# PACIFIC SALMON COMMISSION
# JOINT CHINOOK TECHNICAL COMMITTEE
# 1992 ANNUAL REPORT

## REPORT TCCHINOOK (93)-2

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List of Acronyms with Definitions

| | |
|---|---|
| ADF&G | Alaska Department of Fish & Game |
| AEQ | Adult Equivalent |
| AWG | Analytical Working Group of the CTC |
| C&S | Ceremonial & Subsistence |
| CBC | Central British Columbia Fishing area - Kitimat to Cape Caution |
| CDFO | Canadian Department of Fisheries & Oceans |
| CNR | Chinook Nonretention - all species except chinook fisheries |
| CR | Columbia River |
| CRITFC | Columbia River Intertribal Fish Commission |
| CTC | Chinook Technical Committee |
| CUS | Columbia Upriver Spring chinook stock |
| CWT | Coded Wire Tag |
| ESA | U.S. Endangered Species Act |
| est+fw | Estuary Plus Fresh Water Area |
| FR | Fraser River |
| GS | Strait of Georgia |
| IDFG | Idaho Department of Fish & Game |
| IDL | InterDam Loss (fishing mortalitiy) |
| LFR | Lower Fraser River |
| LGS | Lower Strait of Georgia |
| mar | Marine Area |
| mar+fw | Marine Plus Fresh Water Area |
| MRP | Mark-Recovery Program |
| MSY | Maximum Sustainable Yield for a stock, in adult equivalents |
| MSY ER | Exploitation Rate sustainable at the escapement goal for a stock, in adult equivalents |
| NA | Not Available |
| NBC | Northern British Columbia - Dixon Entrance to Kitimat including Queen Charlotte Islands |
| NCBC | North Central British Columbia - Dixon Entrance to Cape Caution |
| NMFS | National Marine Fisheries Service |
| NOC | Oregon Coastal North Migrating Stocks |
| NPS | North Puget Sound |
| NPS-S/F | North Puget Sound Summer/Fall chinook stock |
| NPS-Sp | North Puget Sound Spring chinook stock |
| NR | Not Representative |
| NWIFC | Northwest Indian Fisheries Commission |
| ODFW | Oregon Department of Fish & Wildlife |
| OTAC | Outside Troll Advisory Committee |
| PFMC | Pacific Fisheries Management Council |
| PS | Puget Sound |
| PSC | Pacific Salmon Commission |
| PSMFC | Pacific States Marine Fisheries Commission |
| PST | Pacific Salmon Treaty |
| QIN | Quinault Nation |
| SEAK | Southeast Alaska - Cape Suckling to Dixon Entrance |
| SPS | South Puget Sound |
| SSRAA | Southern Southeast Region Aqualculture Association |
| TBR | Transboundary Rivers |
| TBTC | Transboundary Technical Committee |
| UFR | Upper Fraser River |
| UGS | Upper Strait of Georgia |
| USFWS | U.S. Fish & Wildlife Service |
| UW | University of Washington |
| WA/OR | Ocean areas off Washington and Oregon North of Cape Falcon |
| WAC | North Washington Coastal Area (Grays Harbor northward) |
| WACO | Washington, Oregon, Columbia River chinook stock |
| WCVI | West Coast Vancouver Island - excluding Area 20 |
| WDF | 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 midpoint of the second phase of the rebuilding program using data through 1992. This report includes recent catch in fisheries of concern to the Pacific Salmon Commission (Chapter 1), assessment of spawning escapements for 42 escapement indicator stocks (Chapter 2), fishery-harvest and stock-specific-exploitation rates based on 40 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

### SUMMARY OF CHAPTER 1: 1992 CHINOOK SALMON CATCHES

Estimates of 1992 catches for each fishery managed under a harvest ceiling established by the Pacific Salmon Commission (PSC) are presented below.

| Area/Fisheries a/ | Ceiling | Catch | Difference | |
|---|---|---|---|---|
| | | | Numbers | Percent |
| S.E. Alaska (T,N,S) | 263 | 221.7 b/ | -41.3 | -15.7 |
| North/Central B.C. (T,N,S) | 263 | 268.1 c/d/ | +5.1 | +1.9% |
| West Coast Vancouver Island (T) | 360 | 345.0 | -15.0 | -4.2% |
| Strait of Georgia (T,S) | 275 | 153.9 | -121.1 | -44.0% |

a/ T=Troll; N=Net; S=Sport
b/ The actual total catch was 260,000 chinook, including a hatchery add-on of 38,300.
c/ Excludes 6,070 chinook caught in terminal areas in 1992, which Canada proposes to exclude from counting towards the ceiling.
d/ Canada has submitted a proposal to exclude hatchery add-ons from the 1992 NCBC fisheries.

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 depicted in the table below. Under the overage/underage policy adopted by the PSC, only the North/Central British Columbia (NCBC) troll fishery is outside its management range.

| | SEAK (T,N,S) | | | NCBC (T,N,S) | | | WCVI (T) | | GS (T,S) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Ceiling | Catch | Add-On | Ceiling | Catch | Proposed Terminal Exclusion | Ceiling | Catch | Ceiling | Catch |
| 1985 | 263 | 276.4 | 8.2 | 263 | 274.0 | | 360 | 354.1 | 275 | 290.5 |
| 1986 | 263 | 282.4 | 11.2 | 263 | 261.2 | | 360 | 342.1 | 275 | 225.8 |
| 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 | 48.3 | 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 | 268.1 | 6.1 | 360 | 346.8 | 275 | 153.9 |
| Cumulative Deviation (Fish) | | -11.7 | | | +29.4 | | | -27.0 a/ | | -20.6 a/ |
| Cumulative Deviation (%) | | -4.4% | | | +11.2% | | | -7.5% | | -7.5% |

a/ Negative deviations below the 7.5% management range are not accumulated.

## SUMMARY OF CHAPTER 2: ESCAPEMENT ASSESSMENT

The rebuilding response of the escapement indicator stocks is inconsistent with expectations and has deteriorated compared to 1991: 18 of the 42 indicator stocks had lower escapements in 1992 than in 1991 and less than half (15 of 36) of the escapement indicator stocks with goals are currently classified as Above Goal, Rebuilding, or Probably Rebuilding. This is especially significant since most stocks are now more than halfway, and the remainder are more than two-thirds, through their rebuilding programs. Of particular concern are the 18 stocks classified as Not Rebuilding or Probably Not Rebuilding. In 1992, the escapements of these stocks ranged from 6% to 63% of their escapement goals and, for 8 of these 18 stocks, the average escapement during the rebuilding period was actually below the base period level. The poor response seen in 1992 for half of the Southeast Alaska (SEAK) and Transboundary (TBR) stocks, primarily the Behm Canal stocks, is of concern to the CTC since this group has only four years remaining in its rebuilding program. The Alaska Department of Fish and Game (ADF&G) has been reevaluating the Behm Canal stocks to determine if the current escapement goals may be too high or if stock-specific measures are appropriate. While the 26 stocks with escapement goals and a target rebuilding date of 1998 still have six years remaining to rebuild, the Chinook Technical Committee (CTC) is concerned by the large and increasing number of stocks that are classified as Probably Not Rebuilding or Not Rebuilding.

| STOCKS WITH ESCAPEMENT GOALS | | | | |
|---|---|---|---|---|
| | 1991 Assessment | | 1992 Assessment | |
| Category | # | % | # | % |
| Above Goal | 12 | 33% | 12 | 33% |
| Rebuilding | 1 | 3% | 2 | 6% |
| Probably Rebuilding | 3 | 8% | 1 | 3% |
| Indeterminate | 5 | 14% | 3 | 8% |
| Probably Not Rebuilding | 12 | 33% | 15 | 42% |
| Not Rebuilding | 3 | 8% | 3 | 8% |
| TOTAL | 36 | 100% | 36 | 100% |

## SUMMARY OF CHAPTER 3: EXPLOITATION RATE ASSESSMENT

The primary purpose of the Exploitation Rate Assessment is to evaluate the effectiveness of management measures in PSC fisheries. The assessment relies upon coded wire tag (CWT) release and recovery data to estimate indices of fishery harvest rates, impacts of nonceiling fisheries on depressed natural stocks, brood exploitation rates, and survival of CWT groups. The utility of the indices is dependent on how representative the indicator stocks are of the actual populations harvested in the fisheries.

Initial analyses by the ad hoc CTC suggested that brood exploitation rates exceeded the rate at the maximum sustainable yield (MSY ER) by 9 to 16 percentage points (PSC 1991). However, substantially greater reductions were required to rebuild depressed chinook stocks by 1998. For example, brood exploitation rates for the LGS stock exceeded the MSY ER by 16 percentage points, but a 26 percentage point reduction was required to rebuild the stock by 1998. The 1982-1988 average brood year ocean exploitation rates for total mortality have declined from base period levels for 11 of the 17 stocks with adequate data. For these stocks, the decline ranged from 2% to 21%. The median reduction from the base period was 11 percentage points. The average 1982-1988 brood year ocean exploitation rates increased from base period levels for three stocks and did not change from base period levels for three stocks.

For all ceiling fisheries, the initial objective was to achieve the 1985 target reduction in harvest rates. Further reductions in harvest rates were expected to occur in subsequent years as abundance increased. The fishery indices show that only the NCBC fishery has consistently achieved the initial objective. Management measures in the SEAK, West Coast Vancouver Island (WCVI), and Strait of Georgia (GS) fisheries have been insufficient to consistently achieve the 1985 target harvest rate reductions. The 1985-1992 average reduction for the SEAK troll fishery was 13% (1985 target reduction of 22%), but 23% for the recent five-year average. The 1990 reduction was estimated as 31%. Since 1990, catch in the WCVI fishery has been controlled primarily through restrictions in fishing areas and by limiting total effort. Since 1985 there have been 2 years with fishery indices below the 1985 target reduction, 1 year near the target, and 5 years with fishery indices higher than the 1985 target reduction. The 1985-1992 average fishery index was 21% lower than the base period, compared to a 1984 target level reduction of -24%. For GS sport and troll fisheries, 1992 fishery index indicated that the fishery harvest rate was 13% above the base period average. The 1985-1992 average reduction in the GS sport and troll fishery index of 22% is less than 50% of the 1985 target reduction of 47%. Values for the GS sport and troll fisheries have changed substantially from previous reports. The changes result from corrections to the CWT sport recovery data for the Big Qualicum Hatchery (BQR) stock (see Chapter 3, section 3.1.2). In previous analyses, terminal sport recoveries had not been separated from other GS sport recoveries. This correction significantly reduced the base-period exploitation rate for the BQR stock in the GS sport fishery. Since the CTC fishery index is a ratio of annual exploitation rates to the base period rates, these corrections tend to increase the annual GS sport fishery indices.

| Fishery | Age | Change in Total Fishery Harvest Rates from Base Period | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 85-92 Average | 85 Target Reduction |
| SEAK Troll | 3,4,5 | 13% | -4% | 0% | -23% | -33% | -16% | -13% | -31% | -13% | -22% |
| NCBC Troll | 3,4,5 | -8% | -19% | -17% | -39% | -33% | -29% | -27% | -23% | -24% | -16% |
| WCVI Troll | 3,4,5 | -10% | -6% | -24% | -5% | -55% | -18% | -38% | -10% | -21% | -24% |
| GS Sport & Troll | 3,4,5 | -40% | -6% | -38% | -43% | -25% | -37% | +1% | +13% | -22% | -47% |

Nonceiling fishery indices were computed using methods suggested by the CTC in 1992 (CTC, 1991). The analysis indicated that harvest rates for nonceiling fisheries have generally been below base period levels for depressed natural stocks, with the following exceptions: 1) 1990 and 1992 for north Puget Sound fisheries affecting the Skagit, Stillaguamish and Snohomish stocks; 2) 1990 for the Columbia River Summer stocks; 3) 1986 for Canadian fisheries impacting the Lower Georgia Strait (LGS) stock; and 4) 1985 for Canadian fisheries impacting the Upper Georgia Strait (UGS) stock.

| Exploitation Indicator Stock Group | Depressed Natural Stock | Nonceiling Fishery | Nonceiling Fishery Index | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | MEAN |
| Upper GS Summer/Fall | Upper GS | U.S. | NA | NA | NA 1/ | NA | NA 1/ | NA | NA | NA | NA |
| | | Canada | 0.8 | 0.5 | 0.7 1/ | 0.3 | 1.0 1/ | 0.4 | 0.3 | 0.2 | 0.5 |
| Lower GS Fall | Lower GS | U.S. | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | Canada | 0.6 | 0.8 | 0.5 | 0.2 | 0.6 | 0.7 | 0.4 | 0.3 | 0.5 |
| North PS Summer/Fall 5/ | Skagit 2/ Stillaguamish Snohomish | U.S. | 2,3/ | 2,3/ | 0.8 | 0.7 | 0.8 | 1.2 2/ | 1.0 | 1.3 | 1.0 |
| | | Canada | 2,3/ | 2,3/ | NA | NA | NA | NA 2/ | NA | NA | NA |
| WACO 6/ | Grays Harbor Fall 4/ Columbia R Summer | U.S. | 0.3 | 0.4 | 0.7 4/ | 0.9 4/ | 0.7 4/ | 1.1 4/ | 0.5 | 0.3 4/ | 0.6 |
| | | Canada | NA | NA | NA | NA | NA | NA | NA | NA | NA |

1/ Escapement greater than goal in 1987 and 1989; passthrough provision not applicable.
2/ Escapement greater than goal in 1985, 1986, and 1990; passthrough provision not applicable.
3/ No CWT groups.
4/ Escapement greater than goal in 1987-1990, 1992; passthrough provision not applicable.
5/ Index does not include Area 8 net, Area 8A net, freshwater net, or freshwater sport.
6/ Index does not include freshwater net or freshwater sport.

