | 0.787 | 0.645 |

Stock Identifiers

| AKS $=$ ALASKA SPRING | QUI $=$ QUINSAM | RBT $=$ ROBERTSON CREEK |
| :--- | :--- | :--- |$\quad$ SRH $=$ SALMON RIVER

Fishery: North/Central B.C. Troll

| REPORT <br> Year | ED CATCH AKS Age 4 |  | ITATION BQR Age 4 | RATES QUI Age 3 | $\begin{array}{r} \text { QUI } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { QUI } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB <br> Age 3 | $\begin{array}{r} \text { URB } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { WSH } \\ \text { Age } 4 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.075 | 0.093 | 0.038 | 0.192 | 0.113 | 0.089 | 0.153 | 0.110 | NA | NA | NA | 0.008 | 0.091 | NA | 0.119 |
| 80 | NA | 0.089 | 0.089 | 0.040 | 0.162 | 0.242 | 0.078 | 0.148 | 0.154 | 0.068 | NA | NA | 0.023 | 0.069 | 0.073 | 0.121 |
| 81 | NA | 0.085 | 0.098 | 0.066 | 0.177 | 0.193 | 0.054 | 0.139 | 0.235 | 0.103 | 0.156 | NA | 0.000 | 0.075 | 0.091 | 0.091 |
| 82 | 0.004 | 0.061 | 0.087 | 0.027 | 0.079 | 0.128 | 0.056 | 0.159 | 0.123 | 0.034 | 0.120 | 0.081 | 0.022 | 0.034 | 0.020 | 0.022 |
| 83 | 0.006 | 0.102 | 0.099 | 0.056 | 0.139 | 0.218 | 0.065 | 0.113 | 0.076 | 0.027 | 0.089 | 0.098 | 0.030 | 0.075 | 0.096 | 0.053 |
| 84 | 0.004 | 0.062 | 0.076 | 0.009 | 0.063 | 0.078 | 0.026 | 0.134 | 0.227 | NA | 0.094 | 0.316 | 0.021 | 0.106 | 0.077 | 0.020 |
| 85 | 0.003 | 0.031 | 0.078 | 0.012 | 0.045 | 0.036 | 0.046 | 0.211 | 0.197 | 0.035 | NA | 0.230 | 0.021 | 0.082 | 0.075 | 0.021 |
| 86 | 0.002 | 0.051 | 0.190 | 0.043 | 0.079 | 0.081 | 0.000 | 0.115 | 0.182 | 0.012 | 0.061 | NA | 0.017 | 0.071 | 0.084 | 0.051 |
| 87 | 0.002 | 0.005 | 0.074 | 0.015 | 0.071 | 0.122 | 0.035 | 0.059 | 0.125 | 0.011 | 0.053 | 0.188 | 0.022 | 0.099 | 0.142 | 0.018 |
| 88 | 0.006 | 0.009 | 0.073 | 0.010 | 0.045 | 0.021 | 0.023 | 0.080 | 0.000 | 0.013 | 0.040 | 0.128 | 0.006 | 0.054 | 0.093 | 0.029 |
| 89 | 0.003 | 0.019 | 0.000 | 0.017 | 0.033 | 0.036 | 0.021 | 0.097 | 0.144 | 0.007 | 0.037 | 0.189 | 0.003 | 0.050 | 0.193 | 0.012 |
| 90 | 0.007 | 0.019 | 0.103 | 0.016 | 0.091 | 0.047 | 0.019 | 0.099 | 0.094 | 0.010 | 0.032 | 0.236 | 0.000 | 0.062 | 0.113 | 0.011 |
| 91 | 0.002 | 0.013 | 0.087 | 0.018 | 0.112 | 0.084 | 0.026 | 0.100 | 0.192 | 0.007 | 0.053 | 0.195 | 0.017 | 0.000 | 0.090 | 0.008 |
| 92 | 0.001 | 0.025 | 0.196 | 0.000 | 0.149 | 0.168 | 0.017 | 0.099 | 0.135 | 0.012 | 0.034 | 0.100 | 0.005 | 0.026 | 0.000 | 0.002 |
| 93 | 0.001 | 0.021 | 0.085 | 0.008 | 0.078 | 0.102 | 0.010 | 0.090 | 0.137 | 0.006 | 0.121 | 0.224 | 0.000 | 0.075 | 0.094 | 0.007 |
| Base | 0.004 | 0.078 | 0.092 | 0.043 | 0.152 | 0.169 | 0.069 | 0.150 | 0.156 | 0.068 | 0.138 | 0.081 | 0.013 | 0.067 | 0.061 | 0.088 |


| REPORT <br> Year |  | BQR Age 3 | ITATION BQR Age 4 |  | NDEX QUI Age 4 | $\begin{array}{r} \text { QUI } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | SRH Age 3 | SRH Age 4 | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 3 \end{array}$ | URB <br> Age 4 | URB <br> Age 5 | $\begin{array}{r} \text { HSH } \\ \text { Age } 4 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.968 | 1.015 | 0.889 | 1.261 | 0.668 | 1.290 | 1.020 | 0.709 | NA | NA | NA | 0.601 | 1.353 | NA | 1.348 | 1.005 |
| 80 | NA | 1.147 | 0.965 | 0.939 | 1.060 | 1.432 | 1.120 | 0.989 | 0.990 | 0.992 | NA | NA | 1.728 | 1.032 | 1.189 | 1.372 | 1.123 |
| 81 | NA | 1.096 | 1.066 | 1.538 | 1.164 | 1.142 | 0.776 | 0.930 | 1.509 | 1.510 | 1.130 | NA | 0.000 | 1.113 | 1.488 | 1.035 | 1.163 |
| 82 | 1.000 | 0.789 | 0.954 | 0.635 | 0.515 | 0.758 | 0.813 | 1.061 | 0.791 | 0.498 | 0.870 | 1.000 | 1.671 | 0.502 | 0.324 | 0.245 | 0.739 |
| 83 | 1.723 | 1.320 | 1.082 | 1.294 | 0.915 | 1.292 | 0.937 | 0.756 | 0.487 | 0.403 | 0.643 | 1.213 | 2.291 | 1.123 | 1.570 | 0.600 | 0.941 |
| 84 | 1.217 | 0.799 | 0.830 | 0.210 | 0.414 | 0.463 | 0.372 | 0.895 | 1.457 | NA | 0.682 | 3.901 | 1.632 | 1.578 | 1.265 | 0.232 | 0.966 |
| 85 | 0.730 | 0.405 | 0.853 | 0.286 | 0.293 | 0.212 | 0.661 | 1.409 | 1.263 | 0.510 | NA | 2.841 | 1.603 | 1.231 | 1.232 | 0.236 | 0.870 |
| 86 | 0.678 | 0.651 | 2.067 | 0.990 | 0.517 | 0.481 | 0.000 | 0.772 | 1.168 | 0.174 | 0.441 | NA | 1.283 | 1.063 | 1.369 | 0.581 | 0.770 |
| 87 | 0.583 | 0.066 | 0.803 | 0.339 | 0.465 | 0.722 | 0.502 | 0.393 | 0.803 | 0.164 | 0.380 | 2.315 | 1.702 | 1.472 | 2.312 | 0.204 | 0.727 |
| 88 | 1.762 | 0.118 | 0.800 | 0.230 | 0.297 | 0.123 | 0.332 | 0.537 | 0.000 | 0.185 | 0.290 | 1.576 | 0.470 | 0.799 | 1.517 | 0.324 | 0.441 |
| 89 | 0.942 | 0.248 | 0.000 | 0.402 | 0.220 | 0.211 | 0.307 | 0.649 | 0.924 | 0.101 | 0.265 | 2.330 | 0.235 | 0.742 | 3.155 | 0.135 | 0.603 |
| 90 | 1.848 | 0.239 | 1.122 | 0.361 | 0.598 | 0.276 | 0.272 | 0.665 | 0.602 | 0.146 | 0.233 | 2.915 | 0.000 | 0.923 | 1.840 | 0.128 | 0.670 |
| 91 | 0.625 | 0.170 | 0.948 | 0.428 | 0.732 | 0.500 | 0.374 | 0.668 | 1.233 | 0.101 | 0.387 | 2.399 | 1.270 | 0.000 | 1.471 | 0.095 | 0.703 |
| 92 | 0.164 | 0.325 | 2.139 | 0.000 | 0.979 | 0.996 | 0.246 | 0.662 | 0.866 | 0.174 | 0.244 | 1.228 | 0.382 | 0.391 | 0.000 | 0.027 | 0.678 |
| 93 | 0.309 | 0.265 | 0.931 | 0.189 | 0.513 | 0.606 | 0.151 | 0.604 | 0.881 | 0.089 | 0.875 | 2.762 | 0.000 | 1.121 | 1.536 | 0.076 | 0.742 |

Stock Identifiers

AKS = ALASKA SPRING
SRH = SALMON RIVER
$B Q R=B I G$ QUALICUM
URB = COLUMBIA UPRIVER BRIGHT

QUI = QUINSAM WSH = WILLAMETTE SPRING

Fishery: North B.C. Troll

| REPORT Year | ED CATCH AKS Age 4 |  | ITATION QUI Age 4 | RATES <br> RBT <br> Age 3 | $\begin{array}{r} \text { RBT } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | SRH Age 3 | SRH Age 4 | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.017 | 0.077 | 0.047 | 0.073 | 0.078 | NA | NA | NA | 0.007 | 0.059 | NA | 0.119 |
| 80 | NA | 0.025 | 0.057 | 0.043 | 0.072 | 0.079 | 0.062 | NA | NA | 0.017 | 0.052 | 0.062 | 0.118 |
| 81 | NA | 0.063 | 0.082 | 0.028 | 0.087 | 0.172 | 0.103 | 0.149 | NA | 0.000 | 0.062 | 0.079 | 0.088 |
| 82 | 0.004 | 0.025 | 0.029 | 0.035 | 0.105 | 0.058 | 0.028 | 0.120 | 0.081 | 0.020 | 0.034 | 0.020 | 0.022 |
| 83 | 0.006 | 0.037 | 0.080 | 0.039 | 0.059 | 0.055 | 0.027 | 0.083 | 0.098 | 0.025 | 0.063 | 0.096 | 0.052 |
| 84 | 0.004 | 0.007 | 0.025 | 0.019 | 0.109 | 0.198 | NA | 0.083 | 0.259 | 0.014 | 0.091 | 0.077 | 0.019 |
| 85 | 0.003 | 0.007 | 0.028 | 0.039 | 0.211 | 0.197 | 0.029 | NA | 0.230 | 0.018 | 0.080 | 0.075 | 0.018 |
| 86 | 0.002 | 0.026 | 0.038 | 0.000 | 0.115 | 0.104 | 0.006 | 0.061 | NA | 0.015 | 0.061 | 0.074 | 0.051 |
| 87 | 0.002 | 0.010 | 0.031 | 0.024 | 0.000 | 0.125 | 0.010 | 0.053 | 0.188 | 0.016 | 0.089 | 0.131 | 0.015 |
| 88 | 0.006 | 0.005 | 0.034 | 0.016 | 0.074 | 0.000 | 0.013 | 0.040 | 0.105 | 0.005 | 0.049 | 0.089 | 0.024 |
| 89 | 0.003 | 0.012 | 0.022 | 0.018 | 0.092 | 0.130 | 0.007 | 0.037 | 0.189 | 0.003 | 0.046 | 0.193 | 0.012 |
| 90 | 0.007 | 0.009 | 0.049 | 0.014 | 0.082 | 0.081 | 0.009 | 0.032 | 0.236 | 0.000 | 0.057 | 0.106 | 0.010 |
| 91 | 0.002 | 0.011 | 0.032 | 0.019 | 0.078 | 0.152 | 0.007 | 0.053 | 0.189 | 0.017 | 0.000 | 0.090 | 0.008 |
| 92 | 0.001 | 0.000 | 0.094 | 0.014 | 0.066 | 0.095 | 0.010 | 0.034 | 0.092 | 0.005 | 0.026 | 0.000 | 0.002 |
| 93 | 0.001 | 0.003 | 0.061 | 0.009 | 0.068 | 0.114 | 0.006 | 0.120 | 0.218 | 0.000 | 0.075 | 0.094 | 0.007 |
| Base | 0.004 | 0.032 | 0.061 | 0.038 | 0.084 | 0.097 | 0.064 | 0.135 | 0.081 | 0.011 | 0.052 | 0.054 | 0.087 |


| REPORT <br> Year | ED CATCH AKS Age 4 |  | ITATION QUI Age 4 | RATE Age 3 | NDEX RBT Age 4 | $\begin{array}{r} \text { RBT } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SRH } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 3 \end{array}$ | $\begin{gathered} \text { URB } \\ \text { Age } 4 \end{gathered}$ | $\begin{array}{r} \text { URB } \\ \text { Age } 5 \end{array}$ | $\begin{array}{r} \text { USH } \\ \text { Age } 4 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 0.539 | 1.254 | 1.216 | 0.872 | 0.805 | NA | NA | NA | 0.630 | 1.136 | NA | 1.370 | 1.032 |
| 80 | NA | 0.764 | 0.922 | 1.126 | 0.852 | 0.813 | 0.968 | NA | NA | 1.559 | 1.008 | 1.154 | 1.363 | 1.011 |
| 81 | NA | 1.935 | 1.343 | 0.739 | 1.032 | 1.782 | 1.602 | 1.107 | NA | 0.000 | 1.205 | 1.477 | 1.017 | 1.279 |
| 82 | 1.000 | 0.762 | 0.480 | 0.919 | 1.244 | 0.599 | 0.431 | 0.893 | 1.000 | 1.811 | 0.651 | 0.369 | 0.249 | 0.725 |
| 83 | 1.723 | 1.157 | 1.306 | 1.003 | 0.703 | 0.570 | 0.427 | 0.617 | 1.213 | 2.333 | 1.224 | 1.787 | 0.602 | 0.903 |
| 84 | 1.217 | 0.223 | 0.405 | 0.487 | 1.296 | 2.052 | NA | 0.617 | 3.188 | 1.252 | 1.766 | 1.440 | 0.217 | 1.231 |
| 85 | 0.730 | 0.201 | 0.456 | 1.025 | 2.507 | 2.032 | 0.444 | NA | 2.841 | 1.682 | 1.543 | 1.403 | 0.212 | 1.405 |
| 86 | 0.678 | 0.814 | 0.623 | 0.000 | 1.373 | 1.074 | 0.093 | 0.453 | NA | 1.354 | 1.191 | 1.379 | 0.590 | 0.772 |
| 87 | 0.583 | 0.296 | 0.511 | 0.618 | 0.000 | 1.292 | 0.157 | 0.390 | 2.315 | 1.481 | 1.727 | 2.433 | 0.168 | 0.866 |
| 88 | 1.762 | 0.153 | 0.551 | 0.421 | 0.877 | 0.000 | 0.196 | 0.298 | 1.300 | 0.442 | 0.950 | 1.659 | 0.282 | 0.576 |
| 89 | 0.942 | 0.377 | 0.364 | 0.462 | 1.098 | 1.347 | 0.107 | 0.272 | 2.330 | 0.284 | 0.900 | 3.593 | 0.138 | 0.957 |
| 90 | 1.811 | 0.288 | 0.793 | 0.355 | 0.971 | 0.834 | 0.143 | 0.239 | 2.915 | 0.000 | 1.098 | 1.962 | 0.115 | 0.863 |
| 91 | 0.625 | 0.352 | 0.527 | 0.488 | 0.924 | 1.575 | 0.108 | 0.391 | 2.330 | 1.536 | 0.000 | 1.675 | 0.097 | 0.823 |
| 92 | 0.164 | 0.000 | 1.529 | 0.366 | 0.788 | 0.986 | 0.154 | 0.250 | 1.138 | 0.462 | 0.507 | 0.000 | 0.027 | 0.549 |
| 93 | 0.309 | 0.084 | 0.993 | 0.230 | 0.811 | 1.181 | 0.094 | 0.888 | 2.685 | 0.000 | 1.453 | 1.750 | 0.078 | 0.969 |

Stock Identifiers

| AKS $=$ ALASKA SPRING | QUI $=$ QUINSAM | RBT $=$ ROBERTSON CREEK |
| :--- | :--- | :--- |
| URB $=$ COLUMBIA UPRIVER BRIGHT | HSH $=$ HILLAMETTE SPRING |  |$\quad$ SRH $=$ SALMON RIVER

Fishery: Central B.C. Troll

| REPORTED CATCH <br> BQR |  |  |  |  |  | EXPLOITATION <br> QUI <br> RBT | RATES <br> RBT |
| ---: | ---: | ---: | ---: | ---: | :---: | :---: | :---: |
| Year | Age 3 | Age 4 | Age 3 | Age 4 |  |  |  |
| 79 | 0.065 | 0.115 | 0.043 | 0.079 |  |  |  |
| 80 | 0.045 | 0.105 | 0.034 | 0.076 |  |  |  |
| 81 | 0.077 | 0.095 | 0.025 | 0.052 |  |  |  |
| 82 | 0.031 | 0.049 | 0.021 | 0.054 |  |  |  |
| 83 | 0.068 | 0.059 | 0.026 | 0.054 |  |  |  |
| 84 | 0.049 | 0.038 | 0.007 | 0.025 |  |  |  |
| 85 | 0.016 | 0.017 | 0.006 | 0.000 |  |  |  |
| 86 | 0.046 | 0.041 | 0.000 | 0.000 |  |  |  |
| 87 | 0.005 | 0.040 | 0.011 | 0.059 |  |  |  |
| 88 | 0.000 | 0.012 | 0.007 | 0.007 |  |  |  |
| 89 | 0.003 | 0.011 | 0.003 | 0.005 |  |  |  |
| 90 | 0.005 | 0.043 | 0.005 | 0.018 |  |  |  |
| 91 | 0.008 | 0.079 | 0.007 | 0.022 |  |  |  |
| 92 | 0.008 | 0.056 | 0.003 | 0.033 |  |  |  |
| 93 | 0.010 | 0.017 | 0.002 | 0.022 |  |  |  |
| Base | 0.055 | 0.091 | 0.031 | 0.065 |  |  |  |


| REPORTED CATCH <br> BQR |  |  |  |  |  |  | EXPLOITATION <br> QUI <br> RBT | RATE INDEX <br> RBT |
| ---: | ---: | ---: | ---: | ---: | :--- | :---: | :---: | :---: |
| Year | Age 3 | Age 4 | Age 3 | Age 4 | Fishery |  |  |  |
| 79 | 1.190 | 1.266 | 1.383 | 1.211 | 1.249 |  |  |  |
| 80 | 0.826 | 1.152 | 1.113 | 1.165 | 1.077 |  |  |  |
| 81 | 1.411 | 1.044 | 0.823 | 0.800 | 1.033 |  |  |  |
| 82 | 0.573 | 0.538 | 0.682 | 0.825 | 0.642 |  |  |  |
| 83 | 1.246 | 0.651 | 0.856 | 0.825 | 0.859 |  |  |  |
| 84 | 0.891 | 0.419 | 0.229 | 0.380 | 0.491 |  |  |  |
| 85 | 0.287 | 0.184 | 0.207 | 0.000 | 0.160 |  |  |  |
| 86 | 0.837 | 0.445 | 0.000 | 0.000 | 0.357 |  |  |  |
| 87 | 0.094 | 0.433 | 0.358 | 0.898 | 0.473 |  |  |  |
| 88 | 0.000 | 0.126 | 0.221 | 0.101 | 0.103 |  |  |  |
| 89 | 0.055 | 0.122 | 0.113 | 0.072 | 0.093 |  |  |  |
| 90 | 0.084 | 0.467 | 0.169 | 0.272 | 0.290 |  |  |  |
| 91 | 0.148 | 0.870 | 0.231 | 0.339 | 0.482 |  |  |  |
| 92 | 0.153 | 0.609 | 0.096 | 0.500 | 0.411 |  |  |  |
| 93 | 0.188 | 0.191 | 0.051 | 0.339 | 0.212 |  |  |  |

Stock Identifiers

```
BQR = BIG QUALICUM
RBT = ROBERTSON CREEK
```

Fishery: West Coast Vancouver Island Troll

| REPORTED <br> Year AGE | CATCH BON $>3$ | $\begin{gathered} \text { EXPLOI } \\ \text { BON } \\ 4 \end{gathered}$ | tATION CWF 4 | RATES GAD 3 | $\begin{gathered} \text { GAD } \\ 4 \end{gathered}$ | $\begin{gathered} \text { LRU } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 3 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 5 \end{gathered}$ | $\begin{aligned} & \text { SAM } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { SAM } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 4 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 3 \end{gathered}$ | ${ }_{4}^{\text {STP }}$ | $\begin{aligned} & \text { URB } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { URB } \\ 4 \end{gathered}$ | $\begin{aligned} & \text { UHA } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { UHA } \\ 4 \end{gathered}$ | $\begin{gathered} \text { HSH } \\ 4 \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.21 | NA | NA | NA | NA | NA | 0.03 | 0.06 | NA | NA | 0.21 | 0.20 | 0.18 | 0.17 | NA | 0.25 | NA | NA | NA | NA | 0.04 | 0.08 | 0.06 | 0.17 | NA |
| 80 | 0.10 | 0.15 | NA | NA | NA | NA | 0.04 | 0.07 | NA | NA | NA | NA | 0.21 | 0.30 | NA | NA | 0.04 | NA | NA | NA | 0.04 | 0.05 | 0.13 | 0.12 | 0.06 |
| 81 | 0.16 | 0.15 | 0.13 | 0.04 | NA | 0.06 | 0.02 | 0.03 | 0.03 | NA | NA | NA | 0.17 | 0.14 | 0.05 | NA | NA | 0.02 | 0.23 | NA | 0.01 | 0.05 | 0.10 | 0.20 | 0.01 |
| 82 | 0.26 | 0.35 | 0.20 | 0.07 | 0.21 | 0.08 | 0.02 | 0.03 | NA | 0.05 | NA | NA | 0.17 | 0.25 | 0.09 | 0.21 | NA | NA | 0.23 | 0.30 | 0.03 | 0.02 | 0.13 | 0.23 | 0.05 |
| 83 | 0.31 | 0.29 | 0.23 | NA | 0.29 | 0.07 | 0.01 | 0.03 | 0.07 | NA | 0.20 | NA | 0.27 | 0.21 | 0.11 | 0.20 | 0.02 | 0.02 | 0.32 | 0.50 | 0.01 | 0.02 | 0.08 | 0.21 | 0.03 |
| 84 | 0.27 | 0.54 | 0.22 | 0.11 | NA | NA | 0.04 | 0.05 | 0.05 | NA | NA | 0.19 | 0.24 | 0.31 | 0.10 | 0.23 | NA | 0.02 | 0.40 | 0.52 | 0.02 | 0.06 | 0.19 | 0.16 | 0.02 |
| 85 | 0.22 | 0.29 | 0.15 | NA | 0.17 | NA | 0.02 | 0.00 | NA | NA | NA | NA | 0.10 | 0.22 | 0.05 | 0.16 | NA | NA | 0.20 | 0.19 | 0.02 | 0.05 | 0.10 | 0.22 | 0.01 |
| 86 | NA | NA | 0.21 | NA | NA | 0.03 | NA | NA | NA | NA | NA | NA | 0.21 | 0.20 | 0.06 | 0.27 | NA | 0.01 | 0.20 | 0.23 | 0.04 | 0.03 | 0.09 | 0.24 | NA |
| 87 | 0.18 | NA | 0.13 | NA | NA | 0.10 | 0.01 | NA | NA | NA | NA | NA | 0.08 | NA | 0.05 | 0.14 | 0.00 | 0.01 | 0.15 | NA | 0.02 | 0.04 | 0.04 | 0.09 | 0.01 |
| 88 | NA | 0.25 | 0.14 | 0.02 | NA | 0.07 | 0.02 | 0.04 | NA | 0.03 | NA | NA | 0.18 | NA | 0.02 | 0.17 | NA | 0.03 | 0.19 | 0.28 | 0.00 | 0.09 | NA | 0.16 | 0.02 |
| 89 | NA | NA | 0.09 | 0.01 | 0.11 | 0.04 | 0.01 | 0.02 | 0.00 | 0.01 | 0.13 | NA | 0.11 | 0.09 | 0.02 | 0.10 | 0.01 | NA | 0.05 | 0.11 | NA | 0.04 | NA | NA | 0.01 |
| 90 | NA | NA | 0.12 | 0.06 | 0.20 | 0.08 | 0.02 | 0.04 | 0.07 | 0.02 | 0.18 | NA | 0.16 | 0.16 | 0.05 | 0.21 | 0.01 | 0.02 | 0.19 | 0.08 | NA | 0.08 | NA | NA | 0.02 |
| 91 | NA | NA | NA | NA | 0.20 | 0.05 | 0.02 | 0.03 | 0.03 | 0.01 | 0.12 | 0.23 | 0.10 | 0.12 | 0.02 | 0.13 | 0.02 | 0.02 | 0.13 | NA | NA | NA | NA | NA | 0.00 |
| 92 | NA | NA | 0.19 | NA | 0.11 | 0.02 | 0.05 | 0.16 | 0.22 | 0.05 | 0.06 | NA | 0.08 | 0.16 | 0.04 | 0.17 | 0.03 | 0.13 | 0.11 | NA | NA | NA | NA | NA | 0.01 |
| 93 | NA | NA | NA | NA | 0.36 | NA | 0.04 | 0.14 | 0.10 | 0.07 | 0.09 | NA | 0.10 | 0.23 | 0.05 | 0.13 | 0.02 | 0.09 | 0.14 | 0.13 | 0.03 | 0.13 | NA | NA | 0.01 |
| Base | 0.18 | 0.22 | 0.16 | 0.05 | 0.21 | 0.07 | 0.03 | 0.05 | 0.03 | 0.05 | 0.21 | 0.20 | 0.18 | 0.22 | 0.07 | 0.23 | 0.04 | 0.02 | 0.23 | 0.30 | 0.03 | 0.05 | 0.11 | 0.18 | 0.04 |


| REPORTED <br> Year AGE | CATCH BON 3 | EXPLOI BON 4 | TATION CHF 4 | RATE GAD 3 | INDEX GAD 4 | $\begin{gathered} \text { LRH } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 3 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 4 \end{gathered}$ | $\begin{gathered} \text { RBT } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SAM } \\ 5 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPR } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SPS } \\ 4 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 3 \end{gathered}$ | $\begin{gathered} \text { SRH } \\ 4 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 3 \end{gathered}$ | $\begin{gathered} \text { STP } \\ 4 \end{gathered}$ | $\begin{aligned} & \text { URB } \\ & 3 \end{aligned}$ | $\begin{gathered} \text { URB } \\ 4 \end{gathered}$ | $\begin{gathered} \text { UHA } \\ 3 \end{gathered}$ | ${ }_{4}^{\text {UWA }}$ | $\begin{gathered} \text { HSH } \\ 4 \end{gathered}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 1.15 | NA | NA | NA | NA | NA | 1.15 | 1.27 | NA | NA | 1.00 | 1.00 | 0.99 | 0.80 | NA | 1.10 | NA | NA | NA | NA | 1.46 | 1.62 | 0.61 | 0.93 | NA | 1.01 |
| 80 | 0.54 | 0.70 | NA | NA | NA | NA | 1.40 | 1.48 | NA | NA | NA | NA | 1.17 | 1.37 | NA | NA | 1.00 | NA | NA | NA | 1.37 | 1.00 | 1.24 | 0.69 | 1.46 | 1.00 |
| 81 | 0.88 | 0.71 | 0.79 | 0.71 | NA | 0.83 | 0.68 | 0.56 | 1.00 | NA | NA | NA | 0.93 | 0.66 | 0.72 | NA | NA | 1.00 | 1.02 | NA | 0.19 | 0.97 | 0.93 | 1.10 | 0.33 | 0.83 |
| 82 | 1.43 | 1.60 | 1.21 | 1.29 | 1.00 | 1.17 | 0.77 | 0.68 | NA | 1.00 | NA | NA | 0.91 | 1.16 | 1.28 | 0.90 | NA | NA | 0.98 | 1.00 | 0.98 | 0.41 | 1.22 | 1.28 | 1.22 | 1.12 |
| 83 | 1.67 | 1.35 | 1.38 | NA | 1.40 | 0.97 | 0.34 | 0.65 | 2.34 | NA | 0.92 | NA | 1.46 | 0.96 | 1.51 | 0.87 | 0.63 | 0.73 | 1.41 | 1.67 | 0.34 | 0.40 | 0.75 | 1.17 | 0.66 | 1.22 |
| 84 | 1.50 | 2.48 | 1.32 | 2.05 | NA | NA | 1.55 | 0.93 | 1.69 | NA | NA | 0.96 | 1.30 | 1.44 | 1.38 | 0.99 | NA | 0.81 | 1.75 | 1.73 | 0.76 | 1.19 | 1.81 | 0.90 | 0.46 | 1.45 |
| 85 | 1.22 | 1.35 | 0.92 | NA | 0.82 | NA | 0.72 | 0.00 | NA | NA | NA | NA | 0.53 | 1.03 | 0.69 | 0.69 | NA | NA | 0.87 | 0.64 | 0.66 | 0.94 | 0.91 | 1.26 | 0.36 | 0.88 |
| 86 | NA | NA | 1.28 | NA | NA | 0.45 | NA | NA | NA | NA | NA | NA | 1.16 | 0.91 | 0.80 | 1.16 | NA | 0.43 | 0.86 | 0.76 | 1.32 | 0.66 | 0.86 | 1.34 | NA | 0.98 |
| 87 | 0.97 | NA | 0.81 | NA | NA | 1.42 | 0.35 | NA | NA | NA | NA | NA | 0.44 | NA | 0.64 | 0.61 | 0.12 | 0.58 | 0.67 | NA | 0.88 | 0.87 | 0.38 | 0.49 | 0.39 | 0.66 |
| 88 | NA | 1.12 | 0.85 | 0.44 | NA | 1.02 | 0.57 | 0.77 | NA | 0.56 | NA | NA | 1.00 | NA | 0.27 | 0.75 | NA | 1.40 | 0.83 | 0.95 | 0.07 | 1.76 | NA | 0.91 | 0.48 | 0.87 |
| 89 | NA | NA | 0.54 | 0.25 | 0.52 | 0.56 | 0.22 | 0.41 | 0.00 | 0.20 | 0.61 | NA | 0.58 | 0.43 | 0.30 | 0.42 | 0.15 | NA | 0.20 | 0.37 | NA | 0.82 | NA | NA | 0.37 | 0.43 |
| 90 | NA | NA | 0.72 | 1.09 | 0.95 | 1.18 | 0.76 | 0.73 | 2.24 | 0.36 | 0.86 | NA | 0.88 | 0.74 | 0.66 | 0.91 | 0.33 | 0.96 | 0.83 | 0.25 | NA | 1.50 | NA | NA | 0.44 | 0.78 |
| 91 | NA | NA | NA | NA | 0.97 | 0.72 | 0.76 | 0.65 | 1.00 | 0.23 | 0.58 | 1.19 | 0.54 | 0.56 | 0.29 | 0.58 | 0.42 | 0.79 | 0.57 | NA | NA | NA | NA | NA | 0.04 | 0.66 |
| 92 | NA | NA | 1.16 | NA | 0.51 | 0.31 | 2.04 | 3.19 | 7.33 | 0.98 | 0.27 | NA | 0.42 | 0.76 | 0.60 | 0.74 | 0.86 | 6.17 | 0.47 | NA | NA | NA | NA | NA | 0.30 | 0.87 |
| 93 | NA | NA | NA | NA | 1.72 | NA | 1.51 | 2.81 | 3.28 | 1.34 | 0.44 | NA | 0.56 | 1.04 | 0.66 | 0.55 | 0.48 | 4.11 | 0.61 | 0.45 | 0.98 | 2.56 | NA | NA | 0.33 | 0.93 |

Stock Identifiers



Fishery: Strait of Georgia Troll and Sport

| REPORT <br> Year |  |  | ITATION PPS Age 3 | RATES SAM Age 3 | $\begin{array}{r} \text { SAM } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | UWA Age 3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.226 | 0.155 | 0.234 | NA | 0.096 | NA | 0.061 | 0.041 |
| 80 | 0.276 | 0.191 | 0.263 | NA | NA | NA | NA | 0.059 |
| 81 | 0.307 | 0.372 | 0.290 | NA | NA | 0.068 | NA | 0.038 |
| 82 | 0.142 | 0.145 | 0.152 | 0.106 | NA | 0.056 | 0.096 | 0.023 |
| 83 | 0.183 | 0.164 | 0.177 | NA | 0.103 | 0.030 | 0.042 | 0.035 |
| 84 | 0.269 | 0.283 | 0.252 | NA | NA | 0.055 | 0.055 | 0.052 |
| 85 | 0.159 | 0.117 | 0.145 | NA | NA | 0.020 | 0.053 | 0.032 |
| 86 | 0.227 | 0.174 | 0.293 | NA | NA | 0.065 | 0.031 | 0.025 |
| 87 | 0.146 | 0.221 | 0.081 | NA | NA | 0.065 | 0.061 | 0.034 |
| 88 | 0.193 | 0.093 | 0.333 | 0.055 | NA | 0.027 | 0.150 | NA |
| 89 | 0.114 | 0.179 | 0.168 | 0.058 | 0.088 | 0.016 | 0.034 | NA |
| 90 | 0.153 | 0.138 | 0.000 | 0.032 | 0.127 | 0.008 | 0.036 | NA |
| 91 | 0.191 | 0.287 | 0.204 | 0.101 | 0.055 | 0.008 | 0.012 | NA |
| 92 | 0.313 | 0.212 | 0.198 | 0.039 | 0.209 | 0.021 | 0.027 | NA |
| 93 | 0.256 | 0.329 | 0.351 | 0.120 | 0.110 | 0.016 | 0.041 | NA |
| Base | 0.237 | 0.216 | 0.235 | 0.106 | 0.096 | 0.062 | 0.078 | 0.040 |


| REPORTE <br> Year | $\begin{gathered} \text { ED CATCH } \\ \text { BQR } \\ \text { Age } 3 \end{gathered}$ |  | ITATION PPS Age 3 | RATE SAM Age 3 | NDEX SAM Age 4 | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | UHA Age 3 | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.950 | 0.717 | 0.996 | NA | 1.000 | NA | 0.781 | 1.016 | 0.900 |
| 80 | 1.161 | 0.886 | 1.121 | NA | NA | NA | NA | 1.476 | 1.084 |
| 81 | 1.291 | 1.725 | 1.235 | NA | NA | 1.090 | NA | 0.934 | 1.359 |
| 82 | 0.598 | 0.672 | 0.648 | 1.000 | NA | 0.910 | 1.219 | 0.574 | 0.739 |
| 83 | 0.772 | 0.761 | 0.755 | NA | 1.075 | 0.491 | 0.535 | 0.878 | 0.762 |
| 84 | 1.132 | 1.310 | 1.073 | NA | NA | 0.880 | 0.701 | 1.304 | 1.111 |
| 85 | 0.668 | 0.544 | 0.618 | NA | NA | 0.325 | 0.674 | 0.804 | 0.606 |
| 86 | 0.957 | 0.808 | 1.248 | NA | NA | 1.051 | 0.390 | 0.621 | 0.939 |
| 87 | 0.616 | 1.024 | 0.344 | NA | NA | 1.044 | 0.776 | 0.845 | 0.699 |
| 88 | 0.811 | 0.433 | 1.420 | 0.514 | NA | 0.442 | 1.915 | NA | 0.911 |
| 89 | 0.482 | 0.830 | 0.714 | 0.542 | 0.917 | 0.262 | 0.439 | NA | 0.638 |
| 90 | 0.643 | 0.641 | 0.000 | 0.302 | 1.333 | 0.133 | 0.454 | NA | 0.480 |
| 91 | 0.805 | 1.330 | 0.870 | 0.946 | 0.573 | 0.130 | 0.151 | NA | 0.832 |
| 92 | 1.318 | 0.980 | 0.845 | 0.363 | 2.189 | 0.337 | 0.350 | NA | 0.989 |
| 93 | 1.076 | 1.526 | 1.494 | 1.126 | 1.154 | 0.257 | 0.522 | NA | 1.187 |

Stock Identifiers

| BQR $=$ BIG QUALICUM | PPS $=$ PUNTLEDGE | SAM $=$ SAMISH FALL FING |
| :--- | :--- | :--- |
| SPS $=$ SO SOUND FALL FING UHA $=U$ OF $H$ FALL ACCEL |  |  |