## SUMMARY OF CHAPTER 4: CHINOOK MODEL ASSESSMENT

The PSC chinook model is the primary tool employed by the CTC to evaluate impacts of alternative management approaches on the chinook rebuilding program. The model has evolved substantially over time as additional information has become available and understanding of impacts of regulatory measures used to implement PSC regimes has increased. The model now contains 29 stocks and 25 fisheries and is capable of evaluating a wide variety of management approaches such as ceilings, harvest rates, enhancement, nonretention, and size limit changes.

A new chapter containing model-based assessments is included in the CTC report. Results generated by the model are generally consistent with those produced through other analytical methods employed by the CTC, such as CWT-based Exploitation Rate Assessment. Several types of estimates are presented, including, estimates of fishery abundance, incidental mortalities, and fishery indices. There are some notable differences between model and CWT-based estimates of fishery indices and further investigations as to cause may be undertaken by the CTC. While model-generated patterns of fishery indices are consistent with those produced by CWT analysis, the magnitude of the index itself differs for some fisheries, most notably the SEAK and WCVI troll fisheries. 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 and for predicting the effect of future changes in stock abundance upon the fishery indices.

The model is the only means available to the CTC to generate estimates of abundance to fisheries, both historically and for near term (1-2 year) projections. Compared to 1992, the model projects that abundance available for 1993 and 1994 will be: 1) lower in the SEAK and NCBC troll fisheries; 2) relatively unchanged for the WCVI troll fishery; and 3) substantially higher for GS sport and troll fisheries. However, troubling signs of abnormally low marine survivals for several stocks became apparent in 1993. Data available through 1993 should be incorporated into the model prior to making decisions regarding management actions for 1994.

## SUMMARY OF CHAPTER 5: INTEGRATED ASSESSMENT

The Integrated Assessment 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 no instance in which the rebuilding status of all stocks is equivalent, and in some instances, the status ranges from Above Goal to Not Rebuilding. If the rebuilding program were proceeding as expected, the fishery and stock indices should have declined relative to values in previous reports (CTC 1990, 1992). Similarly, brood year exploitation rates should have continued to decline, most escapement indicator stocks should be in the upper rebuilding categories, and chinook abundance should be increasing. However, when results of the three assessments are compared, it is apparent that these expectations have not been met. In 1992:

1) Fishery Indices (for total mortality) only met the 1985 target reduction in the SEAK and NCBC troll fisheries, and the average reduction over the four ceiling fisheries was only 13% (average 1985 target reduction of 27%);

2) 50% of the escapement indicator stocks were classified as Probably Not Rebuilding or Not Rebuilding, compared to 29% in 1989 and 42% in 1991;

3) During the rebuilding period, ocean total mortality exploitation rates decreased for 15 of 17 indicator stocks (median reduction nine percentage points). Combined ocean and terminal fishery total exploitation rates declined for 11 of 17 indicator stocks (median reduction five percentage points). Incidental mortalities, relative to base period levels, increased for 14 indicator stocks and decreased for two indicator stocks;

4) Model estimates of chinook abundance available to the ceiling fisheries in 1994 indicate declines in the SEAK (28% lower than 1992 but 26% higher than the base) and NCBC fisheries (21% lower than 1992 but 9% higher than the base), abundances similar to 1992 in the WCVI troll, and increased abundances in the GS sport and troll fisheries (+16% relative to 1992 and 96% of the base period level).

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 groups. Three principle fishing patterns can be identified in the total Adult Equivalent (AEQ) mortality distributions reported for the stock groups: groups primarily exploited in SEAK and NCBC fisheries, groups harvested in southern B.C. and Washington fisheries, and one stock group, South Puget Sound (SPS), harvested in the U.S. nonceiling fisheries and the WCVI troll fishery.

**SEAK and NCBC Fisheries:** The stocks contributing to these fisheries are both far-north migrating type stocks originating in Washington, Oregon, and southern B.C. or, more locally, from north/central B.C. (NCBC) or SEAK. The aggregate abundance of these stocks has increased above pre-Treaty base period levels as reflected in the SEAK and NCBC model abundance indices. Aggregate abundance increased substantially after 1985, peaked in the late 1980s, but has declined since. In general, good brood year survival and the resultant increase in abundance, coupled with the catch ceilings resulted in initial increases in spawning escapements in these stock groups. The fishery index for the reported catch has decreased from the base by 34% and 33% in the SEAK and NCBC fisheries, respectively during the last five years. For the last five years, total mortality (catch plus incidental) indices were 23% below base period levels for SEAK and 30% below base period levels for NCBC. However, of the 28 natural stocks with escapement goals in these stock groups, rebuilding status of these stocks is very mixed. Some individual stocks still show strong rebuilding response, particularly in the Washington Coastal/Columbia River/Oregon Coastal (WACO), the Upper Fraser River (UFR), NCBC, and Southeast Alaska/Transboundary (SEAK/TBR-O) stock groups, but others within these groups are not responding. Fifty percent of the escapement indicator stocks harvested in these fisheries are classified as Rebuilt, Rebuilding, or Probably Rebuilding. Numerous reasons are likely involved in explaining why individual stocks have not responded but harvest impacts in these fisheries will contribute to limiting responses, particularly for the less productive stocks.

In general, the PSC model projects that most of these stocks will rebuild by 1998. The exceptions are the WCVI Fall and Columbia River Summers. The WCVI stock is now projected to only reach about 3% of its escapement goal by 1998, if projections about very poor marine survival for the 1990 through 1992 brood years are correct. The poor survival of the WCVI stocks creates two significant problems: rebuilding concern for the natural stocks, and reduced abundance from WCVI hatchery production in ocean fisheries. Rebuilding of Columbia River Summers will require improved freshwater juvenile production and, subsequently, control of harvest impacts. Rebuilding of the Southeast Alaska/Transboundary Rivers Inside (SEAK/TBR-I) stock by 1995 seems unlikely given the escapement assessments, but the model projects rebuilding in 1996. ADF&G expects to adopt specific management plans to increase the likelihood of rebuilding the Behm Canal stocks.

Survival projections for these stock groups are a concern for managing these fisheries. Abundances are projected to continue to be greater than base period levels but significantly reduced from the high levels in the mid-1980s. The stock diversity in these fisheries may dampen the effect of reduced survival in individual stocks, but production from many of the far-north migrating stocks is projected to decline. Reduced abundance and changes in stock composition could impact the rebuilding of these stock groups, depending on the management actions taken.

**Southern B.C. and Washington Fisheries:** There are four stock groups (LGS, Lower Fraser (LFR), North Puget Sound Spring (NPS-Sp) and North Puget Sound Summer/Fall (NPS-S/F)) which originate in southern B.C. and Puget Sound and are harvested primarily in the GS, WCVI and U.S. nonceiling fisheries. Three of the five stocks included in the PSC chinook model are forecast to rebuild by 1998. However, all of the escapement indicator stocks in these stock groups are classified as Probably Not Rebuilding or Not Rebuilding. This contradiction results from the use of average long-term survivals to predict future rebuilding trends; these survivals may be optimistic because recent survivals for most of these stocks (except LFR) remain well below average.

In addition to poor recent survivals, the limited response of these stocks is likely due to brood year exploitation rates exceeding MSY ERs for most stocks, and the failure to meet target harvest rate reductions in some fisheries. In particular, the target harvest rate reduction in GS fisheries has never been achieved; the 1992 harvest rate is actually estimated to have increased by 13% over the base period. Although improved survivals on large LFR brood year escapements may to some extent buffer poor survivals of other stocks, improved LFR abundance will not compensate for continued high exploitation in the GS sport fishery.

**U.S. Nonceiling Fisheries and WCVI Troll Fishery:** Only the South Puget Sound summer/fall stock is included in this fishing pattern. Escapement of the indicator stock (Green River) increased substantially after the base period and it is classified as Above Goal. This stock has likely benefitted from reduced exploitation rates in ceiling fisheries (ocean exploitation rate reduced by 30%) and from hatchery supplementation of the natural run.

**In view of poor recent survivals and failures to at least achieve 1985 target harvest rate reductions in some ceiling fisheries, the CTC concludes that:**

1) **Stock groups with all escapement indicator stocks presently categorized in the lower two rebuilding categories (WCVI, LGS, LFR, NPS-Sp, and Columbia Upriver Spring) will not rebuild by 1998.** Rebuilding will require sustained increases in productivity (e.g., through habitat improvements or other enhancement activities) or a sustained decrease in fishing mortality of those stocks. Further, projections for continued poor survivals indicate that the required reductions in exploitation will be greater than originally estimated when average survivals were assumed.

2) **Total brood exploitation rates have been reduced for exploitation indicator stocks in most stock groups (no change in SEAK) and are nearing the estimated exploitation rate at MSY ER of associated model stocks (with the exception of the LGS and Columbia Upriver Summer stocks).** The lack of a positive response in escapements coupled with reduced brood exploitations indicate that poor survivals are limiting our ability to achieve the escapement goals. Exploitation rates are being reduced but have generally not been adequate for the degree of reduction in survivals. This seems particularly true for the LGS and Columbia Upriver Summer stocks. Managers of the summer stock noted problems with freshwater survival and the LGS stock has the poorest survival index of the 13 stock groups.

3) **Harvest management of ocean fisheries is not benefitting all stocks equally. 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, etc.).** 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.

## RECOMMENDATIONS

### Stock Status and Fishery Regimes

With, at most, five years remaining before the target date of rebuilding for chinook stocks, and 50% of the escapement indicator stocks classified as either Probably Not Rebuilding or Not Rebuilding, the CTC concludes that not all stocks will rebuild by the target date with the current management regime. Recent reductions in survival rates and reduced contributions from major stock groups will likely reduce the rate of rebuilding of natural stocks in the coming years, unless adjustments to management regimes are made. The CTC recommends that the Parties:

1) ***Define the objectives of the chinook rebuilding program for the five years remaining before the target rebuilding date of 1998.*** These objectives should include specification of criteria for evaluation of rebuilding:

   a) the set of indicator stocks that are to be rebuilt by 1998; and

   b) management objectives and constraints (e.g., target harvest rates, minimum catch levels) for particular fisheries.

2) ***Consider alternatives to fixed quotas for controlling harvest rates.*** The wide fluctuations in chinook abundance suggest that required reductions in harvest rates will be difficult to achieve 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 which can effectively control harvest rates through fishing effort limitations.

3) ***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.

4) ***Evaluate the potential for actions which compliment harvest controls, including enhancement and the reduction of nonfishing related sources of mortality.*** The severely depressed status of some stocks, and the lack of a positive response in escapements, suggest that stock specific actions may be necessary, in addition to the control of harvests in mixed stock fisheries, to rebuild some stocks.

Given well defined objectives, the CTC can work with the Chinook Work Group to develop an appropriate management regime. However, in the absence of new objectives for the rebuilding program, or the clarification of the passthrough provision, the CTC recommends that the Parties:

5) ***Manage ceiling fisheries so as to achieve, at a minimum, the 1985 target harvest rate reductions for total mortalities.*** Given the current status of the escapement indicator stocks, these harvest rate reductions remain useful as initial targets.

6) ***Evaluate compliance with passthrough provision using the CTC Nonceiling Index.*** The CTC recommended index for the evaluation of exploitation rates on depressed stocks in nonceiling

fisheries provides a technically feasible approach for evaluating compliance with the passthrough provision. Any definition of passthrough which may ultimately be adopted by the PSC must be technically measurable to determine compliance.

**Monitoring and Evaluation**

1) ***Eliminate data limitations which are compromising the ability of the CTC to complete the escapement and exploitation rate assessment.*** General research needs of the CTC have been addressed in detail by the CTC (1992b). Data needs for the annual report, that have not been completely satisfied, include the following:

   a) ***Report estimated CWT recoveries to the PSMFC by July of the year following the fishery.*** As requested by the PSC, the CTC is currently conducting the Exploitation Rate Assessment on a year-out basis to allow agencies sufficient time to collect and report recovery data. However, the following data were still not available from the PSMFC: i) Estimated recoveries for the 1992 Puget Sound sport fisheries; ii) 1991-1992 tributary sport recoveries in the Columbia River; and iii) escapement recoveries for most southern U.S stocks.

   b) ***Collect and provide information on the age and sex composition of 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. The CTC is concerned that: i) pilot studies have indicated that many tagged fish may not be successfully identified at hatcheries; and ii) CWT fish which do not return to the hatchery may not be accounted for on a consistent basis. In addition, standardized procedures should be instituted for enumeration of marked and unmarked releases and tag retention rates.

   e) ***Provide estimates of sublegal encounter rates in troll fisheries and legal and sublegal encounter rates in chinook nonretention 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.

2) ***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.

# CHAPTER 1. 1992 CHINOOK CATCH

## 1.1 1992 CHINOOK SALMON CATCHES IN FISHERIES WITH CEILINGS

Estimates of 1992 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.

| Area/Fisheries a/ | Ceiling | Catch | Difference | |
|---|---|---|---|---|
| | | | Numbers | Percent |
| Southeast Alaska (T,N,S) b/ | 263 | 221.7 | -41.3 | -15.7% |
| North/Central B.C. (T,N,S) c/,d/ | 263 | 268.1 | +5.1 | +1.9% |
| West Coast Vancouver Island (T) | 360 | 346.8 | -13.2 | -3.7% |
| Strait of Georgia (T,S) | 275 | 153.9 | -121.1 | -44.0% |

a/ T=Troll; N=Net; S=Sport
b/ The actual total catch was 260,000 chinook, including a hatchery add-on of 38,300.
c/ Excludes 6,070 chinook caught in terminal areas.
d/ Canada has submitted a proposal to exclude hatchery add-ons from the 1992 northern fisheries.

Catches in all chinook fisheries of interest to the PSC are documented in Table 1 for the years 1988-1992 and in Appendix I for the years 1975-1992.