Fishery: Strait of Georgia Troll

| REPORTE <br> Year | $\begin{gathered} \text { ED CATC } \\ \text { BQR } \\ \text { Age } 3 \end{gathered}$ | $\begin{gathered} \text { EXPLO } \\ \text { PPS } \\ \text { Age } 3 \end{gathered}$ | ITATION RATES SAM Age 3 |
| :---: | :---: | :---: | :---: |
| 79 | 0.146 | 0.153 | NA |
| 80 | 0.150 | 0.127 | NA |
| 81 | 0.120 | 0.119 | NA |
| 82 | 0.079 | 0.091 | 0.017 |
| 83 | 0.112 | 0.102 | NA |
| 84 | 0.083 | 0.102 | NA |
| 85 | 0.016 | 0.000 | NA |
| 86 | 0.051 | 0.096 | NA |
| 87 | 0.031 | 0.000 | NA |
| 88 | 0.006 | 0.000 | 0.002 |
| 89 | 0.009 | 0.000 | 0.004 |
| 90 | 0.051 | 0.000 | 0.020 |
| 91 | 0.039 | 0.000 | 0.017 |
| 92 | 0.092 | 0.024 | 0.012 |
| 93 | 0.019 | 0.000 | 0.018 |
| Base | 0.124 | 0.123 | 0.017 |


| REPORTED <br> CATCH |  |  |  |  |  |
| ---: | ---: | ---: | ---: | :--- | :--- |
| Year | EXPLOITATION <br> PPS <br> SAM | RATE INDEX |  |  |  |
| Age 3 | Age 3 | Fishery |  |  |  |
| 79 | 1.180 | 1.250 | NA | 1.215 |  |
| 80 | 1.214 | 1.035 | NA | 1.125 |  |
| 81 | 0.966 | 0.970 | NA | 0.968 |  |
| 82 | 0.640 | 0.745 | 1.000 | 0.712 |  |
| 83 | 0.904 | 0.836 | NA | 0.870 |  |
| 84 | 0.668 | 0.835 | NA | 0.752 |  |
| 85 | 0.127 | 0.000 | NA | 0.064 |  |
| 86 | 0.409 | 0.783 | NA | 0.595 |  |
| 87 | 0.249 | 0.000 | NA | 0.125 |  |
| 88 | 0.049 | 0.000 | 0.146 | 0.033 |  |
| 89 | 0.074 | 0.000 | 0.219 | 0.049 |  |
| 90 | 0.412 | 0.000 | 1.177 | 0.269 |  |
| 91 | 0.312 | 0.000 | 1.014 | 0.212 |  |
| 92 | 0.747 | 0.194 | 0.731 | 0.489 |  |
| 93 | 0.152 | 0.000 | 1.058 | 0.139 |  |

Stock Identifiers
$\overline{B Q R}=$ BIG QUALICUM
SAM $=$ SAMISH FALL FING $\quad$ PPS $=$ PUNTLEDGE

Fishery: Strait of Georgia Sport

| REPORT Year | ED CATCH BQR Age 3 |  | ITATION PPS Age 3 | RATES SAM Age 3 | $\begin{array}{r} \text { SAM } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { UHA } \\ \text { Age } 3 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.080 | 0.097 | 0.081 | NA | 0.075 | NA | 0.052 | 0.027 |
| 80 | 0.125 | 0.111 | 0.136 | NA | NA | NA | NA | 0.057 |
| 81 | 0.187 | 0.295 | 0.171 | NA | NA | 0.062 | NA | 0.033 |
| 82 | 0.063 | 0.060 | 0.061 | 0.090 | NA | 0.052 | 0.060 | 0.022 |
| 83 | 0.071 | 0.118 | 0.075 | NA | 0.093 | 0.029 | 0.037 | 0.025 |
| 84 | 0.186 | 0.283 | 0.150 | NA | NA | 0.046 | 0.055 | 0.047 |
| 85 | 0.143 | 0.117 | 0.145 | NA | NA | 0.020 | 0.050 | 0.032 |
| 86 | 0.177 | 0.174 | 0.197 | NA | NA | 0.065 | 0.031 | 0.025 |
| 87 | 0.115 | 0.214 | 0.081 | NA | NA | 0.065 | 0.061 | 0.025 |
| 88 | 0.187 | 0.073 | 0.333 | 0.052 | NA | 0.026 | 0.150 | NA |
| 89 | 0.105 | 0.179 | 0.168 | 0.054 | 0.088 | 0.016 | 0.032 | NA |
| 90 | 0.102 | 0.138 | 0.000 | 0.012 | 0.103 | 0.005 | 0.034 | NA |
| 91 | 0.153 | 0.287 | 0.204 | 0.084 | 0.045 | 0.007 | 0.012 | NA |
| 92 | 0.221 | 0.196 | 0.175 | 0.026 | 0.190 | 0.021 | 0.027 | NA |
| 93 | 0.237 | 0.293 | 0.351 | 0.102 | 0.098 | 0.013 | 0.041 | NA |
| Base | 0.114 | 0.141 | 0.112 | 0.090 | 0.075 | 0.057 | 0.056 | 0.035 |


| REPORT <br> Year | $\begin{gathered} \text { ED CATCH } \\ \text { BQR } \\ \text { Age } 3 \end{gathered}$ |  | ITATION PPS Age 3 | RATE SAM Age 3 | NDEX SAM Age 4 | $\begin{array}{r} \text { SPS } \\ \text { Age } 3 \end{array}$ | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | UWA Age 3 | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.700 | 0.688 | 0.719 | NA | 1.000 | NA | 0.932 | 0.766 | 0.772 |
| 80 | 1.103 | 0.788 | 1.215 | NA | NA | NA | NA | 1.635 | 1.069 |
| 81 | 1.645 | 2.098 | 1.524 | NA | NA | 1.089 | NA | 0.951 | 1.633 |
| 82 | 0.552 | 0.426 | 0.542 | 1.000 | NA | 0.911 | 1.068 | 0.649 | 0.675 |
| 83 | 0.628 | 0.841 | 0.666 | NA | 1.240 | 0.506 | 0.666 | 0.721 | 0.761 |
| 84 | 1.637 | 2.009 | 1.332 | NA | NA | 0.803 | 0.979 | 1.351 | 1.488 |
| 85 | 1.256 | 0.834 | 1.292 | NA | NA | 0.353 | 0.882 | 0.932 | 0.986 |
| 86 | 1.554 | 1.239 | 1.754 | NA | NA | 1.143 | 0.545 | 0.720 | 1.300 |
| 87 | 1.015 | 1.524 | 0.719 | NA | NA | 1.135 | 1.084 | 0.734 | 1.091 |
| 88 | 1.641 | 0.521 | 2.969 | 0.583 | NA | 0.458 | 2.674 | NA | 1.443 |
| 89 | 0.927 | 1.273 | 1.494 | 0.603 | 1.174 | 0.274 | 0.572 | NA | 0.996 |
| 90 | 0.896 | 0.983 | 0.000 | 0.138 | 1.384 | 0.093 | 0.605 | NA | 0.613 |
| 91 | 1.342 | 2.040 | 1.820 | 0.933 | 0.608 | 0.118 | 0.210 | NA | 1.229 |
| 92 | 1.940 | 1.394 | 1.555 | 0.294 | 2.548 | 0.367 | 0.489 | NA | 1.329 |
| 93 | 2.082 | 2.080 | 3.125 | 1.139 | 1.319 | 0.230 | 0.729 | NA | 1.762 |

Stock Identifiers

| BQR $=$ BIG QUALICUM | PPS $=$ PUNTLEDGE |
| :--- | :--- |
| SPS $=$ SO SOUND FALL FING UWA $=U$ OF $W$ FALL ACCEL |  |$\quad$ SAM $=$ SAMISH FALL FING

Fishery: U.S. South Ocean Troll and Sport: Puget Sound Stocks

| REPORTED CATCH EXPLOITATION RATES <br> SAM <br> SAM <br> GAD |  |  |  |  |  |  |  |  | GAD | SPS | SPS | UWA |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Age 3 | Age 4 | Age 3 | Age 4 | Age 3 | Age 4 | Age 3 |  |  |  |  |  |
| 79 | NA | 0.017 | NA | 0.205 | NA | 0.020 | 0.011 |  |  |  |  |  |
| 80 | NA | NA | NA | NA | NA | NA | 0.021 |  |  |  |  |  |
| 81 | NA | NA | 0.012 | NA | 0.004 | NA | 0.025 |  |  |  |  |  |
| 82 | 0.007 | NA | 0.017 | 0.031 | 0.006 | 0.043 | 0.024 |  |  |  |  |  |
| 83 | NA | 0.039 | 0.012 | 0.015 | 0.004 | 0.026 | 0.015 |  |  |  |  |  |
| 84 | NA | NA | 0.017 | 0.000 | 0.006 | 0.025 | 0.006 |  |  |  |  |  |
| 85 | NA | NA | NA | 0.010 | 0.000 | 0.018 | 0.013 |  |  |  |  |  |
| 86 | NA | NA | NA | NA | 0.033 | 0.026 | 0.012 |  |  |  |  |  |
| 87 | NA | NA | NA | NA | 0.027 | 0.096 | 0.022 |  |  |  |  |  |
| 88 | 0.020 | NA | 0.035 | NA | 0.028 | 0.092 | NA |  |  |  |  |  |
| 89 | 0.023 | 0.053 | 0.059 | 0.120 | 0.042 | 0.073 | NA |  |  |  |  |  |
| 90 | 0.036 | 0.076 | 0.063 | 0.105 | 0.049 | 0.079 | NA |  |  |  |  |  |
| 91 | 0.063 | 0.066 | 0.025 | 0.082 | 0.034 | 0.086 | NA |  |  |  |  |  |
| 92 | 0.040 | 0.110 | 0.080 | 0.163 | 0.047 | 0.093 | NA |  |  |  |  |  |
| 93 | 0.010 | 0.091 | 0.000 | 0.081 | 0.014 | 0.068 | NA |  |  |  |  |  |
| Base | 0.007 | 0.017 | 0.014 | 0.118 | 0.005 | 0.032 | 0.020 |  |  |  |  |  |


| REPORT Year | SAM Age 3 |  | ITATION GAD Age 3 | RATE GAD Age 4 | NDEX SPS Age 3 | $\begin{array}{r} \text { SPS } \\ \text { Age } 4 \end{array}$ | UWA Age 3 | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | NA | 1.000 | NA | 1.740 | NA | 0.645 | 0.555 | 1.358 |
| 80 | NA | NA | NA | NA | NA | NA | 1.050 | 1.050 |
| 81 | NA | NA | 0.811 | NA | 0.861 | NA | 1.232 | 1.033 |
| 82 | 1.000 | NA | 1.189 | 0.260 | 1.139 | 1.355 | 1.163 | 0.647 |
| 83 | NA | 2.311 | 0.857 | 0.129 | 0.712 | 0.824 | 0.724 | 0.537 |
| 84 | NA | NA | 1.228 | 0.000 | 1.125 | 0.784 | 0.310 | 0.287 |
| 85 | NA | NA | NA | 0.089 | 0.000 | 0.564 | 0.616 | 0.234 |
| 86 | NA | NA | NA | NA | 6.433 | 0.807 | 0.615 | 1.239 |
| 87 | NA | NA | NA | NA | 5.243 | 3.025 | 1.092 | 2.534 |
| 88 | 2.949 | NA | 2.463 | NA | 5.579 | 2.896 | NA | 3.031 |
| 89 | 3.319 | 3.183 | 4.167 | 1.023 | 8.298 | 2.299 | NA | 1.929 |
| 90 | 5.242 | 4.524 | 4.444 | 0.892 | 9.677 | 2.496 | NA | 2.124 |
| 91 | 9.117 | 3.927 | 1.743 | 0.695 | 6.638 | 2.729 | NA | 1.850 |
| 92 | 5.837 | 6.588 | 5.607 | 1.383 | 9.213 | 2.944 | NA | 2.773 |
| 93 | 1.484 | 5.410 | 0.000 | 0.692 | 2.755 | 2.159 | NA | 1.377 |

Stock Identifiers
SAM $=$ SAMISH FALL FING GAD $=G$ ADAMS FALL FING
SPS $=S O$ SOUND FALL FING UWA $=U$ OF WALL ACCEL

Fishery: U.S. South Ocean Troll and Sport: Columbia River Stocks

| REPORTED <br> Year | $\begin{gathered} \text { ED CATCH } \\ \text { BON } \\ \text { Age } 3 \end{gathered}$ |  | ITATION CWF Age 4 | RATES SPR Age 3 | $\begin{array}{r} \text { SPR } \\ \text { Age } 4 \end{array}$ | $\begin{array}{r} \text { STP } \\ \text { Age } 3 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.113 | NA | NA | 0.175 | 0.141 | NA |
| 80 | 0.187 | 0.108 | NA | 0.272 | 0.095 | NA |
| 81 | 0.171 | 0.083 | 0.152 | 0.251 | 0.209 | 0.182 |
| 82 | 0.169 | 0.143 | 0.268 | 0.276 | 0.093 | 0.327 |
| 83 | 0.104 | 0.069 | 0.183 | 0.107 | 0.040 | 0.187 |
| 84 | 0.068 | 0.008 | 0.039 | 0.069 | 0.000 | 0.049 |
| 85 | 0.144 | 0.085 | 0.042 | 0.133 | 0.014 | 0.194 |
| 86 | 0.086 | 0.105 | 0.049 | 0.059 | 0.044 | 0.245 |
| 87 | 0.139 | 0.057 | 0.113 | 0.198 | 0.000 | 0.116 |
| 88 | NA | 0.055 | 0.142 | 0.134 | 0.143 | 0.184 |
| 89 | NA | 0.043 | 0.266 | 0.192 | 0.108 | 0.235 |
| 90 | NA | 0.097 | 0.137 | 0.154 | 0.103 | 0.157 |
| 91 | NA | 0.052 | 0.070 | 0.173 | 0.022 | 0.136 |
| 92 | NA | 0.095 | 0.032 | 0.241 | 0.065 | 0.239 |
| 93 | NA | 0.031 | 0.450 | 0.217 | 0.165 | 0.128 |
| Base | 0.160 | 0.111 | 0.210 | 0.243 | 0.134 | 0.254 |


| REPORT <br> Year | $\begin{aligned} & \text { ED CATCH } \\ & \text { BON } \\ & \text { Age } 3 \end{aligned}$ |  | ITATION CWF Age 4 | RATE SPR Age 3 | NDEX <br> SPR <br> Age 4 | $\begin{array}{r} \text { STP } \\ \text { Age } 3 \end{array}$ | Fishery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.706 | NA | NA | 0.718 | 1.046 | NA | 0.796 |
| 80 | 1.166 | 0.973 | NA | 1.117 | 0.709 | NA | 1.020 |
| 81 | 1.070 | 0.748 | 0.724 | 1.030 | 1.554 | 0.715 | 0.941 |
| 82 | 1.058 | 1.279 | 1.276 | 1.136 | 0.690 | 1.285 | 1.146 |
| 83 | 0.652 | 0.621 | 0.873 | 0.441 | 0.301 | 0.736 | 0.621 |
| 84 | 0.428 | 0.068 | 0.185 | 0.284 | 0.000 | 0.193 | 0.209 |
| 85 | 0.901 | 0.762 | 0.202 | 0.548 | 0.104 | 0.762 | 0.550 |
| 86 | 0.539 | 0.947 | 0.234 | 0.242 | 0.325 | 0.962 | 0.528 |
| 87 | 0.872 | 0.512 | 0.541 | 0.814 | 0.000 | 0.457 | 0.561 |
| 88 | NA | 0.498 | 0.678 | 0.549 | 1.063 | 0.725 | 0.691 |
| 89 | NA | 0.383 | 1.268 | 0.789 | 0.803 | 0.923 | 0.885 |
| 90 | NA | 0.874 | 0.654 | 0.633 | 0.764 | 0.616 | 0.680 |
| 91 | NA | 0.471 | 0.335 | 0.709 | 0.163 | 0.534 | 0.475 |
| 92 | NA | 0.850 | 0.155 | 0.991 | 0.486 | 0.940 | 0.706 |
| 93 | NA | 0.274 | 2.143 | 0.890 | 1.226 | 0.502 | 1.037 |

Stock Identifiers
$\begin{array}{ll}\text { BON }=\text { BONNEVILLE TULE } & \text { CWF }=\text { COWLITZ FALL TULE } \\ \text { SPR }=\text { SPRING CREEK TULE } & \text { STP }=\text { STAYTON POND TULE }\end{array}$
SPR $=$ SPRING CREEK TULE STP = STAYTON POND TULE

## APPENDIX F

Annual Distribution of Reported Catch and Total Fishing Mortality<br>by Stock

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## Stock: Alaska Spring

Distribution of Reported Catch

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | eries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 94.5\% | 5.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% |
| 84 | 94.8\% | 3.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 1.5\% | 0.0\% | 0.0\% |
| 85 | 96.5\% | 2.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.6\% | 0.0\% | 0.0\% |
| 86 | 98.1\% | 1.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% |
| 87 | 98.1\% | 1.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 97.5\% | 2.4\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 98.0\% | 2.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 96.6\% | 3.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 98.3\% | 1.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 98.7\% | 1.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 98.8\% | 1.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (83-93) | 97.3\% | 2.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% |
| (85-93) | 97.8\% | 2.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with ceilings-All All $\quad$ WCVI AllAlaska Nth/Cent Groll Geo St |  |  |  | Canada Net | - Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 95.7\% | 4.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.3\% | 0.0\% | 0.0\% |
| 84 | 96.1\% | 2.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 1.1\% | 0.0\% | 0.0\% |
| 85 | 97.5\% | 2.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.4\% | 0.0\% | 0.0\% |
| 86 | 98.7\% | 1.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% |
| 87 | 98.6\% | 1.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 97.9\% | 2.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 98.5\% | 1.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 97.0\% | 3.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 98.7\% | 1.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 99.0\% | 1.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 99.1\% | 0.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (83-93) | 97.9\% | 1.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% |
| (85-93) | 98.3\% | 1.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% |

## Stock: Kitsumkalum

Distribution of Reported Catch

| Catch Year | Fisheries with ceilings_- ALI  <br> All $\quad$ ALI  <br> Alaska Nth/Cent Troll Geo St |  |  |  | Canada Net | $\begin{array}{r} \text { Otr } \\ \text { Canada } \\ \text { Sport } \end{array}$ | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 44.2\% | 55.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 55.4\% | 44.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 54.6\% | 45.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 31.7\% | 68.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 26.0\% | 74.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 41.4\% | 58.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 41.9\% | 58.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 38.3\% | 61.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 35.2\% | 64.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 46.2\% | 52.7\% | 1.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 35.7\% | 64.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (83-93) | 41.0\% | 59.0\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 39.0\% | 60.9\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |

Distribution of Total Mortalities

| Catch Year |  |  | ceilings WCVI Troll | $\begin{array}{r} \mathrm{AlL} \\ \text { Geo } \end{array}$ | Canada Net |  | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 50.1\% | 49.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 61.7\% | 38.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 59.4\% | 40.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 37.1\% | 62.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 35.6\% | 64.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 50.5\% | 49.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 48.1\% | 51.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 43.9\% | 56.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 44.6\% | 55.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 57.3\% | 41.9\% | 0.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 43.1\% | 56.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (83-93) | 48.3\% | 51.6\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 46.6\% | 53.3\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |

## Stock: Kitimat

Distribution of Reported Catch

| Catch Year | -Fisheries with All All Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{array}{r} \mathrm{AlL} \\ \mathrm{Geo} \end{array}$ | Canada Net |  | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 40.6\% | 56.4\% | 0.0\% | 2.5\% | 0.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 36.3\% | 63.5\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 46.3\% | 53.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 59.9\% | 40.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 73.8\% | 26.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 49.1\% | 50.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 52.6\% | 46.6\% | 0.0\% | 0.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 63.7\% | 36.1\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 30.2\% | 69.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 43.6\% | 56.0\% | 0.0\% | 0.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 38.2\% | 61.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 51.8\% | 47.6\% | 0.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 53.0\% | 46.2\% | 0.0\% | 0.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (81-93) | 49.2\% | 50.4\% | 0.0\% | 0.4\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 50.7\% | 49.0\% | 0.1\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |

Distribution of Total Mortalities

| Catch Year | $\qquad$ Alaska | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 44.2\% | 53.3\% | 0.0\% | 2.2\% | 0.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 40.4\% | 59.4\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 51.3\% | 48.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 65.0\% | 35.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 82.1\% | 17.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 59.3\% | 40.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 66.3\% | 33.2\% | 0.0\% | 0.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 71.0\% | 28.8\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 39.9\% | 60.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 53.3\% | 46.2\% | 0.0\% | 0.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 51.4\% | 48.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 68.5\% | 31.1\% | 0.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 63.4\% | 35.9\% | 0.0\% | 0.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (81-93) | 58.2\% | 41.5\% | 0.0\% | 0.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 61.7\% | 38.1\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |

## Stock: Snootli Creek

Distribution of Reported Catch

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | Other <br> Canada Sport | fisher U.S. <br> Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 57.1\% | 16.4\% | 0.0\% | 17.0\% | 9.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 80 | 30.2\% | 66.5\% | 0.0\% | 3.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 81 | 33.9\% | 53.4\% | 0.0\% | 3.9\% | 8.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 32.9\% | 62.3\% | 4.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 49.9\% | 50.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 28.3\% | 71.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 36.0\% | 62.3\% | 0.0\% | 0.0\% | 1.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 21.3\% | 78.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 26.3\% | 73.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 27.4\% | 72.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 16.4\% | 81.1\% | 2.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 29.0\% | 71.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 21.4\% | 77.4\% | 1.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 25.2\% | 73.6\% | 0.8\% | 0.0\% | 0.0\% | 0.0\% | 0.4\% | 0.0\% | 0.0\% |
| 93 | 32.2\% | 66.5\% | 1.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 31.2\% | 65.2\% | 0.7\% | 1.6\% | 1.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 26.1\% | 73.0\% | 0.6\% | 0.0\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |

Distribution of Total Mortalities

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 56.1\% | 21.2\% | 0.0\% | 14.5\% | 8.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 80 | 35.9\% | 61.2\% | 0.6\% | 2.2\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 81 | 41.1\% | 48.2\% | 0.2\% | 3.2\% | 7.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 37.8\% | 57.7\% | 4.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 50.8\% | 49.1\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 35.4\% | 64.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 45.8\% | 52.9\% | 0.0\% | 0.0\% | 1.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 28.1\% | 71.5\% | 0.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 37.7\% | 62.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 31.8\% | 68.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 21.9\% | 75.6\% | 2.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 35.6\% | 64.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 29.3\% | 69.6\% | 1.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 37.7\% | 61.2\% | 0.7\% | 0.0\% | 0.0\% | 0.0\% | 0.4\% | 0.0\% | 0.0\% |
| 93 | 37.3\% | 61.5\% | 1.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 37.5\% | 59.3\% | 0.8\% | 1.3\% | 1.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 33.9\% | 65.2\% | 0.7\% | 0.0\% | 0.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |

## Stock: Robertson Creek

Distribution of Reported Catch

| Catch Year | Fisheries wit All All Alaska Nth/Cent |  | $\begin{aligned} & \text { ceiling } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \end{gathered}$ | Canada Net | Canada Sport | fisher U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 34.4\% | 41.8\% | 11.0\% | 2.3\% | 3.1\% | 7.2\% | 0.0\% | 0.1\% | 0.0\% |
| 80 | 47.4\% | 25.2\% | 9.0\% | 0.3\% | 13.8\% | 4.0\% | 0.0\% | 0.2\% | 0.0\% |
| 81 | 40.2\% | 29.7\% | 6.1\% | 1.2\% | 16.0\% | 6.2\% | 0.0\% | 0.5\% | 0.0\% |
| 82 | 36.2\% | 30.4\% | 6.7\% | 1.0\% | 17.4\% | 7.5\% | 0.1\% | 0.7\% | 0.2\% |
| 83 | 47.2\% | 22.3\% | 5.6\% | 0.3\% | 19.3\% | 4.9\% | 0.0\% | 0.3\% | 0.0\% |
| 84 | 36.1\% | 21.1\% | 6.9\% | 0.8\% | 18.4\% | 16.5\% | 0.0\% | 0.2\% | 0.0\% |
| 85 | 32.5\% | 33.2\% | 2.9\% | 1.1\% | 5.3\% | 22.1\% | 0.0\% | 2.9\% | 0.0\% |
| 86 | 30.2\% | 19.6\% | 6.5\% | 0.0\% | 2.1\% | 40.1\% | 0.0\% | 0.0\% | 1.5\% |
| 87 | 17.7\% | 25.9\% | 4.9\% | 1.2\% | 2.1\% | 47.3\% | 0.0\% | 0.6\% | 0.3\% |
| 88 | 26.3\% | 19.6\% | 7.6\% | 1.2\% | 15.1\% | 29.3\% | 0.0\% | 0.6\% | 0.3\% |
| 89 | 18.9\% | 16.5\% | 2.5\% | 1.2\% | 31.6\% | 29.1\% | 0.0\% | 0.1\% | 0.1\% |
| 90 | 33.7\% | 19.4\% | 10.4\% | 0.7\% | 17.2\% | 18.5\% | 0.0\% | 0.0\% | 0.1\% |
| 91 | 30.9\% | 19.5\% | 6.6\% | 0.5\% | 22.0\% | 20.3\% | 0.0\% | 0.0\% | 0.1\% |
| 92 | 33.9\% | 20.7\% | 31.0\% | 0.2\% | 1.1\% | 13.2\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 28.3\% | 16.1\% | 20.1\% | 0.9\% | 12.0\% | 22.5\% | 0.1\% | 0.0\% | 0.0\% |
| (79-93) | 32.9\% | 24.1\% | 9.2\% | 0.9\% | 13.1\% | 19.2\% | 0.0\% | 0.4\% | 0.2\% |
| (85-93) | 28.0\% | 21.2\% | 10.3\% | 0.8\% | 12.1\% | 26.9\% | 0.0\% | 0.5\% | 0.3\% |

Distribution of Total Mortalities

| Catch Year |  | eries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 38.1\% | 39.3\% | 10.6\% | 1.9\% | 2.7\% | 7.3\% | 0.0\% | 0.2\% | 0.0\% |
| 80 | 48.3\% | 25.3\% | 9.1\% | 0.3\% | 12.8\% | 3.8\% | 0.1\% | 0.3\% | 0.0\% |
| 81 | 44.2\% | 28.4\% | 6.0\% | 1.0\% | 13.5\% | 6.4\% | 0.0\% | 0.6\% | 0.0\% |
| 82 | 41.5\% | 28.5\% | 6.4\% | 0.9\% | 14.8\% | 7.1\% | 0.1\% | 0.7\% | 0.2\% |
| 83 | 51.3\% | 21.1\% | 5.4\% | 0.3\% | 17.1\% | 4.6\% | 0.0\% | 0.3\% | 0.0\% |
| 84 | 39.9\% | 20.2\% | 6.8\% | 0.7\% | 16.7\% | 15.4\% | 0.0\% | 0.2\% | 0.0\% |
| 85 | 47.7\% | 25.9\% | 2.3\% | 0.8\% | 3.9\% | 17.1\% | 0.0\% | 2.4\% | 0.0\% |
| 86 | 43.7\% | 19.2\% | 5.8\% | 0.0\% | 1.6\% | 28.6\% | 0.0\% | 0.0\% | 1.1\% |
| 87 | 23.1\% | 22.3\% | 4.4\% | 0.9\% | 1.4\% | 47.2\% | 0.0\% | 0.5\% | 0.2\% |
| 88 | 32.5\% | 19.3\% | 7.7\% | 1.1\% | 12.2\% | 26.3\% | 0.0\% | 0.6\% | 0.2\% |
| 89 | 29.0\% | 17.0\% | 2.6\% | 1.5\% | 23.9\% | 25.7\% | 0.0\% | 0.1\% | 0.1\% |
| 90 | 44.9\% | 18.2\% | 9.0\% | 0.8\% | 12.1\% | 14.9\% | 0.0\% | 0.0\% | 0.1\% |
| 91 | 38.7\% | 18.8\% | 6.3\% | 0.6\% | 17.7\% | 17.7\% | 0.0\% | 0.0\% | 0.1\% |
| 92 | 45.9\% | 17.4\% | 25.7\% | 0.1\% | 0.8\% | 10.1\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 34.1\% | 15.6\% | 19.5\% | 0.9\% | 10.1\% | 19.8\% | 0.1\% | 0.0\% | 0.0\% |
| (79-93) | 40.2\% | 22.4\% | 8.5\% | 0.8\% | 10.7\% | 16.8\% | 0.0\% | 0.4\% | 0.1\% |
| (85-93) | 37.7\% | 19.3\% | 9.3\% | 0.7\% | 9.3\% | 23.1\% | 0.0\% | 0.4\% | 0.2\% |

## Stock: Quinsam

Distribution of Reported Catch

| Catch Year | $\qquad$ Fisheries with $\underset{\text { Alaska }}{\text { Alth/Cent }}$ Alaska Nth/Cent |  | eiling WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Canada Sport | fisher U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 23.3\% | 59.3\% | 0.0\% | 10.9\% | 6.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 80 | 37.4\% | 46.5\% | 0.0\% | 7.0\% | 9.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 81 | 25.8\% | 50.8\% | 0.7\% | 14.7\% | 8.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 43.0\% | 42.8\% | 0.4\% | 4.7\% | 9.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 35.7\% | 49.5\% | 0.7\% | 5.1\% | 9.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 40.4\% | 39.4\% | 1.1\% | 10.4\% | 8.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 56.3\% | 27.1\% | 0.1\% | 5.7\% | 10.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 36.7\% | 47.4\% | 0.0\% | 8.1\% | 7.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 31.2\% | 51.6\% | 0.5\% | 5.9\% | 10.3\% | 0.5\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 53.6\% | 29.6\% | 1.3\% | 6.6\% | 7.1\% | 1.5\% | 0.0\% | 0.0\% | 0.3\% |
| 89 | 41.0\% | 23.6\% | 0.5\% | 12.6\% | 22.3\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% |
| 90 | 42.1\% | 43.7\% | 2.0\% | 5.5\% | 6.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 31.3\% | 55.1\% | 0.7\% | 6.7\% | 5.1\% | 1.2\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 33.0\% | 56.4\% | 0.6\% | 5.9\% | 4.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 22.4\% | 56.3\% | 1.8\% | 14.3\% | 5.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 36.9\% | 45.3\% | 0.7\% | 8.3\% | 8.7\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 38.6\% | 43.4\% | 0.8\% | 7.9\% | 8.8\% | 0.4\% | 0.0\% | 0.0\% | 0.0\% |

Distribution of Total Mortalities

| Catch Year |  | eries with All Nth/Cent | $\begin{aligned} & \text { ceilings- } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \end{array}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | $\begin{aligned} & \text { fisher } \\ & \text { U.s. } \\ & \text { Troli } \end{aligned}$ | $\begin{aligned} & \text { U.s. } \\ & \text { Net } \end{aligned}$ | $\begin{aligned} & \text { U.S. } \\ & \text { Sport } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 26.8\% | 57.5\% | 0.1\% | 9.4\% | 6.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 80 | 38.2\% | 46.7\% | 0.0\% | 6.4\% | 8.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 81 | 27.0\% | 51.1\% | 0.7\% | 13.6\% | 7.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 46.4\% | 40.7\% | 0.4\% | 4.4\% | 8.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 39.3\% | 47.0\% | 0.7\% | 5.1\% | 7.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 43.8\% | 37.5\% | 1.1\% | 9.7\% | 7.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 65.7\% | 21.5\% | 0.1\% | 4.5\% | 8.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 50.8\% | 36.8\% | 0.0\% | 6.7\% | 5.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 51.6\% | 37.2\% | 0.5\% | 3.8\% | 6.6\% | 0.3\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 62.1\% | 24.7\% | 1.2\% | 5.3\% | 5.4\% | 1.2\% | 0.0\% | 0.0\% | 0.2\% |
| 89 | 54.3\% | 18.3\% | 0.4\% | 10.9\% | 15.9\% | 0.0\% | 0.0\% | 0.1\% | 0.0\% |
| 90 | 54.5\% | 34.4\% | 1.7\% | 4.6\% | 4.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 45.3\% | 43.7\% | 0.6\% | 5.7\% | 3.7\% | 0.9\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 41.7\% | 48.2\% | 0.4\% | 6.7\% | 3.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 30.1\% | 47.9\% | 1.7\% | 16.4\% | 3.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 45.2\% | 39.5\% | 0.6\% | 7.5\% | 6.9\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 50.7\% | 34.7\% | 0.7\% | 7.2\% | 6.4\% | 0.3\% | 0.0\% | 0.0\% | 0.0\% |

## Stock: Puntledge

Distribution of Reported Catch

| Catch Year | $\begin{gathered} \text { Fishe } \\ \text { All } \\ \text { Alaska } \end{gathered}$ | eries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | $\begin{aligned} & \text { fisher } \\ & \text { U.S: } \end{aligned}$ Troll | $\begin{aligned} & \text { U.S. } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 3.7\% | 27.2\% | 1.4\% | 58.3\% | 9.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 80 | 6.4\% | 20.2\% | 7.3\% | 57.4\% | 8.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 81 | 1.1\% | 22.7\% | 0.0\% | 70.0\% | 6.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 2.9\% | 36.7\% | 2.8\% | 33.0\% | 24.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 1.7\% | 49.8\% | 3.9\% | 40.3\% | 4.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 2.3\% | 28.1\% | 4.8\% | 58.6\% | 6.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 19.1\% | 29.7\% | 0.0\% | 44.0\% | 7.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 12.0\% | 23.1\% | 3.8\% | 58.6\% | 2.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 18.6\% | 47.2\% | 0.0\% | 27.1\% | 0.0\% | 7.1\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 30.5\% | 31.9\% | 0.0\% | 36.3\% | 1.3\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 6.2\% | 0.0\% | 0.0\% | 93.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 30.5\% | 39.7\% | 0.0\% | 19.0\% | 10.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 24.9\% | 20.1\% | 0.0\% | 44.0\% | 10.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 0.0\% | 16.6\% | 0.0\% | 62.0\% | 21.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 0.0\% | 19.3\% | 0.0\% | 80.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 10.7\% | 27.5\% | 1.6\% | 52.2\% | 7.5\% | 0.5\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 15.8\% | 25.3\% | 0.4\% | 51.7\% | 6.0\% | 0.8\% | 0.0\% | 0.0\% | 0.0\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with All <br> Alaska Nth/Cent |  | ceilings WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{array}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 4.5\% | 29.2\% | 1.5\% | 55.5\% | 9.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 80 | 7.2\% | 21.6\% | 8.0\% | 54.5\% | 8.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 81 | 1.6\% | 24.7\% | 0.0\% | 67.5\% | 6.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 82 | 3.1\% | 36.5\% | 2.8\% | 35.0\% | 22.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 83 | 2.3\% | 51.2\% | 4.1\% | 38.4\% | 4.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 84 | 2.2\% | 28.2\% | 4.9\% | 59.0\% | 5.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 28.7\% | 26.2\% | 0.0\% | 39.5\% | 5.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 86 | 15.1\% | 21.4\% | 3.5\% | 57.8\% | 2.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 29.8\% | 43.3\% | 0.0\% | 21.4\% | 0.0\% | 5.6\% | 0.0\% | 0.0\% | 0.0\% |
| 88 | 32.3\% | 31.1\% | 0.0\% | 35.5\% | 1.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 89 | 5.9\% | 0.0\% | 0.0\% | 94.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 39.1\% | 33.0\% | 0.0\% | 19.6\% | 8.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 32.3\% | 13.9\% | 0.0\% | 47.3\% | 6.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 92 | 0.0\% | 13.0\% | 0.0\% | 70.8\% | 16.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 0.0\% | 14.3\% | 0.0\% | 85.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 13.6\% | 25.9\% | 1.7\% | 52.1\% | 6.4\% | 0.4\% | 0.0\% | 0.0\% | 0.0\% |
| (85-93) | 20.4\% | 21.8\% | 0.4\% | 52.4\% | 4.4\% | 0.6\% | 0.0\% | 0.0\% | 0.0\% |

## Stock: Big Qualicum

Distribution of Reported Catch

| Catch Year | $\begin{gathered} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{gathered}$ | eries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport |  | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 10.6\% | 21.4\% | 3.0\% | 53.5\% | 10.8\% | 0.1\% | 0.0\% | 0.4\% | 0.1\% |
| 80 | 5.4\% | 21.4\% | 5.7\% | 54.0\% | 12.7\% | 0.0\% | 0.2\% | 0.4\% | 0.3\% |
| 81 | 3.6\% | 20.9\% | 1.8\% | 61.5\% | 11.1\% | 0.3\% | 0.0\% | 0.2\% | 0.7\% |
| 82 | 10.7\% | 27.2\% | 6.2\% | 36.5\% | 17.0\% | 0.0\% | 0.0\% | 1.5\% | 0.9\% |
| 83 | 10.7\% | 22.2\% | 1.4\% | 46.3\% | 18.8\% | 0.0\% | 0.0\% | 0.0\% | 0.7\% |
| 84 | 3.9\% | 21.8\% | 1.9\% | 64.6\% | 7.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 9.1\% | 20.0\% | 2.0\% | 48.0\% | 17.3\% | 0.0\% | 0.0\% | 3.6\% | 0.0\% |
| 86 | 4.6\% | 30.1\% | 1.7\% | 54.7\% | 8.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 19.9\% | 17.6\% | 6.4\% | 47.1\% | 6.9\% | 0.0\% | 1.2\% | 1.0\% | 0.0\% |
| 88 | 8.8\% | 23.3\% | 4.4\% | 51.0\% | 7.5\% | 3.2\% | 0.0\% | 1.7\% | 0.0\% |
| 89 | 15.7\% | 9.8\% | 6.7\% | 54.2\% | 11.8\% | 0.0\% | 0.4\% | 0.0\% | 1.4\% |
| 90 | 21.4\% | 23.2\% | 4.2\% | 34.0\% | 14.3\% | 0.0\% | 0.2\% | 0.0\% | 2.7\% |
| 91 | 6.8\% | 11.9\% | 2.9\% | 67.8\% | 8.1\% | 0.0\% | 0.8\% | 0.6\% | 1.0\% |
| 92 | 4.8\% | 29.7\% | 4.7\% | 55.9\% | 4.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 4.5\% | 16.7\% | 2.6\% | 67.4\% | 8.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 9.4\% | 21.1\% | 3.7\% | 53.1\% | 11.1\% | 0.2\% | 0.2\% | 0.6\% | 0.5\% |
| (85-93) | 10.6\% | 20.3\% | 4.0\% | 53.3\% | 9.8\% | 0.4\% | 0.3\% | 0.8\% | 0.6\% |