## 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 or catch in terminal areas) and deviations from catch ceilings since 1987 (in thousands of fish) are as follows:

| Area/Fisheries a/ | Ceiling | Catch | | | | | | Cumulative Deviation | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | Numbers | Percent |
| Southeast Alaska (T,N,S) b/ | 263 c/ | 265.2 | 255.2 | 264.4 | 313.2 | 295.6 | 221.7 | -11.7 | -4.5% |
| North/Central B.C. (T,N,S) d/ | 263 c/ | 282.8 | 247.1 | 301.2 | 253.0 | 304.3 | 268.1 | +29.4 | e/ +11.2% |
| West Coast Vancouver Island (T) | 360 | 379.0 | 408.7 | 203.7 | 298.0 | 202.9 | 345.0 | -27.0 | f/ -7.5% |
| St. of Georgia (T,S) | 275 | 159.7 | 138.6 | 161.3 | 146.3 | 147.7 | 153.9 | -20.6 | f/ -7.5% |

a/ T=Troll; N=Net; S=Sport
b/ Southeast Alaska catches exclude hatchery add-ons of 16,700, 23,700, 26,700, 53,700, 61,400 and 38,300 for 1987 through 1992.
c/ The 1990 ceiling was 302,000, and the 1991 ceiling was 273,000.
d/ Catches exclude 4,819, 5,549, 6,006 and 6,070 chinook caught in terminal areas in 1989 through 1992, for a total of 22,504.
e/ These overages exceed the 7.5% management range.
f/ Negative deviations below the 7.5% management range can not be accumulated.

## 1.3 REVIEW OF FISHERIES WITH CATCH CEILINGS

### 1.3.1 Southeast Alaska (SEAK) Fisheries

In 1992, 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 sampling.

3) To bring the total cumulative deviation in numbers of fish since 1987 back to within the 7.5% management range. For SEAK, the management range is equivalent to +/- 19,700 chinook salmon for a ceiling of 263,000.

Catch data for 1992 indicate the following:

1) The 1992 all gear harvest (commercial and recreational) of 260,000 consisted of a commercial catch of 216,000 and a recreational catch of 44,000; and includes a hatchery add-on of 38,300.

2) The total estimated catch of Alaska hatchery produced chinook salmon was 45,400 (17.6% of the total catch). The add-on was calculated by reducing this by 5,000 for the estimated pre-Treaty harvest of Alaska hatchery chinook and by 2,100 for risk adjustment.

3) The deviation of the 1992 SEAK chinook salmon catch from the catch ceiling was -41,300. The cumulative deviation since 1987 is -11,700.

**Troll Fisheries:** The troll fishery harvested a total of 183,900 chinook salmon of which 25,700 (14%) were of Alaska hatchery origin. Catches were as follows:

| Fishery | Total Catch | AK Hatchery Catch |
|---|---|---|
| Winter Fishery (October 1, 1991, through April 14, 1992) | 71,800 | 7,000 |
| Hatchery Access (June 1-3 and 17-20) | 23,800 | 6,600 |
| Experimental and terminal | 15,300 | 9,500 |
| Summer Fishery (July 1-4 and August 25) | 73,000 | 2,600 |
| Total Troll | 183,900 | 25,700 |

The troll fishery was managed to bring the total cumulative deviation back within the 7.5% management range. Because of the cumulative deviation and a high winter catch, only a small portion of the ceiling was left for the summer fishery. Chinook nonretention was implemented beginning at noon on July 4. By regulation, all vessels are required to off-load chinook salmon before continuing to fish for coho salmon during a nonretention period. The fishery closed for ten days in mid-August for coho salmon management. When the fishery was reopened, one additional day of chinook salmon retention was allowed. As in the past, areas with high chinook abundance were closed during the chinook nonretention period. In 1992, the total number of chinook nonretention fishing days was 67.5.

**Net Fisheries:** The SEAK net fisheries have a guideline harvest of 20,000 non-Alaska hatchery chinook. The 1992 commercial net catch included 32,100 chinook salmon, of which 9,700 (30%) were from Alaskan hatcheries. Net harvest of chinook salmon in the purse seine fishery is limited by a 28" (71 cm) size limit and chinook nonretention regulations. In addition, chinook below 21" (53 cm) may be retained at all times, while chinook between 21" and 28" may never be retained. Net harvest for gillnet fisheries is limited by early season closures and night closures.

**Recreational Fisheries:** The recreational fishery harvested 44,000 chinook salmon of which 10,000 (23%) were Alaska hatchery chinook. During 1992, a one-fish bag limit was in place through July; a two-fish bag limit was in place after July. This fishery also has a 28" 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 1992, but no major changes are expected.

**North/Central British Columbia (NCBC):** The 1992 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 1991 catch estimates and terminal exclusion calculation procedures, the cumulative deviation at the beginning of the 1992 season was estimated at +24,300.

The estimated 1992 all-gear catch was 268,067 excluding terminal exclusions of 6,070. These preliminary catch statistics indicate a 1992 catch deviation of +5,067, and a cumulative deviation through 1992 of +29,400 chinook (+11.2% of the catch ceiling). This overage exceeds the 7.5% management range.

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

| Area | Base | 1992 Catch | 1992 Exclusion |
|---|---|---|---|
| Skeena | 2,900 | 8,762 | 5,862 |
| Bella Coola | 2,950 | 3,158 | 208 |
| Kitimat | 2,400 | | 0 |
| Total | | | 6,070 |

Troll Fisheries: The 1992 troll fishery opened for all species on July 1. The following management actions were taken throughout the season:

1) On August 1, chinook redline closures were implemented as per the Troll Plan.

2) On August 6, Areas 102-1, 104-5 and 104-3 north of 54 degrees and 104-2 and 104-4 were closed to all trolling for two weeks for conservation of Upper Skeena coho. The boundary was amended to exclude 104-1 from the closed area to permit continued pink fishing, based upon inseason advice from the Outside Troll Advisory Committee (OTAC) advisers.

3) On August 8, Areas 142, 130-2 and 130-3 were closed for sockeye and chinook to trolling as per the Troll Plan.

4) At midnight on August 14, all North Coast area closed to the retention and possession of chinook. Trolling continued for other salmon species.

5) On August 17, trolling restarted on Fraser sockeye due to a run size upgrade and increased allocation to the troll fleet.

6) On August 20, trolling for Fraser sockeye closed again in all areas outside of Areas 1, 3, 5 and 101 to 104. Areas 143, 130-2 and 130-3 again closed to all trolling as per the troll Plan.

7) On August 21, the chinook redline closed area was modified by moving the boundary west to Seth Point to provide for additional opportunities to harvest pink salmon, based upon advice from OTAC advisers. Areas 102-1, 104-5 and 104-3 north of 54 degrees and 104-2 and 104-4 reopened to trolling.

8) On August 24, Area 102 north of 54 degrees, Areas 104-3 and 104-5, and 105-1 closed to all trolling to reduce the incidence of chinook shakers, as per the Troll Plan.

9) On August 27, the balance of Area 104 closed to all trolling due to reported high incidence of chinook shakers.

10) On August 28, Sub-Areas 3-2, 3-3, 3-4, and 3-7 opened to trolling for all species except chinook.

11) At midnight on September 15, all North Coast areas closed to trolling.

Trolling for all species closed on September 15, for a total of 32 days of chinook nonretention. The catch of chinook in NCBC troll fisheries was 181,851.

<u>Net Fisheries</u>: Catch of chinook in NCBC areas was 48,334. Catches by fishery were 5,553 in the Queen Charlotte Islands, 24,592 for the Skeena/Nass and 18,189 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.

<u>Recreational Fisheries</u>: The tidal water sport fishery catch of chinook was 37,881. Catch by fishery was 21,358 for the Queen Charlotte Islands, 6,250 for the Skeena/Nass and 10,273 for the Central Coast.

**West Coast Vancouver Island (WCVI) Troll:** In 1992, 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 1992 troll season started with a short spring fishery. This fishery operated from April 1 to 5 with a catch of 5252. Trolling reopened on July 1 and continued until September 30 with no chinook nonretention fisheries. The conservation areas F1, S, G and H were closed at the start of the season (Fig. 1-1). Later in the season, in order to provide access to sockeye areas F1, G and H were opened for two days, then closed. Beginning in early September, these areas were reopened (September 6, Area H; September 11, Area F1; September 16, Area G) until the end of the season to provide opportunities to fish for coho salmon.

When trolling closed on September 30, it was estimated that 48,152 boat days had been expended during the troll season. This compares to 50,500 boat days for the 1985-1987 average. Chinook catch in 1992 for the WCVI troll fishery was 346,814.

**Strait of Georgia (GS):** Chinook catch in 1992 for the combined GS troll and recreational fisheries was 153,922.

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 30 and continued until August 6 without interruption. After August 6, chinook nonretention was in effect until the season ended on September 30. In order to reduce chinook shaker mortalities, an area of high chinook abundance was closed to trolling between August 19 and September 9 and a regulation for single barbless hooks was implemented on August 18. There were 55 chinook nonretention days in the 1992 GS troll season. Chinook catch by trollers was 37,343.

Recreational: The 1992 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 Bag Limit | | Annual Bag Limit | | | Size Limit (cm) | |
|---|---|---|---|---|---|---|---|
| | 1989-Present | 1985-1988 | 1989-Present | 1988 | 1985-1987 | 1989-Present | 1985-1988 |
| Strait of Georgia (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 1992 catch in the creel survey area (including the Victoria area, but excluding Johnstone Strait) was 116,579. Effort in 1992 totalled 467,559 boat trips, which is about 22% less than the 1986-1990 average effort level.

## 1.4 REVIEW OF OTHER FISHERIES

### 1.4.1 Canadian Fisheries

**Transboundary Rivers:** Chinook catches in the Canadian gillnet fisheries were: Taku River, 1,445 chinook adults and 147 jacks, and Stikine River, 925 chinook adults and 107 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) | Catch (chinook > 5lbs.) |
|---|---|
| Johnstone Strait (11-13) | 9,466 |
| Strait of Georgia (14-19) and Fraser R. (28,29) | 8,740 |
| Juan de Fuca Strait (20) | 9,994 |
| Barkley Sound (23) | 2,818 |
| Other WCVI (21,22,24-27) | 6,064 |

Management of southern B.C. net fisheries has an objective 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 limited fishing time during September in order to restrict catch of Harrison River chinook returning to spawn.

Area 12 Troll: Catch is reported as 2,660 chinook for 1992. 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 1992 Barkley Sound recreational fishery is 47,095, of which 8,947 were taken in the terminal fishery inside Alberni Canal and 38,148 in Barkley Sound. The survey period covered from July 15 through 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 1992 and a catch of 2,507 was recorded. A creel survey was conducted in Johnstone Strait in 1992 covering the period April through August. The estimated chinook catch in the Johnstone Strait area was 14,719.

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 which have responded well to the chinook rebuilding program and most are managed to catch ceilings.

Chinook catch was estimated at 102 in the Alsek, 9,438 in northern B.C. rivers (Areas 1-10), and 1,500 in 11 small sport fisheries in the upper Fraser. Sport fisheries also occur in the Vedder-Chilliwack River and lower Fraser mainstem, but were not assessed in 1992.

Indian Fisheries:

| Fishing Areas | Adult Catch | Jack Catch |
|---|---|---|
| North/Central B.C. | 30,962 | - |
| Somass River | 31,688 | - |
| Fraser River | 12,694 | - |
| Stikine | 904 | 130 |
| Alsek | 84 | - |
| Taku | 83 | - |
| Cowichan | 200 | - |
| Squamish | 1,553 | - |

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 for the first time. All fishing was terminated in mid-August in response to concerns regarding the under reporting of catch.

### 1.4.2 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 chinook fisheries were permitted and no commercial fisheries were permitted during the spring chinook management period (April 15-June 15). Recreational fisheries were also restricted by a maximum size limit of 30" 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" 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 1992 net catch in the Strait of Juan de Fuca total 1,073 chinook, compared to 2,138 in 1991. These fisheries take chinook incidental to the harvest of other species. Preliminary estimates of 1992 tribal troll catch in the Straits (Areas 4B, 5, and 6C) total 31,455 compared to 37,159 caught in 1991. This is a chinook directed fishery. Note that tribal troll catch estimates from this area do not include catch in Area 4B during the May 1-September 30 Pacific Fisheries Management Council (PFMC) management period; catches during this period are included in the North of Cape Falcon troll summary.

In 1992, about 30 chinook were caught in the Area 4B state waters recreational fishery after the PFMC fishery, compared to 400 in 1991. Preliminary estimates of 1992 recreational chinook catch in Areas 5 and 6 total 38,438 compared to 39,667 in 1991.

**San Juan Islands:** Preliminary 1992 estimates of chinook net catch in the San Juan Islands total 13,988 compared to 11,745 in 1991. Recreational catch for 1992 in Area 7 is estimated at 6,788 compared to 5,113 in 1991.

**Puget Sound:** The status of many Puget Sound chinook stocks continued to be poor in 1992. 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, several terminal areas, including Area 8 (located near the mouth of the Stillaguamish and Snohomish Rivers), did not have directed chinook net fisheries 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" 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.

Net catch of chinook was down again in 1992 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 1992 net catch in Puget Sound marine areas total 51,567 chinook, compared to 70,905 in

1991. Preliminary estimates of 1992 net catch in Puget Sound freshwater areas total 11,358 chinook, compared to 18,584 in 1991.

Puget Sound recreational fisheries were managed in the same general manner as in recent years. Preliminary Puget Sound marine (Areas 8-13) recreational chinook catch for 1992 is estimated at 44,831, compared to 46,166 in 1991. Catch for Puget Sound freshwater areas in 1992 is estimated at 2,700, compared to 2,693 in 1991.