Distribution of Total Mortalities

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | eries with All Nth/Cent | ceilings WCV! Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | $\qquad$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 12.6\% | 22.7\% | 3.3\% | 50.4\% | 10.3\% | 0.1\% | 0.0\% | 0.4\% | 0.1\% |
| 80 | 6.0\% | 22.6\% | 6.3\% | 51.5\% | 12.7\% | 0.0\% | 0.2\% | 0.4\% | 0.3\% |
| 81 | 4.3\% | 22.5\% | 2.0\% | 58.9\% | 11.1\% | 0.3\% | 0.0\% | 0.2\% | 0.7\% |
| 82 | 12.4\% | 26.9\% | 6.3\% | 35.5\% | 16.3\% | 0.0\% | 0.0\% | 1.6\% | 0.9\% |
| 83 | 11.8\% | 21.7\% | 1.4\% | 47.0\% | 16.8\% | 0.0\% | 0.0\% | 0.0\% | 1.2\% |
| 84 | 4.3\% | 21.1\% | 1.8\% | 66.1\% | 6.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 85 | 14.9\% | 18.4\% | 1.9\% | 47.4\% | 13.6\% | 0.0\% | 0.0\% | 3.8\% | 0.0\% |
| 86 | 9.2\% | 29.2\% | 1.6\% | 52.1\% | 7.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 87 | 28.5\% | 16.1\% | 6.3\% | 41.1\% | 5.8\% | 0.0\% | 1.1\% | 1.0\% | 0.0\% |
| 88 | 13.3\% | 20.6\% | 4.6\% | 50.5\% | 6.0\% | 2.8\% | 0.0\% | 2.2\% | 0.0\% |
| 89 | 26.1\% | 7.8\% | 5.6\% | 51.5\% | 7.7\% | 0.0\% | 0.3\% | 0.0\% | 1.0\% |
| 90 | 31.8\% | 18.2\% | 3.3\% | 35.0\% | 9.6\% | 0.0\% | 0.2\% | 0.0\% | 1.9\% |
| 91 | 11.6\% | 9.6\% | 2.5\% | 68.8\% | 5.5\% | 0.0\% | 0.6\% | 0.5\% | 0.8\% |
| 92 | 5.3\% | 25.1\% | 4.0\% | 62.0\% | 3.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 4.9\% | 11.9\% | 1.8\% | 76.2\% | 5.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (79-93) | 13.1\% | 19.6\% | 3.5\% | 52.9\% | 9.3\% | 0.2\% | 0.2\% | 0.7\% | 0.5\% |
| (85-93) | 16.2\% | 17.4\% | 3.5\% | 53.8\% | 7.2\% | 0.3\% | 0.3\% | 0.8\% | 0.4\% |

## Stock: Chehalis

Distribution of Reported Catch

| Catch Year | Fisheries wit All All Alaska <br> Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | $\begin{aligned} & \text {-Othe } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. <br> Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | 0.3\% | 5.8\% | 32.2\% | 44.5\% | 4.6\% | 0.9\% | 1.5\% | 5.2\% | 5.1\% |
| 86 | 2.2\% | 6.8\% | 21.3\% | 50.3\% | 12.4\% | 0.6\% | 0.0\% | 1.4\% | 5.1\% |
| 87 | 0.9\% | 3.5\% | 13.0\% | 55.9\% | 5.9\% | 0.0\% | 5.0\% | 12.5\% | 3.2\% |
| 88 | 3.7\% | 5.9\% | 5.9\% | 42.2\% | 8.4\% | 5.2\% | 7.5\% | 16.7\% | 4.4\% |
| 89 | 0.3\% | 1.8\% | 30.8\% | 34.9\% | 8.2\% | 1.5\% | 8.9\% | 7.3\% | 6.3\% |
| 90 | 0.8\% | 3.6\% | 35.9\% | 27.5\% | 4.2\% | 2.6\% | 10.9\% | 5.7\% | 8.9\% |
| 91 | 0.3\% | 2.8\% | 39.1\% | 25.1\% | 6.4\% | 0.0\% | 17.2\% | 3.5\% | 5.7\% |
| 92 | 0.0\% | 1.5\% | 40.6\% | 53.6\% | 3.6\% | 0.0\% | 0.7\% | 0.0\% | 0.0\% |
| 93 | 1.7\% | 2.1\% | 41.0\% | 28.4\% | 3.4\% | 0.0\% | 22.1\% | 1.3\% | 0.0\% |
| (85-93) | 1.1\% | 3.8\% | 28.9\% | 40.3\% | 6.4\% | 1.2\% | 8.2\% | 6.0\% | 4.3\% |
| (85-93) | 1.1\% | 3.8\% | 28.9\% | 40.3\% | 6.4\% | 1.2\% | 8.2\% | 6.0\% | 4.3\% |

Distribution of Total Mortalities

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | eries with All <br> Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | $\qquad$ Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | $\begin{gathered} \text { U.S. } \\ \text { Sport } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | 0.6\% | 5.8\% | 31.9\% | 44.7\% | 4.4\% | 0.9\% | 1.5\% | 5.4\% | 4.9\% |
| 86 | 2.7\% | 6.6\% | 21.0\% | 51.7\% | 11.1\% | 0.5\% | 0.0\% | 1.5\% | 4.9\% |
| 87 | 1.2\% | 3.2\% | 13.4\% | 54.7\% | 4.9\% | 0.0\% | 4.9\% | 14.8\% | 2.9\% |
| 88 | 7.6\% | 5.2\% | 5.3\% | 38.6\% | 5.8\% | 4.6\% | 6.0\% | 18.4\% | 8.5\% |
| 89 | 0.3\% | 1.7\% | 30.4\% | 39.6\% | 6.4\% | 1.2\% | 8.4\% | 6.6\% | 5.2\% |
| 90 | 1.0\% | 3.3\% | 32.2\% | 30.3\% | 3.7\% | 2.4\% | 10.2\% | 7.8\% | 9.1\% |
| 91 | 0.6\% | 2.3\% | 37.3\% | 30.6\% | 4.9\% | 0.0\% | 15.7\% | 3.6\% | 5.1\% |
| 92 | 0.0\% | 1.5\% | 37.9\% | 57.3\% | 2.7\% | 0.0\% | 0.6\% | 0.0\% | 0.0\% |
| 93 | 2.2\% | 2.2\% | 41.2\% | 29.5\% | 2.9\% | 0.0\% | 20.9\% | 1.2\% | 0.0\% |
| (85-93) | 1.8\% | 3.5\% | 27.8\% | 41.9\% | 5.2\% | 1.1\% | 7.6\% | 6.6\% | 4.5\% |
| (85-93) | 1.8\% | 3.5\% | 27.8\% | 41.9\% | 5.2\% | 1.1\% | 7.6\% | 6.6\% | 4.5\% |

## Stock: Chilliwack

Distribution of Reported Catch

| Catch Year | Fish Alaska | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.s. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | 0.7\% | 4.2\% | 39.8\% | 33.7\% | 6.9\% | 0.0\% | 4.8\% | 4.8\% | 5.0\% |
| 86 | 0.0\% | 6.2\% | 24.4\% | 35.2\% | 15.7\% | 0.0\% | 3.2\% | 7.0\% | 8.3\% |
| 87 | 0.1\% | 2.6\% | 24.7\% | 53.4\% | 3.2\% | 0.8\% | 5.8\% | 5.5\% | 3.9\% |
| 88 | 1.4\% | 0.6\% | 36.3\% | 39.1\% | 4.5\% | 0.0\% | 8.6\% | 6.1\% | 3.4\% |
| 89 | 0.6\% | 1.0\% | 37.5\% | 33.1\% | 7.1\% | 0.0\% | 10.6\% | 7.5\% | 2.6\% |
| 90 | 2.0\% | 3.2\% | 15.7\% | 25.9\% | 7.3\% | 4.0\% | 10.8\% | 21.5\% | 9.6\% |
| 91 | 0.7\% | 2.5\% | 25.9\% | 31.0\% | 5.8\% | 1.0\% | 18.9\% | 7.5\% | 6.8\% |
| 92 | 1.5\% | 3.1\% | 49.0\% | 43.5\% | 2.7\% | 0.3\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 0.4\% | 0.9\% | 33.0\% | 41.2\% | 3.9\% | 1.0\% | 19.6\% | 0.0\% | 0.0\% |
| (85-93) | 0.8\% | 2.7\% | 31.8\% | 37.3\% | 6.4\% | 0.8\% | 9.1\% | 6.7\% | 4.4\% |
| (85-93) | 0.8\% | 2.7\% | 31.8\% | 37.3\% | 6.4\% | 0.8\% | 9.1\% | 6.7\% | 4.4\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with All All Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \mathrm{St} \end{gathered}$ | Canada | $\qquad$ other <br> Canada Sport | fishe U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | 0.8\% | 4.1\% | 37.8\% | 34.6\% | 6.3\% | 0.0\% | 4.5\% | 6.2\% | 5.7\% |
| 86 | 0.0\% | 5.8\% | 23.6\% | 36.6\% | 13.4\% | 0.0\% | 3.2\% | 8.2\% | 9.2\% |
| 87 | 0.1\% | 2.7\% | 28.1\% | 50.8\% | 2.9\% | 0.7\% | 5.9\% | 5.3\% | 3.5\% |
| 88 | 1.5\% | 0.6\% | 34.5\% | 37.8\% | 4.1\% | 0.0\% | 8.0\% | 8.0\% | 5.5\% |
| 89 | 0.5\% | 0.7\% | 35.3\% | 42.2\% | 4.6\% | 0.0\% | 9.3\% | 5.5\% | 2.0\% |
| 90 | 2.2\% | 2.2\% | 13.8\% | 36.4\% | 4.4\% | 2.8\% | 8.3\% | 21.3\% | 8.7\% |
| 91 | 1.1\% | 2.1\% | 24.2\% | 37.1\% | 4.4\% | 0.8\% | 16.9\% | 7.4\% | 6.0\% |
| 92 | 2.3\% | 2.8\% | 45.9\% | 46.7\% | 2.1\% | 0.2\% | 0.0\% | 0.0\% | 0.0\% |
| 93 | 0.5\% | 0.7\% | 32.8\% | 43.9\% | 3.1\% | 0.8\% | 18.2\% | 0.0\% | 0.0\% |
| (85-93) | 1.0\% | 2.4\% | 30.7\% | 40.7\% | 5.0\% | 0.6\% | 8.2\% | 6.9\% | 4.5\% |
| (85-93) | 1.0\% | 2.4\% | 30.7\% | 40.7\% | 5.0\% | 0.6\% | 8.2\% | 6.9\% | 4.5\% |

## Stock: South Puget Sound Fall Yearling

Distribution of Reported Catch

| Catch Year |  | eries with All Nth/Cent | ceilings <br> WCVI <br> Troll | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.s. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | $\begin{aligned} & \text { U.s. } \\ & \text { sport } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.0\% | 2.7\% | 3.1\% | 3.8\% | 0.0\% | 0.0\% | 1.2\% | 15.8\% | 73.5\% |
| 83 | 0.0\% | 1.9\% | 6.2\% | 0.5\% | 0.0\% | 0.0\% | 0.0\% | 10.5\% | 81.0\% |
| 84 | 0.0\% | 0.0\% | 8.4\% | 1.9\% | 0.0\% | 0.0\% | 0.0\% | 38.8\% | 50.9\% |
| 90 | 0.0\% | 0.3\% | 0.3\% | 0.0\% | 0.5\% | 0.0\% | 1.5\% | 36.2\% | 61.1\% |
| 91 | 0.0\% | 0.0\% | 7.0\% | 1.1\% | 0.0\% | 0.0\% | 4.6\% | 16.0\% | 71.4\% |
| 92 | 0.0\% | 0.0\% | 5.2\% | 0.9\% | 0.0\% | 0.9\% | 5.2\% | 32.1\% | 55.8\% |
| 93 | 0.0\% | 0.0\% | 1.8\% | 3.2\% | 0.0\% | 0.0\% | 1.4\% | 21.6\% | 72.5\% |
| (82-93) | 0.0\% | 0.7\% | 4.6\% | 1.6\% | 0.1\% | 0.1\% | 2.0\% | 24.4\% | 66.6\% |
| (85-93) | 0.0\% | 0.1\% | 3.6\% | 1.3\% | 0.1\% | 0.2\% | 3.2\% | 26.5\% | 65.2\% |

Distribution of Total Mortalities

| Catch Year | $\begin{aligned} & \text { Fish } \\ & \text { All } \\ & \text { Alaska } \end{aligned}$ | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \mathrm{All} \\ \text { Geo st } \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | U.S. | $\begin{gathered} \text { U.s. } \\ \text { Sport } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.0\% | 2.5\% | 4.0\% | 3.1\% | 0.0\% | 0.0\% | 0.9\% | 14.4\% | 75.2\% |
| 83 | 0.0\% | 2.1\% | 6.4\% | 0.5\% | 0.0\% | 0.0\% | 0.0\% | 10.1\% | 80.9\% |
| 84 | 0.0\% | 0.0\% | 8.6\% | 1.8\% | 0.0\% | 0.0\% | 0.0\% | 39.1\% | 50.0\% |
| 90 | 0.0\% | 0.2\% | 1.0\% | 0.2\% | 0.5\% | 0.0\% | 1.9\% | 36.4\% | 59.7\% |
| 91 | 0.0\% | 0.0\% | 7.0\% | 1.2\% | 0.0\% | 0.0\% | 4.5\% | 14.5\% | 73.0\% |
| 92 | 0.0\% | 0.0\% | 6.0\% | 1.0\% | 0.0\% | 0.8\% | 5.6\% | 31.4\% | 55.0\% |
| 93 | 0.0\% | 0.0\% | 0.5\% | 5.5\% | 0.0\% | 0.0\% | 0.4\% | 4.6\% | 88.9\% |
| (82-93) | 0.0\% | 0.7\% | 4.8\% | 1.9\% | 0.1\% | 0.1\% | 1.9\% | 21.5\% | 68.9\% |
| (85-93) | 0.0\% | 0.1\% | 3.7\% | 2.0\% | 0.1\% | 0.2\% | 3.1\% | 21.7\% | 69.1\% |

## Stock: Squaxin Pens Fall Yearling

Distribution of Reported Catch

| Catch Year | Fisheries with All All Alaska Nth/Cent |  | $\begin{aligned} & \text { ceiling } \\ & \text { HCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{gathered} \text { All } \\ \text { Geo } 5 t \end{gathered}$ | Canada Net | Canada Sport | fisher U.S. <br> Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 90 | 0.0\% | 0.1\% | 3.4\% | 0.8\% | 1.3\% | 0.4\% | 4.1\% | 33.6\% | 56.3\% |
| 91 | 0.0\% | 0.0\% | 4.4\% | 1.6\% | 0.6\% | 0.0\% | 9.5\% | 33.6\% | 50.4\% |
| 92 | 0.0\% | 0.7\% | 2.5\% | 3.9\% | 1.3\% | 0.6\% | 7.7\% | 23.8\% | 59.4\% |
| 93 | 0.0\% | 1.0\% | 11.2\% | 9.6\% | 1.7\% | 1.0\% | 15.5\% | 3.6\% | 56.4\% |
| (90-93) | 0.0\% | 0.4\% | 5.4\% | 4.0\% | 1.2\% | 0.5\% | 9.2\% | 23.7\% | 55.6\% |
| (90-93) | 0.0\% | 0.4\% | 5.4\% | 4.0\% | 1.2\% | 0.5\% | 9.2\% | 23.7\% | 55.6\% |

Distribution of Total Mortalities

| Catch Year | -Fisheries with <br> Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \mathrm{Geo} \end{gathered}$ | Canada | Canada Sport | fishe U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 90 | 0.0\% | 0.1\% | 3.5\% | 1.4\% | 1.1\% | 0.4\% | 4.4\% | 34.1\% | 55.0\% |
| 91 | 0.0\% | 0.0\% | 4.7\% | 1.7\% | 0.5\% | 0.0\% | 10.1\% | 33.2\% | 49.6\% |
| 92 | 0.0\% | 0.7\% | 2.2\% | 4.5\% | 1.0\% | 0.5\% | 6.8\% | 23.5\% | 60.6\% |
| 93 | 0.0\% | 0.9\% | 11.5\% | 10.9\% | 1.6\% | 0.9\% | 15.6\% | 4.4\% | 53.6\% |
| (90-93) | 0.0\% | 0.4\% | 5.5\% | 4.6\% | 1.1\% | 0.5\% | 9.2\% | 23.8\% | 54.7\% |
| (90-93) | 0.0\% | 0.4\% | 5.5\% | 4.6\% | 1.1\% | 0.5\% | 9.2\% | 23.8\% | 54.7\% |

## Stock: University of Washington Accelerated

Distribution of Reported Catch

| Catch Year | Fisheries with All All Alaska Nth/Cent |  | $\begin{gathered} \text { ceiling } \\ \text { WCVI } \\ \text { Troll } \end{gathered}$ | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. <br> Troll | $\underset{\text { Uet }}{\text { U.s. }}$ | U.s. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.0\% | 0.4\% | 18.8\% | 7.9\% | 5.2\% | 0.1\% | 2.0\% | 7.2\% | 58.2\% |
| 80 | 0.0\% | 0.4\% | 8.6\% | 7.0\% | 1.8\% | 0.1\% | 1.4\% | 16.4\% | 64.3\% |
| 81 | 0.0\% | 0.7\% | 12.7\% | 6.8\% | 5.0\% | 0.0\% | 2.7\% | 14,8\% | 57.2\% |
| 82 | 0.2\% | 0.5\% | 24.5\% | 6.1\% | 1.3\% | 0.4\% | 3.4\% | 20.1\% | 43.7\% |
| 83 | 0.0\% | 1.6\% | 13.4\% | 6.5\% | 2.1\% | 0.1\% | 1.7\% | 32.5\% | 42.0\% |
| 84 | 0.0\% | 0.8\% | 25.1\% | 7.0\% | 1.3\% | 0.3\% | 2.5\% | 31.0\% | 32.1\% |
| 85 | 0.0\% | 0.5\% | 21.2\% | 6.9\% | 6.7\% | 1.8\% | 3.1\% | 21.1\% | 38.7\% |
| 86 | 0.0\% | 0.6\% | 22.3\% | 5.4\% | 9.4\% | 1.1\% | 1.8\% | 31.8\% | 27.4\% |
| 87 | 0.4\% | 0.4\% | 12.8\% | 7.5\% | 0.4\% | 1.4\% | 4.8\% | 56.9\% | 15.7\% |
| (79-87) | 0.1\% | 0.7\% | 17.7\% | 6.8\% | 3.7\% | 0.6\% | 2.6\% | 25.8\% | 42.1\% |
| (85-93) | 0.1\% | 0.5\% | 18.8\% | 6.6\% | 5.5\% | 1.4\% | 3.2\% | 36.6\% | 27.3\% |

Distribution of Total Mortalities

| Catch Year | $\begin{aligned} & \text { Fish } \\ & \text { All } \\ & \text { Alaska } \end{aligned}$ | eries with <br> All <br> Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \mathrm{St} \end{array}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | $\begin{aligned} & \text { fisher } \\ & \text { U.S. } \\ & \text { Troll } \end{aligned}$ | U.S. Net | U.s. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.0\% | 0.4\% | 18.8\% | 7.2\% | 4.9\% | 0.1\% | 2.2\% | 8.0\% | 58.4\% |
| 80 | 0.0\% | 0.4\% | 9.4\% | 5.2\% | 1.6\% | 0.1\% | 1.6\% | 16.2\% | 65.5\% |
| 81 | 0.0\% | 0.7\% | 12.7\% | 5.6\% | 4.5\% | 0.0\% | 2.8\% | 14.3\% | 59.5\% |
| 82 | 0.2\% | 0.5\% | 25.6\% | 5.8\% | 1.1\% | 0.3\% | 3.8\% | 20.5\% | 42.2\% |
| 83 | 0.0\% | 1.3\% | 11.4\% | 6.0\% | 1.6\% | 0.1\% | 1.5\% | 30.8\% | 47.2\% |
| 84 | 0.0\% | 0.7\% | 23.2\% | 6.4\% | 1.3\% | 0.3\% | 2.3\% | 29.9\% | 35.9\% |
| 85 | 0.0\% | 0.6\% | 19.8\% | 6.8\% | 6.0\% | 1.6\% | 2.8\% | 19.5\% | 43.1\% |
| 86 | 0.0\% | 0.6\% | 21.8\% | 5.4\% | 8.1\% | 1.1\% | 2.0\% | 29.6\% | 31.5\% |
| 87 | 0.5\% | 0.6\% | 14.9\% | 7.0\% | 0.3\% | 1.2\% | 5.2\% | 55.3\% | 14.9\% |
| (79-87) | 0.1\% | 0.6\% | 17.5\% | 6.2\% | 3.3\% | 0.5\% | 2.7\% | 24.9\% | 44.2\% |
| (85-93) | 0.2\% | 0.6\% | 18.8\% | 6.4\% | 4.8\% | 1.3\% | 3.3\% | 34.8\% | 29.8\% |

## Stock: Samish Fall Fingerling

Distribution of Reported Catch

| Catch Year | Fisheries with <br> All All <br> Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo } \mathrm{St} \end{gathered}$ | $\begin{aligned} & \text { Canada } \\ & \text { Net } \end{aligned}$ | $\begin{gathered} \text { Canada } \\ \text { Sport } \end{gathered}$ | fisher U.S. rroll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 89 | 0.1\% | 1.1\% | 8.4\% | 21.0\% | 4.0\% | 0.7\% | 9.1\% | 43.8\% | 11.9\% |
| 90 | 0.2\% | 0.9\% | 22.6\% | 16.8\% | 1.6\% | 0.9\% | 11.0\% | 37.1\% | 8.9\% |
| 91 | 0.0\% | 0.6\% | 18.4\% | 15.8\% | 3.5\% | 3.2\% | 12.5\% | 31.6\% | 14.6\% |
| 92 | 0.0\% | 0.9\% | 15.5\% | 21.6\% | 2.8\% | 0.7\% | 13.6\% | 21.2\% | 23.5\% |
| 93 | 0.0\% | 1.3\% | 16.9\% | 27.6\% | 2.8\% | 4.1\% | 5.0\% | 25.3\% | 17.1\% |
| (89-93) | 0.1\% | 1.0\% | 16.4\% | 20.6\% | 2.9\% | 1.9\% | 10.2\% | 31.8\% | 15.2\% |
| (89-93) | 0.1\% | 1.0\% | 16.4\% | 20.6\% | 2.9\% | 1.9\% | 10.2\% | 31.8\% | 15.2\% |

Distribution of Total Mortalities

| Catch Year | $\begin{array}{lll}\text { Fisheries with ceilings- } & \\ \text { All ACVI All } \\ \text { Alaska Nth/Cent } & \text { Troll Geo St }\end{array}$ |  |  |  | Canada Net | -other <br> Canada Sport |  | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 89 | 0.1\% | 1.1\% | 11.0\% | 23.2\% | 3.5\% | 0.6\% | 9.7\% | 39.0\% | 11.7\% |
| 90 | 0.2\% | 1.0\% | 24.1\% | 17.7\% | 1.5\% | 0.8\% | 11.3\% | 34.7\% | 8.6\% |
| 91 | 0.0\% | 0.6\% | 19.4\% | 17.8\% | 3.2\% | 3.1\% | 12.7\% | 28.8\% | 14.4\% |
| 92 | 0.0\% | 0.8\% | 13.4\% | 30.8\% | 2.1\% | 0.6\% | 11.6\% | 15.9\% | 24.8\% |
| 93 | 0.0\% | 1.3\% | 16.1\% | 36.7\% | 2.1\% | 3.5\% | 4.4\% | 19.9\% | 16.1\% |
| (89-93) | 0.1\% | 1.0\% | 16.8\% | 25.2\% | 2.5\% | 1.7\% | 9.9\% | 27.6\% | 15.1\% |
| (89-93) | 0.1\% | 1.0\% | 16.8\% | 25.2\% | 2.5\% | 1.7\% | 9.9\% | 27.6\% | 15.1\% |

## Stock: Stillaguamish Fall Fingerling

Distribution of Reported Catch

| Catch Year | Fisheries wit <br> Alaska Nth/Cent |  | $\begin{aligned} & \text { ceiling } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{gathered}$ | Canada Net | Canada Sport | fisher U.S. Troll | $\begin{aligned} & \text { U.s. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 84 | 0.0\% | 29.8\% | 7.1\% | 16.7\% | 22.6\% | 0.0\% | 0.0\% | 4.8\% | 19.0\% |
| 85 | 11.8\% | 7.8\% | 28.4\% | 9.8\% | 10.8\% | 8.8\% | 0.0\% | 8.8\% | 15.7\% |
| 86 | 5.6\% | 4.5\% | 31.5\% | 21.3\% | 0.0\% | 0.0\% | 0.0\% | 16.9\% | 20.2\% |
| 90 | 0.7\% | 17.7\% | 25.9\% | 12.1\% | 5.7\% | 3.2\% | 6.7\% | 11.3\% | 16.7\% |
| 91 | 0.8\% | 1.6\% | 17.3\% | 12.9\% | 3.1\% | 5.9\% | 15.3\% | 20.0\% | 23.5\% |
| 92 | 0.0\% | 3.7\% | 22.9\% | 7.7\% | 3.4\% | 4.1\% | 7.5\% | 16.2\% | 34.7\% |
| 93 | 0.0\% | 8.2\% | 18.4\% | 18.4\% | 1.9\% | 6.8\% | 6.8\% | 2.3\% | 37.6\% |
| (84-93) | 2.7\% | 10.5\% | 21.6\% | 14.1\% | 6.8\% | 4.1\% | 5.2\% | 11.5\% | 23.9\% |
| (85-93) | 3.1\% | 7.3\% | 24.1\% | 13.7\% | 4.2\% | 4.8\% | 6.0\% | 12.6\% | 24.7\% |

Distribution of Total Mortalities

| Catch Year | Fisheries wit Alaska Nth/Cent |  | ilin WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{array}$ | Canada Net | $\qquad$ Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 84 | 1.8\% | 24.1\% | 9.8\% | 17.0\% | 18.8\% | 0.9\% | 0.0\% | 3.6\% | 23.2\% |
| 85 | 15.0\% | 7.1\% | 27.6\% | 8.7\% | 8.7\% | 7.9\% | 0.0\% | 7.1\% | 18.1\% |
| 86 | 7.4\% | 4.3\% | 31.9\% | 20.2\% | 0.0\% | 0.0\% | 0.0\% | 16.0\% | 19.1\% |
| 90 | 1.1\% | 15.7\% | 24.2\% | 15.4\% | 4.7\% | 3.3\% | 8.0\% | 9.9\% | 17.9\% |
| 91 | 1.0\% | 1.3\% | 16.9\% | 16.0\% | 2.9\% | 5.1\% | 15.3\% | 17.3\% | 24.0\% |
| 92 | 0.0\% | 2.7\% | 19.3\% | 13.6\% | 2.2\% | 3.3\% | 6.2\% | 11.4\% | 41.2\% |
| 93 | 0.0\% | 7.8\% | 21.6\% | 21.2\% | 1.6\% | 5.7\% | 7.3\% | 2.0\% | 32.4\% |
| (84-93) | 3.8\% | 9.0\% | 21.6\% | 16.0\% | 5.5\% | 3.7\% | 5.3\% | 9.6\% | 25.1\% |
| (85-93) | 4.1\% | 6.5\% | 23.6\% | 15.8\% | 3.3\% | 4.2\% | 6.1\% | 10.6\% | 25.5\% |

## Stock: George Adams Fall Fingerling

Distribution of Reported Catch

| Catch Year | -Fisheries wit All All Alaska Nth/Cent |  | cilin WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo } \mathrm{St} \end{gathered}$ | Canada Net | $\begin{gathered} \text { Otr } \\ \begin{array}{c} \text { Canada } \\ \text { Sport } \end{array} \end{gathered}$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.0\% | 1.0\% | 26.6\% | 5.6\% | 0.5\% | 0.0\% | 3.9\% | 48.9\% | 13.7\% |
| 83 | 0.0\% | 3.8\% | 18.8\% | 5.6\% | 4.8\% | 0.6\% | 0.2\% | 35.4\% | 31.0\% |
| 84 | 0.1\% | 5.7\% | 21.3\% | 7.5\% | 1.4\% | 0.0\% | 2.6\% | 36.8\% | 24.4\% |
| 89 | 0.1\% | 0.3\% | 9.9\% | 4.4\% | 5.4\% | 0.6\% | 14.9\% | 44.6\% | 19.9\% |
| 90 | 0.2\% | 1.6\% | 21.5\% | 5.9\% | 0.8\% | 1.3\% | 16.7\% | 31.5\% | 20.6\% |
| 91 | 0.4\% | 0.0\% | 21.8\% | 2.9\% | 0.5\% | 3.9\% | 10.1\% | 39.4\% | 21.2\% |
| 92 | 0.0\% | 0.6\% | 17.8\% | 2.3\% | 5.2\% | 0.0\% | 23.6\% | 10.3\% | 40.8\% |
| 93 | 0.0\% | 0.0\% | 44.2\% | 5.8\% | 0.0\% | 4.7\% | 8.1\% | 7.0\% | 30.2\% |
| (82-93) | 0.1\% | 1.6\% | 22.7\% | 5.0\% | 2.3\% | 1.4\% | 10.0\% | 31.7\% | 25.2\% |
| (85-93) | 0.1\% | 0.5\% | 23.0\% | 4.3\% | 2.4\% | 2.1\% | 14.7\% | 26.5\% | 26.6\% |

Distribution of Total Mortalities

| Catch Year | $\begin{aligned} & \text { Fish } \\ & \text { All } \\ & \text { Alaska } \end{aligned}$ | $\begin{aligned} & \text { es wi } \\ & \text { All } \\ & \text { Cent } \end{aligned}$ | $\begin{gathered} \text { ciling } \\ \text { WCVI } \\ \text { Troll } \end{gathered}$ | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{array}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | $\begin{aligned} & \text { fisher } \\ & \text { U.s. } \\ & \text { Troli } \end{aligned}$ | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.0\% | 1.2\% | 26.3\% | 6.0\% | 0.6\% | 0.0\% | 3.8\% | 47.1\% | 15.2\% |
| 83 | 0.0\% | 2.6\% | 13.9\% | 5.0\% | 3.3\% | 0.5\% | 0.1\% | 28.0\% | 46.6\% |
| 84 | 0.2\% | 5.7\% | 21.8\% | 7.2\% | 1.4\% | 0.0\% | 2.8\% | 37.2\% | 23.5\% |
| 89 | 0.3\% | 0.5\% | 11.9\% | 5.6\% | 4.6\% | 0.8\% | 15.0\% | 40.4\% | 21.0\% |
| 90 | 0.3\% | 1.7\% | 24.1\% | 6.5\% | 0.7\% | 1.2\% | 17.5\% | 29.1\% | 18.9\% |
| 91 | 0.5\% | 0.0\% | 23.1\% | 2.9\% | 0.5\% | 3.7\% | 10.4\% | 37.9\% | 20.8\% |
| 92 | 0.0\% | 0.5\% | 19.6\% | 2.1\% | 4.8\% | 0.0\% | 24.3\% | 10.1\% | 38.1\% |
| 93 | 0.0\% | 0.0\% | 43.0\% | 7.5\% | 0.0\% | 4.7\% | 7.5\% | 6.5\% | 31.8\% |
| (82-93) | 0.2\% | 1.5\% | 23.0\% | 5.4\% | 2.0\% | 1.4\% | 10.2\% | 29.5\% | 27.0\% |
| (85-93) | 0.2\% | 0.5\% | 24.3\% | 4.9\% | 2.1\% | 2.1\% | 15.0\% | 24.8\% | 26.1\% |

## Stock: South Puget Sound Fall Fingerling

Distribution of Reported Catch

| Catch Year | Fish Allaska | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | - Other <br> Canada Sport | fisheri U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.3\% | 1.6\% | 25.6\% | 16.0\% | 1.8\% | 0.1\% | 3.1\% | 27.7\% | 23.8\% |
| 83 | 0.2\% | 3.6\% | 19.9\% | 6.6\% | 3.0\% | 0.3\% | 1.9\% | 31.6\% | 32.9\% |
| 84 | 0.4\% | 3.0\% | 25.0\% | 10.9\% | 1.2\% | 0.3\% | 1.8\% | 30.1\% | 27.4\% |
| 85 | 1.1\% | 1.0\% | 22.9\% | 7.6\% | 2.0\% | 0.9\% | 2.3\% | 35.7\% | 26.5\% |
| 86 | 0.0\% | 1.8\% | 26.6\% | 11.2\% | 2.4\% | 0.0\% | 5.7\% | 15.4\% | 36.9\% |
| 87 | 0.0\% | 0.0\% | 20.8\% | 20.8\% | 6.8\% | 0.0\% | 11.7\% | 22.3\% | 17.4\% |
| 88 | 0.2\% | 2.8\% | 8.0\% | 11.1\% | 5.6\% | 2.3\% | 10.7\% | 38.5\% | 20.7\% |
| 89 | 0.2\% | 1.0\% | 11.2\% | 6.8\% | 6.1\% | 1.2\% | 16.7\% | 32.4\% | 24.5\% |
| 90 | 0.1\% | 1.1\% | 30.7\% | 5.2\% | 1.1\% | 1.5\% | 12.1\% | 31.6\% | 16.5\% |
| 91 | 0.6\% | 0.2\% | 21.5\% | 2.4\% | 1.1\% | 2.3\% | 15.3\% | 39.6\% | 16.9\% |
| 92 | 1.4\% | 2.1\% | 20.3\% | 4.8\% | 3.3\% | 1.9\% | 12.1\% | 27.5\% | 26.6\% |
| 93 | 0.4\% | 1.2\% | 23.5\% | 8.2\% | 3.0\% | 3.5\% | 7.3\% | 21.7\% | 31.5\% |
| (82-93) | 0.4\% | 1.6\% | 21.3\% | 9.3\% | 3.1\% | 1.2\% | 8.4\% | 29.5\% | 25.1\% |
| (85-93) | 0.4\% | 1.3\% | 20.6\% | 8.7\% | 3.5\% | 1.5\% | 10.4\% | 29.4\% | 24.2\% |

Distribution of Total Mortalities

| Catch Year | $\begin{gathered} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{gathered}$ | eries with All Nth/Cent | ceilings WCV! Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | -Other <br> Canada Sport |  | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.3\% | 1.7\% | 26.0\% | 15.2\% | 1.7\% | 0.1\% | 3.1\% | 26.6\% | 25.2\% |
| 83 | 0.2\% | 3.5\% | 19.1\% | 6.5\% | 2.6\% | 0.3\% | 1.9\% | 28.7\% | 37.3\% |
| 84 | 0.4\% | 3.1\% | 25.9\% | 10.4\% | 1.2\% | 0.3\% | 1.9\% | 30.0\% | 26.8\% |
| 85 | 1.2\% | 1.0\% | 22.9\% | 7.5\% | 2.0\% | 1.0\% | 2.3\% | 35.4\% | 26.7\% |
| 86 | 0.0\% | 1.8\% | 25.3\% | 11.3\% | 2.3\% | 0.0\% | 5.5\% | 13.5\% | 40.8\% |
| 87 | 0.0\% | 0.0\% | 28.9\% | 20.2\% | 4.4\% | 0.0\% | 12.9\% | 14.9\% | 18.9\% |
| 88 | 0.4\% | 2.9\% | 13.1\% | 15.1\% | 3.6\% | 1.7\% | 10.1\% | 26.7\% | 26.3\% |
| 89 | 0.2\% | 1.2\% | 13.1\% | 8.4\% | 5.4\% | 1.1\% | 18.2\% | 29.9\% | 22.6\% |
| 90 | 0.2\% | 1.2\% | 32.1\% | 5.5\% | 1.0\% | 1.5\% | 12.3\% | 30.0\% | 16.3\% |
| 91 | 0.8\% | 0.2\% | 22.9\% | 2.7\% | 1.2\% | 2.2\% | 16.1\% | 37.3\% | 16.5\% |
| 92 | 2.0\% | 1.9\% | 18.3\% | 7.5\% | 2.6\% | 1.7\% | 10.8\% | 21.6\% | 33.4\% |
| 93 | 1.0\% | 1.1\% | 26.5\% | 10.3\% | 2.5\% | 3.0\% | 7.6\% | 19.3\% | 28.6\% |
| (82-93) | 0.6\% | 1.6\% | 22.8\% | 10.0\% | 2.5\% | 1.1\% | 8.6\% | 26.2\% | 26.6\% |
| (85-93) | 0.7\% | 1.2\% | 22.6\% | 9.8\% | 2.8\% | 1.3\% | 10.6\% | 25.4\% | 25.6\% |

## Stock: Kalama Fall Fingerling

Distribution of Reported Catch

| Catch Year | $\qquad$ Fisheries with Al All Alaska Nth/Cent |  | eilin WCVI Troll | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{gathered}$ | Canada Net | Canada Sport | fishe U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 0.0\% | 2.5\% | 16.5\% | 13.5\% | 6.0\% | 0.0\% | 4.5\% | 11.0\% | 46.0\% |
| 84 | 0.0\% | 0.0\% | 30.5\% | 2.1\% | 2.7\% | 0.0\% | 1.6\% | 40.1\% | 23.0\% |
| 85 | 0.0\% | 0.0\% | 32.8\% | 0.0\% | 6.6\% | 3.3\% | 1.6\% | 34.4\% | 23.0\% |
| 86 | 0.0\% | 0.0\% | 18.1\% | 16.0\% | 2.1\% | 0.0\% | 0.0\% | 43.6\% | 21.3\% |
| 87 | 0.0\% | 3.9\% | 12.4\% | 16.3\% | 0.8\% | 0.0\% | 6.2\% | 40.3\% | 21.7\% |
| 88 | 0.0\% | 7.3\% | 7.9\% | 25.7\% | 6.8\% | 0.0\% | 12.6\% | 25.1\% | 14.7\% |
| 89 | 0.0\% | 1.1\% | 5.1\% | 2.9\% | 4.1\% | 2.2\% | 15.2\% | 48.5\% | 20.9\% |
| 90 | 0.0\% | 0.3\% | 25.6\% | 4.0\% | 0.2\% | 1.7\% | 11.5\% | 43.1\% | 13.7\% |
| 91 | 0.0\% | 2.4\% | 9.7\% | 4.4\% | 2.9\% | 1.5\% | 19.9\% | 27.2\% | 32.0\% |
| 92 | 0.0\% | 1.4\% | 13.1\% | 4.5\% | 4.1\% | 4.5\% | 12.7\% | 31.2\% | 28.5\% |
| 93 | 0.0\% | 1.0\% | 18.7\% | 7.5\% | 2.9\% | 0.8\% | 4.2\% | 36.1\% | 28.6\% |
| (83-93) | 0.0\% | 1.8\% | 17.3\% | 8.8\% | 3.5\% | 1.3\% | 8.2\% | 34.6\% | 24.8\% |
| (85-93) | 0.0\% | 1.9\% | 15.9\% | 9.0\% | 3.4\% | 1.5\% | 9.3\% | 36.6\% | 22.7\% |

Distribution of Total Mortalities

| Catch Year | -Fisheries with All Alaska Nth/Cent |  | $\begin{gathered} \text { ceiling } \\ \text { WCVI } \end{gathered}$ Troll | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \mathrm{St} \end{array}$ | Canada Net | Canada Sport | $\begin{aligned} & \text { fisher } \\ & \text { U.S. } \\ & \text { Troli } \end{aligned}$ | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 0.0\% | 1.8\% | 15.1\% | 10.5\% | 4.9\% | 0.0\% | 3.2\% | 9.5\% | 54.7\% |
| 84 | 0.0\% | 0.0\% | 31.2\% | 1.8\% | 2.8\% | 0.0\% | 1.8\% | 38.1\% | 24.3\% |
| 85 | 0.0\% | 0.0\% | 32.5\% | 0.0\% | 5.2\% | 3.9\% | 1.3\% | 32.5\% | 26.0\% |
| 86 | 0.0\% | 0.0\% | 18.3\% | 16.5\% | 1.8\% | 0.0\% | 0.0\% | 38.5\% | 23.9\% |
| 87 | 0.0\% | 4.1\% | 15.9\% | 15.9\% | 0.6\% | 0.0\% | 6.5\% | 32.4\% | 24.1\% |
| 88 | 0.0\% | 7.9\% | 7.0\% | 27.0\% | 4.4\% | 0.0\% | 10.2\% | 19.4\% | 23.8\% |
| 89 | 0.0\% | 1.3\% | 6.2\% | 3.8\% | 3.8\% | 2.0\% | 17.2\% | 46.5\% | 19.5\% |
| 90 | 0.0\% | 0.2\% | 27.0\% | 4.1\% | 0.2\% | 1.6\% | 11.9\% | 41.2\% | 13.8\% |
| 91 | 0.0\% | 2.6\% | 10.8\% | 5.2\% | 2.6\% | 1.7\% | 20.7\% | 25.0\% | 31.9\% |
| 92 | 0.0\% | 1.5\% | 9.3\% | 10.8\% | 2.6\% | 3.1\% | 9.0\% | 21.6\% | 42.2\% |
| 93 | 0.0\% | 1.2\% | 18.9\% | 12.3\% | 2.3\% | 0.8\% | 4.1\% | 30.0\% | 30.7\% |
| (83-93) | 0.0\% | 1.9\% | 17.5\% | 9.8\% | 2.8\% | 1.2\% | 7.8\% | 30.4\% | 28.6\% |
| (85-93) | 0.0\% | 2.1\% | 16.2\% | 10.6\% | 2.6\% | 1.5\% | 9.0\% | 31.9\% | 26.2\% |

## Stock: Elwha Fall Fingerling

Distribution of Reported Catch

| Catch Year | -Fisheries with All All Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo } \mathrm{St} \end{gathered}$ | Canada | $\begin{aligned} & \text { Othe } \\ & \begin{array}{c} \text { Canada } \\ \text { Sport } \end{array} \end{aligned}$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | $\begin{gathered} \text { U.S. } \\ \text { Sport } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 86 | 32.0\% | 9.5\% | 19.3\% | 8.0\% | 1.5\% | 1.0\% | 1.0\% | 13.5\% | 14.5\% |
| 87 | 20.3\% | 15.6\% | 16.8\% | 12.9\% | 0.6\% | 2.4\% | 3.5\% | 7.6\% | 20.6\% |
| 88 | 13.1\% | 14.4\% | 25.0\% | 0.0\% | 0.8\% | 3.8\% | 8.1\% | 22.0\% | 13.1\% |
| 89 | 17.3\% | 20.3\% | 12.0\% | 0.0\% | 0.0\% | 0.0\% | 5.3\% | 22.6\% | 23.3\% |
| 90 | 0.0\% | 50.0\% | 50.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 0.0\% | 7.1\% | 14.3\% | 0.0\% | 0.0\% | 0.0\% | 7.1\% | 71.4\% | 0.0\% |
| 92 | 3.7\% | 5.6\% | 44.4\% | 0.0\% | 3.7\% | 3.7\% | 16.7\% | 0.0\% | 22.2\% |
| 93 | 8.2\% | 0.0\% | 20.0\% | 16.5\% | 0.0\% | 9.4\% | 4.7\% | 0.0\% | 41.2\% |
| (86-93) | 11.8\% | 15.3\% | 25.2\% | 4.7\% | 0.8\% | 2.5\% | 5.8\% | 17.1\% | 16.9\% |
| (86-93) | 11.8\% | 15.3\% | 25.2\% | 4.7\% | 0.8\% | 2.5\% | 5.8\% | 17.1\% | 16.9\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with <br> All All <br> Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | $\underset{\text { Net }}{\text { U.S. }}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 86 | 35.8\% | 9.9\% | 18.1\% | 7.5\% | 1.3\% | 1.2\% | 1.3\% | 11.7\% | 13.5\% |
| 87 | 26.3\% | 14.9\% | 17.4\% | 11.2\% | 0.5\% | 2.1\% | 3.3\% | 6.3\% | 17.9\% |
| 88 | 15.9\% | 14.1\% | 26.7\% | 0.0\% | 0.7\% | 3.3\% | 7.8\% | 19.6\% | 11.5\% |
| 89 | 26.1\% | 18.3\% | 11.1\% | 0.0\% | 0.0\% | 0.0\% | 4.6\% | 19.6\% | 20.3\% |
| 90 | 0.0\% | 45.5\% | 54.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| 91 | 4.0\% | 4.0\% | 24.0\% | 4.0\% | 0.0\% | 0.0\% | 8.0\% | 40.0\% | 12.0\% |
| 92 | 4.1\% | 4.1\% | 38.4\% | 4.1\% | 2.7\% | 4.1\% | 15.1\% | 0.0\% | 26.0\% |
| 93 | 8.8\% | 0.0\% | 20.9\% | 18.7\% | 0.0\% | 8.8\% | 4.4\% | 0.0\% | 38.5\% |
| (86-93) | 15.1\% | 13.8\% | 26.4\% | 5.7\% | 0.7\% | 2.4\% | 5.5\% | 12.2\% | 17.5\% |
| (86-93) | 15.1\% | 13.8\% | 26.4\% | 5.7\% | 0.7\% | 2.4\% | 5.5\% | 12.2\% | 17.5\% |

## Stock: Hoko Fall Fingerling

Distribution of Reported Catch

| Catch Year | Fisheries wit All All Alaska Nth/Cent |  | ceiling <br> WCVI <br> Troll | $\begin{gathered} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | $\begin{aligned} & \text { fisher } \\ & \text { U.s. } \\ & \text { Troli } \end{aligned}$ | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 89 | 7.2\% | 19.9\% | 15.5\% | 2.8\% | 22.1\% | 0.0\% | 1.1\% | 1.1\% | 31.5\% |
| 90 | 29.8\% | 16.6\% | 25.3\% | 1.7\% | 3.0\% | 0.0\% | 0.7\% | 1.7\% | 21.3\% |
| 91 | 38.9\% | 17.2\% | 17.4\% | 1.0\% | 1.5\% | 0.8\% | 0.4\% | 2.7\% | 20.1\% |
| 92 | 32.4\% | 23.7\% | 31.2\% | 1.7\% | 0.0\% | 2.3\% | 0.0\% | 1.2\% | 8.1\% |
| 93 | 18.7\% | 24.4\% | 37.4\% | 2.4\% | 5.7\% | 0.0\% | 0.0\% | 0.0\% | 12.2\% |
| (89-93) | 25.4\% | 20.4\% | 25.4\% | 1.9\% | 6.5\% | 0.6\% | 0.4\% | 1.3\% | 18.6\% |
| (89-93) | 25.4\% | 20.4\% | 25.4\% | 1.9\% | 6.5\% | 0.6\% | 0.4\% | 1.3\% | 18.6\% |

Distribution of Total Mortalities

| Catch Year | -Fisheries with All All Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 89 | 19.6\% | 19.2\% | 17.8\% | 2.4\% | 14.3\% | 0.0\% | 0.7\% | 0.7\% | 25.5\% |
| 90 | 37.5\% | 16.0\% | 23.4\% | 1.4\% | 2.4\% | 0.0\% | 0.8\% | 1.4\% | 17.4\% |
| 91 | 45.4\% | 15.5\% | 16.0\% | 0.8\% | 1.3\% | 0.7\% | 0.3\% | 2.3\% | 17.3\% |
| 92 | 40.0\% | 20.9\% | 27.0\% | 1.9\% | 0.0\% | 1.9\% | 0.0\% | 0.9\% | 7.0\% |
| 93 | 22.4\% | 23.1\% | 36.6\% | 2.2\% | 5.2\% | 0.0\% | 0.0\% | 0.0\% | 11.2\% |
| (89-93) | 33.0\% | 18.9\% | 24.1\% | 1.8\% | 4.7\% | 0.5\% | 0.4\% | 1.1\% | 15.7\% |
| (89-93) | 33.0\% | 18.9\% | 24.1\% | 1.8\% | $4.7 \%$ | 0.5\% | 0.4\% | 1.1\% | 15.7\% |

## Stock: Skagit Spring Yearling

Distribution of Reported Catch

| Catch Year | -Fisheries wit All AllAlaska Nth/Cent |  | eiling WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Canada Sport | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | 0.0\% | 0.0\% | 7.3\% | 31.8\% | 29.1\% | 0.0\% | 0.0\% | 10.9\% | 21.8\% |
| 86 | 2.3\% | 13.5\% | 7.6\% | 52.6\% | 3.5\% | 7.0\% | 0.0\% | 4.1\% | 9.9\% |
| 87 | 0.0\% | 14.8\% | 4.9\% | 14.8\% | 7.4\% | 0.0\% | 2.5\% | 29.6\% | 25.9\% |
| 88 | 0.0\% | 7.9\% | 2.3\% | 19.9\% | 10.2\% | 3.8\% | 2.3\% | 36.0\% | 17.3\% |
| 89 | 0.0\% | 1.3\% | 5.2\% | 25.4\% | 4.8\% | 0.8\% | 6.5\% | 44.2\% | 12.0\% |
| 90 | 0.0\% | 4.9\% | 6.7\% | 21.5\% | 5.5\% | 4.1\% | 4.5\% | 21.1\% | 31.7\% |
| (85-90) | 0.4\% | 7.1\% | 5.7\% | 27.7\% | 10.1\% | 2.6\% | 2.6\% | 24.3\% | 19.8\% |
| (85-93) | 0.4\% | 7.1\% | 5.7\% | 27.7\% | 10.1\% | 2.6\% | 2.6\% | 24.3\% | 19.8\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with ceilings- All ACVI |  |  |  | Canada Net | Canada Sport | fishe U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 85 | 0.0\% | 0.8\% | 7.6\% | 31.9\% | 26.9\% | 0.0\% | 0.0\% | 10.1\% | 21.8\% |
| 86 | 3.7\% | 12.7\% | 7.4\% | 51.9\% | 3.2\% | 6.3\% | 0.0\% | 3.7\% | 11.1\% |
| 87 | 0.0\% | 11.1\% | 3.5\% | 16.0\% | 4.9\% | 0.0\% | 1.4\% | 19.4\% | 44.4\% |
| 88 | 0.0\% | 7.8\% | 3.2\% | 19.6\% | 9.7\% | 3.7\% | 2.8\% | 35.0\% | 18.2\% |
| 89 | 0.0\% | 1.4\% | 5.6\% | 31.1\% | 4.4\% | 0.8\% | 6.7\% | 37.8\% | 12.7\% |
| 90 | 0.0\% | 4.6\% | 7.1\% | 23.1\% | 5.4\% | 3.8\% | 5.0\% | 20.6\% | 30.2\% |
| (85-90) | 0.6\% | 6.4\% | 5.7\% | 28.9\% | 9.1\% | 2.4\% | 2.6\% | 21.1\% | 23.1\% |
| (85-93) | 0.6\% | 6.4\% | 5.7\% | 28.9\% | 9.1\% | 2.4\% | 2.6\% | 21.1\% | $23.1 \%$ |

Stock: Nooksack Spring Yearling

Distribution of Reported Catch

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | $\qquad$ Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 86 | 0.0\% | 0.0\% | 0.0\% | 55.9\% | 26.5\% | 0.0\% | 0.0\% | 2.9\% | 14.7\% |
| 89 | 0.0\% | 0.0\% | 0.0\% | 23.3\% | 0.0\% | 0.0\% | 0.0\% | 50.0\% | 26.7\% |
| 90 | 0.0\% | 6.5\% | 0.0\% | 25.8\% | 12.9\% | 0.0\% | 3.2\% | 6.5\% | 45.2\% |
| 91 | 0.0\% | 1.1\% | 3.4\% | 53.6\% | 9.5\% | 7.8\% | 3.4\% | 13.4\% | 8.4\% |
| 92 | 1.1\% | 4.1\% | 39.0\% | 29.5\% | 2.4\% | 2.7\% | 2.4\% | 0.8\% | 17.9\% |
| 93 | 0.0\% | 5.6\% | 9.1\% | 34.1\% | 11.1\% | 4.5\% | 0.7\% | 11.8\% | 23.3\% |
| (86-93) | 0.2\% | 2.9\% | 8.6\% | 37.1\% | 10.4\% | 2.5\% | 1.6\% | 14.2\% | 22.7\% |
| (86-93) | 0.2\% | 2.9\% | 8.6\% | 37.1\% | 10.4\% | 2.5\% | 1.6\% | 14.2\% | 22.7\% |

Distribution of Total Mortalities

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | eries with All Nth/Cent | ceilings <br> WCVI <br> Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | -Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 86 | 0.0\% | 0.7\% | 3.9\% | 66.7\% | 7.2\% | 1.3\% | 0.7\% | 12.4\% | 7.2\% |
| 89 | 0.0\% | 0.0\% | 0.0\% | 37.0\% | 0.0\% | 0.0\% | 0.0\% | 37.0\% | 23.9\% |
| 90 | 0.0\% | 4.1\% | 7.1\% | 57.1\% | 6.1\% | 1.0\% | 1.0\% | 2.0\% | 20.4\% |
| 91 | 0.0\% | 0.6\% | 2.5\% | 67.5\% | 5.8\% | 5.2\% | 2.5\% | 8.9\% | 7.1\% |
| 92 | 2.1\% | 3.5\% | 36.6\% | 34.6\% | 1.7\% | 2.3\% | 2.1\% | 0.6\% | 16.2\% |
| 93 | 0.0\% | 5.3\% | 9.6\% | 36.3\% | 10.6\% | 4.6\% | 0.7\% | 11.2\% | 22.1\% |
| (86-93) | 0.4\% | 2.4\% | 9.9\% | 49.9\% | 5.2\% | 2.4\% | 1.2\% | 12.0\% | 16.2\% |
| (86-93) | 0.4\% | 2.4\% | 9.9\% | 49.9\% | 5.2\% | 2.4\% | 1.2\% | 12.0\% | 16.2\% |

Stock: White River Spring Yearling

Distribution of Reported Catch

| Catch Year | Fisheries with Alaska Nth/Cent |  | $\begin{aligned} & \text { ceiling } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{array}$ | Canada | Canada Sport | $\begin{aligned} & \text { fishe } \\ & \text { U.S. } \\ & \text { Troli } \end{aligned}$ | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.s. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 0.0\% | 2.1\% | 5.5\% | 0.0\% | 0.0\% | 0.0\% | 2.1\% | 14.4\% | 76.0\% |
| 84 | 0.0\% | 11.3\% | 8.8\% | 10.0\% | 0.0\% | 0.0\% | 5.0\% | 17.5\% | 48.8\% |
| 85 | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 3.0\% | 2.3\% | 0.0\% | 31.9\% | 62.8\% |
| 86 | 0.0\% | 0.4\% | 0.7\% | 2.9\% | 2.2\% | 0.0\% | 0.4\% | 21.5\% | 72.0\% |
| 87 | 0.0\% | 0.0\% | 0.0\% | 2.7\% | 0.8\% | 0.0\% | 5.9\% | 21.1\% | 69.5\% |
| 88 | 0.0\% | 0.0\% | 0.4\% | 4.1\% | 0.3\% | 0.4\% | 2.1\% | 20.9\% | 72.0\% |
| 89 | 0.0\% | 0.0\% | 1.9\% | 1.9\% | 1.6\% | 0.0\% | 9.0\% | 20.5\% | 65.0\% |
| 90 | 0.0\% | 0.0\% | 2.8\% | 1.3\% | 0.9\% | 0.0\% | 7.6\% | 22.1\% | 65.6\% |
| 91 | 0.0\% | 0.0\% | 1.4\% | 2.3\% | 0.0\% | 1.9\% | 7.4\% | 19.4\% | 68.1\% |
| 92 | 0.0\% | 0.6\% | 3.9\% | 3.5\% | 3.5\% | 0.4\% | 3.9\% | 12.6\% | 71.5\% |
| 93 | 0.0\% | 0.0\% | 0.0\% | 3.7\% | 0.0\% | 0.0\% | 6.5\% | 11.2\% | 78.5\% |
| (83-93) | 0.0\% | 1.3\% | 2.3\% | 3.0\% | 1.1\% | 0.5\% | 4.5\% | 19.4\% | 68.2\% |
| (85-93) | 0.0\% | 0.1\% | 1.2\% | 2.5\% | 1.4\% | 0.6\% | 4.8\% | 20.1\% | 69.4\% |

Distribution of Total Mortalities

| Catch Year | Fisheries wit <br> All All <br> Alaska Nth/Cent |  | eilin WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \\ \mathrm{St} \end{array}$ | Canada Net | Canada Sport | fisher U.S. Troll | $\begin{aligned} & \text { U.s. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 83 | 0.0\% | 2.6\% | 5.2\% | 0.0\% | 0.0\% | 0.0\% | 2.0\% | 14.4\% | 75.8\% |
| 84 | 0.0\% | 7.1\% | 5.8\% | 6.4\% | 0.0\% | 0.0\% | 2.6\% | 10.3\% | 67.9\% |
| 85 | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 2.6\% | 1.9\% | 0.0\% | 26.9\% | 68.8\% |
| 86 | 0.0\% | 0.5\% | 0.7\% | 2.8\% | 2.2\% | 0.0\% | 0.5\% | 21.1\% | 72.2\% |
| 87 | 0.0\% | 0.0\% | 0.0\% | 2.0\% | 0.6\% | 0.0\% | 3.8\% | 12.4\% | 81.1\% |
| 88 | 0.0\% | 0.0\% | 0.5\% | 3.9\% | 0.3\% | 0.4\% | 2.5\% | 20.9\% | 71.7\% |
| 89 | 0.0\% | 0.0\% | 2.1\% | 2.3\% | 1.5\% | 0.0\% | 9.4\% | 18.1\% | 66.5\% |
| 90 | 0.0\% | 0.0\% | 2.9\% | 1.6\% | 0.8\% | 0.0\% | 8.3\% | 19.5\% | 66.9\% |
| 91 | 0.0\% | 0.0\% | 1.4\% | 3.1\% | 0.0\% | 1.7\% | 6.8\% | 18.5\% | 69.2\% |
| 92 | 0.0\% | 0.6\% | 4.4\% | 4.2\% | 3.3\% | 0.4\% | 4.4\% | 12.5\% | 69.8\% |
| 93 | 0.0\% | 0.0\% | 0.0\% | 4.3\% | 0.0\% | 0.0\% | 7.0\% | 11.3\% | 79.1\% |
| (83-93) | 0.0\% | 1.0\% | 2.1\% | 2.8\% | 1.0\% | 0.4\% | 4.3\% | 16.9\% | 71.7\% |
| (85-93) | 0.0\% | 0.1\% | 1.3\% | 2.7\% | 1.3\% | 0.5\% | 4.7\% | 17.9\% | 71.7\% |

## Stock: Sooes Fall Fingerling

Distribution of Reported Catch

| Catch Year | Fisheries withAll AllAlaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo } \mathrm{St} \end{gathered}$ | Canada Net | $\xrightarrow[\substack{\text { Canada } \\ \text { Sport }}]{0 t l}$ | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 89 | 44.8\% | 24.1\% | 10.3\% | 0.0\% | 10.3\% | 13.8\% | 0.0\% | 0.0\% | 0.0\% |
| 90 | 24.4\% | 25.6\% | 27.8\% | 11.1\% | 3.3\% | 0.0\% | 2.2\% | 0.0\% | 5.6\% |
| 91 | 33.3\% | 32.5\% | 14.6\% | 0.0\% | 5.7\% | 0.0\% | 0.0\% | 0.0\% | 13.8\% |
| 92 | 19.7\% | 23.2\% | 40.1\% | 2.1\% | 7.0\% | 2.1\% | 0.7\% | 0.0\% | 4.9\% |
| 93 | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (89-93) | 24.5\% | 21.1\% | 18.6\% | 2.6\% | 5.3\% | 3.2\% | 0.6\% | 0.0\% | 4.9\% |
| (89-93) | 24.5\% | 21.1\% | 18.6\% | 2.6\% | 5.3\% | 3.2\% | 0.6\% | 0.0\% | 4.9\% |

Distribution of Total Mortalities

| Catch Year | Fisheries wit <br> All All <br> Alaska Nth/Cent |  | $\begin{aligned} & \text { ceilings } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{gathered} \text { All } \\ \text { Geo } \end{gathered}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | $\begin{aligned} & \text { fisher } \\ & \text { U.S. } \\ & \text { Troli } \end{aligned}$ | $\begin{aligned} & \text { U.S. } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 89 | 44.1\% | 22.1\% | 13.2\% | 1.5\% | 7.4\% | 5.9\% | 0.0\% | 0.0\% | 5.9\% |
| 90 | 32.5\% | 26.0\% | 24.4\% | 8.9\% | 2.4\% | 0.0\% | 1.6\% | 0.0\% | 4.1\% |
| 91 | 37.4\% | 29.3\% | 16.3\% | 0.7\% | 4.8\% | 0.0\% | 0.0\% | 0.0\% | 11.6\% |
| 92 | 24.8\% | 21.7\% | 37.9\% | 2.5\% | 6.2\% | 1.9\% | 0.6\% | 0.0\% | 4.3\% |
| 93 | 0.0\% | 0.0\% | 100.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% |
| (89-93) | 27.8\% | 19.8\% | 38.4\% | 2.7\% | 4.2\% | 1.5\% | 0.4\% | 0.0\% | 5.2\% |
| (89-93) | 27.8\% | 19.8\% | 38.4\% | 2.7\% | 4.2\% | 1.5\% | 0.4\% | 0.0\% | 5.2\% |

## Stock: Queets Fall Fingerling

Distribution of Reported Catch

| Catch Year | Fisheries witAll AllAlaska Nth/Cent |  | ceiling WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 15.3\% | 23.6\% | 15.3\% | 0.0\% | 1.4\% | 0.0\% | 1.4\% | 40.3\% | 4.2\% |
| 82 | 17.7\% | 33.1\% | 14.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 34.3\% | 0.0\% |
| 83 | 43.6\% | 8.9\% | 9.9\% | 0.0\% | 3.0\% | 0.0\% | 1.0\% | 33.7\% | 0.0\% |
| 84 | 20.6\% | 28.0\% | 10.3\% | 0.0\% | 0.0\% | 0.0\% | 2.8\% | 38.3\% | 0.0\% |
| 85 | 24.5\% | 47.2\% | 3.1\% | 0.0\% | 2.5\% | 0.0\% | 0.0\% | 22.1\% | 1.2\% |
| 86 | 38.8\% | 25.9\% | 13.7\% | 0.0\% | 2.2\% | 0.0\% | 0.0\% | 19.4\% | 0.0\% |
| 87 | 38.3\% | 22.3\% | 1.2\% | 0.0\% | 0.0\% | 0.0\% | 0.9\% | 36.7\% | 0.9\% |
| 88 | 31.4\% | 20.6\% | 7.7\% | 0.0\% | 0.0\% | 1.8\% | 0.0\% | 31.9\% | 6.6\% |
| 89 | 18.9\% | 18.3\% | 12.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 47.3\% | 2.7\% |
| 90 | 31.7\% | 17.6\% | 16.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 34.4\% | 0.0\% |
| 91 | 40.8\% | 20.2\% | 8.9\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 29.2\% | 0.8\% |
| 92 | 21.1\% | 16.3\% | 30.1\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 31.4\% | 1.4\% |
| 93 | 30.0\% | 28.2\% | 22.0\% | 0.0\% | 0.0\% | 0.0\% | 0.9\% | 13.6\% | 5.0\% |
| (81-93) | 28.7\% | 23.9\% | 12.7\% | 0.0\% | 0.7\% | 0.1\% | 0.5\% | 31.8\% | 1.8\% |
| (85-93) | 30.6\% | 24.1\% | 12.9\% | 0.0\% | 0.5\% | 0.2\% | 0.2\% | 29.6\% | 2.1\% |

Distribution of Total Mortalities

| Catch Year | -Fisheries with <br> All All <br> Alaska Nth/Cent |  | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net |  | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 21.1\% | 24.4\% | 14.4\% | 0.0\% | 1.1\% | 0.0\% | 2.2\% | 34.4\% | 3.3\% |
| 82 | 21.9\% | 32.8\% | 13.4\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 31.8\% | 0.0\% |
| 83 | 55.1\% | 8.7\% | 7.2\% | 0.0\% | 2.9\% | 0.0\% | 0.7\% | 26.1\% | 0.0\% |
| 84 | 23.4\% | 29.8\% | 9.7\% | 0.0\% | 0.0\% | 0.0\% | 3.2\% | 33.9\% | 0.0\% |
| 85 | 29.7\% | 46.4\% | 2.9\% | 0.0\% | 1.9\% | 0.0\% | 0.0\% | 17.7\% | 1.4\% |
| 86 | 48.4\% | 22.5\% | 11.5\% | 0.0\% | 1.6\% | 0.0\% | 0.0\% | 15.4\% | 0.0\% |
| 87 | 45.8\% | 20.1\% | 2.4\% | 0.0\% | 0.0\% | 0.0\% | 0.7\% | 29.8\% | 1.0\% |
| 88 | 37.2\% | 21.3\% | 9.5\% | 0.0\% | 0.0\% | 1.4\% | 0.0\% | 25.1\% | 5.3\% |
| 89 | 27.9\% | 19.2\% | 13.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 37.1\% | 2.3\% |
| 90 | 35.8\% | 18.2\% | 15.8\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 30.1\% | 0.0\% |
| 91 | 48.0\% | 18.4\% | 8.2\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 24.6\% | 0.7\% |
| 92 | 29.3\% | 16.2\% | 28.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 24.9\% | 1.1\% |
| 93 | 34.7\% | 26.3\% | 21.0\% | 0.0\% | 0.0\% | 0.0\% | 0.8\% | 12.4\% | 4.6\% |
| (81-93) | 35.3\% | 23.4\% | 12.2\% | 0.0\% | 0.6\% | 0.1\% | 0.6\% | 26.4\% | 1.5\% |
| (85-93) | 37.4\% | 23.2\% | 12.6\% | 0.0\% | 0.4\% | 0.2\% | 0.2\% | 24.1\% | 1.8\% |

Stock: Cowlitz Fall Tule

Distribution of Reported Catch

| Catch Year | Fisheries withAll AllAlaska Nth/Cent |  | ceilings WCVI Troll | $\underset{\mathrm{Geo}}{\mathrm{All}} \mathrm{St}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | U.S. | $\begin{aligned} & \text { U.s. } \\ & \text { Sport } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 8.9\% | 12.1\% | 22.7\% | 0.0\% | 3.3\% | 0.0\% | 13.6\% | 21.2\% | 18.2\% |
| 82 | 5.9\% | 5.9\% | 22.1\% | 0.0\% | 1.9\% | 1.4\% | 29.0\% | 14.8\% | 19.0\% |
| 83 | 6.0\% | 17.1\% | 27.7\% | 0.9\% | 0.8\% | 0.0\% | 10.7\% | 7.6\% | 29.1\% |
| 84 | 7.5\% | 15.7\% | 38.1\% | 0.0\% | 2.7\% | 0.0\% | 6.9\% | 23.5\% | 5.6\% |
| 85 | 8.6\% | 17.0\% | 22.8\% | 0.9\% | 2.2\% | 0.0\% | 8.7\% | 12.9\% | 27.0\% |
| 86 | 0.8\% | 2.3\% | 17.6\% | 0.5\% | 1.4\% | 0.0\% | 17.3\% | 42.7\% | 17.5\% |
| 87 | 5.3\% | 6.2\% | 11.8\% | 0.0\% | 1.0\% | 0.6\% | 14.3\% | 32.5\% | 28.3\% |
| 88 | 2.9\% | 2.9\% | 22.0\% | 0.0\% | 0.9\% | 0.0\% | 21.3\% | 33.4\% | 16.6\% |
| 89 | 7.7\% | 9.2\% | 12.7\% | 0.0\% | 2.0\% | 0.0\% | 34.2\% | 13.8\% | 20.5\% |
| 90 | 8.9\% | 15.3\% | 29.8\% | 0.0\% | 1.8\% | 0.0\% | 19.6\% | 0.0\% | 24.6\% |
| 91 | 18.9\% | 8.3\% | 10.7\% | 0.0\% | 0.0\% | 4.8\% | 18.8\% | 20.9\% | 17.6\% |
| 92 | 5.2\% | 8.3\% | 43.4\% | 0.0\% | 0.0\% | 0.0\% | 17.8\% | 13.2\% | 12.2\% |
| 93 | 6.2\% | 5.3\% | 11.2\% | 0.0\% | 0.0\% | 0.0\% | 27.9\% | 5.2\% | 44.2\% |
| (81-93) | 7.1\% | 9.7\% | 22.5\% | 0.2\% | 1.4\% | 0.5\% | 18.5\% | 18.6\% | 21.6\% |
| (85-93) | 7.2\% | 8.3\% | 20.2\% | 0.1\% | 1.0\% | 0.6\% | 20.0\% | 19.4\% | 23.2\% |

Distribution of Total Mortalities

| Catch Year |  | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport |  | U.S. Net | $\begin{aligned} & \text { U.S. } \\ & \text { Sport } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 9.5\% | 11.0\% | 23.6\% | 0.0\% | 3.1\% | 0.0\% | 16.0\% | 19.6\% | 17.2\% |
| 82 | 7.7\% | 5.6\% | 22.6\% | 0.0\% | 1.7\% | 1.5\% | 29.7\% | 13.6\% | 17.5\% |
| 83 | 7.8\% | 17.2\% | 27.9\% | 0.8\% | 0.8\% | 0.0\% | 11.4\% | 7.0\% | 27.1\% |
| 84 | 8.8\% | 15.8\% | 38.1\% | 0.0\% | 2.6\% | 0.0\% | 7.2\% | 22.1\% | 5.4\% |
| 85 | 11.7\% | 16.0\% | 22.8\% | 0.9\% | 2.0\% | 0.0\% | 9.2\% | 11.4\% | 25.9\% |
| 86 | 1.2\% | 2.3\% | 18.3\% | 0.5\% | 1.3\% | 0.0\% | 18.6\% | 39.0\% | 18.7\% |
| 87 | 7.9\% | 7.0\% | 13.2\% | 0.0\% | 0.8\% | 0.5\% | 14.5\% | 29.0\% | 27.1\% |
| 88 | 4.0\% | 3.1\% | 24.2\% | 0.0\% | 0.8\% | 0.0\% | 21.5\% | 30.9\% | 15.6\% |
| 89 | 9.9\% | 9.4\% | 13.1\% | 0.0\% | 1.8\% | 0.0\% | 34.1\% | 12.6\% | 19.2\% |
| 90 | 10.4\% | 15.3\% | 30.0\% | 0.0\% | 1.7\% | 0.0\% | 19.3\% | 0.0\% | 23.3\% |
| 91 | 24.8\% | 8.9\% | 11.1\% | 0.0\% | 0.0\% | 4.2\% | 18.2\% | 17.2\% | 15.7\% |
| 92 | 6.9\% | 9.3\% | 42.6\% | 0.0\% | 0.0\% | 0.0\% | 17.6\% | 12.4\% | 11.1\% |
| 93 | 7.8\% | 5.7\% | 11.8\% | 0.0\% | 0.0\% | 0.0\% | 27.8\% | 4.4\% | 42.5\% |
| (81-93) | 9.1\% | 9.7\% | 23.0\% | 0.2\% | 1.3\% | 0.5\% | 18.9\% | 16.9\% | 20.5\% |
| (85-93) | 9.4\% | 8.6\% | 20.8\% | 0.2\% | 0.9\% | 0.5\% | 20.1\% | 17.4\% | 22.1\% |

Stock: Spring Creek Tule

Distribution of Reported Catch

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | heries with All Nth/Cent | ceiling WCVI <br> Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo St } \end{array}$ | Canada Net | -other <br> Canada Sport |  | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.0\% | 1.2\% | 29.4\% | 1.8\% | 2.9\% | 0.1\% | 19.7\% | 28.7\% | 16.2\% |
| 80 | 0.1\% | 0.8\% | 29.1\% | 3.2\% | 1.1\% | 0.1\% | 27.0\% | 26.6\% | 12.0\% |
| 81 | 0.0\% | 0.5\% | 25.8\% | 1.8\% | 2.3\% | 0.2\% | 28.9\% | 25.1\% | 15.5\% |
| 82 | 0.0\% | 0.6\% | 25.1\% | 1.3\% | 0.2\% | 0.0\% | 22.5\% | 40.8\% | 9.5\% |
| 83 | 0.0\% | 0.5\% | 42.1\% | 2.2\% | 0.0\% | 0.7\% | 12.1\% | 28.4\% | 14.2\% |
| 84 | 0.0\% | 3.4\% | 38.7\% | 0.0\% | 1.8\% | 0.6\% | 8.4\% | 36.7\% | 10.4\% |
| 85 | 0.0\% | 0.3\% | 23.6\% | 0.0\% | 0.3\% | 1.1\% | 22.6\% | 45.3\% | 7.0\% |
| 86 | 0.0\% | 3.7\% | 26.9\% | 2.5\% | 2.1\% | 3.3\% | 4.1\% | 47.1\% | 10.3\% |
| 87 | 0.0\% | 0.0\% | 9.8\% | 0.0\% | 0.0\% | 0.0\% | 17.4\% | 47.8\% | 25.0\% |
| 88 | 0.0\% | 1.1\% | 27.4\% | 1.1\% | 2.2\% | 0.9\% | 20.2\% | 36.7\% | 10.7\% |
| 89 | 0.0\% | 0.2\% | 17.2\% | 0.5\% | 0.5\% | 1.2\% | 29.3\% | 41.2\% | 9.9\% |
| 90 | 0.0\% | 1.0\% | 23.8\% | 0.9\% | 0.8\% | 2.0\% | 19.4\% | 34.4\% | 17.7\% |
| 91 | 0.0\% | 0.5\% | 17.1\% | 0.3\% | 0.5\% | 1.3\% | 21.8\% | 44.3\% | 14.4\% |
| 92 | 0.0\% | 0.4\% | 17.6\% | 1.0\% | 0.7\% | 2.1\% | 39.1\% | 21.6\% | 17.5\% |
| 93 | 0.0\% | 0.0\% | 25.6\% | 0.0\% | 0.4\% | 2.6\% | 25.4\% | 30.9\% | 15.4\% |
| (79-93) | 0.0\% | 1.0\% | 25.3\% | 1.1\% | 1.1\% | 1.1\% | 21.2\% | 35.7\% | 13.7\% |
| (85-93) | 0.0\% | 0.8\% | 21.0\% | 0.7\% | 0.8\% | 1.6\% | 22.1\% | 38.8\% | 14.2\% |