**Washington Coast:** In 1992, because terminal runs of northern Washington coastal stocks were expected to be above minimum spawning levels, both commercial and recreational directed chinook fisheries were allowed in terminal areas. Preliminary estimates of Grays Harbor and Willapa Bay net catch total 48,760 chinook, compared to 38,979 in 1991. Preliminary 1992 estimates of commercial net fisheries in north coastal rivers total 14,852 chinook, compared to 14,065 in 1991.

**Ocean Fisheries North of Cape Falcon:** In 1992, ocean commercial and recreational fisheries operating in the PFMC region north of Cape Falcon, Oregon, 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 when coho or chinook quotas are achieved or when seasons expire. In 1992, coho quotas were substantially reduced due to concerns for the Hood Canal wild coho stock. Fisheries were closed when coho quotas were reached. The non-tribal trollers traded 21,000 coho to the recreational fishery in exchange for an additional 7,000 chinook. In an attempt to improve efficiency in chinook targeting during the all species season, trollers were required to use 6" or larger plugs and no more than four spreads per line. The chinook quota was almost fully harvested before the coho quota was reached. Preliminary estimates of non-tribal troll chinook catch total 45,900 (2,300 Oregon and 43,600 Washington), about 98% of the 47,000 chinook quota and up from 29,700 in 1991. Approximately 36,900 of these non-tribal troll-caught chinook were taken during the early season chinook fishery, May 1 through June 15, 1992.

Preliminary recreational catches are estimated at 18,927 (500 in Oregon and 18,500 Washington), about 57% of the 33,000 chinook quota and up from 16,732 in 1991. In 1992, an all salmon except coho fishery was conducted in Area 4B during May. The catch of 100 chinook counted against the ocean chinook quota. This fishery was not conducted in 1991.

Preliminary estimates of the 1992 tribal troll chinook catch total 22,500 chinook, 68% of the 33,000 chinook quota and up from 20,600 in 1991.

**Columbia River:** Since 1988, all inriver management of Columbia River fish runs and fisheries has been directly 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 1992 inriver commercial catch of chinook was 53,200, compared to 106,900 in 1991 and 148,000 in 1990. Total freshwater recreational catch in 1992 is not available due to the lag time for analysis of punch card reporting for tributary fisheries in the Columbia Basin.

The 1992 total catch of upriver spring chinook was 8,657 fish, consisting of 1,973 caught in the non-Indian sport and commercial fisheries (including 553 caught in the Idaho recreational fishery), 5,700 caught in Zone 6 Ceremonial and Subsistence (C&S) fisheries and 984 caught in C&S fisheries in Snake River Tributaries. The CRFMP provides that on 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 and tribal treaty C&S fisheries in Zone 6 are limited to 7.0% of the run. The estimated 1992 impacts in mainstem fisheries were 1.6% and 6.3%, respectively.

There has not been a targeted mainstem fishery on upriver summer chinook since 1964. In the past, incidental harvest of summer chinook has occurred during commercial sockeye fisheries. However, no commercial sockeye fisheries have occurred below McNary Dam since 1988. In 1992, a small Treaty commercial sockeye fishery in the pool behind Priest Rapids Dam in the mid-Columbia harvested four summer chinook. There is a very small catch of summer chinook in the mainstem tribal C&S sockeye fishery. The total catch in 1992 in this fishery was less than 60 fish. A tribal treaty C&S fishery in Idaho harvested 100 summer chinook.

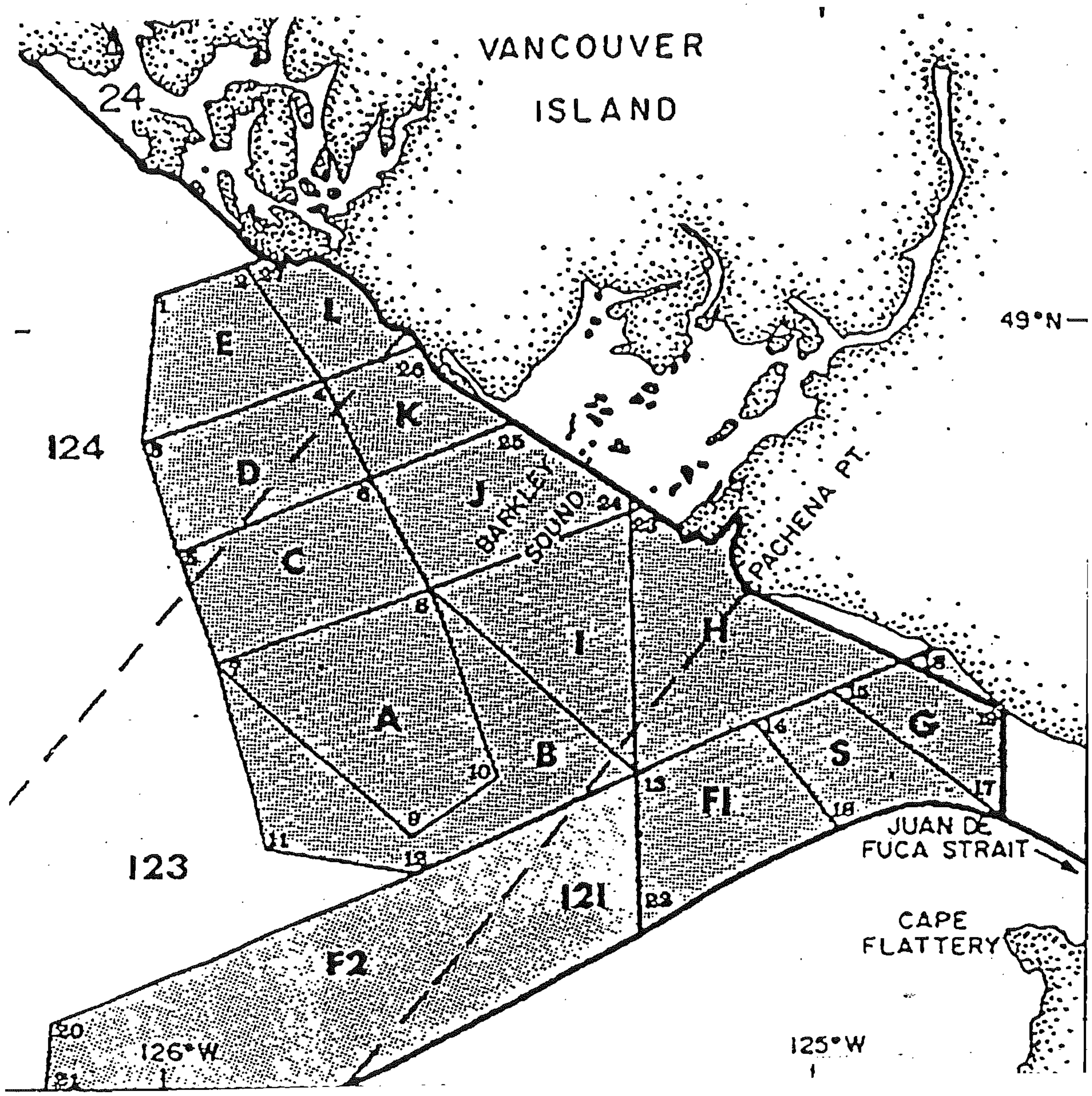
Commercial catch of fall chinook in 1992 totalled 49,231 (17,789 in lower river non-Indian fisheries below Bonneville Dam). Management constraints included achieving the Spring Creek National Fish Hatchery escapement goal of 8,200 adult chinook and an adult escapement of 40,000 Upriver Bright chinook over McNary Dam. The Upriver Bright escapement goal at McNary Dam was increased by 5,000 chinook to 45,000 in 1990 through 1992 on an interim basis, by agreement of the CRFMP parties, to account for increased brood-stock hatchery needs.

**Ocean Fisheries Cape Falcon to Humbug Mountain:** Ocean fisheries off Oregon's central coast primarily harvest a mixture of southern chinook 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 streams do migrate into PSC fisheries, including the Northern Oregon Coastal (NOC) stock aggregate. These north migrating stocks are harvested incidentally (probably < 10%) in Oregon ocean fisheries. The only troll fishery that predominately harvests the NOC stock aggregate is the late season near-shore fishery off the mouth of the Elk River. In 1992 this Elk River fishery caught an estimated 384 chinook. In both 1990 and 1991, this Elk River fishery was not conducted due to conservation concerns. Coastal estuary and riverine recreational fisheries that target upon the North Oregon Coastal stock harvested 38,024 chinook in 1992.

Table 1-1. Summary of the 1989-1992 chinook catches in fisheries relevant to the U.S./Canada Pacific Salmon Treaty (numbers in thousands of fish).

| | Troll | | | | Net | | | | Sport | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 1992 | 1991 | 1990 | 1989 | 1992 | 1991 | 1990 | 1989 | 1992 | 1991 | 1990 | 1989 | 1992 | 1991 | 1990 | 1989 |
| S.E. ALASKA a/ | 184 | 264 | 288 | 236 | 32 | 33 | 28 | 24 | 44 | 60 | 51 | 31 | 260 | 357 | 367 | 291 |
| BRITISH COLUMBIA b/c/ | | | | | | | | | | | | | | | | |
| North/Cent. Coast | 182 | 221 | 179 | 225 | 48 | 50 | 42 | 41 | 38 | 32 | 31 | 35 | 268 | 303 | 252 | 301 |
| W. Vanc. Island d/ | 347 | 203 | 298 | 204 | 9 | 60 | 30 | 40 | 47 | 80 | 61 | 48 | 403 | 343 | 389 | 292 |
| Georgia St./Fraser e/ | 37 | 32 | 34 | 28 | 9 | 15 | 15 | 24 | 117 | 116 | 112 | 133 | 163 | 163 | 161 | 185 |
| Johnstone St. | 3 | 1 | 2 | 2 | 9 | 13 | 18 | 29 | 15 | 10 | 10 | 10 | 27 | 24 | 30 | 41 |
| Juan de fuca Strait | 0 | 0 | 0 | 0 | 10 | 8 | 7 | 21 | | | | | 10 | 8 | 7 | 21 |
| subtotal | 569 | 457 | 513 | 459 | 85 | 146 | 112 | 155 | 217 | 238 | 214 | 226 | 871 | 841 | 839 | 840 |
| WASHINGTON INSIDE f/ | | | | | | | | | | | | | | | | |
| Strait (mar) g/ | 31 | 37 | 47 | 65 | 1 | 2 | 5 | 10 | 38 | 40 | 51 | 52 | 70 | 79 | 103 | 127 |
| San Juans (mar) h/ | 0 | 0 | 1 | 1 | 14 | 12 | 9 | 16 | 7 | 5 | 7 | 9 | 21 | 17 | 17 | 26 |
| Other PS (mar+fw) i/ | 0 | 0 | 0 | 0 | 63 | 89 | 178 | 156 | 48 | 49 | 71 | 75 | 111 | 138 | 249 | 231 |
| Coastal (mar+fw) i/ | 0 | 0 | 0 | 0 | 64 | 53 | 58 | 85 | NA | 6 | 5 | 6 | NA | 59 | 63 | 91 |
| subtotal | 31 | 37 | 48 | 66 | 142 | 156 | 250 | 267 | NA | 100 | 134 | 142 | NA | 293 | 432 | 475 |
| COLUMBIA RIVER j/k/ | - | - | - | - | 53 | 107 | 148 | 275 | NA | 78 | 95 | 97 | NA | 185 | 243 | 372 |
| WA/OR N OF FALCON l/ | 69 | 51 | 65 | 75 | 0 | 0 | 0 | 1 | 19 | 17 | 30 | 21 | 88 | 68 | 95 | 97 |
| OREGON | | | | | | | | | | | | | | | | |
| Inside Waters m/ | <1 | 0 | 0 | 5 | - | - | - | - | 38 | 45 | 38 | 45 | 38 | 45 | 38 | 50 |
| GRAND TOTAL | 853 | 809 | 914 | 841 | 312 | 442 | 538 | 722 | NA | 550 | 562 | 562 | NA | 1793 | 2014 | 2125 |

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.
l/ North of Falcon troll catch includes catch in area 4B during the PFMC management period (May-Sept.).
m/ Troll = late season troll off Elk River mouth (Cape Blanco); sport = estuary and inland (preliminary for 1990).




A-E, G : Chinook conservation areas.
F1,F2, H-K : Coho conservation areas.
S : Swiftsure Bank closure area.

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

# CHAPTER 2. ESCAPEMENT ASSESSMENT OF REBUILDING THROUGH 1992

## 2.1 INTRODUCTION

In this chapter, we present the results of a rebuilding assessment based upon escapement information. Our objective is to assess the rebuilding status of each escapement indicator stock. The escapement is a product of the brood year adult abundance, freshwater and marine survival rates and fishery harvest rates. To determine if management actions since the Pacific Salmon Treaty (PST) implementation have been effective in rebuilding, 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.

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 of stocks with escapement goals were assessed as one measure of rebuilding progress since implementation of management actions under the PST. The assessment first identified stocks with escapements greater than their goal in recent years. For the remaining stocks, the assessment focused on: 1) changes in average escapements since the base period years, 2) comparison of recent escapements with a linear escapement trend from the base period to the goal at the rebuilding target date, and 3) trends in escapements since PST implementation. For stocks without escapement goals, annual escapements are monitored.

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.

The two rebuilding programs were divided into three 5-year phases (CTC 1987) with more stringent assessment criteria used to measure rebuilding in each successive phase. In 1992, the SEAK and TBR stocks were in the 12th year or 80% through the rebuilding period and in Phase III (1991-1995). The remaining stocks were in the 9th year or 60% through the rebuilding period and in Phase II (1989-1993).

Caution is urged against directly 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 terms of population abundance but trends in escapement values should be more reflective of changes in spawning population.