Distribution of Total Mortalities

| Catch Year | -Fisheries with <br> All All <br> Alaska Nth/Cent |  | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | $\qquad$ | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 0.0\% | 1.2\% | 30.6\% | 1.5\% | 2.7\% | 0.1\% | 21.6\% | 26.1\% | 16.1\% |
| 80 | 0.1\% | 0.8\% | 29.8\% | 2.7\% | 1.0\% | 0.1\% | 28.6\% | 24.7\% | 12.2\% |
| 81 | 0.0\% | 0.5\% | 26.1\% | 1.6\% | 2.2\% | 0.2\% | 30.3\% | 23.9\% | 15.3\% |
| 82 | 0.0\% | 0.6\% | 25.5\% | 1.2\% | 0.2\% | 0.0\% | 25.3\% | 38.4\% | 8.9\% |
| 83 | 0.0\% | 0.6\% | 42.4\% | 2.4\% | 0.0\% | 0.6\% | 12.5\% | 25.5\% | 16.0\% |
| 84 | 0.0\% | 3.2\% | 36.0\% | 0.0\% | 1.6\% | 0.5\% | 8.0\% | 32.9\% | 17.7\% |
| 85 | 0.0\% | 0.2\% | 24.1\% | 0.0\% | 0.2\% | 1.0\% | 25.5\% | 42.5\% | 6.5\% |
| 86 | 0.0\% | 3.8\% | 27.9\% | 2.6\% | 2.3\% | 3.4\% | 4.5\% | 45.3\% | 10.6\% |
| 87 | 0.0\% | 0.0\% | 11.9\% | 0.0\% | 0.0\% | 0.0\% | 18.7\% | 45.5\% | 24.6\% |
| 88 | 0.0\% | 1.3\% | 30.7\% | 1.3\% | 1.7\% | 1.0\% | 20.3\% | 30.7\% | 13.2\% |
| 89 | 0.0\% | 0.3\% | 19.2\% | 0.8\% | 0.5\% | 1.1\% | 31.2\% | 36.5\% | 10.4\% |
| 90 | 0.0\% | 1.1\% | 25.8\% | 1.3\% | 0.8\% | 2.0\% | 20.4\% | 29.8\% | 18.9\% |
| 91 | 0.0\% | 0.5\% | 19.1\% | 0.5\% | 0.5\% | 1.2\% | 23.4\% | 39.5\% | 15.2\% |
| 92 | 0.0\% | 0.5\% | 19.6\% | 1.2\% | 0.6\% | 1.8\% | 40.4\% | 19.1\% | 16.8\% |
| 93 | 0.0\% | 0.0\% | 27.5\% | 0.0\% | 0.3\% | 2.6\% | 26.7\% | 27.2\% | 15.5\% |
| (79-93) | 0.0\% | 1.0\% | 26.4\% | 1.1\% | 1.0\% | 1.0\% | 22.5\% | 32.5\% | 14.5\% |
| (85-93) | 0.0\% | 0.8\% | 22.9\% | 0.9\% | 0.8\% | 1.6\% | 23.5\% | 35.1\% | 14.6\% |

## Stock: Bonneville Tule

Distribution of Reported Catch

| Catch Year | Fish All Alaska | heries with All Nth/Cent | $\begin{aligned} & \text { ceilings- } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 80 | 1.3\% | 2.0\% | 26.2\% | 1.0\% | 2.5\% | 1.0\% | 29.5\% | 10.9\% | 25.5\% |
| 81 | 0.0\% | 1.1\% | 36.4\% | 5.5\% | 4.3\% | 0.0\% | 37.2\% | 3.6\% | 11.8\% |
| 82 | 0.0\% | 1.7\% | 45.5\% | 0.0\% | 0.8\% | 0.9\% | 11.8\% | 31.4\% | 8.0\% |
| 83 | 0.0\% | 4.4\% | 54.5\% | 4.2\% | 0.8\% | 0.5\% | 14.5\% | 9.9\% | 11.0\% |
| 84 | 0.0\% | 7.4\% | 51.6\% | 0.0\% | 3.2\% | 0.0\% | 8.3\% | 23.8\% | 5.7\% |
| 85 | 0.0\% | 1.1\% | 53.7\% | 0.0\% | 2.6\% | 2.0\% | 23.5\% | 9.9\% | 7.2\% |
| 86 | 0.0\% | 0.0\% | 8.1\% | 4.4\% | 14.6\% | 5.7\% | 3.7\% | 39.2\% | 24.4\% |
| 87 | 0.0\% | 2.7\% | 33.8\% | 0.7\% | 0.3\% | 1.1\% | 21.7\% | 28.7\% | 11.1\% |
| (80-87) | 0.2\% | 2.5\% | 38.7\% | 2.0\% | 3.6\% | 1.4\% | 18.8\% | 19.7\% | 13.1\% |
| (85-93) | 0.0\% | 1.2\% | 31.9\% | 1.7\% | 5.8\% | 2.9\% | 16.3\% | 25.9\% | 14.2\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with ceilings-_All All AllAlaska Nth/Cent Troll Geo St |  |  |  | Canada Net | Canada Sport | fisher U.S. Troll | U.S. Net | $\begin{aligned} & \text { U.S. } \\ & \text { Sport } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 80 | 0.9\% | 1.9\% | 31.2\% | 0.7\% | 2.4\% | 0.9\% | 31.9\% | 8.3\% | 21.8\% |
| 81 | 0.0\% | 1.1\% | 35.9\% | 4.8\% | 3.8\% | 0.0\% | 40.2\% | 3.4\% | 10.8\% |
| 82 | 0.0\% | 1.6\% | 47.1\% | 0.0\% | 0.7\% | 0.9\% | 13.3\% | 28.2\% | 8.1\% |
| 83 | 0.0\% | 4.6\% | 54.5\% | 4.1\% | 0.7\% | 0.5\% | 15.4\% | 9.2\% | 11.0\% |
| 84 | 0.0\% | 7.4\% | 51.4\% | 0.0\% | 3.1\% | 0.0\% | 8.5\% | 23.0\% | 6.6\% |
| 85 | 0.0\% | 1.0\% | 53.6\% | 0.0\% | 2.3\% | 1.8\% | 25.9\% | 9.0\% | 6.5\% |
| 86 | 0.0\% | 0.0\% | 4.4\% | 3.9\% | 6.9\% | 3.9\% | 2.0\% | 21.3\% | 57.6\% |
| 87 | 0.0\% | 2.8\% | 35.9\% | 0.6\% | 0.3\% | 1.0\% | 21.1\% | 26.8\% | 11.6\% |
| (80-87) | 0.1\% | 2.6\% | 39.2\% | 1.8\% | 2.5\% | 1.1\% | 19.8\% | 16.1\% | 16.7\% |
| (85-93) | 0.0\% | 1.3\% | 31.3\% | 1.5\% | 3.1\% | 2.2\% | 16.4\% | 19.0\% | 25.2\% |

Stock: Stayton Pond Tule

Distribution of Reported Catch

| Catch Year | $\begin{array}{r} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{array}$ | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \text { Geo St } \end{gathered}$ | Canada Net | - Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.0\% | 3.0\% | 33.3\% | 1.3\% | 0.4\% | 0.6\% | 27.9\% | 20.4\% | 13.1\% |
| 83 | 0.0\% | 4.0\% | 50.3\% | 2.1\% | 0.8\% | 0.7\% | 18.1\% | 10.4\% | 13.5\% |
| 84 | 0.0\% | 2.8\% | 71.0\% | 2.5\% | 1.5\% | 0.5\% | 7.1\% | 10.3\% | 4.3\% |
| 85 | 0.0\% | 2.7\% | 45.6\% | 2.7\% | 1.8\% | 0.9\% | 29.4\% | 5.5\% | 11.5\% |
| 86 | 0.2\% | 2.6\% | 23.2\% | 5.6\% | 13.0\% | 4.4\% | 20.2\% | 12.7\% | 18.1\% |
| 87 | 0.0\% | 1.9\% | 35.6\% | 0.8\% | 0.3\% | 2.1\% | 21.2\% | 24.7\% | 13.5\% |
| 88 | 0.6\% | 0.5\% | 42.8\% | 0.0\% | 0.0\% | 1.4\% | 19.2\% | 31.5\% | 4.0\% |
| 89 | 0.0\% | 0.0\% | 27.5\% | 0.0\% | 3.9\% | 0.0\% | 47.4\% | 10.8\% | 10.4\% |
| 90 | 0.0\% | 0.5\% | 40.3\% | 0.0\% | 3.3\% | 0.0\% | 32.8\% | 0.7\% | 22.4\% |
| 91 | 0.0\% | 0.5\% | 24.5\% | 1.7\% | 5.6\% | 3.6\% | 22.2\% | 5.6\% | 36.3\% |
| 92 | 0.0\% | 0.8\% | 27.5\% | 0.0\% | 1.6\% | 2.2\% | 47.9\% | 1.3\% | 18.7\% |
| 93 | 0.0\% | 0.0\% | 34.5\% | 0.0\% | 0.0\% | 3.0\% | 37.1\% | 4.0\% | 21.3\% |
| (82-93) | 0.1\% | 1.6\% | 38.0\% | 1.4\% | 2.7\% | 1.6\% | 27.5\% | 11.5\% | 15.6\% |
| (85-93) | 0.1\% | 1.0\% | 33.5\% | 1.2\% | 3.3\% | 2.0\% | 30.8\% | 10.8\% | 17.4\% |

Distribution of Total Mortalities

| Catch Year | -Fisheries with All All Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo St } \end{array}$ | Canada Net | - Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 82 | 0.0\% | 3.0\% | 33.7\% | 1.5\% | 0.3\% | 0.5\% | 28.5\% | 19.7\% | 12.7\% |
| 83 | 0.0\% | 3.9\% | 49.7\% | 2.2\% | 0.7\% | 0.7\% | 18.7\% | 9.7\% | 14.3\% |
| 84 | 0.0\% | 2.8\% | 70.9\% | 2.4\% | 1.4\% | 0.4\% | 7.4\% | 9.7\% | 4.9\% |
| 85 | 0.0\% | 2.4\% | 45.5\% | 2.5\% | 1.6\% | 0.8\% | 31.1\% | 5.4\% | 10.8\% |
| 86 | 0.3\% | 2.5\% | 17.7\% | 6.4\% | 8.7\% | 4.0\% | 15.6\% | 9.2\% | 35.8\% |
| 87 | 0.0\% | 2.2\% | 41.2\% | 0.6\% | 0.2\% | 1.6\% | 20.9\% | 20.2\% | 13.1\% |
| 88 | 0.7\% | 0.5\% | 46.0\% | 0.0\% | 0.0\% | 1.3\% | 18.9\% | 28.9\% | 3.7\% |
| 89 | 0.0\% | 0.0\% | 28.8\% | 0.0\% | 3.5\% | 0.0\% | 48.4\% | 9.2\% | 10.2\% |
| 90 | 0.0\% | 0.4\% | 42.0\% | 0.0\% | 2.9\% | 0.0\% | 33.0\% | 0.6\% | 21.1\% |
| 91 | 0.0\% | 0.5\% | 23.6\% | 6.3\% | 4.5\% | 3.5\% | 21.3\% | 4.6\% | 35.7\% |
| 92 | 0.0\% | 0.9\% | 29.7\% | 0.0\% | 1.3\% | 1.8\% | 47.6\% | 1.1\% | 17.6\% |
| 93 | 0.0\% | 0.0\% | 35.3\% | 0.0\% | 0.0\% | 2.8\% | 36.6\% | 3.8\% | 21.4\% |
| (82-93) | 0.1\% | 1.6\% | 38.7\% | 1.8\% | 2.1\% | 1.5\% | 27.3\% | 10.2\% | 16.8\% |
| (85-93) | 0.1\% | 1.1\% | 34.4\% | 1.8\% | 2.5\% | 1.8\% | 30.4\% | 9.2\% | 18.8\% |

## Stock: Columbia River Upriver Bright

Distribution of Reported Catch

| Catch Year | $\qquad$ Fisheries with All All Alaska Nth/Cent |  | ceilings WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \mathrm{Geo} \end{array}$ | Canada | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 27.3\% | 20.5\% | 15.8\% | 0.6\% | 0.9\% | 0.0\% | 1.6\% | 30.7\% | 2.5\% |
| 80 | 44.2\% | 20.0\% | 14.7\% | 2.0\% | 0.4\% | 0.0\% | 2.2\% | 12.9\% | 3.6\% |
| 81 | 47.6\% | 23.3\% | 11.1\% | 1.0\% | 1.4\% | 0.5\% | 1.5\% | 10.7\% | 2.9\% |
| 82 | 34.2\% | 23.8\% | 22.1\% | 0.0\% | 2.1\% | 0.0\% | 2.8\% | 12.0\% | 3.0\% |
| 83 | 36.7\% | 35.9\% | 7.9\% | 0.6\% | 0.2\% | 0.0\% | 0.9\% | 17.9\% | 0.0\% |
| 84 | 31.5\% | 22.2\% | 13.1\% | 0.3\% | 1.4\% | 0.4\% | 0.3\% | 27.9\% | 3.0\% |
| 85 | 16.4\% | 15.8\% | 11.4\% | 0.1\% | 1.7\% | 0.1\% | 0.8\% | 47.3\% | 6.5\% |
| 86 | 19.3\% | 15.3\% | 9.4\% | 0.2\% | 0.2\% | 0.1\% | 1.1\% | 51.3\% | 3.2\% |
| 87 | 19.9\% | 18.8\% | 9.9\% | 0.0\% | 0.2\% | 0.3\% | 1.7\% | 44.6\% | 4.7\% |
| 88 | 14.2\% | 10.3\% | 13.4\% | 0.0\% | 0.1\% | 0.0\% | 2.5\% | 56.6\% | 2.8\% |
| 89 | 15.0\% | 19.6\% | 9.4\% | 0.0\% | 0.9\% | 0.0\% | 1.5\% | 51.3\% | 2.3\% |
| 90 | 20.1\% | 15.8\% | 11.6\% | 0.0\% | 0.0\% | 0.0\% | 1.8\% | 47.5\% | 3.3\% |
| 91 | 15.7\% | 12.2\% | 19.2\% | 0.0\% | 0.0\% | 0.0\% | 1.9\% | 41.6\% | 9.4\% |
| 92 | 10.2\% | 11.4\% | 24.7\% | 0.0\% | 1.2\% | 1.6\% | 0.0\% | 36.4\% | 14.4\% |
| 93 | 19.7\% | 13.8\% | 30.2\% | 0.0\% | 0.0\% | 0.0\% | 2.9\% | 27.2\% | 6.1\% |
| (79-93) | 24.8\% | 18.6\% | 14.9\% | 0.3\% | 0.7\% | 0.2\% | 1.6\% | 34.4\% | 4.5\% |
| (85-93) | 16.7\% | 14.8\% | 15.5\% | 0.0\% | 0.5\% | 0.2\% | 1.6\% | 44.9\% | 5.9\% |

Distribution of Total Mortalities

| Catch Year | Fisheries withAll AllAlaska Nth/Cent |  | ceilings WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | $\qquad$ | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 79 | 28.1\% | 20.4\% | 15.9\% | 0.6\% | 0.9\% | 0.0\% | 1.7\% | 29.7\% | 2.5\% |
| 80 | 45.2\% | 19.8\% | 14.6\% | 1.9\% | 0.4\% | 0.0\% | 2.2\% | 12.3\% | 3.5\% |
| 81 | 49.1\% | 22.7\% | 10.9\% | 0.9\% | 1.4\% | 0.5\% | 1.5\% | 10.1\% | 2.8\% |
| 82 | 42.2\% | 21.7\% | 19.6\% | 0.0\% | 1.7\% | 0.0\% | 2.8\% | 9.4\% | 2.5\% |
| 83 | 45.1\% | 32.6\% | 7.2\% | 0.5\% | 0.1\% | 0.0\% | 0.9\% | 13.7\% | 0.0\% |
| 84 | 38.8\% | 21.2\% | 12.6\% | 0.3\% | 1.1\% | 0.4\% | 0.3\% | 22.0\% | 3.1\% |
| 85 | 22.4\% | 15.1\% | 11.0\% | 0.1\% | 1.5\% | 0.1\% | 0.8\% | 42.3\% | 6.7\% |
| 86 | 22.8\% | 15.0\% | 9.6\% | 0.2\% | 0.2\% | 0.1\% | 1.2\% | 47.5\% | 3.3\% |
| 87 | 26.2\% | 19.1\% | 10.4\% | 0.0\% | 0.1\% | 0.2\% | 1.7\% | 38.1\% | 4.2\% |
| 88 | 17.7\% | 10.9\% | 14.5\% | 0.0\% | 0.1\% | 0.0\% | 2.5\% | 51.7\% | 2.6\% |
| 89 | 19.1\% | 19.6\% | 9.5\% | 0.0\% | 0.8\% | 0.0\% | 1.5\% | 47.4\% | 2.2\% |
| 90 | 23.5\% | 16.2\% | 11.7\% | 0.0\% | 0.0\% | 0.0\% | 1.8\% | 43.6\% | 3.1\% |
| 91 | 22.1\% | 12.7\% | 19.6\% | 0.0\% | 0.0\% | 0.0\% | 1.9\% | 35.3\% | 8.5\% |
| 92 | 14.8\% | 11.7\% | 25.5\% | 0.0\% | 1.1\% | 1.6\% | 0.0\% | 31.4\% | 13.9\% |
| 93 | 24.1\% | 14.1\% | 30.7\% | 0.0\% | 0.0\% | 0.0\% | 2.8\% | 23.0\% | 5.4\% |
| (79-93) | 29.4\% | 18.2\% | 14.9\% | 0.3\% | 0.6\% | 0.2\% | 1.6\% | 30.5\% | 4.3\% |
| (85-93) | 21.4\% | 14.9\% | 15.8\% | 0.0\% | 0.4\% | 0.2\% | 1.6\% | 40.0\% | 5.5\% |

## Stock: Hanford Wild Brights

Distribution of Reported Catch

| Catch Year | -Fisheries with <br> All All <br> Alaska Nth/Cent |  | ceiling WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | Canada Sport | fisher U.S. <br> Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 90 | 16.4\% | 9.1\% | 15.0\% | 0.0\% | 0.5\% | 1.5\% | 0.8\% | 44.3\% | 12.4\% |
| 91 | 18.8\% | 18.7\% | 8.6\% | 1.5\% | 0.0\% | 0.0\% | 1.9\% | 42.5\% | 8.1\% |
| 92 | 30.8\% | 9.3\% | 24.8\% | 0.0\% | 0.0\% | 0.0\% | 1.6\% | 28.6\% | 4.9\% |
| 93 | 30.2\% | 7.5\% | 9.8\% | 0.0\% | 3.3\% | 1.8\% | 5.8\% | 29.2\% | 12.5\% |
| (90-93) | 24.0\% | 11.2\% | 14.6\% | 0.4\% | 0.9\% | 0.8\% | 2.5\% | 36.1\% | 9.4\% |
| (90-93) | 24.0\% | 11.2\% | 14.6\% | 0.4\% | 0.9\% | 0.8\% | 2.5\% | 36.1\% | 9.4\% |

Distribution of Total Mortalities

| Catch Year |  | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | $\begin{gathered} \text { U.S. } \\ \text { Net } \end{gathered}$ | U.s. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 90 | 21.7\% | 10.0\% | 14.7\% | 0.0\% | 0.4\% | 1.3\% | 1.2\% | 39.2\% | 11.4\% |
| 91 | 23.8\% | 18.7\% | 8.6\% | 1.7\% | 0.0\% | 0.0\% | 1.9\% | 38.0\% | 7.3\% |
| 92 | 39.3\% | 9.5\% | 22.8\% | 0.0\% | 0.0\% | 0.0\% | 1.4\% | 22.8\% | 4.2\% |
| 93 | 36.3\% | 7.3\% | 10.4\% | 0.0\% | 2.8\% | 1.5\% | 5.4\% | 25.2\% | 11.0\% |
| (90-93) | 30.3\% | 11.4\% | 14.1\% | 0.4\% | 0.8\% | 0.7\% | 2.5\% | 31.3\% | 8.5\% |
| (90-93) | 30.3\% | 11.4\% | 14.1\% | 0.4\% | 0.8\% | 0.7\% | 2.5\% | 31.3\% | 8.5\% |

## Stock: Lewis River Wild

Distribution of Reported Catch

| Catch Year | $\qquad$ Fish <br> All <br> Alaska | eries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 16.1\% | 15.5\% | 14.3\% | 0.0\% | 1.7\% | 0.0\% | 4.8\% | 9.9\% | 37.5\% |
| 82 | 13.8\% | 9.0\% | 18.1\% | 0.7\% | 1.3\% | 0.0\% | 8.1\% | 10.4\% | 38.7\% |
| 86 | 9.7\% | 8.0\% | 11.0\% | 0.0\% | 0.0\% | 4.2\% | 4.8\% | 42.6\% | 19.7\% |
| 87 | 6.8\% | 10.5\% | 14.5\% | 0.0\% | 0.0\% | 0.7\% | 4.7\% | 44.6\% | 18.1\% |
| 88 | 7.0\% | 5.6\% | 14.6\% | 0.0\% | 0.2\% | 0.0\% | 7.4\% | 37.9\% | 27.4\% |
| 89 | 6.4\% | 15.9\% | 14.3\% | 0.0\% | 2.3\% | 0.9\% | 12.9\% | 26.5\% | 20.8\% |
| 90 | 14.9\% | 9.5\% | 36.4\% | 0.0\% | 0.0\% | 1.7\% | 11.5\% | 9.7\% | 16.2\% |
| 91 | 14.6\% | 11.9\% | 13.6\% | 0.0\% | 1.6\% | 0.0\% | 5.3\% | 36.4\% | 16.6\% |
| 92 | 4.7\% | 13.6\% | 13.5\% | 0.0\% | 0.0\% | 0.0\% | 6.3\% | 9.9\% | 52.0\% |
| 93 | 12.3\% | 13.8\% | 20.1\% | 0.0\% | 2.7\% | 0.0\% | 2.0\% | 16.5\% | 32.6\% |
| (81-93) | 10.6\% | 11.3\% | 17.1\% | 0.1\% | 1.0\% | 0.8\% | 6.8\% | 24.4\% | 28.0\% |
| (85-93) | 9.5\% | 11.1\% | 17.3\% | 0.0\% | 0.9\% | 0.9\% | 6.9\% | 28.0\% | 25.4\% |

Distribution of Total Mortalities

| Catch Year | Fisheries with All All Alaska Nth/Cent |  | $\begin{aligned} & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{gathered} \text { All } \\ \text { Geo } 5 \text { ( } \end{gathered}$ | Canada | $\qquad$ Other <br> Canada Sport | fisher U.S. Troll | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 18.0\% | 15.0\% | 15.3\% | 0.0\% | 1.6\% | 0.0\% | 5.4\% | 9.2\% | 35.6\% |
| 82 | 16.8\% | 9.0\% | 17.7\% | 0.7\% | 1.2\% | 0.0\% | 8.0\% | 9.7\% | 37.0\% |
| 86 | 12.0\% | 8.6\% | 12.7\% | 0.0\% | 0.0\% | 3.8\% | 5.3\% | 38.9\% | 18.8\% |
| 87 | 9.2\% | 11.1\% | 15.6\% | 0.0\% | 0.0\% | 0.7\% | 4.7\% | 40.9\% | 17.8\% |
| 88 | 8.1\% | 6.3\% | 16.8\% | 0.0\% | 0.2\% | 0.0\% | 7.8\% | 34.2\% | 26.7\% |
| 89 | 8.9\% | 16.6\% | 15.1\% | 0.0\% | 2.1\% | 0.8\% | 13.0\% | 23.9\% | 19.6\% |
| 90 | 17.5\% | 9.6\% | 36.7\% | 0.0\% | 0.0\% | 1.6\% | 11.3\% | 8.6\% | 14.8\% |
| 91 | 19.3\% | 11.7\% | 13.6\% | 0.0\% | 1.4\% | 0.0\% | 5.1\% | 32.9\% | 16.0\% |
| 92 | 6.4\% | 14.3\% | 13.9\% | 0.0\% | 0.0\% | 0.0\% | 6.4\% | 9.3\% | 49.7\% |
| 93 | 14.4\% | 14.2\% | 20.3\% | 0.0\% | 2.5\% | 0.0\% | 3.7\% | 14.9\% | 29.9\% |
| (81-93) | 13.1\% | 11.6\% | 17.8\% | 0.1\% | 0.9\% | 0.7\% | 7.1\% | 22.2\% | 26.6\% |
| (85-93) | 12.0\% | 11.5\% | 18.1\% | 0.0\% | 0.8\% | 0.9\% | 7.2\% | 25.5\% | 24.2\% |

## Stock: Lyons Ferry

Distribution of Reported Catch

| Catch Year | -Fisheries wit $\underset{\text { Alaska Nth/Cent }}{\text { All }}$ Alaska Nth/Cent |  | $\begin{aligned} & \text { ceitin } \\ & \text { WCVI } \\ & \text { Troll } \end{aligned}$ | $\begin{gathered} \text { All } \\ \text { Geo } \mathrm{St} \end{gathered}$ | Canada | $\begin{aligned} & \text { Other } \\ & \text { Canada } \\ & \text { Sport } \end{aligned}$ | fisher U.S. Troll | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 88 | 4.3\% | 6.5\% | 26.4\% | 0.0\% | 0.3\% | 0.0\% | 15.4\% | 42.5\% | 4.7\% |
| 89 | 4.8\% | 9.0\% | 21.5\% | 0.0\% | 1.6\% | 0.8\% | 16.6\% | 36.7\% | 9.0\% |
| 90 | 8.0\% | 5.6\% | 23.2\% | 0.0\% | 0.0\% | 0.0\% | 13.5\% | 41.4\% | 8.3\% |
| 91 | 11.3\% | 13.8\% | 22.6\% | 0.0\% | 2.1\% | 0.0\% | 10.2\% | 32.7\% | 7.3\% |
| 92 | 5.8\% | 13.5\% | 29.1\% | 0.0\% | 3.0\% | 5.4\% | 16.1\% | 22.3\% | 4.8\% |
| 93 | 7.7\% | 14.6\% | 23.6\% | 0.0\% | 2.6\% | 0.0\% | 17.4\% | 30.4\% | 3.7\% |
| (88-93) | 7.0\% | 10.5\% | 24.4\% | 0.0\% | 1.6\% | 1.0\% | 14.8\% | 34.4\% | 6.3\% |
| (88-93) | 7.0\% | 10.5\% | 24.4\% | 0.0\% | 1.6\% | 1.0\% | 14.8\% | 34.4\% | 6.3\% |

Distribution of Total Mortalities

| Catch <br> Year |  | heries with All Nth/Cent | ceilings WCVI Troll | $\begin{array}{r} \mathrm{All} \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | Other <br> Canada Sport |  | U.S. Net | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 88 | 5.4\% | 7.3\% | 29.0\% | 0.0\% | 0.3\% | 0.1\% | 15.8\% | 37.4\% | 4.7\% |
| 89 | 6.5\% | 9.8\% | 23.3\% | 0.0\% | 1.4\% | 0.7\% | 16.9\% | 33.0\% | 8.3\% |
| 90 | 9.5\% | 5.8\% | 23.8\% | 0.0\% | 0.0\% | 0.0\% | 13.5\% | 39.4\% | 8.0\% |
| 91 | 15.1\% | 14.1\% | 22.9\% | 0.0\% | 2.0\% | 0.0\% | 10.1\% | 28.9\% | 6.9\% |
| 92 | 9.7\% | 14.0\% | 29.7\% | 0.0\% | 2.6\% | 5.0\% | 15.6\% | 18.4\% | 5.0\% |
| 93 | 9.3\% | 14.2\% | 24.0\% | 0.0\% | 2.4\% | 0.0\% | 17.4\% | 28.9\% | 3.7\% |
| (88-93) | 9.2\% | 10.9\% | 25.5\% | 0.0\% | 1.5\% | 1.0\% | 14.9\% | 31.0\% | 6.1\% |
| (88-93) | 9.2\% | 10.9\% | 25.5\% | 0.0\% | 1.5\% | 1.0\% | 14.9\% | 31.0\% | 6.1\% |

## Stock: Willamette Spring

Distribution of Reported Catch

| Catch Year | Fisheries with <br> Alaska Nth/Cent |  | ciling WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | $\qquad$ Other <br> Canada Sport | fisher U.S. Troll | U.S. | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 80 | 26.8\% | 29.5\% | 11.9\% | 0.8\% | 0.0\% | 0.0\% | 3.0\% | 0.2\% | 27.8\% |
| 81 | 12.5\% | 20.4\% | 4.0\% | 0.4\% | 0.0\% | 0.0\% | 1.7\% | 21.4\% | 39.7\% |
| 82 | 12.4\% | 16.0\% | 11.3\% | 0.0\% | 0.1\% | 0.0\% | 2.6\% | 10.2\% | 47.4\% |
| 83 | 20.9\% | 17.6\% | 6.1\% | 1.3\% | 0.0\% | 0.0\% | 4.0\% | 11.3\% | 38.9\% |
| 84 | 12.0\% | 8.2\% | 5.4\% | 0.2\% | 0.3\% | 0.0\% | 2.6\% | 17.7\% | 53.6\% |
| 85 | 16.7\% | 2.9\% | 1.8\% | 0.4\% | 0.0\% | 0.0\% | 0.8\% | 36.2\% | 41.2\% |
| 86 | 5.3\% | 18.1\% | 6.0\% | 0.0\% | 0.0\% | 1.3\% | 0.5\% | 32.2\% | 36.7\% |
| 87 | 21.7\% | 15.0\% | 3.5\% | 0.0\% | 0.0\% | 0.4\% | 4.3\% | 9.0\% | 45.9\% |
| 88 | 15.4\% | 9.5\% | 4.5\% | 0.0\% | 0.0\% | 0.0\% | 3.1\% | 16.2\% | 51.5\% |
| 89 | 10.5\% | 3.9\% | 3.5\% | 1.0\% | 0.2\% | 0.2\% | 3.4\% | 30.4\% | 46.8\% |
| 90 | 12.9\% | 3.7\% | 3.2\% | 0.0\% | 0.1\% | 0.3\% | 1.9\% | 31.9\% | 45.9\% |
| 91 | 8.8\% | 3.2\% | 0.4\% | 0.3\% | 0.2\% | 0.2\% | 1.2\% | 12.3\% | 73.5\% |
| 92 | 12.5\% | 2.5\% | 5.9\% | 0.0\% | 0.1\% | 0.2\% | 5.4\% | 14.3\% | 59.4\% |
| 93 | 18.2\% | 2.3\% | 3.2\% | 0.3\% | 0.0\% | 0.2\% | 4.1\% | 2.0\% | 69.8\% |
| (80-93) | 14.8\% | 10.9\% | 5.1\% | 0.3\% | 0.1\% | 0.2\% | 2.8\% | 17.5\% | 48.4\% |
| (85-93) | 13.6\% | 6.8\% | 3.6\% | 0.2\% | 0.1\% | 0.3\% | 2.7\% | 20.5\% | 52.3\% |

Distribution of Total Mortalities

| Catch Year | Fisheries withAll AllAlaska Nth/Cent |  | eiling WCVI Troll | $\begin{array}{r} \text { All } \\ \text { Geo } \mathrm{St} \end{array}$ | Canada Net | Canada Sport | fisher U.S. Troll | U.S. Net | U.s. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 80 | 26.6\% | 27.9\% | 11.1\% | 0.6\% | 0.0\% | 0.0\% | 2.9\% | 0.6\% | 30.2\% |
| 81 | 15.4\% | 20.9\% | 4.2\% | 0.3\% | 0.0\% | 0.0\% | 1.8\% | 18.4\% | 39.0\% |
| 82 | 15.5\% | 15.8\% | 11.5\% | 0.0\% | 0.1\% | 0.0\% | 2.8\% | 8.8\% | 45.6\% |
| 83 | 24.7\% | 17.1\% | 5.8\% | 1.1\% | 0.0\% | 0.0\% | 4.0\% | 9.5\% | 37.6\% |
| 84 | 13.8\% | 8.4\% | 5.4\% | 0.2\% | 0.3\% | 0.0\% | 2.5\% | 15.3\% | 54.2\% |
| 85 | 23.1\% | 2.7\% | 1.7\% | 0.3\% | 0.0\% | 0.0\% | 0.8\% | 31.2\% | 40.1\% |
| 86 | 7.1\% | 20.5\% | 6.9\% | 0.0\% | 0.0\% | 1.6\% | 0.7\% | 29.2\% | 33.9\% |
| 87 | 31.4\% | 14.4\% | 3.7\% | 0.0\% | 0.0\% | 0.4\% | 4.1\% | 6.0\% | 40.1\% |
| 88 | 19.4\% | 10.5\% | 4.7\% | 0.0\% | 0.0\% | 0.0\% | 2.9\% | 13.5\% | 49.0\% |
| 89 | 13.7\% | 4.4\% | 3.8\% | 1.4\% | 0.2\% | 0.2\% | 3.4\% | 27.0\% | 45.9\% |
| 90 | 19.2\% | 4.5\% | 3.9\% | 0.0\% | 0.1\% | 0.3\% | 2.1\% | 27.1\% | 42.7\% |
| 91 | 13.1\% | 3.4\% | 0.5\% | 0.4\% | 0.1\% | 0.1\% | 1.3\% | 10.8\% | 70.3\% |
| 92 | 20.8\% | 2.7\% | 6.2\% | 0.0\% | 0.1\% | 0.2\% | 5.4\% | 11.4\% | 53.4\% |
| 93 | 23.3\% | 2.7\% | 3.2\% | 0.6\% | 0.0\% | 0.2\% | 4.2\% | 1.6\% | 64.1\% |
| (80-93) | 19.1\% | 11.1\% | 5.2\% | 0.4\% | 0.1\% | 0.2\% | 2.8\% | 15.0\% | 46.2\% |
| (85-93) | 19.0\% | 7.3\% | 3.8\% | 0.3\% | 0.1\% | 0.3\% | 2.8\% | 17.5\% | 48.8\% |

## Stock: Salmon River

Distribution of Reported Catch

| Catch Year | $\begin{gathered} \text { Fish } \\ \text { All } \\ \text { Alaska } \end{gathered}$ | eries with All Nth/Cent | ceilings WCVI Troll | $\begin{gathered} \text { All } \\ \text { Geo St } \end{gathered}$ | Canada Net | Other <br> Canada Sport |  | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 22.5\% | 44.3\% | 5.5\% | 0.0\% | 0.0\% | 1.3\% | 2.0\% | 0.0\% | 24.8\% |
| 82 | 22.5\% | 27.2\% | 11.8\% | 0.0\% | 0.0\% | 0.0\% | 2.7\% | 0.0\% | 35.8\% |
| 83 | 31.4\% | 31.1\% | 13.5\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 23.6\% |
| 84 | 19.0\% | 39.8\% | 5.8\% | 0.0\% | 1.4\% | 0.0\% | 0.2\% | 0.7\% | 33.1\% |
| 85 | 34.2\% | 31.1\% | 2.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 32.2\% |
| 86 | 38.2\% | 29.3\% | 4.7\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 28.3\% |
| 87 | 19.4\% | 27.5\% | 3.7\% | 0.0\% | 0.0\% | 0.0\% | 3.7\% | 0.0\% | 45.8\% |
| 88 | 24.2\% | 21.0\% | 9.7\% | 0.0\% | 0.0\% | 0.0\% | 2.0\% | 0.0\% | 42.8\% |
| 89 | 15.7\% | 20.8\% | 6.7\% | 0.0\% | 1.4\% | 0.0\% | 5.3\% | 0.0\% | 50.4\% |
| 90 | 20.0\% | 19.8\% | 11.6\% | 0.0\% | 0.4\% | 0.0\% | 4.7\% | 0.0\% | 43.7\% |
| 91 | 26.8\% | 25.2\% | 9.7\% | 0.0\% | 0.0\% | 0.0\% | 0.4\% | 0.0\% | 37.9\% |
| 92 | 6.8\% | 19.7\% | 32.6\% | 0.0\% | 0.0\% | 0.0\% | 4.2\% | 0.0\% | 36.6\% |
| 93 | 11.9\% | 23.2\% | 24.2\% | 0.0\% | 0.6\% | 0.0\% | 4.0\% | 0.0\% | 36.1\% |
| (81-93) | 22.5\% | 27.7\% | 10.9\% | 0.0\% | 0.3\% | 0.1\% | 2.2\% | 0.1\% | 36.2\% |
| (85-93) | 21.9\% | 24.2\% | 11.7\% | 0.0\% | 0.3\% | 0.0\% | 2.7\% | 0.0\% | 39.3\% |