## 2.2 FRAMEWORK

### 2.2.1 Escapement Indicator Stocks

**Indicator Stocks:** As in 1990 and 1991, 42 naturally spawning escapement indicator stocks were included in the assessment (excluding the Chilkat River, see Section 2.2.2). These stocks represent distinct naturally spawning 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 the following table:

| AREA OF ORIGIN | RUN TIMING [1] | | | | | |
|---|---|---|---|---|---|---|
| | Spring | Spring/ Summer | Summer | Summer/ Fall | Fall | 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 | 8 | 18 |
| TOTALS | 15 | 6 | 6 | 4 | 11 | 42 |

[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. As in 1990-1991, data were not provided for the Chilkat River pending review of the estimation method. Data for the other systems are presented in Appendix A tables and in Appendix B graphs. For each stock with terminal harvest, Table 2-1 lists the sources of mortality that are included in estimates of the terminal runsize.

**Estimation Methods:** Methods varied depending on river characteristics and agency resources. Most escapement estimates used were measures of actual spawner abundance, 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 Oregon coastal north-migrating stocks are not numerical estimates of abundance; instead they are estimates of the density of spawners per river mile for standard survey areas.

For some stocks, indirect estimates are adjusted for hatchery production to make them a more representative measure of natural stock escapements:

1) For the Columbia Upriver spring stock, mainstem dam counts adjusted for hatchery fish were used.

2) For some stocks, adjustments were made to reduce enhancement influence. Methods used include: excluding spawners removed for hatchery brood stock, and excluding rivers with major enhancement influence (e.g., Kitimat River and adjacent tributaries in Area 6 and Bella Coola River in Area 8).

**Stock-Specific Notes:**

Chilkat: This stock was removed from the 1990 rebuilding assessment when it was discovered through a radio-tagging study that the two index streams used to monitor escapement were not representative of the escapement to the entire Chilkat drainage. Results from the radio-tagging conducted in 1991 and 1992 (Johnson et al. 1992; Johnson et al., *in press*) showed that the two index streams comprised only about 1-2% of the total drainage escapement and that about 90% of the total escapement occurred in two tributaries that are glacially occluded and are, therefore, unsuited to either foot or aerial survey methods. The Alaska Department of Fish and Game (ADF&G) Sport Fishery Division is determining if a test fishery near the mouth of the river can be used to estimate total escapement to the Chilkat drainage.

Area 6 Index: In 1992, as in 1990, poor visibility during the escapement survey prevented estimation of an escapement figure 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 for these two years. It is the opinion of the local Canadian Department of Fisheries and Oceans (CDFO) staff that escapement enumeration for this stock has been too inconsistent for use in the escapement assessment. Future inclusion of this stock is currently under review.

Stillaguamish River: Management actions taken in the terminal area to protect the Stillaguamish stock have been in effect since 1985. However, run reconstruction methods used to estimate terminal harvest have not yet been updated to reflect these management changes. As such, reported terminal run sizes (and thus terminal catches) for 1985-1992 are likely overestimated.

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 spring which is a nonnative enhanced spring stock. While the summer run is managed for natural production, run timing of the two stocks overlaps to some extent.

Oregon Coastal: This stock aggregate is currently under review. For the next annual report, two separate stock aggregates may be designated and escapements may be expressed in terms of spawner abundance.

**Changes Relative to the 1991 Annual Report:** Minor updates to catch and escapement data, including updates to preliminary estimates for the most recent years, are not described. Only two major changes from the 1991 report (CTC 1992) were made:

Columbia Upriver springs: The 1990 escapement estimate dropped from 28,800 to 20,100 and the terminal run size estimate dropped from 32,800 to 22,900, when the correct proportion natural (23% vs. 33%) was applied to the overall upriver run size for this stock.

Skagit spring: During a review of historical escapement and terminal run data, it was discovered that an incorrect number of index miles had been used in some calculations. Because this error was made many years ago and transferred to subsequent worksheets, it affected escapement and terminal run estimates in most years. This error has now been corrected, resulting in small changes for most years and large changes for 1989 and 1990.

Table 2-1. Fisheries included in terminal runsize estimates for chinook escapement indicator stocks.

| Stock | Brood Stock/ Rack Sales | Commercial Net | Ceremonial & Subsistence | Freshwater Sport | Indian Food Fisheries |
|---|---|---|---|---|---|
| Situk | | ✓ | ✓ | ✓ | |
| Alsek[1] | | NI | | NI | NI |
| Taku[1] | | NI | NI | NI | NI |
| Stikine[1] | | NI | | NI | NI |
| Nass | | | | ✓ | ✓ |
| Skeena[2] | | ✓ | | ✓ | ✓ |
| WCVI[3] | NI | | | NI | NI |
| Lower Georgia Strait | ✓ | | | NI | ✓ |
| Fraser | NI | ✓ | | NI | ✓ |
| Harrison | | ✓ | | NI | ✓ |
| Skagit spring[4] | NI | ✓ | | | |
| Skagit summer/fall[4] | | ✓ | | NI | |
| Stillaguamish[4] | ✓ | ✓ | | NI | |
| Snohomish[4] | | ✓ | | NI | |
| Green[4] | ✓ | ✓ | | NI | |
| Quillayute summer | | ✓ | ✓ | ✓ | |
| Quillayute fall | | ✓ | ✓ | ✓ | |
| Hoh spring/summer | | ✓ | ✓ | ✓ | |
| Hoh fall | | ✓ | ✓ | ✓ | |
| Queets spring/summer | | ✓ | ✓ | ✓ | |
| Queets fall[5] | | ✓ | ✓ | ✓ | |
| Grays Harbor spring | | ✓ | ✓ | ✓ | |
| Grays Harbor fall | | ✓ | ✓ | ✓ | |
| Col. Upriver spring | | ✓ | ✓ | ✓ | |
| Col. Upriver summer | | ✓ | ✓ | ✓ | |
| Col. Upriver bright | | ✓ | ✓ | ✓ | |
| Lewis | | ✓ | ✓ | ✓ | |

✓ : A fishery occurs and the catch is included in the terminal runsize estimate.
NI: A fishery occurs, but the catch is not included in the terminal runsize estimate.

[1] Because this report only presents unexpanded index escapement estimates for TBR rivers, terminal runsize estimates are not reported; terminal catch estimates can be found in TBTC (1993). Sport catch is Canadian only.
[2] Includes catch from the River/Gap/Slough gillnet fishery.
[3] WCVI terminal runsize is not estimated.
[4] Puget Sound estimates include reconstructed, stock-specific catches from Areas 8, 8a, 10, and 10a.
[5] Escapement estimates include fish taken for brood stock.

### 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 agency(ies) for each stock. The Transboundary Technical Committee (TBTR) 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 (e.g., Columbia Upriver spring, summer and bright).

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. Interim goals were also established by ADF&G for the Behm Canal systems. ADF&G is currently reviewing the goals for Behm Canal and will be adopting new goals for 1994. Other goals may change as new information is acquired.

Six of the indicator stocks have no escapement goals: Oregon Coastal, Quillayute fall, Hoh spring/summer, Hoh fall, Queets spring/summer and Queets fall. These six stocks, referred to as stocks without goals, are discussed separately throughout this report. The five Washington coastal stocks are managed on the basis of 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.

**Stock-Specific Notes:**

Oregon Coastal. Based upon a review of this stock group, escapement goals may soon be available for use by the PSC.

### 2.2.4 Assessment Time Frame

For assessment purposes, a base period and a rebuilding assessment period were established for each stock. The rebuilding assessment period includes all years to date, when management actions were taken as part of a chinook rebuilding program. The base period includes years prior to implementation of management actions. Base and rebuilding assessment periods differ among stocks as follows:

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 1981-1992.

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 1985-1992.

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 1984-1992.

## 2.3 METHODS

### 2.3.1 Stock Assessment

**Changes Relative to the 1991 Annual Report:** Stocks without escapement goals are particularly difficult for the Chinook Technical Committee (CTC) to assess. First, because these stocks cannot be measured against a goal, it is unclear what pattern of rebuilding is expected and what sort of assessment is most appropriate. Second, the intent of the harvest rate management used for the Washington coastal stocks is to create variable escapements above the escapement floor, to allow potential future development of escapement goals. Classifying these stocks as Increasing, Decreasing and Indeterminate may therefore be misleading, because it incorrectly implies management intent to steadily increase escapements.

In past years, the CTC assessed these stocks using the mean and trend criteria. When escapements are highly variable, as intended for Washington coastal stocks, the trend criterion gives a score of 0, and the final score for the stock is determined solely by the mean criterion. High escapements during any years of the rebuilding program tend to result in a +1 score for the mean criterion and make classification as Increasing likely.

Because of these problems, the CTC decided to no longer classify stocks without goals as Increasing, Decreasing, or Indeterminate. Beginning with this report, a written discussion of these stocks will be provided, instead of a formal assessment and classification. As in past years, escapement and terminal run data for these stocks will be graphed and tabled in the Appendices.

**Stocks With Escapement Goals:** All escapement indicator stocks with escapement goals were first assessed according to the two criteria for the Above Goal category: 1) was escapement at or above goal for at least four of the last five years, and 2) was the average escapement over the last four years equal to or greater than the escapement goal. Above Goal stocks were not further evaluated.

Stocks not Above Goal were then classified based on the following three assessment criteria:

1) The mean criterion assessed the overall escapement change by comparing averages of the base period and rebuilding assessment period escapements for each stock. A difference between the two time periods of greater than 10% was accepted as a change between periods. Stocks were scored as follows: 1) stocks with increases of greater than 10% were scored +1, 2) stocks with decreases of greater than 10% were scored -1, and 3) stocks with changes of 10% or less were judged to show no response and scored 0.

2) The line criterion assessed escapements for consistency with a linear approximation of the expected rebuilding schedule. For each stock, a base period average escapement was established. A straight line was drawn from this base period average across the 15-year rebuilding program to the escapement goal in 1995 for SEAK and TBR stocks and 1998 for all other stocks. For each stock, the most recent three escapements (1990-1992) were compared with the linear approximation. Stocks were scored as follows: 1) stocks with all three escapements on or above the line were scored +1, 2) stocks with all three points below the line were scored -1, and 3) stocks that did not meet either condition were scored 0.

Regardless of escapement levels at the initiation of the rebuilding program, the linear approximation assumes for each stock that: 1) the escapement goal will be achieved at the target date (not before or after), and 2) escapement will increase by a constant number in each year until that time. Neither assumption is consistent with theoretical effects of harvest rate reductions or observed escapement trends. Development of more realistic rebuilding schedules would require more information about stock productivity and future marine survivals. In the absence of this information, a straight line was selected as a surrogate.

3) The trend criterion identified escapement trends since PST implementation. Slopes were calculated for 1984-1992 escapement data. R-squared values were used as a measure of the strength of a linear trend in the data. R-squared values vary from 0 to 1, with a higher value indicating a stronger linear trend. Stocks were scored as follows: 1) stocks that had positive slopes with r-squared values of greater than 0.25 were scored +1, 2) stocks that had negative slopes with r-squared values of greater than 0.25 were scored -1, and 3) all other stocks were scored 0.

   An r-squared value was selected to identify stocks with and without minimal positive or negative linear trends in escapement during the rebuilding assessment period. The selection of the r-squared value was not intended to measure statistical confidence in the slope values.

The CTC will be reviewing new criteria for potential use in the 1993 annual report.

**Stocks Without Escapement Goals:** A written discussion of these stocks is provided in Section 2.6.1; escapement and terminal run data are graphed and tabled in the Appendices.

### 2.3.2 Classification of Stocks with Escapement Goals

Because each criterion addresses a different aspect of stock status, a classification system based on all three criteria was developed for stocks not classified as Above Goal:

1) For each stock, scores were summed across all three criteria.

2) Stocks were classified according to the following system (SEAK and TBR stocks are in Phase III, other stocks are in Phase II):

| STATUS OF STOCK | TOTAL SCORE OF CRITERIA | | |
|---|---|---|---|
| | Phase I [1] | Phase II [2] | Phase III [3] |
| Rebuilding | +3 | +3 | +3 |
| Probably Rebuilding | +2 | +2 | +2 |
| Indeterminate | +1,0,-1 | +1,0 | |
| Probably Not Rebuilding | -2 | -1,-2 | +1,0,-1 |
| Not Rebuilding | -3 | -3 | -2,-3 |

[1] 1981-1985 for SEAK and TBR, 1984-1988 for others
[2] 1986-1990 for SEAK and TBR, 1989-1993 for others
[3] 1991-1995 for SEAK and TBR, 1994-1998 for others

This system uses more stringent criteria in Phases II and III, reflecting our recognition that as the rebuilding target date approaches, our expectations for improvement increase and the time remaining for rebuilding diminishes.

3) After completing steps 1 and 2, the resulting classifications were evaluated by the CTC, and stocks classified as Indeterminate were considered for possible status changes.

## 2.4 RESULTS

### 2.4.1 Stock Assessment

**Stocks With Escapement Goals:** Individual stock results for the rebuilding criteria are shown in Table 2-2, assessment scores and status are shown in Table 2-3, and rebuilding status is summarized in Table 2-4. Stocks are distributed within the six rebuilding categories as follows:

| CATEGORY | SEAK and TBR (Phase III) | | Other Stocks (Phase II) | | Total | |
|---|---|---|---|---|---|---|
| | # | % | # | % | # | % |
| Above Goal | 2 | 20% | 10 | 38% | 12 | 33% |
| Rebuilding | 1 | 10% | 1 | 4% | 2 | 6% |
| Probably Rebuilding | 1 | 10% | 0 | 0% | 1 | 3% |
| Indeterminate | NA | NA | 3 | 12% | 3 | 8% |
| Probably Not Rebuilding | 5 | 50% | 10 | 38% | 15 | 42% |
| Not Rebuilding | 1 | 10% | 2 | 8% | 3 | 8% |
| TOTAL | 10 | 100% | 26 | 100% | 36 | 100% |

**Stocks Without Escapement Goals:** Escapements for 1992 and changes in mean escapement are shown in the following table:

| Stock | Region | Esc. Floor [1] | 1992 Esc. | Mean Escapement | | Change Between Periods | |
|---|---|---|---|---|---|---|---|
| | | | | Base Period | Rebuilding Period | # | % |
| Quillayute fall | WAC | 3000 | 6300 | 5850 | 9900 | 4050 | 69% |
| Hoh spr/sum | WAC | 900 | 800 | 1325 | 2089 | 764 | 58% |
| Hoh fall | WAC | 1200 | 4000 | 2875 | 3500 | 625 | 22% |
| Queets spr/sum | WAC | 700 | 400 | 925 | 1156 | 231 | 25% |
| Queets fall | WAC | 2500 | 4700 | 3875 | 6500 | 2625 | 68% |
| Oregon Coastal fall | NOC | NA | 141 [2] | 91 | 145 | 54 | 59% |

[1] Washington Coastal stocks are managed for escapement floors.
[2] Oregon Coastal assessment is based upon an index of spawner density in units of fish per mile.