Distribution of Total Mortalities

| Catch Year |  | heries with All Nth/Cent | ceilings <br> WCVI <br> Troll | $\begin{array}{r} \text { All } \\ \text { Geo St } \end{array}$ | Canada Net | Other <br> Canada Sport | $\begin{aligned} & \text { fisher } \\ & \text { U.S. } \\ & \text { Troll } \end{aligned}$ | $\begin{aligned} & \text { U.S. } \\ & \text { Net } \end{aligned}$ | U.S. Sport |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 81 | 24.1\% | 43.0\% | 5.9\% | 0.0\% | 0.0\% | 1.1\% | 2.0\% | 0.0\% | 24.3\% |
| 82 | 26.1\% | 26.6\% | 11.7\% | 0.0\% | 0.0\% | 0.0\% | 2.7\% | 0.0\% | 32.9\% |
| 83 | 35.7\% | 29.5\% | 12.6\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 0.0\% | 22.2\% |
| 84 | 22.1\% | 38.3\% | 5.7\% | 0.0\% | 1.3\% | 0.0\% | 0.2\% | 0.6\% | 31.8\% |
| 85 | 42.3\% | 26.8\% | 2.1\% | 0.0\% | 0.0\% | 0.0\% | 0.2\% | 0.0\% | 29.0\% |
| 86 | 40.4\% | 27.6\% | 5.5\% | 0.0\% | 0.0\% | 0.0\% | 0.7\% | 0.0\% | 25.7\% |
| 87 | 26.8\% | 27.8\% | 3.8\% | 0.0\% | 0.0\% | 0.0\% | 3.2\% | 0.0\% | 38.6\% |
| 88 | 29.9\% | 23.3\% | 10.4\% | 0.0\% | 0.0\% | 0.0\% | 2.0\% | 0.0\% | 34.5\% |
| 89 | 24.9\% | 23.6\% | 6.7\% | 0.0\% | 1.1\% | 0.0\% | 4.5\% | 0.0\% | 39.3\% |
| 90 | 25.5\% | 21.5\% | 11.2\% | 0.0\% | 0.3\% | 0.0\% | 4. $2 \%$ | 0.0\% | 37.5\% |
| 91 | 33.7\% | 23.8\% | 9.3\% | 0.0\% | 0.0\% | 0.0\% | 0.4\% | 0.0\% | 32.7\% |
| 92 | 10.0\% | 20.7\% | 31.9\% | 0.0\% | 0.0\% | 0.0\% | 4.0\% | 0.0\% | 33.4\% |
| 93 | $14.7 \%$ | 24.1\% | 24.1\% | 0.0\% | 0.4\% | 0.0\% | 3.7\% | 0.0\% | 33.0\% |
| (81-93) | 27.4\% | 27.4\% | 10.8\% | 0.0\% | 0.2\% | 0.1\% | 2.1\% | 0.0\% | 31.9\% |
| (85-93) | 27.6\% | 24.4\% | 11.7\% | 0.0\% | 0.2\% | 0.0\% | 2.6\% | 0.0\% | 33.7\% |

## APPENDIX G

## Brood Year Exploitation Rates

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Total Exploitation Rates ..... G-3

Ocean Exploitation Rates

| Stock P | Base Period | 1982 | 1983 | 1984 | Brood 1985 | Year 1986 | 1987 | 1988 | 1989 | Change from BaseAvg Percentage$82-89$ Points |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\overline{\text { Alaska Spring (SEAK Spring) }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 41\% | 37\% | 31\% | 30\% | 26\% | 45\% | 28\% | 26\%* | N/A | 31\% | -10 | -24\% |
| Incidental Mortalities | 13\% | 23\% | 19\% | 24\% | 21\% | 23\% | 28\% | 33\%* | N/A | 23\% | 10 | 77\% |
| Total Mortalities | 54\% | 60\% | 50\% | 54\% | 47\% | 69\% | 56\% | 58\%* | N/A | 54\% | 0 | 1\% |
| Robertson Creek (WCVI Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 52\% | 36\% | 25\% | 34\% | 39\% | 40\% | 44\% | 46\% | 41\%* | 40\% | -12 | -23\% |
| Incidental Mortalities | 14\% | 29\% | 54\% | 10\% | 10\% | 13\% | 17\% | 18\% | 30\%* | 18\% | 5 | 35\% |
| Total Mortalities | 66\% | 65\% | 78\% | 44\% | 49\% | 53\% | 61\% | 64\% | 71\%* | 58\% | -7 | -11\% |
| Quinsam (Upper GS Summer/Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 60\% | 44\% | 38\% | 34\% | 32\% | 37\% | 40\% | 39\%* | N/A | 38\% | -22 | -37\% |
| Incidental Mortalities | 11\% | 14\% | 31\% | 22\% | 23\% | 24\% | 28\% | 26\%* | N/A | 24\% | 13 | 114\% |
| Total Mortalities | 71\% | 57\% | 69\% | 56\% | 55\% | 61\% | 68\% | 65\%* | N/A | 62\% | -10 | -13\% |
| Big Qualicum (Lower GS Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 66\% | 53\% | 59\% | 41\% | 46\% | 44\% | 40\% | 45\% | 50\%* | 47\% | -19 | -29\% |
| Incidental Mortalities | 8\% | 15\% | 15\% | 22\% | 17\% | 21\% | 30\% | 25\% | 27\%* | 22\% | 14 | 166\% |
| Total Mortalities | 74\% | 67\% | 74\% | 63\% | 63\% | 65\% | 70\% | 70\% | 77\%* | 69\% | -5 | -7\% |
| Puntledge (Lower GS Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 69\% | 56\% | 59\% | 42\% | 73\% | 38\% | 15\% | 43\% | 42\%* | 46\% | -23 | -33\% |
| Incidental Mortalities | 7\% | 13\% | 16\% | 20\% | 14\% | 17\% | 25\% | 24\% | 24\%* | 19\% | 12 | 185\% |
| Total Mortalities | 76\% | 70\% | 76\% | 62\% | 87\% | 55\% | 40\% | 67\% | 66\%* | 65\% | -11 | -14\% |
| So. Puget Sound Fall Yearling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 72\% | N/A | N/A | N/A | N/A | 50\% | 52\% | 49\% | 45\%* | 49\% | -23 | -32\% |
| Incidental Mortalities | 12\% | N/A | N/A | N/A | N/A | 13\% | 12\% | 13\% | 19\%* | 14\% | 2 | 21\% |
| Total Mortalities | 84\% | N/A | N/A | N/A | N/A | 63\% | 65\% | 62\% | 64\%* | 63\% | -21 | -25\% |
| Squaxin Pens Fall Yearling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | N/A | N/A | N/A | N/A | 49\% | 49\% | 54\% | 56\%* | 52\% | N/A | N/A |
| Incidental Mortalities | N/A | N/A | N/A | N/A | N/A | 12\% | 16\% | 13\% | 14\%* | 14\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | N/A | N/A | 60\% | 65\% | 67\% | 70\%* | 66\% | N/A | N/A |
| Samish Fall Fingerling (North PS Summer/Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 53\% | N/A | N/A | N/A | 37\% | 42\% | 44\% | 52\% | 44\%* | 44\% | -9 | -16\% |
| Incidental Mortalities | 6\% | N/A | N/A | N/A | 8\% | 12\% | 11\% | 15\% | 15\%* | 12\% | 7 | 118\% |
| Total Mortalities | 58\% | N/A | N/A | N/A | 46\% | 54\% | 55\% | 67\% | 59\%* | 56\% | -2 | -3\% |
| George Adams Fall Fingerling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 48\% | N/A | N/A | N/A | 43\% | 53\% | 46\% | 53\% | 62\%* | 51\% | 4 | 8\% |
| Incidental Mortalities | 8\% | N/A | N/A | N/A | 10\% | 12\% | 13\% | 16\% | 18\%* | 14\% | 5 | 66\% |
| Total Mortalities | 56\% | N/A | N/A | N/A | 53\% | 65\% | 59\% | 69\% | 80\%* | 65\% | 9 | 16\% |
| So. Puget Sound Fall Fingerling (South PS Summer/Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 59\% | 51\% | 40\% | 47\% | 34\% | 42\% | 43\% | 45\% | 47\%* | 44\% | -15 | -25\% |
| Incidental Mortalities | 8\% | 11\% | 10\% | 14\% | 10\% | 11\% | 12\% | 13\% | 10\%* | 11\% | 4 | 48\% |
| Total Mortalities | 66\% | 62\% | 50\% | 61\% | 44\% | 53\% | 56\% | 58\% | 57\%* | 55\% | -11 | -17\% |
| Skagit Spring Yearling (North PS Spring) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | 68\% | 58\% | 39\% | 39\% | 46\% | 44\% | N/A | N/A | 49\% | N/A | N/A |
| Incidental Mortalities | N/A | 10\% | 10\% | 11\% | 6\% | 10\% | 13\% | N/A | N/A | 10\% | N/A | N/A |
| Total Mortalities | N/A | 78\% | 67\% | 50\% | 45\% | 56\% | 57\% | N/A | N/A | 59\% | N/A | N/A |
| Nooksack Spring Yearling (North PS Spring) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | 69\% | N/A | 47\% | N/A | 46\% | 36\% | 42\% | 39\%* | 46\% | N/A | N/A |
| Incidental Mortalities | N/A | 8\% | N/A | 9\% | N/A | 12\% | 14\% | 15\% | 20\%* | 13\% | N/A | N/A |
| Total Mortalities | N/A | 76\% | N/A | 55\% | N/A | 57\% | 50\% | 58\% | 59\%* | 59\% | N/A | N/A |
| Hoko Fall Finger ling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | N/A | N/A | N/A | 51\% | 49\% | 34\% | N/A | 25\%* | 40\% | N/A | N/A |
| Incidental Mortalities | N/A | N/A | N/A | N/A | 12\% | 13\% | 11\% | N/A | 13\%* | 13\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | N/A | 63\% | 63\% | 45\% | N/A | 38\%* | 52\% | N/A | N/A |

Ocean Exploitation Rates (continued)

| Stock Pe | Base Period | 1982 | 1983 | 1984 | Brood 1985 | $\begin{gathered} \text { Year } \\ 1986 \end{gathered}$ | 1987 | 1988 | 1989 | Change Avg 82-89 |  | \% |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| White River Spring Yearling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 43\% | 46\% | 54\% | 48\% | 45\% | 43\% | 35\% | 40\% | 36\%* | 43\% | 0 | 1\% |
| Incidental Mortalities | 6\% | 10\% | 9\% | 14\% | 11\% | 13\% | 13\% | 10\% | 9\%* | 11\% | 5 | 90\% |
| Total Mortalities | 49\% | 55\% | 64\% | 62\% | 56\% | 55\% | 48\% | 50\% | 45\%* | 54\% | 5 | 11\% |
| Sooes fall fingerling (WACO) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | N/A | N/A | N/A | 39\% | 25\% | 35\% | N/A | N/A | 33\% | N/A | N/A |
| Incidental Mortalities | N/A | N/A | N/A | N/A | 10\% | 11\% | 12\% | N/A | N/A | 11\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | N/A | 49\% | 36\% | 48\% | N/A | N/A | 44\% | N/A | N/A |
| Cowlitz Fall Tule (CR Tule) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 53\% | 39\% | 32\% | 31\% | 36\% | 30\% | 27\% | 37\% | 60\%* | 37\% | -17 | -32\% |
| Incidental Mortalities | 9\% | 7\% | 5\% | 9\% | 12\% | 13\% | 12\% | 10\% | 6\%* | 9\% | -0 | -3\% |
| Total Mortalities | 63\% | 46\% | 37\% | 40\% | 48\% | 43\% | 39\% | 47\% | 66\%* | 46\% | -17 | -27\% |
| Spring Creek Tule (CR Tule) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 53\% | 31\% | 28\% | 40\% | 47\% | 38\% | 41\% | 33\% | 44\%* | 38\% | -16 | -30\% |
| Incidental Mortalities | 12\% | 11\% | 10\% | 11\% | 9\% | 10\% | 11\% | 10\% | 13\%* | 11\% | -2 | -13\% |
| Total Mortalities | 66\% | 42\% | 38\% | 50\% | 56\% | 48\% | 52\% | 43\% | 57\%* | 48\% | -17 | -27\% |
| Stayton Pond Tule (CR Tule) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 62\% | 51\% | 52\% | 43\% | 43\% | 43\% | 41\% | 35\% | 44\%* | 44\% | -18 | -29\% |
| Incidental Mortalities | 14\% | 13\% | 11\% | 16\% | 23\% | 16\% | 10\% | 9\% | 11\%* | 14\% | 0 | 0\% |
| Total Mortalities | 75\% | 64\% | 63\% | 59\% | 66\% | 59\% | 52\% | 43\% | 55\%* | 58\% | -18 | -23\% |
| Columbia River Upriver Bright (WACO) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 32\% | 29\% | 34\% | 28\% | 22\% | 25\% | 17\% | 31\% | 30\%* | 27\% | -5 | -15\% |
| Incidental Mortalities | 7\% | 7\% | 9\% | 11\% | 17\% | 16\% | 15\% | 10\% | 6\%* | 11\% | 4 | 60\% |
| Total Mortalities | 39\% | 36\% | 42\% | 40\% | 39\% | 42\% | 32\% | 41\% | 37\%* | 39\% | -0 | -1\% |
| Lyons Ferry (WACO) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | N/A | N/A | 29\% | 29\% | 37\% | 12\% | 16\% | 24\%* | 25\% | N/A | N/A |
| Incidental Mortalities | N/A | N/A | N/A | 8\% | 7\% | 9\% | 13\% | 11\% | 7\%* | 9\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | 38\% | 37\% | 46\% | 25\% | 27\% | 30\%* | 34\% | N/A | N/A |
| Hanford Wild Brights (WACO) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | N/A | N/A | N/A | N/A | 25\% | 37\% | 23\% | 29\%* | 29\% | N/A | N/A |
| Incidental Mortalities | N/A | N/A | N/A | N/A | N/A | 7\% | 12\% | 8\% | 16\%* | 11\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | N/A | N/A | 32\% | 49\% | 31\% | 45\%* | 39\% | N/A | N/A |
| Lewis River Wild (WACO) |  |  |  |  |  |  |  |  |  |  |  |  |
| Incidental Mortalities | 6\% | 4\% | 6\% | 5\% | 5\% | 5\% | 6\% | 7\% | 5\%* | 5\% | -0 | -6\% |
| Total Mortalities | 35\% | 27\% | 33\% | 23\% | 25\% | 25\% | 24\% | 26\% | 12\%* | 24\% | -10 | -29\% |
| Willamette Spring |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 28\% | 14\% | 26\% | 15\% | 10\% | 14\% | 12\% | 14\%* | N/A | 16\% | -12 | -44\% |
| Incidental Mortalities | 8\% | 10\% | 10\% | 9\% | 6\% | 6\% | 7\% | 6\%* | N/A | 8\% | -0 | -1\% |
| Total Mortalities | 37\% | 24\% | 36\% | 25\% | 16\% | 21\% | 19\% | 21\%* | N/A | 24\% | -12 | -34\% |
| Salmon River (WACO) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 36\% | 35\% | 19\% | 25\% | 33\% | 37\% | 27\% | 34\% | 33\%* | 30\% | -5 | -15\% |
| Incidental Mortalities | 7\% | 12\% | 5\% | 8\% | 10\% | 11\% | 10\% | 12\% | 13\%* | 10\% | 3 | 40\% |
| Total Mortalities | 43\% | 47\% | 24\% | 33\% | 43\% | 48\% | 37\% | 46\% | 46\%* | 40\% | -2 | -5\% |

Total Exploitation Rates

| Stock P | Base <br> Period | 1982 | 1983 | 1984 | Brood 1985 | Year 1986 | 1987 | 1988 | 1989 | $\begin{aligned} & \text { Change from Base } \\ & \text { Avg Percentage } \\ & 82-89 \text { Points } \end{aligned}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Alaska Spring (SEAK Spring) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 42\% | 40\% | 34\% | 36\% | 32\% | 51\% | 34\% | 30\%* | N/A | 36\% | -6 | -13\% |
| Incidental Mortalities | 13\% | 23\% | 20\% | 24\% | 21\% | 24\% | 29\% | 34\%* | N/A | 24\% | 11 | 84\% |
| Total Mortalities | 55\% | 63\% | 54\% | 61\% | 53\% | 75\% | 63\% | 64\%* | N/A | 60\% | 5 | 10\% |
| Robertson Creek (WCVI Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 72\% | 58\% | 35\% | 63\% | 78\% | 75\% | 67\% | 66\% | 57\%* | 66\% | -6 | -8\% |
| Incidental Mortalities | 14\% | 32\% | 54\% | 17\% | 12\% | 15\% | 20\% | 22\% | 32\%* | 21\% | 7 | 48\% |
| Total Mortalities | 87\% | 90\% | 90\% | 79\% | 90\% | 90\% | 87\% | 87\% | 90\%* | 88\% | 1 | 1\% |
| Quinsam (Upper GS Summer/Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 74\% | 59\% | 44\% | 44\% | 43\% | 46\% | 48\% | 45\%* | N/A | 47\% | -27 | -37\% |
| Incidental Mortalities | 11\% | 17\% | 32\% | 24\% | 25\% | 26\% | 29\% | 27\%* | N/A | 26\% | 14 | 128\% |
| Total Mortalities | 86\% | 76\% | 76\% | 69\% | 68\% | 72\% | 78\% | 72\%* | N/A | 73\% | -13 | -15\% |
| Big Qualicum (Lower GS Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 72\% | 59\% | 65\% | 47\% | 54\% | 51\% | 44\% | 50\% | 52\%* | 53\% | -20 | -27\% |
| Incidental Mortalities | 8\% | 15\% | 16\% | 23\% | 19\% | 23\% | 31\% | 27\% | 28\%* | 23\% | 14 | 170\% |
| Total Mortalities | 81\% | 74\% | 81\% | 70\% | 72\% | 74\% | 75\% | 77\% | 80\%* | 75\% | -5 | -7\% |
| Puntledge (Lower GS Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 70\% | 56\% | 63\% | 43\% | 73\% | 42\% | 24\% | 43\% | 42\%* | 48\% | -22 | -31\% |
| Incidental Mortalities | 7\% | 13\% | 18\% | 21\% | 14\% | 18\% | 28\% | 24\% | 24\%* | 20\% | 13 | 196\% |
| Total Mortalities | 77\% | 70\% | 81\% | 63\% | 87\% | 61\% | 52\% | 67\% | 66\%* | 68\% | -8 | -11\% |
| So. Puget Sound Fall Yearling |  |  |  |  |  |  |  |  |  |  |  |  |
| Incidental Mortalities | 13\% | N/A | N/A | N/A | N/A | 17\% | 14\% | 15\% | 21\%* | 17\% | -6 | 30\% |
| Total Mortalities | 93\% | N/A | N/A | N/A | N/A | 92\% | 87\% | 98\% | 86\%* | 91\% | -2 | -2\% |
| Squaxin Pens Fall Yearling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | N/A | N/A | N/A | N/A | 80\% | 75\% | 78\% | 75\%* | 77\% | N/A | N/A |
| Incidental Mortalities | N/A | N/A | N/A | N/A | N/A | 17\% | 22\% | 20\% | 20\%* | 20\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | N/A | N/A | 97\% | 97\% | 98\% | 95\%* | 97\% | N/A | N/A |
| Samish Fall Fingerling (North PS Summer/Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 81\% | N/A | N/A | N/A | 80\% | 70\% | 66\% | 67\% | 62\%* | 69\% | -12 | -15\% |
| Incidental Mortalities | 7\% | N/A | N/A | N/A | 10\% | 14\% | 12\% | 16\% | 16\%* | 13\% | 6 | 87\% |
| Total Mortalities | 89\% | N/A | N/A | N/A | 90\% | 84\% | 78\% | 83\% | 78\%* | 83\% | -6 | -7\% |
| George Adams Fall Fingerling |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 77\% | N/A | N/A | N/A | 79\% | 80\% | 71\% | 74\% | 67\%* | 74\% | -3 | -4\% |
| Incidental Mortalities | 11\% | N/A | N/A | N/A | 12\% | 13\% | 16\% | 18\% | 20\%* | 16\% | 5 | 43\% |
| Total Mortalities | 88\% | N/A | N/A | N/A | 91\% | 93\% | 87\% | 92\% | 87\%* | 90\% | 2 | 2\% |
| So. Puget Sound Fall Fingerling (South PS Summer/Fall) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | 80\% | 59\% | 53\% | 59\% | 51\% | 66\% | 62\% | 66\% | 63\%* | 60\% | -20 | -25\% |
| Incidental Mortalities | 9\% | 12\% | 12\% | 14\% | 11\% | 12\% | 14\% | 14\% | 12\%* | 13\% | 4 | 43\% |
| Total Mortalities | 89\% | 71\% | 65\% | 73\% | 62\% | 78\% | 76\% | 80\% | 74\%* | 72\% | -17 | -19\% |
| Skagit Spring Yearling (North PS Spring) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | 74\% | 82\% | 66\% | 63\% | 63\% | 57\% | N/A | N/A | 68\% | N/A | N/A |
| Incidental Mortalities | N/A | 10\% | 10\% | 12\% | 7\% | 10\% | 14\% | N/A | N/A | 10\% | N/A | N/A |
| Total Mortalities | N/A | 84\% | 92\% | 78\% | 70\% | 74\% | 71\% | N/A | N/A | 78\% | N/A | N/A |
| Nooksack Spring Yearling (North PS Spring) |  |  |  |  |  |  |  |  |  |  |  |  |
| Reported Catch | N/A | 69\% | N/A | 57\% | N/A | 73\% | 41\% | 45\% | 39\%* | 54\% | N/A | N/A |
| Incidental Mortalities | N/A | 8\% | N/A | 10\% | N/A | 13\% | 15\% | 16\% | 20\%* | 14\% | N/A | N/A |
| Total Mortalities | N/A | 76\% | N/A | 67\% | N/A | 86\% | 56\% | 61\% | 60\%* | 68\% | N/A | N/A |
| Hoko Fall Fingerling |  |  |  |  |  |  |  |  |  |  |  |  |
| Incidental Mortalities | N/A | N/A | N/A | N/A | 12\% | 14\% | 11\% | N/A | 13\%* | 13\% | N/A | N/A |
| Total Mortalities | N/A | N/A | N/A | N/A | 69\% | 66\% | 47\% | N/A | 43\%* | 56\% | N/A | N/A |

Total Exploitation Rates (continued)

\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline Stock Per \& Base Period \& 1982 \& 1983 \& 1984 \& Brood
1985 \& Year 1986 \& 1987 \& 1988 \& 1989 \& $$
\begin{gathered}
\text { Change } \\
\text { Avg } \\
82-89
\end{gathered}
$$ \& from Ba Percent Points \& \% <br>
\hline \multicolumn{13}{|l|}{White River Spring Yearling} <br>
\hline Reported Catch \& 82\% \& 64\% \& 68\% \& 55\% \& 56\% \& 60\% \& 46\% \& 49\% \& 44\%* \& 55\% \& -27 \& -33\% <br>
\hline Incidental Mortalities \& 8\% \& 11\% \& 11\% \& 15\% \& 12\% \& 14\% \& 14\% \& 10\% \& 11\%* \& 12\% \& 4 \& 51\% <br>
\hline Total Mortalities \& 90\% \& 75\% \& 78\% \& 70\% \& 67\% \& 74\% \& 60\% \& 59\% \& 55\%* \& 67\% \& -23 \& -25\% <br>
\hline \multicolumn{13}{|l|}{Sooes Fall fingerling (WACO)} <br>
\hline Reported Catch \& N/A \& N/A \& N/A \& N/A \& 43\% \& 30\% \& 38\% \& N/A \& N/A \& 37\% \& N/A \& N/A <br>
\hline Incidental Mortalities \& N/A \& N/A \& N/A \& N/A \& 10\% \& 11\% \& 12\% \& N/A \& N/A \& 11\% \& N/A \& N/A <br>
\hline Total Mortalities \& N/A \& N/A \& N/A \& N/A \& 53\% \& 41\% \& 50\% \& N/A \& N/A \& 48\% \& N/A \& N/A <br>
\hline \multicolumn{13}{|l|}{Cowlitz Fall Tule (CR Tule) $64 \%$ 64\% 67\% 60\% 62\% $38 \%$ 35\% 40\% 66\%* 54\% -10 -15\%} <br>
\hline Reported Catch \& 64\% \& 64\% \& 67\% \& 60\% \& 62\% \& 38\% \& 35\% \& 40\% \& 66\%* \& 54\% \& -10 \& -15\% <br>
\hline Incidental Mortalities \& 10\% \& 8\% \& 8\% \& 11\% \& 14\% \& 14\% \& 13\% \& 10\% \& 6\%* \& 11\% \& 1 \& 8\% <br>
\hline Total Mortalities \& 74\% \& 71\% \& 75\% \& 71\% \& 76\% \& 52\% \& 48\% \& 50\% \& 72\%* \& 65\% \& -9 \& -12\% <br>
\hline \multicolumn{13}{|l|}{Spring Creek Tule (CR Tule)} <br>
\hline Reported Catch \& 74\% \& 54\% \& 72\% \& 69\% \& 82\% \& 70\% \& 65\% \& 60\% \& 60\%* \& 67\% \& -7 \& -10\% <br>
\hline Incidental Mortalities \& 14\% \& 13\% \& 13\% \& 14\% \& 11\% \& 14\% \& 13\% \& 13\% \& 15\%* \& 13\% \& -0 \& -3\% <br>
\hline Total Mortalities \& 87\% \& 66\% \& 86\% \& 83\% \& 93\% \& 84\% \& 78\% \& 73\% \& 75\%* \& 80\% \& -8 \& -9\% <br>
\hline \multicolumn{13}{|l|}{} <br>
\hline Reported Catch \& 69\% \& 54\% \& 62\% \& 61\% \& 50\% \& 45\% \& 42\% \& 43\% \& 48\%* \& 51\% \& -18 \& -26\% <br>
\hline Incidental Mortalities \& 14\% \& 14\% \& 12\% \& 19\% \& 24\% \& 17\% \& 11\% \& 12\% \& 12\%* \& 15\% \& 1 \& 7\% <br>
\hline Total Mortalities \& 83\% \& 68\% \& 74\% \& 80\% \& 74\% \& 62\% \& 53\% \& 55\% \& 61\%* \& 66\% \& -17 \& -21\% <br>
\hline \multicolumn{13}{|l|}{Columbia River Upriver Bright (WACO)} <br>
\hline Reported Catch \& 38\% \& 64\% \& 63\% \& 70\% \& 61\% \& 54\% \& 33\% \& 49\% \& 49\%* \& 55\% \& 17 \& 45\% <br>
\hline Incidental Mortalities \& 7\% \& 9\% \& 10\% \& 13\% \& 18\% \& 18\% \& 16\% \& 11\% \& 7\%* \& 13\% \& 5 \& 75\% <br>
\hline Total Mortalities \& 46\% \& 72\% \& 74\% \& 83\% \& 78\% \& 72\% \& 49\% \& 60\% \& 57\%* \& 68\% \& 23 \& 49\% <br>
\hline \multicolumn{13}{|l|}{Lyons Ferry (WACO)} <br>
\hline Incidental Mortalities \& N/A \& N/A \& N/A \& 10\% \& 54\%

$9 \%$ \& 10\% \& 15\% \& 13\% \& 32\%** \& 11\% \& N/A
N/A \& N/A <br>
\hline Total Mortalities \& N/A \& N/A \& N/A \& 62\% \& 63\% \& 67\% \& 50\% \& 36\% \& 40\%* \& 53\% \& N/A \& N/A <br>
\hline \multicolumn{13}{|l|}{Hanford Wild Brights (WACO)} <br>
\hline Reported Catch \& $N / A$ \& N/A \& N/A \& N/A \& N/A \& 55\% \& 56\% \& 45\% \& 53\%* \& 52\% \& N/A \& N/A <br>
\hline Incidental Mortalities \& N/A \& N/A \& N/A \& N/A \& N/A \& 7\% \& 12\% \& 9\% \& 17\%* \& 12\% \& N/A \& N/A <br>
\hline Total Mortalities \& N/A \& N/A \& N/A \& N/A \& N/A \& 62\% \& 69\% \& 54\% \& 70\%* \& 64\% \& N/A \& N/A <br>
\hline \multicolumn{13}{|l|}{Lewis River Wild (WACO)} <br>
\hline Reported Catch \& 46\% \& 53\% \& 61\% \& 41\% \& 40\% \& 35\% \& 32\% \& 42\% \& 46\%* \& 44\% \& -2 \& -4\% <br>
\hline Incidental Mortalities \& 7\% \& 5\% \& 7\% \& 6\% \& 7\% \& 7\% \& 7\% \& 8\% \& 7\%* \& 7\% \& -0 \& -2\% <br>
\hline Total Mortalities \& 52\% \& 58\% \& 68\% \& 47\% \& 47\% \& 42\% \& 39\% \& 50\% \& 53\%* \& 50\% \& -2 \& -4\% <br>
\hline \multicolumn{13}{|l|}{Willamette Spring} <br>
\hline Reported Catch \& 58\% \& 57\% \& 70\% \& 56\% \& 56\% \& 60\% \& 62\% \& 49\%* \& N/A \& 58\% \& -0 \& -0\% <br>
\hline Incidental Mortalities \& 15\% \& 13\% \& 18\% \& 16\% \& 10\% \& 11\% \& 15\% \& 12\%* \& N/A \& 14\% \& -1 \& -7\% <br>
\hline Total Mortalities \& 73\% \& 70\% \& 88\% \& 73\% \& 66\% \& 71\% \& 77\% \& 61\%* \& N/A \& 72\% \& -1 \& -2\% <br>
\hline \multicolumn{13}{|l|}{Salmon River (WACO)} <br>
\hline Reported Catch \& 52\% \& 50\% \& 38\% \& 42\% \& 50\% \& 56\% \& 47\% \& 55\% \& 52\%* \& 49\% \& -3 \& -6\% <br>
\hline Incidental Mortalities \& 10\% \& 13\% \& 7\% \& 10\% \& 11\% \& 12\% \& 11\% \& 13\% \& 16\%* \& 12\% \& 2 \& 18\% <br>
\hline Total Mortalities \& 62\% \& 63\% \& 45\% \& 52\% \& 61\% \& 68\% \& 58\% \& 68\% \& 68\%* \& 60\% \& -1 \& -2\% <br>
\hline
\end{tabular}

## APPENDIX H

## Brood Year Ocean Exploitation Rate Figures

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Squaxin Pens Fall Yearling ..... H-4
Samish Fall Fingerling ..... H-5
George Adams Fall Fingerling ..... H-5
South Puget Sound Fall Fingerling ..... H-6
Hoko Fall Fingerling ..... H-6
Sooes Fall Fingerling ..... H-7
Skagit Spring Yearling ..... H-7
Nooksack Spring Yearling ..... H-8
White River Spring Yearling ..... H-8
Cowlitz Tule ..... H-9
Spring Creek Tule ..... H-9
Stayton Pond Tule ..... H-10
Columbia River Upriver Bright ..... H-10
Hanford Wild Brights ..... H-11
Lewis River Wild ..... H-11
Lyons Ferry ..... H-12
Willamette Spring ..... H-12
Salmon River ..... H-13

ALASKA SPRING
BROOD YEAR OCEAN EXPLOITATION RATE


*1988 Brood Year is incomplete

## ROBERTSON CREEK BROOD YEAR OCEAN EXPLOITATION RATE


*1989 Brood Year is incomplete
QUINSAM
BROOD YEAR OCEAN EXPLOITATION RATE


[^4]*1988 Brood Year is incomplete

## BIG QUALICAM BROOD YEAR OCEAN EXPLOITATION RATE


*1989 Brood Year is incomplete
PUNTLEDGE BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 蜀 Incidental Mortality
*1989 Brood Year is incomplete

## SOUTH PUGET SOUND FALL YEARLING BROOD YEAR OCEAN EXPLOITATION RATE



Reported Catch 纁Incidental Mortality
*1989 Brood Year is incomplete

## SQUAXIN PENS FALL YEARLING

BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch Incidental Mortality
*1989 Brood Year is incomplete

## SAMISH FALL FINGERLING BROOD YEAR OCEAN EXPLOITATION RATE



Reported Catch Incidental Mortality
*1989 BROOD YEAR IS INCOMPLETE

## GEORGE ADAMS FALL FINGERLING BROOD YEAR OCEAN EXPLOITATION RATE



*1989 Brood Year is incomplete

SOUTH PUGET SOUND FALL FINGERLING BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 徳 Incidental Mortality
*1989 Brood Year is incomplete
HOKO FALL FINGERLING BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch Incidental Mortality
*1989 Brood Year is incomplete

H-6

## SOOES FALL FINGERLING BROOD YEAR OCEAN EXPLOITATION RATE



Reported Catch 圖 Incidental Mortality
SKAGIT SPRING YEARLING BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 䍚 Incidental Mortality

*1989 BROOD YEAR IS INCOMPLETE

## WHITE RIVER SPRING YEARLING BROOD YEAR OCEAN EXPLOITATION RATE



Reported Catch 鰗 Incidental Mortality
*1989 BROOD YEAR IS INCOMPLETE

H-8

## COWLITZ FALL TULE

 BROOD YEAR OCEAN EXPLOITATION RATE
Reported Catch 圖Incidental Mortality
${ }^{* 1989}$ Brood Year
SPRING CREEK TULE
BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 獋Incidental Mortality
*1989 Brood Year is incomplete

*1989 Brood Year is incomplete
COLUMBIA RIVER UPRIVER BRIGHT BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 围Incidental Mortality
*1989 Brood Year is incomplete

## HANFORD WILD BRIGHTS BROOD YEAR OCEAN EXPLOITATION RATE


*1989 Brood Year is incomplete
LEWIS RIVER WILD BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 䡒 Incidental Mortality
*1989 Brood Year is incomplete

$$
\mathrm{H}-11
$$

## LYONS FERRY <br> BROOD YEAR OCEAN EXPLOITATION RATE



Reported Catch 圏 Incidental Mortality
*1989 Brood Year is incomplete
WILLAMETTE SPRING BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 䡒Incidental Mortality
*1988 Brood Year is incomplete

SALMON RIVER
BROOD YEAR OCEAN EXPLOITATION RATE


Reported Catch 國Incidental Mortality
*1989 Brood Year is incomplete

## APPENDIX I

## Survival Rate Figures

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Alaska Spring ..... I-1
Robertson Creek ..... I-1
Quinsam ..... I-2
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Samish Fall Fingerling ..... I-4
George Adams Fall Fingerling ..... I-5
South Puget Sound Fall Fingerling ..... I-5
Hoko Fall Fingerling ..... I-6
Sooes Fall Fingerling ..... I-6
Skagit Spring Yearling ..... I-7
Nooksack Spring Yearling ..... I-7
White River Spring Yearling ..... I-8
Cowlitz Tule ..... I-8
Spring Creek Tule ..... I-9
Stayton Pond Tule ..... I-9
Columbia River Upriver Bright ..... I-10
Hanford Wild Brights ..... I-10
Lewis River Wild ..... I-11
Lyons Ferry ..... I-11
Willamette Spring ..... I-12
Salmon River ..... I-12

## ALASKA SPRING <br> INDEX OF SURVIVAL <br> $R=0.80$



Age 3 \& 4 Index Avg. Cohort Survival
ROBERTSON CREEK INDEX OF SURVIVAL

$$
R=0.94
$$


$\rightarrow$ Age 2 \& 3 Index Avg. Cohort Survival

$$
R=0.88
$$



- Age 2 \& 3 Index Avg. Cohort Survival

PUNTLEDGE
INDEX OF SURVIVAL

$$
R=1.00
$$



- Age 2 \& 3 Index Avg. Cohort Survival


## BIG QUALICUM INDEX OF SURVIVAL <br> $$
R=1.00
$$



- Age 2 \& 3 Index Avg. - Cohort Survival

> SOUTH PUGET SOUND FALL YEARLING INDEX OF SURVIVAL
> R=1.00

$\rightarrow$ Age 2 \& 3 Index Avg. Cohort Survival

$$
R=1.00
$$



INDICES BASED ON 86 BROOD
SAMISH FALL FINGERLING INDEX OF SURVIVAL

$$
R=0.99
$$



## GEORGE ADAMS FALL FINGERLING INDEX OF SURVIVAL <br> $$
\mathrm{R}=0.96
$$



Age 2 \& 3 Index Avg. - Cohort Survival

## SOUTH PUGET SOUND FALL FINGERLING INDEX OF SURVIVAL <br> $$
R=0.98
$$



- Age 2 \& 3 Index Avg. Cohort Survival

HOKO FALL FINGERLING INDEX OF SURVIVAL

$$
R=0.77
$$



Age 2 \& 3 Index Avg. - Cohort Survival
INDICES BASED ON 85 BROOD

## SOOES FALL FINGERLING INDEX OF SURVIVAL <br> $R=1.00$



- Age 2 \& 3 Index Avg. Cohort Survival

INDICES BASED ON 85 BROOD

## SKAGIT SPRING YEARLING INDEX OF SURVIVAL <br> $R=0.98$


$\rightarrow$ Age 2 \& 3 Index Avg. Cohort Survival
INDICES BASED ON 81 BROOD
NOOKSACK SPRING YEARLING INDEX OF SURVIVAL
$R=0.99$