Table 2-2. Assessment results through 1992 for natural chinook indicator stocks with escapement goals. Stocks categorized as "Above Goal" were not assessed by the three criteria.

| | | | | | | | MEAN CRITERION | | | | LINE CRITERION | | TREND CRITERION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean Escape. | | Change Between Periods | | Comparison with line | | 1984-1992 Trend | |
| | Stock Name | Region | Run Type | Esc. Goal | 1992 Esc. | 1992 % of Goal | Base Period | Rebuild. Period | Number | Percent | # Above | # Below | Slope | r2 |
| | Situk | SEAK | spring | 600 | 1400 | 233% | 1299 | 1120 | | | | | | |
| | King Salmon | SEAK | spring | 250 | 117 | 47% | 92 | 197 | 105 | 115% | 0 | 3 | -13 | 0.51 |
| | Andrew Creek | SEAK | spring | 750 | 1245 | 166% | 379 | 785 | | | | | | |
| PHASE | Blossom | SEAK | spring | 1280 | 240 | 19% | 163 | 841 | 678 | 416% | 0 | 3 | -157 | 0.36 |
| III | Keta | SEAK | spring | 800 | 347 | 43% | 407 | 990 | 582 | 143% | 1 | 2 | -64 | 0.16 |
| | Alsek | TBR | spring | 4700 | 1246 | 27% | 2697 | 1970 | -727 | -27% | 0 | 3 | -6 | 0.00 |
| | Taku | TBR | spring | 13200 | 11058 | 84% | 4582 | 7717 | 3135 | 68% | 1 | 2 | 844 | 0.77 |
| | Stikine | TBR | spring | 5300 | 6627 | 125% | 1945 | 4535 | 2590 | 133% | 3 | 0 | 388 | 0.44 |
| | Unuk | TBR | spring | 2880 | 1400 | 49% | 1469 | 2046 | 577 | 39% | 0 | 3 | -249 | 0.53 |
| | Chickamin | TBR | spring | 1440 | 554 | 38% | 333 | 1248 | 914 | 274% | 0 | 3 | -179 | 0.60 |
| | Yakoun | NBC | summer | 1580 | 2000 | 127% | 788 | 1667 | | | | | | |
| | Nass | NBC | spr/sum | 15890 | 7312 | 46% | 7944 | 10602 | 2658 | 33% | 1 | 2 | -710 | 0.26 |
| | Skeena | NBC | spr/sum | 41770 | 63392 | 152% | 20883 | 56479 | | | | | | |
| | Area 6 Index | CBC | summer | 5520 | 340 | 6% | 2761 | 1455 | -1305 | -47% | 0 | 3 | -232 | 0.41 |
| | Area 8 Index | CBC | spring | 5450 | 3247 | 60% | 2725 | 2928 | 204 | 7% | 0 | 3 | -215 | 0.26 |
| | Rivers Inlet | CBC | spr/sum | 4950 | 10000 | 202% | 2475 | 5111 | 2636 | 107% | 3 | 0 | 584 | 0.38 |
| | Smith Inlet | CBC | summer | 2110 | 500 | 24% | 1055 | 596 | -459 | -43% | 0 | 3 | -19 | 0.03 |
| | W. Coast Van. Is. | WCVI | fall | 11665 | 7300 | 63% | 5520 | 5671 | 151 | 3% | 0 | 3 | 310 | 0.34 |
| | Upper Geor. St. | GS | sum/fall | 5100 | 5268 | 103% | 2546 | 4131 | 1586 | 62% | 1 | 2 | 12 | 0.00 |
| | Lower Geor. St. | GS | fall | 22280 | 10893 | 49% | 10968 | 7458 | -3510 | -32% | 0 | 3 | 600 | 0.21 |
| | Upper Fraser | FR | spring | 24460 | 24330 | 99% | 12229 | 31556 | | | | | | |
| PHASE | Middle Fraser | FR | spr/sum | 21130 | 24474 | 116% | 9216 | 21849 | | | | | | |
| II | Thompson | FR | summer | 55710 | 39406 | 71% | 22059 | 39386 | 17328 | 79% | 1 | 2 | 359 | 0.04 |
| | Harrison | FR | fall | 241700 | 130310 | 54% | 120837 | 116041 | -4796 | -4% | 1 | 2 | -3139 | 0.03 |
| | Skagit spring | PS | spring | 3000 | 1001 | 33% | 1247 | 1632 | 386 | 31% | 0 | 3 | -96 | 0.13 |
| | Skagit sum/fall | PS | sum/fall | 14900 | 7671 | 51% | 13265 | 11881 | -1383 | -10% | 1 | 2 | -964 | 0.32 |
| | Stillaguamish | PS | sum/fall | 2000 | 780 | 39% | 817 | 1018 | 202 | 25% | 1 | 2 | 15 | 0.01 |
| | Snohomish | PS | sum/fall | 5250 | 2708 | 52% | 5028 | 3912 | -1115 | -22% | 0 | 3 | -211 | 0.47 |
| | Green | PS | fall | 5800 | 5267 | 91% | 5723 | 7083 | | | | | | |
| | Quillayute sum. | WAC | summer | 1200 | 1000 | 83% | 1250 | 1089 | | | | | | |
| | Grays Hrb. spr. | WAC | spring | 1400 | 1700 | 121% | 450 | 1711 | | | | | | |
| | Grays Hrb. fall | WAC | fall | 14600 | 16200 | 111% | 8575 | 17956 | | | | | | |
| | Col. UpR. spring | CR | spring | 84000 | 26500 | 32% | 28050 | 27544 | -506 | -2% | 0 | 3 | -845 | 0.07 |
| | Col. UpR. sum. | CR | summer | 85000 | 15000 | 18% | 23100 | 24156 | 1056 | 5% | 0 | 3 | -707 | 0.14 |
| | Col. UpR. bright | CR | fall | 40000 | 48800 | 122% | 28325 | 84789 | | | | | | |
| | Lewis River | CR | fall | 5700 | 6307 | 111% | 13021 | 11741 | | | | | | |

Table 2-3. Assessment scores and status through 1992 of natural chinook indicator stocks with escapement goals.

| | Stock Name | Region | Run type | Assessment Scores Mean | Line | Trend | Total | Rebuilding Status Through 1992 | Status Change from 1991 |
|---|---|---|---|---|---|---|---|---|---|
| | Situk | SEAK | spring | | | | | Above Goal | |
| | King Salmon | SEAK | spring | 1 | -1 | -1 | -1 | Probably Not Rebuilding | |
| | Andrew Creek | SEAK | spring | | | | | Above Goal | |
| PHASE III | Blossom | SEAK | spring | 1 | -1 | -1 | -1 | Probably Not Rebuilding | |
| | Keta | SEAK | spring | 1 | 0 | 0 | 1 | Probably Not Rebuilding | Decline |
| | Alsek | TBR | spring | -1 | -1 | 0 | -2 | Not Rebuilding | |
| | Taku | TBR | spring | 1 | 0 | 1 | 2 | Probably Rebuilding | |
| | Stikine | TBR | spring | 1 | 1 | 1 | 3 | Rebuilding | |
| | Unuk | TBR | spring | 1 | -1 | -1 | -1 | Probably Not Rebuilding | |
| | Chickamin | TBR | spring | 1 | -1 | -1 | -1 | Probably Not Rebuilding | |
| | Yakoun | NBC | summer | | | | | Above Goal | |
| | Nass | NBC | spr/sum | 1 | 0 | -1 | 0 | Indeterminate | |
| | Skeena | NBC | spr/sum | | | | | Above Goal | |
| | Area 6 Index | NBC | summer | -1 | -1 | -1 | -3 | Not Rebuilding | |
| | Area 8 Index | CBC | spring | 0 | -1 | -1 | -2 | Probably Not Rebuilding | |
| | Rivers Inlet | CBC | spr/sum | 1 | 1 | 1 | 3 | Rebuilding | Improvement |
| | Smith Inlet | CBC | summer | -1 | -1 | 0 | -2 | Probably Not Rebuilding | |
| | W. Coast Van. Is. | WCVI | fall | 0 | -1 | 1 | 0 | Probable Not Rebuilding/1 | |
| | Upper Geor. St. | GS | sum/fall | 1 | 0 | 0 | 1 | Indeterminate | |
| | Lower Geor. St. | GS | fall | -1 | -1 | 0 | -2 | Probably Not Rebuilding | |
| | Upper Fraser | FR | spring | | | | | Above Goal | |
| PHASE II | Middle Fraser | FR | spr/sum | | | | | Above Goal | |
| | Thompson | FR | summer | 1 | 0 | 0 | 1 | Indeterminate | |
| | Harrison | FR | fall | 0 | 0 | 0 | 0 | Probably Not Rebuilding/1 | |
| | Skagit spring | PS | spring | 1 | -1 | 0 | 0 | Probably Not Rebuilding/1 | |
| | Skagit sum/fall | PS | sum/fall | -1 | 0 | -1 | -2 | Probably Not Rebuilding | Decline |
| | Stillaguamish | PS | sum/fall | 1 | 0 | 0 | 1 | Probably Not Rebuilding/1 | Decline |
| | Snohomish | PS | sum/fall | -1 | -1 | -1 | -3 | Not Rebuilding | |
| | Green | PS | fall | | | | | Above Goal | |
| | Quillayute summer | WAC | summer | | | | | Above Goal | |
| | Grays Harbor spring | WAC | spring | | | | | Above Goal | Improvement |
| | Grays Harbor fall | WAC | fall | | | | | Above Goal | |
| | Col. UpR. spring | CR | spring | 0 | -1 | 0 | -1 | Probably Not Rebuilding | |
| | Col. UpR. summer | CR | summer | 0 | -1 | 0 | -1 | Probably 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.

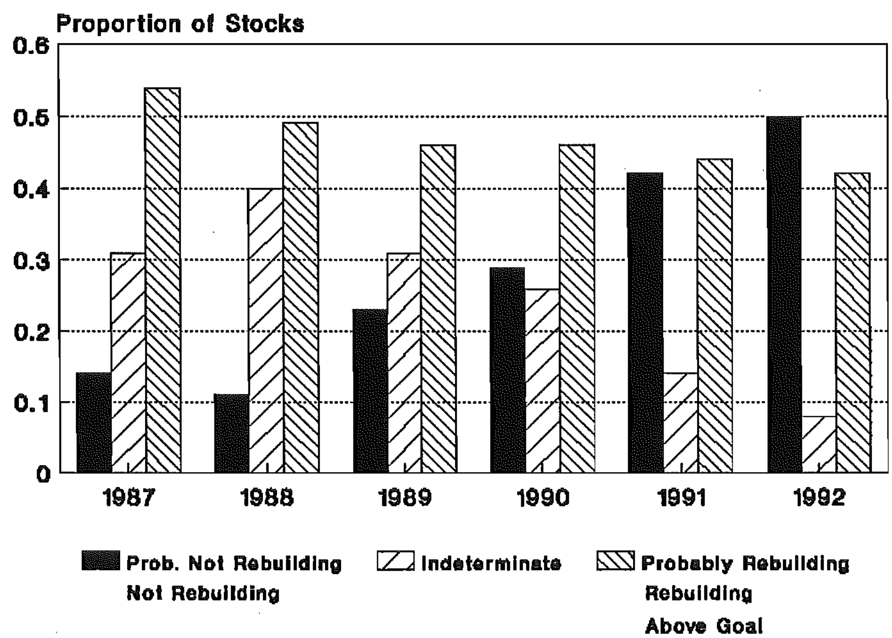
## 2.4.2 Results Relative to Previous Years

**Relative To 1991:** Three of the 36 stocks with escapement goals (8%) showed status declines relative to the 1991 assessment, while 2 stocks (6%) showed improvement (Table 2-3). The table below shows the net change between years as well as the total number of stocks moving in and out of a particular category (e.g., one stock moved into the Above Goal category while one stock moved out, resulting in no net change):

| CATEGORY | 1991 Assessment | | 1992 Assessment | | # stocks moving between categories | |
|---|---|---|---|---|---|---|
| | # | % | # | % | In | Out |
| Above Goal | 12 | 33% | 12 | 33% | 1 | 1 |
| Rebuilding | 1 | 3% | 2 | 6% | 1 | 0 |
| Probably Rebuilding | 3 | 8% | 1 | 3% | 0 | 2 |
| Indeterminate | 5 | 14% | 3 | 8% | 0 | 2 |
| Probably Not Rebuilding | 12 | 33% | 15 | 42% | 3 | 0 |
| Not Rebuilding | 3 | 8% | 3 | 8% | 0 | 0 |
| TOTAL [1] | 36 | 100% | 36 | 100% | | |

[1] Assessments for Chilkat River are not included in this table.

**Relative To All Previous Years:** Results relative to all previous years for stocks with escapement goals are graphed below. Proportions for each category were calculated by re-evaluating previous years with corrected escapement data and current assessment methods.



### 2.4.3 1992 Escapements Relative to Escapement Goals

Escapements relative to escapement goals for 1992 are summarized in Table 2-2; 14 of the 36 stocks with goals (39%) had escapements less than 50% of their escapement goal, while a total of 20 of the 36 stocks with goals (56%) had escapements less than 75% of their escapement goal. Twelve stocks (33%) had 1992 escapements that were above their escapement goals.

## 2.5 STOCKS CONSIDERED FOR STATUS CHANGES

The CTC examined each of the seven stocks in the Indeterminate category and considered whether to change its status to Probably Rebuilding or Probably Not Rebuilding. A decision was made to change the status of four of these stocks.

### 2.5.1 West Coast Vancouver Island (WCVI)

As in 1991, the CTC revised the WCVI stock classification to Probably Not Rebuilding because: 1) the average escapement has not increased since the base period, 2) the 1992 escapement was only 62% of goal and well below the base to goal line, and 3) the last three years' escapement points were all below the trend line.

### 2.5.2 Harrison

As in 1991, the CTC revised the Harrison stock classification to Probably Not Rebuilding because: 1) the average escapement has not increased since the base period, 2) the 1992 escapement was only 54% of goal and well below the base to goal line, and 3) the marginal result of the Line Criterion test reflected the large 1990 escapement.

### 2.5.3 Skagit Spring

As in 1991, the CTC revised the Skagit Spring stock to Probably Not Rebuilding because: 1) although the average escapement has increased from the base period, escapements have remained static or declined in each of the last seven years, 2) the 1992 escapement was only 33% of the goal, and 3) the 1992 escapement was below the base period average.

### 2.5.4 Stillaguamish

The CTC revised the Stillaguamish summer/fall stock to Probably Not Rebuilding because: 1) although the average escapement has increased from the base period, escapements have remained static or declined in all but one of the last seven years, 2) the 1992 escapement was only 39% of the goal, and 3) the 1992 escapement was below the base period average.

### 2.5.5 Other Indeterminate Stocks

The Nass, Thompson, and Upper Strait of Georgia stocks remain in the Indeterminate category.

Trends in the Nass River terminal run and spawning escapement are inconsistent. Terminal run and catches have been increasing, but the spawning escapement index has decreased recently. The escapement index is, however, only based on visual observations, and its reliability is highly dependent on observation effort and conditions. In 1992, additional resources for stock assessments in the Nass River provided for a quantitative estimate of chinook escapements. These studies indicate chinook escapements two to three times higher than that reported from visual surveys. These data are presently being reviewed by CDFO.

The Thompson River showed a strong initial response to the rebuilding program; however, escapements have remained relatively static for eight consecutive years. Additional increases in escapement have not resulted from elevated 1984-1986 escapement levels.

Escapements of the Upper Strait of Georgia stock have varied from below base period levels to above the escapement goal, showing no apparent pattern during the rebuilding period.

## 2.6 SUMMARY OF ESCAPEMENT TRENDS

### 2.6.1 Stocks Without Escapement Goals

The five Washington Coastal stocks, Hoh spring/summer, Hoh fall, Queets spring/summer, Queets fall and Quillayute fall, all showed steady increases in terminal runs during the early years of the rebuilding program. Escapements were somewhat variable, but still increasing. This pattern of increase peaked in the late 1980s and has been followed by sharply reduced terminal runs and escapements over the last two to three years. Only the Hoh fall stock had a fairly strong return in 1992. The Oregon Coastal stock aggregate has shown a positive response since the rebuilding program began. For this group, the average escapement index for the rebuilding period is substantially greater than for the base period.

Two of the Washington Coastal spring/summer stocks, Queets and Hoh, had 1992 escapements below their escapement floors, despite restricted terminal catches. In addition, escapements for both stocks were below 1984 levels. For the Queets spring/summer stock, this was the second consecutive year below the escapement floor. While it is not possible to assess the rebuilding status of stocks without escapement goals, the Queets and Hoh should be carefully monitored to determine if additional management actions are needed.

### 2.6.2 Stocks With Escapement Goals

Although there are now 15 stocks classified as Above Goal, Rebuilding, or Probably Rebuilding, the proportion of stocks in these three categories has consistently declined since 1988, while the proportion classified as Probably Not Rebuilding or Not Rebuilding has consistently increased (see figure in Section 2.4.2). Eighteen of the 36 escapement indicator stocks (50%) are currently classified as Probably Not Rebuilding or Not Rebuilding, even though the rebuilding program is now 60% complete for most stocks and 80% complete for the remainder. Three of these stocks, Nass, Upper Strait of Georgia and Thompson, are currently classified as Indeterminate.

Fifteen of the 36 stocks (42%) have shown positive escapement patterns during the rebuilding period. Twelve of these stocks are classified as Above Goal: Situk and Andrew Creek in SEAK, Yakoun and Skeena Rivers in Northern British Columbia (NBC), the upper and middle Fraser River stocks, Green River in Puget Sound, Grays Harbor spring and falls and Quillayute summers from the Washington Coast, and the Upriver Bright and Lewis River stocks from the Columbia River. The remaining three stocks are classified as Rebuilding or Probably Rebuilding: the Taku and Stikine TBR stocks and Rivers Inlet in Central British columbia (CBC).

Of concern to the CTC are the 18 stocks (50%) classified as Not Rebuilding or Probably Not Rebuilding. Thirteen of the these stocks had 1992 escapements that were below base period levels and eight had average rebuilding period escapements below base period levels. The 1992 escapements of these stocks ranged from only 6% to 63% of their escapement goals.

These 18 stocks have shown either no positive response to the rebuilding program or an initial positive response followed by a decline. Under current survival conditions (both ocean and inriver) and management regimes, these stocks are unlikely to rebuild by the rebuilding target dates. The rebuilding period escapement patterns shown by the these 18 stocks can be summarized as follows:

**Initial Decline, Subsequent Insufficient Increase.** Escapements for the WCVI and Lower Strait of Georgia (LGS) stocks have increased since 1985, but at a rate that is probably insufficient to achieve the escapement objective by 1998.

**Initial Increase to Escapement Objective, Subsequent Decline.** Five of the SEAK and TBR stocks (King Salmon, Blossom, Keta, Unuk, and Chickamin) increased in abundance during the early years of their rebuilding period, to levels at or above their escapement goals. All five of these stocks have since declined to levels well below goal.

**Initial Increase, Subsequent Decline.** The escapements of two stocks, Columbia Upriver Springs and Columbia Upriver Summers, increased from 1985 through 1987, but have declined since that time. Even at their maximum levels, the escapements for these stocks were less than 45% of goal.

**No Response.** Six stocks (Alsek, Area 8 Index, Smith Inlet, Harrison, Stillaguamish, and Skagit summer/fall) have shown no consistent trend in escapements during their rebuilding periods. Except for the Stillaguamish, which has shown a slight increase, all of these stocks have average rebuilding period escapements at or below base period levels.

**Decrease.** Escapement for three stocks (Area 6 Index, Skagit spring, and Snohomish) have declined since 1985.

Table 2-4. Rebuilding status through 1992 of natural chinook indicator stocks with escapement goals.

| | | | |
|---|---|---|---|
| | **STOCKS IN 12TH YEAR OF REBUILDING (Phase III)** | | |
| ABOVE GOAL | REGION | RUN TYPE | CHAPTER 5 GROUP |
| Situk | SEAK | spring | SEAK/TBR-O |
| Andrew Creek | SEAK | spring | SEAK/TBR-I |
| REBUILDING | | | |
| Stikine | TBR | spring | SEAK/TBR-O |
| PROBABLY REBUILDING | | | |
| Taku | TBR | spring | SEAK/TBR-O |
| PROBABLY NOT REBUILDING | | | |
| King Salmon | SEAK | spring | SEAK/TBR-I |
| Blossom | SEAK | spring | SEAK/TBR-I |
| Keta | SEAK | spring | SEAK/TBR-I |
| Unuk | TBR | spring | SEAK/TBR-I |
| Chickamin | TBR | spring | SEAK/TBR-I |
| NOT REBUILDING | | | |
| Alsek | TBR | spring | SEAK/TBR-O |
| | **STOCKS IN 9TH YEAR OF REBUILDING (Phase II)** | | |
| ABOVE GOAL | | | |
| Yakoun | NBC | summer | NCBC |
| Skeena | NBC | spring/summer | NCBC |
| Upper Fraser | FR | spring | UFR |
| Middle Fraser | FR | spring/summer | UFR |
| Green | PS | fall | SPS |
| Quillayute summer | WAC | summer | WACO |
| Grays Harbor spring | WAC | spring | WACO |
| Grays Harbor fall | WAC | fall | WACO |
| Col. Upriver Bright | CR | fall | WACO |
| Lewis River | CR | fall | WACO |
| REBUILDING | | | |
| Rivers Inlet | CBC | spring/summer | NCBC |
| INDETERMINATE | | | |
| Nass | NBC | spring/summer | NCBC |
| Upper Georgia Strait | GS | summer/fall | UGS |
| Thompson | FR | summer | UFR |
| PROBABLY NOT REBUILDING | | | |
| Area 8 Index | CBC | spring | NCBC |
| Smith Inlet | CBC | summer | NCBC |
| W. Coast Vancouver Island 1/ | WCVI | fall | WCVI |
| Lower Georgia Strait | GS | fall | LGS |
| Harrison 1/ | FR | fall | LFR |
| Skagit spring 1/ | PS | spring | NPS-Sp |
| Skagit summer/fall | PS | summer/fall | NPS-S/F |
| Stillaguamish 1/ | PS | summer/fall | NPS-S/F |
| Col. Upriver spring | CR | spring | CUS |
| Col. Upriver summer | CR | summer | WACO |
| NOT REBUILDING | | | |
| Area 6 Index | NBC | summer | NCBC |
| Snohomish | PS | summer/fall | NPS-S/F |

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

## CHAPTER 3. EXPLOITATION RATE ASSESSMENT
## Based on CWT Recovery Data Through Calendar Year 1992

### 3.1 INTRODUCTION

The Exploitation Rate Assessment relies on coded-wire-tag (CWT) release and recovery data from a set of indicator stocks to estimate: 1) harvest rate indices for the ceiling fisheries, 2) exploitation rate indices for depressed natural stocks harvested in nonceiling fisheries, 3) brood year exploitation rates, 4) survival rate indices, 5) stock indices for ceiling and nonceiling fisheries, and 6) the distribution of catch and total mortality among fisheries. The types of data and indices presented are similar to those reported in the 1991 annual report (CTC 1992).

#### 3.1.1 Overview

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 and/or generalizations about fishery impacts will only be appropriate to the extent that these indicator stocks are representative of the stocks harvested in the fisheries or the natural stocks 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, three stocks in Idaho (Sawtooth Spring, Rapid River Spring, and McCall Summer) are tagged as PSC indicator stocks but are not included because of the limited number of recoveries in ocean fisheries.

Data for some stocks are inadequate for use in all analyses of the exploitation rate assessment. Table 3-2 identifies the stocks used for each type of analysis and Table 3-3 indicates the brood years with available CWT data for each exploitation rate indicator stock. Tag codes used in the analysis are provided in Appendix L.

The 1992 analysis includes two new indicator stocks, the Puntledge (summer fingerling) and Kitsumkalum (spring/summer fingerling) and excludes seven stocks previously used (4 from Puget Sound: Lummi Ponds Fall Fingerling, Tulalip Fall Fingerling, Skookum Spring Fingerling, and Quilcene Spring Yearling; 3 from the Washington Coast: Quinault Fall Fingerling, Humptulips Fall Fingerling, and Quillayute Summers). The Puntledge stock is located on the east coast of Vancouver Island midway between the Big Qualicum and Quinsam hatcheries. It was added after a review of the recoveries indicated that the stock had been tagged over a sufficient time period and at a sufficient level for inclusion in the exploitation rate assessment. The Kitsumkalum is a stock located on a tributary to the Skeena River. Although escapement data have not yet been included, recoveries do provide useful information on the catch distribution. Scott et al. (in prep.) recommended that the seven Puget Sound and Washington coastal stocks be excluded due to an inability to tag a sufficient number of fish and poor or absent estimates of escapement. In addition, CWT tag groups from the Crystal Lake Hatchery and Carroll Inlet release site were added to the Southeast Alaska stock. This aggregate indicator stock previously included Deer Mountain Hatchery, Little Port Walter, Neets Bay, and Whitman Lake. More stocks may be added or removed from the exploitation rate assessment as data needs and limitations are identified.