Age 2 \& 3 Index Avg. Cohort Survival
INDICES BASED ON 81 BROOD


Age 2 \& 3 Index Avg. - Cohort Survival

## COWLITZ FALL TULE

INDEX OF SURVIVAL

$$
R=0.91
$$



Age 2 \& 3 Index Avg. Cohort Survival

## SPRING CREEK TULE <br> INDEX OF SURVIVAL <br> $R=0.98$



Age 2 \& 3 Index Avg. Cohort Survival
STAYTON POND TULE
INDEX OF SURVIVAL
$R=1.00$


- Age 2 \& 3 Index Avg. Cohort Survival


## COLUMBIA RIVER UPRIVER BRIGHT INDEX OF SURVIVAL <br> $$
R=0.92
$$



Age 2 \& 3 Index Avg. Cohort Survival HANFORD WILD BRIGHTS INDEX OF SURVIVAL
$R=0.82$


- Age 2 \& 3 Index Avg. Cohort Survival

INDICES BASED ON 86 BROOD
LEWIS RIVER WILD INDEX OF SURVIVAL $R=0.96$

Age 2 \& 3 Index Avg. - Cohort Survival
LYONS FERRY
INDEX OF SURVIVAL

$$
R=0.97
$$




- Age 3 \& 4 Index Avg. Cohort Survival

$$
\begin{gathered}
\text { SALMON RIVER } \\
\text { INDEX OF SURVIVAL } \\
R=0.73
\end{gathered}
$$



Age 2 \& 3 Index Avg. Cohort Survival

## APPENDIX J

# Chinook Model Estimates of Stock Composition of Total Fishing Mortality in Ceiling Fisheries, Percent of Total Stock Mortality Occurring in Fishery, and Status of Associated Escapement Indicator Stock 

Stock composition and mortality distribution are average for the years 1985-1993.Page
SE Alaska All Gear ..... J-1
North/Central B.C. All Gear ..... J-2
West Coast Vancouver Island Troll ..... J-3
GS Sport and Troll ..... J-4

| Model Stock $\quad \mathrm{Yr}$ Re | Yr Rebuilt or z in 1998 | Percent Fishery | Percent Stock | Escapement Indicator Name | Stock Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| WCVI Hatchery |  | 31.85\% | 38.77\% | NA |  |
| Columbia Upriver Bright | 1996 | 17.61\% | 24.46\% | Columbia Upriver Bright | Above Goal |
| North/Central BC | 1992 | 12.98\% | 47.11\% | Yakoun Nass Skeena Area 6 Index Area 8 Index Rivers Inlet Smith Inlet | Above Goal <br> Not Rebuilding <br> Above Goal <br> Not Rebuilding <br> Not Rebuilding <br> Rebuilding <br> Not Rebuilding |
| Oregon Coastal North Migrating | 1994 | 10.06\% | 30.10\% | Oregon Coastal | Not Classified |
| Fraser Early | 1994 | 6.32\% | 32.02\% | Upper Fraser Middle Fraser Thompson | Above Goal Above Goal Not Rebuilding |
| WCVI Wild | 69\% | 5.66\% | 35.07\% | WCVI | Not Rebuilding |
| Washington Coastal Wild | 1994 | 3.14\% | 16.28\% | Grays Harbor Fall Quillayute Fall Hoh Fall Queets Fall | Rebuilding <br> Not Classified <br> Not Classified <br> Not Classified |
| Mid-Columbia Brights | 1997 | 2.45\% | 16.22\% | Not Represented |  |
| WA Coastal Hatchery |  | 2.28\% | 15.99\% | NA |  |
| Upper Georgia Strait | 59\% | 2.27\% | 27.38\% | Upper Georgia Strait | Indeterminate |
| Willamette River Hatchery |  | 1.75\% | 8.16\% | NA |  |
| Columbia Upriver Summer | 48\% | 0.91\% | 25.28\% | Columbia Upriver Summer | Not Rebuilding |
| Alaska South SE | 1997 | 0.84\% | 95.13\% | King Salmon <br> Andrew Creek <br> Blossom <br> Keta <br> Unuk <br> Chickamin | Not Rebuilding Above Goal Indeterminate Rebuilding Rebuilding Rebuilding |
| Lewis River Wild | 1996 | 0.69\% | 10.47\% | Lewis River | Above Goal |
| Lower GS Hatchery |  | 0.24\% | 1.65\% | NA |  |
| Fall Cowlitz Hatchery |  | 0.23\% | 6.02\% | NA |  |
| Fraser Late | 1998 | 0.17\% | 0.18\% | Harrison | Not Rebuilding |
| Lower Georgia Strait | 1998 | 0.16\% | 1.47\% | Lower Georgia Strait | Not Rebuilding |
| Spring Cowlitz Hatchery |  | 0.10\% | 1.63\% | NA |  |
| PS Hatchery Fingerling |  | 0.07\% | 0.28\% | NA |  |
| Skagit Summer/Fall | 58\% | 0.06\% | 2.43\% | Skagit Summer/Fall | Not Rebuilding |
| Nooksack Fall | 76\% | 0.04\% | 0.12\% | NA |  |
| Puget Sound Natural | 1996 | 0.04\% | 0.28\% | Green | Rebuilding |
| Snohomish Summer/Fall | 62\% | 0.03\% | 1.65\% | Snohomish | Not Rebuilding |
| Snake River Fall | 50\% | 0.02\% | 5.39\% | Not Represented |  |
| Stillaguamish Summer/Fall | 56\% | 0.02\% | 5.95\% | Stillaguamish | Not Rebuilding |
| PS Yearling | 40\% | 0.02\% | 0.24\% | NA |  |
| Lower Bonneville Hatchery |  | 0.00\% | 0.00\% | NA |  |
| Spring Creek Hatchery |  | 0.00\% | 0.00\% | NA |  |
| Nooksack Spring | 58\% | 0.00\% | 0.00\% | Not Represented |  |


| Model Stock $\quad$ Yr Re | Rebuilt or \% in 1998 | Percent Fishery | Percent Stock | Escapement Indicator S Name | Stock Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| WCVI Hatchery |  | 21.44\% | 25.23\% | NA |  |
| North/Central BC | 1992 | 14.04\% | 48.01\% | Yakoun <br> Nass <br> Skeena <br> Area 6 Index <br> Area 8 Index <br> Rivers Inlet <br> Smith Inlet | Above Goal <br> Not Rebuilding <br> Above Goal <br> Not Rebuilding <br> Not Rebuilding <br> Rebuilding <br> Not Rebuilding |
| Columbia Upriver Bright | 1996 | 12.89\% | 17.94\% | Columbia Upriver Bright | Above Goal |
| Oregon Coastal North Migrating | g 1994 | 11.71\% | 34.78\% | Oregon Coastal | Not Classified |
| Fraser Early | 1994 | 6.14\% | 30.46\% | Upper Fraser Middle Fraser Thompson | Above Goal Above Goal Not Rebuilding |
| Fraser Late | 1998 | 5.12\% | 5.60\% | Harrison | Not Rebuilding |
| Upper Georgia Strait | 59\% | 4.29\% | 49.55\% | Upper Georgia Strait | Indeterminate |
| WCVI Wild | 69\% | 4.17\% | 24.97\% | WCVI | Not Rebuilding |
| Washington Coastal Wild | 1994 | 3.91\% | 19.22\% | Grays Harbor Fall Quillayute Fall Hoh Fall Queets Fall | Rebuilding <br> Not Classified <br> Not Classified <br> Not Classified |
| Willamette River Hatchery |  | 3.45\% | 15.57\% | NA |  |
| WA Coastal Hatchery |  | 2.95\% | 19.01\% | NA |  |
| Mid-Columbia Brights | 1997 | 2.14\% | 14.44\% | Not Represented |  |
| Lower GS Hatchery |  | 1.45\% | 9.62\% | NA |  |
| Columbia Upriver Summer | 48\% | 1.09\% | 30.10\% | Columbia Upriver Summer | Not Rebuilding |
| Lower Georgia Strait | 1998 | 1.06\% | 9.52\% | Lower Georgia Strait | Not Rebuilding |
| Nooksack Fall | 76\% | 0.76\% | 2.27\% | NA |  |
| Lower Bonneville Hatchery |  | 0.76\% | 1.85\% | NA |  |
| Skagit Surmer/Fall | 58\% | 0.51\% | 18.61\% | Skagit Summer/Fall | Not Rebuilding |
| Lewis River Wild | 1996 | 0.43\% | 6.45\% | Lewis River | Above Goal |
| PS Hatchery Fingerling |  | 0.35\% | 1.38\% | NA |  |
| PS Yearling | 40\% | 0.26\% | 3.61\% | NA |  |
| Snohomish Summer/Fall | 62\% | 0.26\% | 13.30\% | Snohomish | Not Rebuilding |
| Spring Cowlitz Hatchery |  | 0.23\% | 3.78\% | NA |  |
| Puget Sound Natural | 1996 | 0.21\% | 1.34\% | Green | Rebuilding |
| Fall Cowlitz Hatchery |  | 0.19\% | 4.84\% | NA |  |
| Stillaguamish Summer/Fall | 56\% | 0.05\% | 12.89\% | Stillaguamish | Not Rebuilding |
| Alaska South SE | 1997 | 0.05\% | 4.87\% | King Salmon Andrew Creek <br> Blossom <br> Keta <br> Unuk <br> Chickamin | Not Rebuilding Above Goal Indeterminate Rebuilding Rebuilding Rebuilding |
| Snake River Fall | 50\% | 0.04\% | 9.98\% | Not Represented |  |
| Spring Creek Hatchery |  | 0.04\% | 0.44\% | NA |  |
| Nooksack Spring | 58\% | 0.01\% | 2.99\% | Not Represented |  |


| Model Stock $\quad$ Yr Re | Rebuilt or \% in 1998 | Percent Fishery | Percent Stock | Escapement Indicator Name | Stock Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| WCVI Hatchery |  | 20.43\% | 20.12\% | NA |  |
| Fraser Late | 1998 | 19.32\% | 21.70\% | Harrison | Not Rebuilding |
| Lower Bonneville Hatchery |  | 14.24\% | 37.83\% | NA |  |
| Columbia Upriver Bright | 1996 | 10.45\% | 15.03\% | Columbia Upriver Bright | Above Goal |
| Nooksack Fall | 76\% | 4.98\% | 14.96\% | NA |  |
| PS Hatchery Fingerling |  | 4.62\% | 19.55\% | NA |  |
| WCVI Wild | 69\% | 4.33\% | 19.98\% | WCVI | Not Rebuil.ding |
| Oregon Coastal North Migrating | g 1994 | 3.66\% | 11.78\% | Oregon Coastal | Not Classified |
| Puget Sound Natural | 1996 | 2.91\% | 19.77\% | Green | Rebuilding |
| Spring Creek Hatchery |  | 1.98\% | 22.35\% | NA |  |
| Mid-Columbia Brights | 1997 | 1.71\% | 11.67\% | Not Represented |  |
| Washington Coastal Wild | 1994 | 1.57\% | 8.42\% | Grays Harbor Fall Quillayute Fall Hoh Fall Queets Fall | Rebuilding <br> Not Classified <br> Not Classified <br> Not Classified |
| Willamette River Hatchery |  | 1.54\% | 7.35\% | NA |  |
| WA Coastal Hatchery |  | 1.20\% | 8.68\% | NA |  |
| Fraser Early | 1994 | 1.19\% | 6.62\% | Upper Fraser Middle Fraser Thompson | Above Goal <br> Above Goal <br> Not Rebuilding |
| Fall Cowlitz Hatchery |  | 1.19\% | 32.25\% | NA |  |
| Columbia Upriver Summer | 48\% | 1.03\% | 30.10\% | Columbia Upriver Summer | Not Rebuilding |
| PS Yearling | 40\% | 0.79\% | 12.14\% | NA |  |
| Lewis River Wild | 1996 | 0.68\% | 11.44\% | Lewis River | Above Goal |
| Skagit Summer/Fall | 58\% | 0.58\% | 22.80\% | Skagit Summer/Fall | Not Rebuilding |
| Spring Cowlitz Hatchery |  | 0.52\% | 9.67\% | NA |  |
| Snohomish Summer/Fall | 62\% | 0.28\% | 15.75\% | Snohomish | Not Rebuilding |
| Lower GS Hatchery |  | 0.24\% | 1.66\% | NA |  |
| Lower Georgia Strait | 1998 | 0.16\% | 1.59\% | Lower Georgia Strait | Not Rebuilding |
| North/Central BC | 1992 | 0.14\% | 0.55\% | Yakoun <br> Nass <br> Skeena <br> Area 6 Index <br> Area 8 Index <br> Rivers Inlet <br> Smith Inlet | Above Goal <br> Not Rebuilding <br> Above Goal <br> Not Rebuilding <br> Not Rebuilding <br> Rebuilding <br> Not Rebuilding |
| Snake River Fall | 50\% | 0.13\% | 30.68\% | Not Represented |  |
| Upper Georgia Strait | 59\% | 0.06\% | 0.82\% | Upper Georgia Strait | Indeterminate |
| Stillaguamish Summer/Fall | 56\% | 0.05\% | 15.63\% | Still aguamish | Not Rebuilding |
| Nooksack Spring | 58\% | 0.03\% | 10.04\% | Not Represented |  |
| Alaska South SE | 1997 | 0.00\% | 0.00\% | King Salmon Andrew Creek <br> Blossom <br> Keta <br> Unuk <br> Chickamin | Not Rebuilding Above Goal Indeterminate Rebuilding Rebuilding Rebuilding |


| Model Stock $\quad \begin{gathered}\text { Yr Reb } \\ \%\end{gathered}$ | Rebuilt or \% in 1998 | Percent Fishery | Percent Stock | Escapement Indicator S Name | Stock Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Fraser Late | 1998 | 58.82\% | 49.13\% | Harrison | Not Rebuilding |
| Nooksack Fall | 76\% | 10.18\% | 23.25\% | NA |  |
| Lower GS Hatchery |  | 6.54\% | 33.74\% | NA |  |
| Lower Georgia Strait | 1998 | 4.79\% | 33.90\% | Lower Georgia Strait | Not Rebuilding |
| PS Hatchery Fingerling |  | 3.29\% | 9.33\% | NA |  |
| PS Yearling | 40\% | 2.09\% | 21.47\% | NA |  |
| Puget Sound Natural | 1996 | 1.89\% | 8.64\% | Green | Rebuilding |
| WCVI Hatchery |  | 1.76\% | 1.42\% | NA |  |
| Lower Bonneville Hatchery |  | 1.65\% | 3.40\% | NA |  |
| Columbia Upriver Bright | 1996 | 1.55\% | 1.42\% | Columbia Upriver Bright | Above Goal |
| Upper Georgia Strait | 59\% | 1.51\% | 13.82\% | Upper Georgia Strait | Indeterminate |
| Fraser Early | 1994 | 1.46\% | 5.82\% | Upper Fraser Middle Fraser Thompson | Above Goal <br> Above Goal <br> Not Rebuilding |
| Washington Coastal Wild | 1994 | 1.10\% | 3.79\% | Grays Harbor Fall Quillayute Fall Hoh Fall Queets Fall | Rebuilding <br> Not Classified <br> Not Classified <br> Not Classified |
| WA Coastal Hatchery |  | 0.93\% | $4.17 \%$ | NA |  |
| Skagit Summer/Fall | 58\% | 0.71\% | 18.31\% | Skagit Summer/Fall | Not Rebuilding |
| Snohomish Summer/Fall | 62\% | 0.35\% | 13.41\% | Snohomish | Not Rebuilding .- |
| WCVI Wild | 69\% | 0.26\% | 1.17\% | WCVI | Not Rebuilding |
| Mid-Columbia Brights | 1997 | 0.25\% | 1.10\% | Not Represented |  |
| Nooksack Spring | 58\% | 0.23\% | 52.78\% | Not Represented |  |
| Spring Creek Hatchery |  | 0.17\% | 1.56\% | NA |  |
| Columbia Upriver Summer | 48\% | 0.16\% | 3.15\% | Columbia Upriver Summer | Not Rebuilding |
| North/Central BC | 1992 | 0.11\% | 0.30\% | Yakoun <br> Nass <br> Skeena <br> Area 6 Index <br> Area 8 Index <br> Rivers Inlet <br> Smith Inlet | Above Goal <br> Not Rebuilding <br> Above Goal <br> Not Rebuilding <br> Not Rebuilding <br> Rebuilding <br> Not Rebuilding |
| Stillaguamish Summer/Fall | 56\% | 0.09\% | 18.88\% | Stillaguamish | Not Rebuilding |
| Willamette River Hatchery |  | 0.06\% | 0.19\% | NA |  |
| Lewis River Wild | 1996 | 0.03\% | 0.32\% | Lewis River | Above Goal |
| Spring Cowlitz Hatchery |  | 0.02\% | 0.21\% | NA |  |
| Fall Cowlitz Hatchery |  | 0.01\% | 0.08\% | NA |  |
| Snake River Fall | 50\% | 0.00\% | 0.14\% | Not Represented |  |
| Oregon Coastal North Migrating | 1994 | 0.00\% | 0.00\% | Oregon Coastal | Not Classified |
| Alaska South SE | 1997 | 0.00\% | 0.00\% | King Salmon <br> Andrew Creek <br> Blossom <br> Keta <br> Unuk <br> Chickamin | Not Rebuilding Above Goal Indeterminate Rebuilding Rebuilding Rebuilding |

## APPENDIX K

## Model AEQ Mortality Estimates and Indices

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Southeast Alaska Troll

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 183745 | 44030 | 0 | 0 | 227775 |
| 1980 | 181776 | 41958 | 0 | 0 | 223734 |
| 1981 | 170264 | 42244 | 3742 | 2696 | 218946 |
| 1982 | 210548 | 60503 | 23227 | 17591 | 311869 |
| 1983 | 330625 | 87858 | 27545 | 21257 | 467285 |
| 1984 | 300825 | 71582 | 33354 | 25331 | 431093 |
| 1985 | 180584 | 43868 | 29644 | 24300 | 278395 |
| 1986 | 195473 | 48887 | 19439 | 18796 | 282595 |
| 1987 | 194508 | 44583 | 46152 | 32000 | 317243 |
| 1988 | 185371 | 31304 | 14643 | 15554 | 246872 |
| 1989 | 188277 | 44140 | 36090 | 28727 | 297233 |
| 1990 | 221934 | 49639 | 27244 | 19536 | 318354 |
| 1991 | 196734 | 44186 | 40047 | 29649 | 310616 |
| 1992 | 137419 | 31466 | 30428 | 34065 | 233378 |
| 1993 | 180920 | 29588 | 17426 | 22619 | 250554 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 0.985 | 0.933 | 0.000 | 0.000 | 0.927 |
| 1980 | 0.974 | 0.889 | 0.000 | 0.000 | 0.911 |
| 1981 | 0.913 | 0.895 | 0.555 | 0.532 | 0.892 |
| 1982 | 1.128 | 1.282 | 3.445 | 3.468 | 1.270 |
| 1983 | 1.772 | 1.862 | 4.085 | 4.191 | 1.903 |
| 1984 | 1.612 | 1.517 | 4.947 | 4.995 | 1.755 |
| 1985 | 0.968 | 0.930 | 4.397 | 4.791 | 1.134 |
| 1986 | 1.048 | 1.036 | 2.883 | 3.706 | 1.151 |
| 1987 | 1.042 | 0.945 | 6.845 | 6.310 | 1.292 |
| 1988 | 0.994 | 0.663 | 2.172 | 3.067 | 1.005 |
| 1989 | 1.009 | 0.935 | 5.353 | 5.664 | 1.210 |
| 1990 | 1.189 | 1.052 | 4.041 | 3.852 | 1.296 |
| 1991 | 1.054 | 0.936 | 5.940 | 5.846 | 1.265 |
| 1992 | 0.737 | 0.667 | 4.513 | 6.717 | 0.950 |
| 1993 | 0.970 | 0.627 | 2.585 | 4.460 | 1.020 |

Southeast Alaska Net

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 14121 | 889 | 0 | 0 | 15011 |
| 1980 | 14004 | 851 | 0 | 0 | 14856 |
| 1981 | 12289 | 899 | 0 | 0 | 13188 |
| 1982 | 17062 | 1317 | 0 | 0 | 18379 |
| 1983 | 24210 | 1855 | 0 | 0 | 26065 |
| 1984 | 17247 | 1068 | 0 | 0 | 18315 |
| 1985 | 21015 | 1196 | 10105 | 45776 | 78092 |
| 1986 | 11659 | 2904 | 11843 | 24180 | 50586 |
| 1987 | 7654 | 3198 | 6868 | 22535 | 40255 |
| 1988 | 10421 | 2258 | 7210 | 24713 | 44602 |
| 1989 | 10502 | 2584 | 7266 | 24509 | 44861 |
| 1990 | 10420 | 2272 | 7209 | 24389 | 44290 |
| 1991 | 12317 | 2391 | 8521 | 28763 | 51993 |
| 1992 | 14261 | 3895 | 9867 | 33544 | 61568 |
| 1993 | 9839 | 2162 | 6807 | 23367 | 42176 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 0.983 | 0.899 | - NA - | - NA - | 0.977 |
| 1980 | 0.975 | 0.860 | - NA - | - NA - | 0.967 |
| 1981 | 0.855 | 0.909 | - NA - | - NA - | 0.859 |
| 1982 | 1.187 | 1.331 | - NA - | - NA - | 1.197 |
| 1983 | 1.685 | 1.875 | - NA - | - NA - | 1.697 |
| 1984 | 1.200 | 1.080 | - NA - | - NA - | 1.193 |
| 1985 | 1.463 | 1.209 | - NA - | - NA - | 5.085 |
| 1986 | 0.811 | 2.936 | - NA - | - NA - | 3.294 |
| 1987 | 0.533 | 3.233 | - NA - | - NA - | 2.621 |
| 1988 | 0.725 | 2.283 | - NA - | - NA - | 2.904 |
| 1989 | 0.731 | 2.612 | - NA - | - NA - | 2.921 |
| 1990 | 0.725 | 2.296 | - NA - | - NA - | 2.884 |
| 1991 | 0.857 | 2.417 | - NA - | - NA - | 3.385 |
| 1992 | 0.993 | 3.937 | - NA - | - NA - | 4.009 |
| 1993 | 0.685 | 2.185 | - NA - | - NA - | 2.746 |

Southeast Alaska Sport

Adult Equivalent Mortality Estimates

| Year | Retention |  | CNR |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 9537 | 5165 | 0 | 0 | 14702 |
| 1980 | 9390 | 4920 | 0 | 0 | 14310 |
| 1981 | 8818 | 5615 | 0 | 0 | 14433 |
| 1982 | 10332 | 7884 | 0 | 0 | 18215 |
| 1983 | 13015 | 8972 | 0 | 0 | 21987 |
| 1984 | 14921 | 7819 | 0 | 0 | 22740 |
| 1985 | 11288 | 6474 | 0 | 0 | 17762 |
| 1986 | 9240 | 5811 | 0 | 0 | 15051 |
| 1987 | 9727 | 3879 | 0 | 0 | 13606 |
| 1988 | 10022 | 3733 | 0 | 0 | 13755 |
| 1989 | 13513 | 6506 | 0 | 0 | 20019 |
| 1990 | 19406 | 10152 | 0 | 0 | 29558 |
| 1991 | 22692 | 12562 | 0 | 0 | 35253 |
| 1992 | 18657 | 7613 | 0 | 0 | 26270 |
| 1993 | 22722 | 6008 | 0 | 0 | 28730 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.002 | 0.876 | - NA - | - NA - | 0.954 |
| 1980 | 0.986 | 0.835 | - NA - | - NA - | 0.928 |
| 1981 | 0.926 | 0.952 | - NA - | - NA - | 0.936 |
| 1982 | 1.085 | 1.337 | - NA - | - NA - | 1.182 |
| 1983 | 1.367 | 1.522 | - NA - | - NA - | 1.426 |
| 1984 | 1.567 | 1.326 | - NA - | - NA - | 1.475 |
| 1985 | 1.186 | 1.098 | - NA - | - NA - | 1.152 |
| 1986 | 0.971 | 0.986 | - NA - | - NA - | 0.976 |
| 1987 | 1.022 | 0.658 | - NA - | - NA - | 0.883 |
| 1988 | 1.053 | 0.633 | - NA - | - NA - | 0.892 |
| 1989 | 1.420 | 1.104 | - NA - | - NA - | 1.299 |
| - 1990 | 2.039 | 1.722 | - NA - | - NA - | 1.917 |
| 1991 | 2.384 | 2.131 | - NA - | - NA - | 2.287 |
| 1992 | 1.960 | 1.291 | - NA - | - NA - | 1.704 |
| 1993 | 2.387 | 1.019 | - NA - | - NA - | 1.864 |

North/Central B.C. Troll

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 250242 | 44093 | 0 | 0 | 294334 |
| 1980 | 235443 | 40812 | 0 | 0 | 276255 |
| 1981 | 227069 | 42840 | 0 | 0 | 269909 |
| 1982 | 271826 | 49833 | 0 | 0 | 321659 |
| 1983 | 233484 | 44061 | 0 | 0 | 277545 |
| 1984 | 336357 | 57560 | 0 | 0 | 393917 |
| 1985 | 206558 | 34789 | 0 | 0 | 241348 |
| 1986 | 206088 | 34771 | 0 | 0 | 240859 |
| 1987 | 243631 | 58919 | 2193 | 8838 | 313580 |
| 1988 | 184145 | 34730 | 4368 | 13730 | 236973 |
| 1989 | 216009 | 53913 | 1767 | 7352 | 279041 |
| 1990 | 177158 | 40668 | 3449 | 13212 | 234486 |
| 1991 | 217131 | 49868 | 1517 | 5814 | 274330 |
| 1992 | 184593 | 43467 | 3485 | 13707 | 245253 |
| 1993 | 183025 | 35521 | 2689 | 8812 | 230046 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.017 | 0.993 | - NA - | - NA - | 1.013 |
| 1980 | 0.957 | 0.919 | - NA - | - NA - | 0.951 |
| 1981 | 0.923 | 0.965 | - NA - | - NA - | 0.929 |
| 1982 | 1.104 | 1.123 | - NA - | - NA - | 1.107 |
| 1983 | 0.949 | 0.992 | - NA - | - NA - | 0.955 |
| 1984 | 1.367 | 1.297 | - NA - | - NA - | 1.356 |
| 1985 | 0.839 | 0.784 | - NA - | - NA - | 0.831 |
| 1986 | 0.837 | 0.783 | - NA - | - NA - | 0.829 |
| 1987 | 0.990 | 1.327 | - NA - | - NA - | 1.079 |
| 1988 | 0.748 | 0.782 | - NA - | - NA - | 0.816 |
| 1989 | 0.878 | 1.214 | - NA - | - NA - | 0.960 |
| 1990 | 0.720 | 0.916 | - NA - | - NA - | 0.807 |
| 1991 | 0.882 | 1.123 | - NA - | - NA - | 0.944 |
| 1992 | 0.750 | 0.979 | - NA - | - NA - | 0.844 |
| 1993 | 0.744 | 0.800 | - NA - | - NA - | 0.792 |

North/Central B.C. Net

Adult Equivalent Mortality Estimates

| Year | Retention |  | CNR |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 68211 | 6334 | 0 | 0 | 74545 |
| 1980 | 65528 | 6117 | 0 | 0 | 71645 |
| 1981 | 63401 | 6401 | 0 | 0 | 69802 |
| 1982 | 63905 | 5949 | 0 | 0 | 69854 |
| 1983 | 28610 | 3009 | 0 | 0 | 31619 |
| 1984 | 52583 | 4696 | 0 | 0 | 57279 |
| 1985 | 52088 | 3890 | 0 | 0 | 55978 |
| 1986 | 67546 | 5639 | 0 | 0 | 73185 |
| 1987 | 36672 | 2222 | 0 | 0 | 38894 |
| 1988 | 35413 | 2761 | 0 | 0 | 38174 |
| 1989 | 26988 | 1483 | 0 | 0 | 28471 |
| 1990 | 45017 | 3540 | 0 | 0 | 48557 |
| 1991 | 40536 | 2527 | 0 | 0 | 43064 |
| 1992 | 37758 | 2354 | 0 | 0 | 40112 |
| 1993 | 29276 | 1741 | 0 | 0 | 31017 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.045 | 1.022 | - NA - | - NA - | 1.043 |
| 1980 | 1.004 | 0.987 | - NA - | - NA - | 1.003 |
| 1981 | 0.971 | 1.032 | - NA - | - NA - | 0.977 |
| 1982 | 0.979 | 0.959 | - NA - | - NA - | 0.978 |
| 1983 | 0.438 | 0.485 | - NA - | - NA - | 0.442 |
| 1984 | 0.806 | 0.757 | - NA - | - NA - | 0.802 |
| 1985 | 0.798 | 0.627 | - NA - | - NA - | 0.783 |
| 1986 | 1.035 | 0.909 | - NA - | - NA - | 1.024 |
| 1987 | 0.562 | 0.358 | - NA - | - NA - | 0.544 |
| 1988 | 0.543 | 0.445 | - NA - | - NA - | 0.534 |
| 1989 | 0.414 | 0.239 | - NA - | - NA - | 0.398 |
| 1990 | 0.690 | 0.571 | - NA - | - NA - | 0.679 |
| 1991 | 0.621 | 0.408 | - NA - | - NA - | 0.603 |
| 1992 | 0.579 | 0.380 | - NA - | - NA - | 0.561 |
| 1993 | 0.449 | 0.281 | - NA - | - NA - | 0.434 |

North/Central B.C. Sport

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 11779 | 2638 | 0 | 0 | 14418 |
| 1980 | 11345 | 2597 | 0 | 0 | 13941 |
| 1981 | 10825 | 2273 | 0 | 0 | 13098 |
| 1982 | 11805 | 3563 | 0 | 0 | 15368 |
| 1983 | 13135 | 4208 | 0 | 0 | 17343 |
| 1984 | 16934 | 4869 | 0 | 0 | 21803 |
| 1985 | 8696 | 1606 | 0 | 0 | 10302 |
| 1986 | 11368 | 2289 | 0 | 0 | 13657 |
| 1987 | 12313 | 2291 | 0 | 0 | 14604 |
| 1988 | 17077 | 3638 | 0 | 0 | 20715 |
| 1989 | 33089 | 4330 | 0 | 0 | 37420 |
| 1990 | 27639 | 7823 | 0 | 0 | 35463 |
| 1991 | 28410 | 5999 | 0 | 0 | 34409 |
| 1992 | 33038 | 6735 | 0 | 0 | 39773 |
| 1993 | 33338 | 7270 | 0 | 0 | 40609 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.030 | 0.953 | - NA - | - NA - | 1.015 |
| 1980 | 0.992 | 0.938 | - NA - | - NA - | 0.981 |
| 1981 | 0.946 | 0.821 | - NA - | - NA - | 0.922 |
| 1982 | 1.032 | 1.287 | - NA - | - NA - | 1.082 |
| 1983 | 1.148 | 1.520 | - NA - | - NA - | 1.221 |
| 1984 | 1.481 | 1.759 | - NA - | - NA - | 1.535 |
| 1985 | 0.760 | 0.580 | - NA - | - NA - | 0.725 |
| 1986 | 0.994 | 0.827 | - NA - | - NA - | 0.961 |
| 1987 | 1.076 | 0.828 | - NA - | - NA - | 1.028 |
| 1988 | 1.493 | 1.314 | - NA - | - NA - | 1.458 |
| 1989 | 2.893 | 1.564 | - NA - | - NA - | 2.634 |
| 1990 | 2.416 | 2.827 | - NA - | - NA - | 2.496 |
| 1991 | 2.484 | 2.167 | - NA - | - NA - | 2.422 |
| 1992 | 2.888 | 2.433 | - NA - | - NA - | 2.800 |
| 1993 | 2.915 | 2.627 | - NA - | - NA - | 2.859 |

West Coast Vancouver Island Troll

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 416879 | 75565 | 0 | 0 | 492444 |
| 1980 | 404912 | 73712 | 0 | 0 | 478625 |
| 1981 | 384288 | 73378 | 0 | 0 | 457666 |
| 1982 | 422555 | 75110 | 0 | 0 | 497664 |
| 1983 | 331236 | 61852 | 0 | 0 | 393089 |
| 1984 | 378969 | 69599 | 0 | 0 | 448568 |
| 1985 | 310513 | 50817 | 1508 | 2420 | 365259 |
| 1986 | 303361 | 54841 | 0 | 0 | 358201 |
| 1987 | 365038 | 109221 | 5545 | 16267 | 496071 |
| 1988 | 385127 | 86283 | 10714 | 23532 | 505655 |
| 1989 | 220161 | 63183 | 0 | 0 | 283344 |
| 1990 | 319652 | 71543 | 0 | 0 | 391195 |
| 1991 | 222222 | 56751 | 0 | 0 | 278974 |
| 1992 | 324168 | 81038 | 0 | 0 | 405206 |
| 1993 | 294906 | 61981 | 0 | 0 | 356887 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.024 | 1.015 | - NA - | - NA - | 1.023 |
| 1980 | 0.994 | 0.990 | - NA - | - NA - | 0.994 |
| 1981 | 0.944 | 0.986 | - NA - | - NA - | 0.950 |
| 1982 | 1.038 | 1.009 | - NA - | - NA - | 1.033 |
| 1983 | 0.814 | 0.831 | - NA - | - NA - | 0.816 |
| 1984 | 0.931 | 0.935 | - NA - | - NA - | 0.931 |
| 1985 | 0.763 | 0.683 | - NA - | - NA - | 0.758 |
| 1986 | 0.745 | 0.737 | - NA - | - NA - | 0.744 |
| 1987 | 0.897 | 1.467 | - NA - | - NA - | 1.030 |
| 1988 | 0.946 | 1.159 | - NA - | - NA - | 1.050 |
| 1989 | 0.541 | 0.849 | - NA - | - NA - | 0.588 |
| 1990 | 0.785 | 0.961 | - NA - | - NA - | 0.812 |
| 1991 | 0.546 | 0.762 | - NA - | - NA - | 0.579 |
| 1992 | 0.796 | 1.089 | - NA - | - NA - | 0.841 |
| 1993 | 0.724 | 0.833 | - NA - | - NA - | 0.741 |

## West Coast Vancouver Island Terminal Sport ${ }^{1}$

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 22143 | 2356 | 0 | 0 | 24499 |
| 1980 | 20841 | 1275 | 0 | 0 | 22116 |
| 1981 | 14568 | 1433 | 0 | 0 | 16002 |
| 1982 | 20681 | 1358 | 0 | 0 | 22039 |
| 1983 | 17905 | 1284 | 0 | 0 | 19188 |
| 1984 | 30375 | 856 | 0 | 0 | 31230 |
| 1985 | 8003 | 191 | 0 | 0 | 8194 |
| 1986 | 6445 | 564 | 0 | 0 | 7009 |
| 1987 | 11846 | 375 | 0 | 0 | 12221 |
| 1988 | 21948 | 1137 | 0 | 0 | 23085 |
| 1989 | 18128 | 610 | 0 | 0 | 18738 |
| 1990 | 34982 | 1443 | 0 | 0 | 36425 |
| 1991 | 48319 | 1412 | 0 | 0 | 49731 |
| 1992 | 26458 | 606 | 0 | 0 | 27064 |
| 1993 | 30731 | 431 | 0 | 0 | 31162 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.132 | 1.467 | - NA - | - NA - | 1.158 |
| 1980 | 1.066 | 0.794 | - NA - | - NA - | 1.045 |
| 1981 | 0.745 | 0.893 | - NA - | - NA - | 0.756 |
| 1982 | 1.057 | 0.846 | - NA - | - NA - | 1.041 |
| 1983 | 0.915 | 0.800 | - NA - | - NA - | 0.907 |
| 1984 | 1.553 | 0.533 | - NA - | - NA - | 1.476 |
| 1985 | 0.409 | 0.119 | - NA - | - NA - | 0.387 |
| 1986 | 0.330 | 0.351 | - NA - | - NA - | 0.331 |
| 1987 | 0.606 | 0.233 | - NA - | - NA - | 0.577 |
| 1988 | 1.122 | 0.708 | - NA - | - NA - | 1.091 |
| 1989 | 0.927 | 0.380 | - NA - | - NA - | 0.885 |
| 1990 | 1.789 | 0.899 | - NA - | - NA - | 1.721 |
| 1991 | 2.471 | 0.879 | - NA - | - NA - | 2.350 |
| 1992 | 1.353 | 0.378 | - NA - | - NA - | 1.279 |
| 1993 | 1.571 | 0.269 | - NA - | - NA - | 1.472 |

1 Based upon recoveries in WCVI sport fishery in model base period.

Strait of Georgia Troll

Adult Equivalent Mortality Estimates

| Year | Retention |  | CNR |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 197613 | 13669 | 0 | 0 | 211282 |
| 1980 | 172104 | 12395 | 0 | 0 | 184499 |
| 1981 | 157390 | 11706 | 0 | 0 | 169096 |
| 1982 | 142012 | 9276 | 0 | 0 | 151289 |
| 1983 | 105363 | 9027 | 0 | 0 | 114390 |
| 1984 | 91539 | 13939 | 0 | 0 | 105478 |
| 1985 | 43211 | 3794 | 3094 | 2334 | 52433 |
| 1986 | 36610 | 5431 | 1286 | 3353 | 46681 |
| 1987 | 31279 | 5914 | 0 | 0 | 37193 |
| 1988 | 15125 | 3855 | 0 | 0 | 18980 |
| 1989 | 21560 | 7015 | 0 | 0 | 28574 |
| 1990 | 28668 | 5015 | 0 | 0 | 33684 |
| 1991 | 24791 | 6628 | 1029 | 2697 | 35144 |
| 1992 | 29761 | 7074 | 1957 | 4561 | 43353 |
| 1993 | 25730 | 6987 | 1876 | 4993 | 39587 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.181 | 1.162 | - NA - | - NA - | 1.180 |
| 1980 | 1.029 | 1.054 | - NA - | - NA - | 1.030 |
| 1981 | 0.941 | 0.995 | - NA - | - NA - | 0.944 |
| 1982 | 0.849 | 0.789 | - NA - | - NA - | 0.845 |
| 1983 | 0.630 | 0.768 | - NA - | - NA - | 0.639 |
| 1984 | 0.547 | 1.185 | - NA - | - NA - | 0.589 |
| 1985 | 0.258 | 0.323 | - NA - | - NA - | 0.293 |
| 1986 | 0.219 | 0.462 | - NA - | - NA - | 0.261 |
| 1987 | 0.187 | 0.503 | - NA - | - NA - | 0.208 |
| 1988 | 0.090 | 0.328 | - NA - | - NA - | 0.106 |
| 1989 | 0.129 | 0.596 | - NA - | - NA - | 0.160 |
| 1990 | 0.171 | 0.426 | - NA - | - NA - | 0.188 |
| 1991 | 0.148 | 0.564 | - NA - | - NA - | 0.196 |
| 1992 | 0.178 | 0.601 | - NA - | - NA - | 0.242 |
| 1993 | 0.154 | 0.594 | - NA - | - NA - | 0.221 |

Strait of Georgia Sport

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 371964 | 120 | 0 | 0 | 372083 |
| 1980 | 329365 | 109 | 0 | 0 | 329474 |
| 1981 | 304912 | 102 | 0 | 0 | 305013 |
| 1982 | 221777 | 34472 | 0 | 0 | 256250 |
| 1983 | 164778 | 35725 | 0 | 0 | 200503 |
| 1984 | 362960 | 73598 | 0 | 0 | 436558 |
| 1985 | 256136 | 19983 | 0 | 0 | 276119 |
| 1986 | 206304 | 20577 | 0 | 0 | 226881 |
| 1987 | 133807 | 13072 | 0 | 0 | 146879 |
| 1988 | 127832 | 41341 | 0 | 0 | 169173 |
| 1989 | 146195 | 76992 | 0 | 0 | 223187 |
| 1990 | 135039 | 56797 | 0 | 0 | 191836 |
| 1991 | 131751 | 77911 | 0 | 0 | 209662 |
| 1992 | 135032 | 91081 | 0 | 0 | 226113 |
| 1993 | 135986 | 113919 | 0 | 0 | 249906 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.212 | 0.014 | - NA - | - NA - | 1.179 |
| 1980 | 1.073 | 0.013 | - NA - | - NA - | 1.044 |
| 1981 | 0.993 | 0.012 | - NA - | - NA - | 0.966 |
| 1982 | 0.722 | 3.962 | - NA - | - NA - | 0.812 |
| 1983 | 0.537 | 4.106 | - NA - | - NA - | 0.635 |
| 1984 | 1.182 | 8.459 | - NA - | - NA - | 1.383 |
| 1985 | 0.834 | 2.297 | - NA - | - NA - | 0.875 |
| 1986 | 0.672 | 2.365 | - NA - | - NA - | 0.719 |
| 1987 | 0.436 | 1.502 | - NA - | - NA - | 0.465 |
| 1988 | 0.416 | 4.751 | - NA - | - NA - | 0.536 |
| 1989 | 0.476 | 8.849 | - NA - | - NA - | 0.707 |
| 1990 | 0.440 | 6.528 | - NA - | - NA - | 0.608 |
| 1991 | 0.429 | 8.955 | - NA - | - NA - | 0.664 |
| 1992 | 0.440 | 10.468 | - NA - | - NA - | 0.716 |
| 1993 | 0.443 | 13.093 | - NA - | - NA - | 0.792 |

Other B.C. Net

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 137005 | 9457 | 0 | 0 | 146462 |
| 1980 | 129526 | 8620 | 0 | 0 | 138146 |
| 1981 | 118644 | 8595 | 0 | 0 | 127239 |
| 1982 | 112443 | 7105 | 0 | 0 | 119548 |
| 1983 | 154312 | 10773 | 0 | 0 | 165085 |
| 1984 | 137367 | 8271 | 0 | 0 | 145637 |
| 1985 | 86678 | 4095 | 0 | 0 | 90772 |
| 1986 | 90104 | 4427 | 0 | 0 | 94531 |
| 1987 | 61696 | 2410 | 0 | 0 | 64106 |
| 1988 | 89625 | 8063 | 0 | 0 | 97688 |
| 1989 | 100438 | 3656 | 0 | 0 | 104095 |
| 1990 | 67628 | 2904 | 0 | 0 | 70532 |
| 1991 | 126006 | 4001 | 0 | 0 | 130007 |
| 1992 | 56155 | 2098 | 0 | 0 | 58253 |
| 1993 | 94013 | 3982 | 0 | 0 | 97995 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.101 | 1.120 | - NA - | - NA - | 1.102 |
| 1980 | 1.041 | 1.021 | - NA - | - NA - | 1.040 |
| 1981 | 0.954 | 1.018 | - NA - | - NA - | 0.958 |
| 1982 | 0.904 | 0.841 | - NA - | - NA - | 0.900 |
| 1983 | 1.240 | 1.276 | - NA - | - NA - | 1.243 |
| 1984 | 1.104 | 0.979 | - NA - | - NA - | 1.096 |
| 1985 | 0.697 | 0.485 | - NA - | - NA - | 0.683 |
| 1986 | 0.724 | 0.524 | - NA - | - NA - | 0.712 |
| 1987 | 0.496 | 0.285 | - NA - | - NA - | 0.483 |
| 1988 | 0.720 | 0.955 | - NA - | - NA - | 0.735 |
| 1989 | 0.807 | 0.433 | - NA - | - NA - | 0.784 |
| 1990 | 0.544 | 0.344 | - NA - | - NA - | 0.531 |
| 1991 | 1.013 | 0.474 | - NA - | - NA - | 0.979 |
| 1992 | 0.451 | 0.248 | - NA - | - NA - | 0.438 |
| 1993 | 0.756 | 0.472 | - NA - | - NA - | 0.738 |

Other U.S. Troll

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 155745 | 38384 | 0 | 0 | 194128 |
| 1980 | 156862 | 38335 | 0 | 0 | 195198 |
| 1981 | 150582 | 38360 | 0 | 0 | 188942 |
| 1982 | 169020 | 40766 | 0 | 0 | 209785 |
| 1983 | 41600 | 9658 | 0 | 0 | 51258 |
| 1984 | 27814 | 6710 | 0 | 0 | 34523 |
| 1985 | 52730 | 12043 | 0 | 0 | 64772 |
| 1986 | 48593 | 12142 | 0 | 0 | 60735 |
| 1987 | 75925 | 20030 | 0 | 0 | 95954 |
| 1988 | 99399 | 19731 | 0 | 0 | 119130 |
| 1989 | 66238 | 15939 | 0 | 0 | 82177 |
| 1990 | 60421 | 11266 | 0 | 0 | 71688 |
| 1991 | 46067 | 10747 | 0 | 0 | 56814 |
| 1992 | 62486 | 13997 | 0 | 0 | 76483 |
| 1993 | 48833 | 11693 | 0 | 0 | 60526 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 0.985 | 0.985 | - NA - | - NA - | 0.985 |
| 1980 | 0.992 | 0.984 | - NA - | - NA - | 0.991 |
| 1981 | 0.953 | 0.985 | - NA - | - NA - | 0.959 |
| 1982 | 1.069 | 1.046 | - NA - | - NA - | 1.065 |
| 1983 | 0.263 | 0.248 | - NA - | - NA - | 0.260 |
| 1984 | 0.176 | 0.172 | - NA - | - NA - | 0.175 |
| 1985 | 0.334 | 0.309 | - NA - | - NA - | 0.329 |
| 1986 | 0.307 | 0.312 | - NA - | - NA - | 0.308 |
| 1987 | 0.480 | 0.514 | - NA - | - NA - | 0.487 |
| 1988 | 0.629 | 0.506 | - NA - | - NA - | 0.605 |
| 1989 | 0.419 | 0.409 | - NA - | - NA - | 0.417 |
| 1990 | 0.382 | 0.289 | - NA - | - NA - | 0.364 |
| 1991 | 0.291 | 0.276 | - NA - | - NA - | 0.288 |
| 1992 | 0.395 | 0.359 | - NA - | - NA - | 0.388 |
| 1993 | 0.309 | 0.300 | - NA - | - NA - | 0.307 |

Other U.S. Net

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 313563 | 29799 | 0 | 0 | 343361 |
| 1980 | 323657 | 30794 | 0 | 0 | 354451 |
| 1981 | 312285 | 29640 | 0 | 0 | 341925 |
| 1982 | 331644 | 28797 | 0 | 0 | 360441 |
| 1983 | 212805 | 26746 | 0 | 0 | 239552 |
| 1984 | 302298 | 25912 | 0 | 0 | 328211 |
| 1985 | 368000 | 27994 | 0 | 0 | 395994 |
| 1986 | 511317 | 38881 | 0 | 0 | 550198 |
| 1987 | 627680 | 42854 | 0 | 0 | 670534 |
| 1988 | 577241 | 40814 | 0 | 0 | 618055 |
| 1989 | 412141 | 23705 | 0 | 0 | 435846 |
| 1990 | 350730 | 22498 | 0 | 0 | 373228 |
| 1991 | 247616 | 24402 | 0 | 0 | 272018 |
| 1992 | 179489 | 20179 | 0 | 0 | 199668 |
| 1993 | 200913 | 24951 | 0 | 0 | 225863 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 0.979 | 1.001 | - NA - | - NA - | 0.981 |
| 1980 | 1.011 | 1.035 | - NA - | - NA - | 1.013 |
| 1981 | 0.975 | 0.996 | - NA - | - NA - | 0.977 |
| 1982 | 1.035 | 0.968 | - NA - | - NA - | 1.030 |
| 1983 | 0.664 | 0.899 | - NA - | - NA - | 0.684 |
| 1984 | 0.944 | 0.871 | - NA - | - NA - | 0.938 |
| 1985 | 1.149 | 0.941 | - NA - | - NA - | 1.131 |
| 1986 | 1.596 | 1.307 | - NA - | - NA - | 1.572 |
| 1987 | 1.960 | 1.440 | - NA - | - NA - | 1.916 |
| 1988 | 1.802 | 1.372 | - NA - | - NA - | 1.766 |
| 1989 | 1.287 | 0.797 | - NA - | - NA - | 1.245 |
| 1990 | 1.095 | 0.756 | - NA - | - NA - | 1.066 |
| 1991 | 0.773 | 0.820 | - NA - | - NA - | 0.777 |
| 1992 | 0.560 | 0.678 | - NA - | - NA - | 0.570 |
| 1993 | 0.627 | 0.838 | - NA - | - NA - | 0.645 |

Other U.S. Sport

| Adult Equivalent Mortality Estimates |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 314944 | 71426 | 0 | 0 | 386370 |
| 1980 | 290640 | 64209 | 0 | 0 | 354849 |
| 1981 | 281566 | 61849 | 0 | 0 | 343415 |
| 1982 | 258538 | 56558 | 0 | 0 | 315096 |
| 1983 | 293725 | 82468 | 0 | 0 | 376193 |
| 1984 | 263822 | 67478 | 0 | 0 | 331299 |
| 1985 | 268419 | 48520 | 0 | 0 | 316938 |
| 1986 | 253042 | 52665 | 0 | 0 | 305707 |
| 1987 | 291570 | 46411 | 0 | 0 | 337981 |
| 1988 | 275531 | 44067 | 0 | 0 | 319598 |
| 1989 | 250340 | 31595 | 0 | 0 | 281935 |
| 1990 | 224117 | 30531 | 0 | 0 | 254649 |
| 1991 | 221337 | 37854 | 0 | 0 | 259191 |
| 1992 | 189544 | 35887 | 0 | 0 | 225431 |
| 1993 | 179860 | 38330 | 0 | 0 | 218190 |


| Adult Equivalent Mortality Indices |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year | Retention |  | CNR |  | Total |
|  | Landed | Shaker | Legal | Sublegal |  |
| 1979 | 1.100 | 1.125 | - NA - | - NA - | 1.104 |
| 1980 | 1.015 | 1.011 | - NA - | - NA - | 1.014 |
| 1981 | 0.983 | 0.974 | - NA - | - NA - | 0.981 |
| 1982 | 0.903 | 0.891 | - NA - | - NA - | 0.900 |
| 1983 | 1.025 | 1.298 | - NA - | - NA - | 1.075 |
| 1984 | 0.921 | 1.062 | - NA - | - NA - | 0.947 |
| 1985 | 0.937 | 0.764 | - NA - | - NA - | 0.906 |
| 1986 | 0.883 | 0.829 | - NA - | - NA - | 0.874 |
| 1987 | 1.018 | 0.731 | - NA - | - NA - | 0.966 |
| 1988 | 0.962 | 0.694 | - NA - | - NA - | 0.913 |
| 1989 | 0.874 | 0.497 | - NA - | - NA - | 0.806 |
| 1990 | 0.782 | 0.481 | - NA - | - NA - | 0.728 |
| 1991 | 0.773 | 0.596 | - NA - | - NA - | 0.741 |
| 1992 | 0.662 | 0.565 | - NA - | - NA - | 0.644 |
| 1993 | 0.628 | 0.604 | - NA - | - NA - | 0.624 |

K-14

## APPENDIX L

Model Estimates of Fishery Abundance Indices

| Catch Year | SEAK <br> Troll | NCBC Troll | $\begin{aligned} & \text { WCYI } \\ & \text { WMoll } \end{aligned}$ | GS Spport and Tholl |
| :---: | :---: | :---: | :---: | :---: |
| 1979 | 0.98 | 1.02 | 1.03 | 1.17 |
| 1980 | 0.96 | 0.96 | 1.00 | 1.03 |
| 1981 | 0.91 | 0.93 | 0.95 | 0.94 |
| 1982 | 1.15 | 1.09 | 1.02 | 0.86 |
| 1983 | 1.38 | 1.16 | 0.83 | 0.79 |
| 1984 | 1.70 | 1.37 | 0.94 | 0.96 |
| 1985 | 1.60 | 1.30 | 0.94 | 0.97 |
| 1986 | 1.66 | 1.24 | 0.95 | 0.85 |
| 1987 | 1.84 | 1.42 | 1.15 | 0.49 |
| 1988 | 2.30 | 1.54 | 0.95 | 0.44 |
| 1989 | 2.05 | 1.57 | 0.91 | 0.65 |
| 1990 | 2.19 | 1.60 | 0.92 | 0.84 |
| 1991 | 2.26 | 1.53 | 0.73 | 0.52 |
| 1992 | 2.08 | 1.49 | 0.72 | 0.63 |
| 1993 | 1.99 | 1.36 | 0.69 | 0.64 |
| 1994 | 1.44 | 1.04 | 0.67 | 0.85 |
| 1995 | 1.00 | 0.94 | 0.66 | 0.97 |

## APPENDIX M

Catch By Fishery, Troll CNR, and Add-on, 1975-1993
See Table 1-1 footnotes for explanation of catch areas.Page
Southeast Alaska ..... M-1
North/Central B.C. ..... M-2
West Coast Vancouver Island ..... M-3
Strait of Georgia/Fraser ..... M-4
Johnstone Strait ..... M-5
Canada - Strait of Juan de Fuca ..... M-6
Washington - Strait of Juan de Fuca ..... M-7
Washington - San Juans ..... M-8
Washington - Other Puget Sound ..... M-9
Washington - Inside Coastal ..... M-10
Columbia River ..... M-11
Washington/Oregon North of Cape Falcon ..... M-12
Oregon ..... M-13

| Year | S. E. Alaska |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Tiroll CNP Days | Iroll | Net | Sport | Total | Addun | Ceiling Catch |
| 1975 | 0 | 287,342 | 13,365 | 17,000 | 317,707 |  |  |
| 1976 | 0 | 231,239 | 10,523 | 17,000 | 258,762 |  |  |
| 1977 | 0 | 271,735 | 13,443 | 17,000 | 302,178 |  |  |
| 1978 | 0 | 375,919 | 25,492 | 17,000 | 418,411 |  |  |
| 1979 | 0 | 339,151 | 28,455 | 17,000 | 384,606 |  |  |
| 1980 | 0 | 303,885 | 20,114 | 20,000 | 343,999 |  |  |
| 1981 | 9 | 248,791 | 18,951 | 21,000 | 288,742 |  |  |
| 1982 | 44 | 242,315 | 48,999 | 26,000 | 317,314 |  |  |
| 1983 | 37 | 269,790 | 19,655 | 22,321 | 311,766 |  |  |
| 1984 | 43 | 235,629 | 32,398 | 22,049 | 290,076 |  |  |
| 1985 | 48.4 | 216,086 | 35,469 | 24,858 | 276,413 | 8,200 | 268,213 |
| 1986 | 42 | 237,557 | 22,302 | 22,551 | 282,410 | 11,200 | 271,210 |
| 1987 | 60 | 242,025 | 15,539 | 24,323 | 281,887 | 16,700 | 265,187 |
| 1988 | 47 | 231,281 | 21,450 | 26,160 | 278,891 | 23,700 | 255,191 |
| 1989 | 59 | 235,731 | 24,276 | 31,071 | 291,078 | 26,700 | 264,378 |
| 1990 | 48 | 287,931 | 27,696 | 51,200 | 366,827 | 53,700 | 313,127 |
| 1991 | 63.5 | 263,756 | 32,807 | 60,400 | 356,963 | 61,400 | 295,563 |
| 1992 | 67.5 | 183,893 | 32,104 | 43,984 | 259,981 | 38,300 | 221,681 |
| 1993 | 49 | 226,832 | 28,004 | 49,246 | 304,082 | 35,879 | 268,203 |

Troll, net, sport, and total catches include catch of SEAK hatchery-origin fish; catches that count towards the all-gear ceiling (with hatchery add-on subtracted) are shown in the "ceiling catch" column.

## M-1

North/Central B.C.

| rear |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Tholl CNB Days |  |  | Sport | Total | Terminal Exclusion | Ceilimg Catcli\% |
| 1975 | 0 | 327,883 | 66,080 | NA | NA | 0 |  |
| 1976 | 0 | 315,596 | 48,774 | NA | NA | 0 |  |
| 1977 | 0 | 241,307 | 76,605 | 8,795 | 326,707 | 0 |  |
| 1978 | 0 | 233,034 | 63,632 | 11,457 | 308,123 | 0 |  |
| 1979 | 0 | 244,706 | 91,085 | 15,302 | 351,093 | 0 |  |
| 1980 | 0 | 249,675 | 54,610 | 19,669 | 323,954 | 0 |  |
| 1981 | 0 | 218,699 | 60,636 | 11,425 | 290,760 | 0 |  |
| 1982 | 0 | 237,536 | 77,316 | 17,274 | 332,126 | 0 |  |
| 1983 | 0 | 253,688 | 29,659 | 12,353 | 295,700 | 0 |  |
| 1984 | 0 | 254,157 | 35,935 | 10,525 | 300,617 | 0 |  |
| 1985 | 0 | 211,979 | 52,156 | 9,867 | 274,002 | 0 | 274,002 |
| 1986 | 0 | 201,604 | 46,998 | 12,619 | 261,221 | 0 | 261,221 |
| 1987 | 87 | 239,693 | 29,260 | 13,827 | 282,780 | 0 | 282,780 |
| 1988 | 17 | 181,907 | 44,382 | 20,807 | 247,096 | 0 | 247,096 |
| 1989 | 9 | 224,947 | 45,379 | 35,650 | 305,976 | 4,819 | 301,157 |
| 1990 | 43 | 179,130 | 47,459 | 31,967 | 258,556 | 5,549 | 253,007 |
| 1991 | 27 | 220,625 | 57,209 | 32,496 | 310,330 | 6,057 | 304,273 |
| 1992 | 32 | 181,851 | 54,405 | 37,881 | 274,137 | 6,070 | 268,067 |
| 1993 | 22 | 182,162 | 44,361 | 37,330 | 263,853 | 7,673 | 256,180 |

${ }^{1}$ Net catches in 1989-1992 include terminal gillnet catches that are excluded from the catch ceiling; catches that count towards the all-gear ceiling (with terminal exclusions subtracted) are shown in the "ceiling catch" column.

Troll: Areas 1-11, and 30 (North, 1-5; Central, 6-11 and 30)
Net and Sport: Areas 1-10 (North, 1-5; Central, 6-10)

West Coast Vancouver Island

| Year | Westeoast Vancouver IIAnd |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Iroll CAP Days | Troll | Net | Sporl | Total |
| 1975 | 0 | 547,402 | 19,233 | NA | NA |
| 1976 | 0 | 656,161 | 17,492 | NA | NA |
| 1977 | 0 | 566,571 | 13,745 | 11,023 | 591,339 |
| 1978 | 0 | 555,259 | 25,143 | 8,974 | 589,376 |
| 1979 | 0 | 480,373 | 35,623 | 7,964 | 523,960 |
| 1980 | 0 | 488,155 | 34,716 | 8,539 | 531,410 |
| 1981 | 0 | 397,518 | 36,408 | 11,230 | 445,156 |
| 1982 | 0 | 543,783 | 41,408 | 17,100 | 602,291 |
| 1983 | 0 | 385,367 | 37,535 | 28,000 | 450,902 |
| 1984 | 0 | 460,057 | 43,792 | 44,162 | 548,011 |
| 1985 | 5 | 354,068 | 11,089 | 21,587 | 386,744 |
| 1986 | 0 | 342,063 | 3,276 | 13,410 | 358,749 |
| 1987 | 7 | 378,931 | 478 | 31,790 | 411,199 |
| 1988 | 15 | 408,724 | 15,438 | 32,810 | 456,972 |
| 1989 | 0 | 203,695 | 40,321 | 48,222 | 292,238 |
| 1990 | 0 | 297,974 | 29,578 | 61,268 | 388,820 |
| 1991 | 0 | 202,919 | 60,797 | 79,991 | 343,707 |
| 1992 | 0 | 346,814 | 9,507 | 49,602 | 405,923 |
| 1993 | 0 | 273,749 | 28,505 | 66,010 | 368,264 |

Troll: Areas 21, 23-27, and 121-127
Net: Areas 21, and 23-27
Sport: Areas 23a, 23b, and 24

## Strait of Georgia/Fraser


${ }^{1}$ In 1985, major inside areas were closed during all CNR periods to reduce chinook shakers.
${ }^{2}$ Based on creel census surveys through September.
Troll: Areas 13-18, and 29
Net: Areas 14-19, 28, and 29
Sport: Areas 13-19, 19b, 28, and 29

Johnstone Strait

| Year | Iothistome Strail Net | Johistone Stratil Sport |
| :---: | :---: | :---: |
| 1975 | 30,295 | NA |
| 1976 | 31,855 | NA |
| 1977 | 49,511 | NA |
| 1978 | 55,148 | NA |
| 1979 | 31,291 | NA |
| 1980 | 31,325 | NA |
| 1981 | 28,620 | NA |
| 1982 | 29,454 | NA |
| 1983 | 28,364 | NA |
| 1984 | 18,361 | NA |
| 1985 | 38,073 | NA |
| 1986 | 17,866 | NA |
| 1987 | 13,863 | NA |
| 1988 | 6,292 | NA |
| 1989 | 29,486 | NA |
| 1990 | 18,433 | NA |
| 1991 | 15,071 | 10,000 |
| 1992 | 9,574 | 14,719 |
| 1993 | 14,878 | 12,363 |

Net: Areas 11-13
Sport: Based on April - August creel census in Area 12 and northern half of Area 13

| Year | Strat of Juan de Fuca Net |
| :---: | :---: |
| 1975 | 9,799 |
| 1976 | 13,004 |
| 1977 | 25,344 |
| 1978 | 9,725 |
| 1979 | 8,665 |
| 1980 | 3,438 |
| 1981 | 9,982 |
| 1982 | 7,072 |
| 1983 | 328 |
| 1984 | 6,237 |
| 1985 | 17,164 |
| 1986 | 17,727 |
| 1987 | 6,782 |
| 1988 | 4,473 |
| 1989 | 21,238 |
| 1990 | 7,405 |
| 1991 | 8,893 |
| 1992 | 10,024 |
| 1993 | 2,136 |

Net: Area 20

Washington - Strait of Juan de Fuca

| Year | Washington Strale ol Juan de Fuca |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | MMR, Days | \nole\& | Nel. | Sporlam\& | Iotal $\%$ |
| 1975 | 0 | 5,752 | 8,048 | 81,681 | 95,481 |
| 1976 | 0 | 10,488 | 6,072 | 75,308 | 91,868 |
| 1977 | 0 | 8,915 | 14,930 | 53,238 | 77,083 |
| 1978 | 0 | 10,006 | 11,224 | 62,299 | 83,529 |
| 1979 | 0 | 7,804 | 10,939 | 67,094 | 85,837 |
| 1980 | 0 | 10,682 | 11,320 | 56,415 | 78,417 |
| 1981 | 0 | 15,638 | 18,541 | 51,352 | 85,531 |
| 1982 | 0 | 19,024 | 22,547 | 29,842 | 71,413 |
| 1983 | 0 | 18,489 | 16,141 | 58,060 | 92,690 |
| 1984 | 0 | 15,650 | 12,120 | 48,003 | 75,773 |
| 1985 | 0 | 11,808 | 12,784 | 44,267 | 68,859 |
| 1986 | 0 | 30,000 | 17,000 | 69,000 | 116,000 |
| 1987 | 0 | 45,000 | 11,000 | 53,000 | 109,000 |
| 1988 | 0 | 49,000 | 10,000 | 39,000 | 98,000 |
| 1989 | 0 | 65,000 | 10,000 | 52,000 | 127,000 |
| 1990 | 0 | 47,162 | 5,294 | 50,903 | 103,359 |
| 1991 | 0 | 37,127 | 3,390 | 39,667 | 80,184 |
| 1992 | 0 | 31,452 | 927 | 38,438 | 70,817 |
| 1993 | 0 | 9,794 | 1,482 | 32,434 | 43,710 |

Troll: Areas 5 and 6C; Area 4B from Jan. 1 - April 30 and Oct. 1 - Dec. 31
Net: Areas 4B, 5, and 6C
Sport: Areas 5 and 6; 4B Neah Bay "add-on" fishery

Washington - San Juans

| Vear | Washington San Juans |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | CNR Days | Troll | Net | Sport | Tont |
| 1975 | 0 | 3 | 90,100 | 31,988 | 122,091 |
| 1976 | 0 | 0 | 66,832 | 34,505 | 101,337 |
| 1977 | 0 | 62 | 84,316 | 14,049 | 98,427 |
| 1978 | 0 | 3 | 87,565 | 15,083 | 102,651 |
| 1979 | 0 | 5 | 53,750 | 17,367 | 71,122 |
| 1980 | 0 | 0 | 64,338 | 12,231 | 76,569 |
| 1981 | 0 | 4 | 50,695 | 9,727 | 60,426 |
| 1982 | 0 | 0 | 38,763 | 6,953 | 45,716 |
| 1983 | 0 | 2 | 28,497 | 15,166 | 43,665 |
| 1984 | 0 | 83 | 33,432 | 25,759 | 59,274 |
| 1985 | 0 | 872 | 33,579 | 12,610 | 47,061 |
| 1986 | 0 | 0 | 21,000 | 15,000 | 36,000 |
| 1987 | 0 | 0 | 29,000 | 14,000 | 43,000 |
| 1988 | 0 | 0 | 32,000 | 9,000 | 41,000 |
| 1989 | 0 | 1,000 | 16,000 | 9,000 | 26,000 |
| 1990 | 0 | 666 | 8,608 | 7,370 | 16,644 |
| 1991 | 0 | 135 | 11,753 | 5,115 | 17,003 |
| 1992 | 0 | 172 | 14,011 | 6,788 | 20,971 |
| 1993 | 0 | 243 | 14,002 | 6,916 | 21,161 |

Troll: Areas 6, 6A, 7, and 7A
Net: Areas 6, 6A, 7, and 7A
Sport: Area 7

Washington - Other Puget Sound

| Year | Washington, Other, Fuge Sound |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | /a. | Ne§\&\& | Sporl\%\& | Iotal $\%$ \% |
| 1975 | 0 | 131,982 | 173,086 | 305,068 |
| 1976 | 0 | 141,281 | 151,246 | 292,527 |
| 1977 | 0 | 145,470 | 97,761 | 243,231 |
| 1978 | 0 | 150,298 | 116,979 | 267,277 |
| 1979 | 0 | 128,073 | 156,402 | 284,475 |
| 1980 | 0 | 171,516 | 142,799 | 314,315 |
| 1981 | 0 | 145,152 | 106,048 | 251,200 |
| 1982 | 0 | 149,274 | 85,703 | 234,977 |
| 1983 | 0 | 134,492 | 123,752 | 258,244 |
| 1984 | 0 | 180,248 | 102,740 | 282,988 |
| 1985 | 0 | 184,907 | 92,603 | 277,510 |
| 1986 | 0 | 153,000 | 88,000 | 241,000 |
| 1987 | 0 | 127,000 | 59,000 | 186,000 |
| 1988 | 0 | 133,000 | 63,000 | 196,000 |
| 1989 | 0 | 156,000 | 75,000 | 231,000 |
| 1990 | 0 | 179,593 | 71,000 | 250,593 |
| 1991 | 0 | 89,495 | 48,859 | 138,354 |
| 1992 | 0 | 63,460 | 51,656 | 115,116 |
| 1993 | 0 | 54,968 | 41,034 ${ }^{1}$ | 96,002 |

Not including sport catch in rivers.
Net: Areas 6B, 6D, 7B, 7C, and 7E; Areas 8-13 (including all sub-areas); Areas 74C-83F Sport: Areas 8-13 and all Puget Sound Rivers

| Year | Washingion liside Constal |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Jnoll | Nek\& | Spirl | lotal |
| 1975 | 0 | 34,859 | 1,716 | 36,575 |
| 1976 | 0 | 51,995 | 2,219 | 54,214 |
| 1977 | 0 | 72,467 | 2,043 | 74,510 |
| 1978 | 0 | 32,662 | 3,399 | 36,061 |
| 1979 | 0 | 36,501 | 2,199 | 38,700 |
| 1980 | 0 | 47,681 | 1,476 | 49,157 |
| 1981 | 0 | 36,880 | 786 | 37,666 |
| 1982 | 0 | 33,271 | 1,114 | 34,385 |
| 1983 | 0 | 16,210 | 1,452 | 17,662 |
| 1984 | 0 | 16,239 | 1,319 | 17,558 |
| 1985 | 0 | 25,162 | 1,955 | 27,117 |
| 1986 | 0 | 29,000 | 3,000 | 32,000 |
| 1987 | 0 | 51,000 | 3,000 | 54,000 |
| 1988 | 0 | 74,000 | 7,000 | 81,000 |
| 1989 | 0 | 85,000 | 6,000 | 91,000 |
| 1990 | 0 | 57,770 | 5,000 | 62,770 |
| 1991 | 0 | 54,397 | 6,070 | 60,467 |
| 1992 | 0 | 64,223 | 6,577 | 70,800 |
| 1993 | 0 | 59,285 | NA | NA |

Net: Areas 2A-2M; Areas 72B - 73H
Sport: All coastal rivers, Area 2.1, and Area 2.2 (when Area 2 is closed)

## Columbia River

| Year | Colimbian River |  |  |
| :---: | :---: | :---: | :---: |
|  | Nel $\% / 4$. | Sporl | Iotal |
| 1975 | 323,000 | 34,870 | 357,870 |
| 1976 | 288,400 | 42,527 | 330,927 |
| 1977 | 255,600 | 58,838 | 314,438 |
| 1978 | 189,100 | 56,582 | 245,682 |
| 1979 | 171,000 | 36,505 | 207,505 |
| 1980 | 150,300 | 32,774 | 183,074 |
| 1981 | 95,100 | 36,269 | 131,369 |
| 1982 | 155,300 | 51,560 | 206,860 |
| 1983 | 57,700 | 45,609 | 103,309 |
| 1984 | 127,900 | 64,364 | 192,264 |
| 1985 | 151,400 | 45,515 | 196,915 |
| 1986 | 283,100 | 71,865 | 354,965 |
| 1987 | 483,500 | 116,545 | 600,045 |
| 1988 | 489,100 | 110,398 | 599,498 |
| 1989 | 275,000 | 96,878 | 371,878 |
| 1990 | 148,000 | 94,820 | 242,820 |
| 1991 | 106,900 | 77,986 | 184,886 |
| 1992 | 53,200 | 68,300 | 121,500 |
| 1993 | 50,792 | 82,500 | 133,292 |

Washington/Oregon Ocean North of Cape Falcon

| Year | Washington/Oregon North of Falcon |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | CNA. Days | Irolle\&\&\& | Net\%月\&/2l | Sport\&\&\& |  |
| 1975 | 0 | 268,971 | 1,212 | 265,785 | 535,968 |
| 1976 | 0 | 371,239 | 203 | 215,319 | 586,761 |
| 1977 | 0 | 244,491 | 4 | 197,563 | 442,058 |
| 1978 | 0 | 150,673 | 4 | 104,306 | 254,983 |
| 1979 | 0 | 133,035 | 3 | 84,977 | 218,015 |
| 1980 | 0 | 125,709 | 1,215 | 59,099 | 186,023 |
| 1981 | 0 | 109,519 | 209 | 96,151 | 205,879 |
| 1982 | 0 | 154,720 | 267 | 114,952 | 269,939 |
| 1983 | 0 | 63,584 | 62 | 51,789 | 115,435 |
| 1984 | $0^{1}$ | 15,392 | 0 | 6,980 | 22,372 |
| 1985 | $0^{1}$ | 55,408 | 493 | 30,189 | 86,090 |
| 1986 | 0 | 52,000 | 0 | 23,000 | 75,000 |
| 1987 | $0^{1}$ | 81,000 | 4,000 | 44,000 | 129,000 |
| 1988 | 0 | 108,000 | 3,000 | 19,000 | 130,000 |
| 1989 | 0 | 75,000 | 1,000 | 21,000 | 97,000 |
| 1990 | 0 | 65,221 | 0 | 30,000 | 95,221 |
| 1991 | 0 | 51,296 | 0 | 16,732 | 68,028 |
| 1992 | 0 | 68,866 | 0 | 18,927 | 87,793 |
| 1993 | 0 | 55,140 | 0 | 13,711 | 68,851 |

${ }^{1}$ Chinook non-retention regulations were in effect for short time periods in small sub-areas of the recreational fishery. Because of the small size of these fisheries, the CNR days have not been included. See Appendix C of the PFMC Review of 1992 Ocean Salmon Fisheries for more detail.

Troll: OR Area 2; WA Areas 1, 2, 3, and 4; Area 4B from May 1 through Sept. 30 (during PFMC management)
Net: WA Areas 1, 2, 3, 4, 4A
Sport: OR Area 2; WA Areas 1, 1.1, 1.2, 2, 3, 4 and 2.2 (when Area 2 is open)

## Oregon



Troll: Late season troll off Elk River mouth
Sport: Estuary and inland


[^0]:    ${ }^{1}$ Washington Coastal stocks are managed for escapement floors.
    ${ }^{2}$ Assessment of Oregon Coast indicator stocks is based upon an index of spawner density in units of fish per mile.

[^1]:    1/ Stock groupings are used for nonceiling fishery indices, regional survival indices, regional brood exploitation indices, and in Chapter 5. Acronyms are:

    SEAK-TBR/I: SEAK and Transboundary rivers, inside migrating
    NCBC: NCBC spring/summer
    WCVI: WCVI fall
    UGS: UGS summer/fall
    LGS: LGS fall
    LFR: Lower Fraser fall
    NPS-S/F: North Puget Sound summer/fall
    SPS-S/F: $\quad$ South Puget Sound summer/fall
    NPS-Sp: North Puget Sound spring
    CRT: Colmbia River Tule hatchery stock
    WACO: Washington Coastal Spring/Summer/Fall, non-Tule Columbia River Fall, North Oregon
    2/ Only hatchery rack recoveries are included in escapement.
    3/ Harrison stock only.
    4/ Hatchery stock not used to represent wild stock.

[^2]:    * An asterisk indicates a stock that rebuilds when a $50 \%$ exploitation rate decrease is assumed.
    ${ }^{1}$ Current model escapement goals for these stocks are not appropriate for use in the rebuilding evaluation.

[^3]:    BQR = BIG QUALICUM
    BGR $=$ BIG QUALICUM PPS $=$ PUNTLEDGE
    SAM = SAMISH FALL FING

[^4]:    Reported Catch Incidental Mortality