Table 3-1. List of exploitation rate indicator stocks.

| Stock Name | Location | Description |
|---|---|---|
| Alaska Spring | Southeast Alaska | Spring Yearling |
| Kitsumkalum 1/ | North/Central BC | Spring/Summer Fingerling |
| Snootli Creek | North/Central BC | Spring/Summer Fingerling |
| Kitimat River | North/Central BC | Spring/Summer Fingerling |
| Robertson Creek | WCVI | Fall Fingerling |
| Quinsam | Georgia Strait | Fall Fingerling |
| Puntledge 1/ | Georgia Strait | Summer Fingerling |
| Big Qualicum | Georgia Strait | Fall Fingerling |
| Chehalis (Harrison Stock) | Lower Fraser River | Fall Fed Fry |
| Chilliwack (Harrison Stock) | Lower Fraser River | Fall Fingerling |
| South Puget Sound Fall Yearling | South Puget Sound | Summer/Fall Yearling |
| Squaxin Pens Fall Yearling | South Puget Sound | Summer/Fall Yearling |
| University of Washington Accelerated | Central Puget Sound | Summer/Fall Fingerling |
| Samish Fall Fingerling | North Puget Sound | Summer/Fall Fingerling |
| Stillaguamish Fall Fingerling | Central Puget Sound | Summer/Fall Fingerling |
| George Adams Fall Fingerling | Hood Canal | Summer/Fall Fingerling |
| South Puget Sound Fall Fingerling | South Puget Sound | Summer/Fall Fingerling |
| Kalama Creek Fall Fingerling | South Puget Sound | Summer/Fall Fingerling |
| Elwha Fall Fingerling | Strait of Juan de Fuca | Summer/Fall Fingerling |
| Hoko Fall Fingerling | Strait of Juan de Fuca | Summer/Fall Fingerling |
| Skagit Spring Yearling | Central Puget Sound | Spring Yearling |
| Nooksack Spring Yearling | North Puget Sound | Spring Yearling |
| White River Spring Yearling | South Puget Sound | Spring Yearling |
| Sooes Fall Fingerling | North Washington Coast | Fall Fingerling |
| Queets Fall Fingerling | North Washington Coast | Fall Fingerling |
| Cowlitz Tule | Columbia River (WA) | Fall Tule Fingerling |
| Spring Creek Tule | Columbia River (WA) | Fall Tule Fingerling |
| Bonneville Tule | Columbia River (OR) | Fall Tule Fingerling |
| Stayton Pond Tule | Columbia River (OR) | Fall Tule Fingerling |
| Upriver Bright | Upper Columbia River | Fall Bright Fingerling |
| Hanford Wild | Upper Columbia River | Fall Bright |
| Lewis River Wild | Lower Columbia River | Fall Bright |
| Lyons Ferry | Snake River | Fall Bright Fingerling |
| Willamette Spring | Lower Columbia River | Spring Yearling |
| Salmon River | North Oregon Coast | Fall Fingerling |
| Sawtooth Spring 2/ | Idaho | Spring Yearling |
| Rapid River Spring 2/ | Idaho | Spring Yearling |
| McCall Summer 2/ | Idaho | Summer Yearling |

1/ Indicates stocks added for the 1992 analysis.
2/ Tagged PSC indicator stocks with too few recoveries for analysis.

Table 3-2. Indicator stocks, associated stock group, analyses in which each indicator stock is used, and the availability of quantitative escapement recoveries and base period tagging data. All stocks are used in the distribution analysis. (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 | NC Index | Brood Exp | Survival Index | Esc | Base Tagging |
|---|---|---|---|---|---|---|---|
| Alaska Spring | SEAK/TBR-I | yes | - - | yes | yes | yes | yes |
| Kitsumkalum | NCBC | - - | - - | - - | - - | - - | yes |
| Snootli Creek | NCBC | - - | - - | - - | - - | - - | - - |
| Kitimat River | NCBC | - - | - - | - - | - - | - - | - - |
| Robertson Creek | WCVI | yes | - - | yes | yes | yes[2/] | yes |
| Quinsam | UGS | yes | yes | yes | yes | yes | yes |
| Puntledge | LGS | yes | yes | yes | yes | yes | yes |
| Big Qualicum | LGS | yes | yes | yes | yes | yes | yes |
| Chehalis | LFR | - - | - - | - - | - - | - - | - - |
| Chilliwack[3/] | LFR | - - | - - | - - | - - | - - | - - |
| South Puget Sound Fall Yearling | SPS | yes | - - | yes | yes | yes | yes |
| Squaxin Pens Fall Yearling | SPS | - - | - - | yes | yes | - - | - - |
| Univ of Washington Accelerated | SPS | yes | - - | yes | yes | yes | yes |
| Samish Fall Fingerling | NPS-S/F | yes | yes | yes | yes | yes[2/] | yes |
| Stillaguamish Fall Fingerling | NPS-S/F | - - | - - | - - | - - | - - | - - |
| George Adams Fall Fingerling | | yes | - - | yes | yes | yes[2/] | yes |
| South Puget Sound Fall Fnglg | SPS | yes | - - | yes | yes | yes[2/] | yes |
| Kalama Creek Fall Fingerling | SPS | - - | - - | - - | - - | - - | yes |
| Elwha Fall Fingerling | | - - | - - | - - | - - | - - | - - |
| Hoko Fall Fingerling | | - - | - - | - - | yes | yes | - - |
| Skagit Spring Yearling | NPS-Sp | - - | - - | yes | yes | yes[2/] | - - |
| Nooksack Spring Yearling | NPS-Sp | - - | - - | yes | yes | yes | - - |
| White River Spring Yearling | | yes | - - | yes | yes | yes | yes |
| Sooes Fall Fingerling | WACO | - - | - - | yes | yes | yes | - - |
| Queets Fall Fingerling | WACO | - - | - - | - - | - - | - - | yes |
| Cowlitz Tule | CR Hatchery Tule Fall[4/] | yes | - - | yes | yes | yes | yes |
| Spring Creek Tule | CR Hatchery Tule Fall | yes | - - | yes | yes | yes | yes |
| Bonneville Tule | CR Hatchery Tule Fall | yes | - - | yes | yes | yes | yes |
| Stayton Pond Tule | CR Hatchery Tule Fall | yes | - - | yes | yes | yes | yes |
| Upriver Bright | WACO | yes | yes | yes | yes | yes | yes |
| Hanford Wild | WACO | yes | - - | yes | yes | yes | - - |
| Lewis River Wild | WACO | yes | yes | yes | yes | yes | yes |
| Lyons Ferry | WACO | - - | - - | yes | yes | yes | - - |
| Willamette Spring | | yes | - - | yes | yes | yes | yes |
| Salmon River | WACO | yes | yes | yes | yes | yes | yes |

1/ Stock groupings are used for nonceiling fishery index, regional survival 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: | South Puget Sound summer/fall |
| NPS-Sp: | North Puget Sound spring |
| WACO: | Washington Coastal Spring/Summer/Fall, non-Tule Columbia River Fall, North Oregon Coast. |

2/ Only hatchery rack recoveries are included in escapement.
3/ Harrison stock only.
4/ Used in Table 3-9 only.

Table 3-3. Brood years included by stock for Exploitation Rate Assessment (x = valid).

| Stock Name | Youngest Age | Oldest Age | Brood Year 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alaska Spring | 3 | 6 | - | - | - | - | - | - | - | 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 |
| Snootli Creek | 2 | 6 | - | - | - | - | 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 |
| Robertson Creek | 2 | 5 | - | 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 |
| Puntledge | 2 | 5 | - | - | - | - | 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 |
| Chehalis | 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 | 2 | 5 | - | - | - | - | - | - | - | 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 |
| Stillaguamish Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | - | 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 |
| SPS Fall Fingerling | 2 | 5 | - | - | - | - | 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 |
| Elwha Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | x | x | x | x | x | - | x | x | x |
| Hoko Fall Fingerling | 2 | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 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 |
| Sooes Fall Fingerling | 2 | 6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 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 |
| Spring Creek Tule | 2 | 5 | - | 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 |
| Upriver Bright | 2 | 5 | - | - | - | - | 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 |
| 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 | x | x | x | x | x | x | x | x | x | x | x | x | - |
| Salmon River | 2 | 5 | - | - | - | - | - | - | x | x | x | x | - | x | x | x | x | x | x | x | x | x |

**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 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 nonretention periods. Direct estimates of incidental mortality cannot be obtained from CWT recoveries; indirect 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 although the ceilings are applicable to net and sport gear as well. Because the proportion of the catch harvested by the sport fishery has increased in these ceiling fisheries, the indices may underestimate the harvest impact of all gear types. Only the recoveries from the troll fishery have been used because in past years the majority of the catch, and the most reliable CWT sampling, occurred in these fisheries. The CTC is evaluating how to include other gear types in the indices for the SEAK and NCBC fisheries.

**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 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 on a calendar year basis over all nonceiling fisheries of a Party. Index values greater than 1.0 for U.S. nonceiling fisheries indicate that the exploitation rates have increased relative to the base period. Consistent with Canadian commitments to reduce harvest rates 25% for net fisheries, the index should be evaluated with respect to 0.75 for these fisheries.

Some fisheries subject to the passthrough provision are not included in the index:

a) The WCVI sport fishery was not included because catch estimates and CWT recoveries are not available for the base period.

b) Nonceiling fishery indices excluded terminal fisheries if the exploitation rate indicator stocks were subject to different fishing patterns than the associated natural stocks. For example, exploitation rate indicator stocks of hatchery origin may be subjected to fisheries designed to harvest surplus hatchery production. In other instances, depressed natural stocks may be subjected to fisheries that do not impact the associated exploitation rate indicator stock. Information on terminal fishery harvest rates on natural stocks is presented in Chapter 5.

Nonceiling fisheries included in the analysis are:

| Fisheries Included in Nonceiling Index | |
|---|---|
| **United States** | **Canada** |
| Washington/Oregon/California Troll<br>Puget Sound Northern Net<br>Puget Sound Other Net<br>Washington Coastal Net<br>Washington/Oregon/California Sport<br>Puget Sound Northern Sport<br>Puget Sound Southern Sport | West Coast Vancouver Island Net<br>Juan de Fuca Net<br>Johnstone Net<br>Fraser Net |

In some instances, CWT recoveries in the nonceiling fisheries were limited. To reduce the variability of the estimates, only stock-fishery combinations were included which satisfied the minimum average recovery criteria used to select stocks for inclusion in the fishery index.

The natural 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, and 3) an exploitation indicator stock with base period tagging and estimates of escapement existed in the stock group. The Skagit spring, Columbia Upriver spring, and Harrison met criteria 1) and 2) but were not included in the analysis because of the absence of a suitable exploitation rate indicator stock.

**Brood Exploitation Rates:** 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 mortality to AEQ total mortality plus escapement. The numerator may be partitioned into components which represent AEQ reported catch, AEQ incidental morality, or AEQ total mortality, with each component occurring in either ocean fisheries (generally marine sport, troll, and recoveries of age 2 and 3 chinook in nonterminal net fisheries) or all fisheries. The values presented in the tables and figures are actual percentages, not indices.

**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 total age-specific exploitation rates expressed relative to the initial cohort (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.

**Survival Indices:** The survival index is the sum of CWT catch recoveries plus escapement of a given age divided by the number of tagged fish released for the brood. Separate indices were computed for ocean age 2 and 3 fish instead of a single estimate based on total survival in order to include the 1990 brood year in the analysis. On average, the ocean age 3 estimate provides a better index for total survival; however, past experience has shown that both indices fluctuate in a similar manner for most stocks.

Stocks included in each stock group are indicated in Table 3-2. The index provides an indication of survival trends for broods contributing to fisheries in 1993-1994.

**Stock Catch Distribution:** The distributions of reported catch and of 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.

### 3.1.2 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 (May-September) 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 BQR origin. BQR 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.

Quinsam 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. The 1978 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 1987, 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: pre-1979 recoveries of U.S. stocks are not in the MRP database; 1991-1992 tributary sport data and terminal sport recovery data for Columbia River Basin stocks except Willamette Spring were obtained from ODFW and WDF; and 1992 Puget Sound sport catch/sample expansion factors were obtained from WDF.

Data were obtained directly from WDF 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 WDF facilities in Puget Sound for 1991-1992 were obtained from WDF;

2) Recoveries for tribal facilities in Puget Sound and the Washington Coast for 1991-1992 were obtained from the NWIFC;

3) Recoveries to the U.S. Fish and Wildlife Service (USFWS) Makah National Fish Hatchery in 1992 were obtained from the USFWS; and

4) Columbia River Basin escapements for 1991-1992 were obtained from USFWS, WDF and ODFW.

5) Pre-1982 escapement data for the Stayton Pond stock 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:

$$\frac{\textit{McNary Count}}{(\textit{Bonneville URBs})-(\textit{Zone 6 Comm Catch})-(\textit{Deschutes Turnoff})}$$

Bonneville Upriver Bright counts are calculated by the WDF 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 & WDF 1993); ceremonial, subsistence, and sport catches between Bonneville and McNary Dams are not accounted for and result in a slight overestimate of IDL. 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.

### 3.1.3 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 C.

## 3.2 ESTIMATION OF EXPLOITATION RATES

### 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) except as noted below:

1) Tag recoveries within a brood year were not weighted by the size of the associated unmarked release. In some instances, a tag code with few recoveries would previously have received a greater weight in the analysis than a tag code with more recoveries. Since the precision of the estimates increases as the number of recoveries increases, the previous weighting system could have resulted in reduced precision and accuracy.

2) Beginning with the 1991 analysis, incidental mortality rates in the cohort analysis for Canadian and SEAK net fisheries were adjusted to be consistent with observations in Canadian field sampling programs. This was accomplished in the cohort analysis by reducing the nonvulnerable proportion of the cohort. A similar adjustment was implemented for the 1992 analysis for the Columbia River net fisheries.

3) Revised methods were used to estimate the number of encounters of chinook in SEAK troll fisheries during CNR periods in 1990 through 1992. A number of potential predictors were developed, including encounter rates during the summer troll fishery, the length in days of the CNR period, and the gear-days of effort in the CNR period. A jackknife analysis of one and two

variable regression models indicated that the legal encounters were best predicted by a two variable model with the summer catch in the troll fishery and the number of days in the CNR period. The best predictor of the sublegal encounters was the number of days of the CNR period.

4) Previous CTC analyses had shown that the bias of the survival index was small for stocks without escapement data as long as changes in survival rates were large in comparison to changes in exploitation rates. However, to simplify interpretation of the results, survival indices are no longer computed for stocks for which escapement data are lacking or of poor quality.

5) Survival trends for regional stock groups are reported relative to broods which contributed to the 1979 through 1982 base period (Alaska Spring, 1978 brood; Quinsam 1976-1980 broods; all others, 1976-1979 broods) rather than to the average of all years. Brood years used for the base period and projected period are summarized below.

| Time Period | SEAK/TBR Inside Migrating | Quinsam | All Other Stocks |
|---|---|---|---|
| Base | 1978 | 1976-1980 | 1976-1979 |
| Projected (1991 Analysis) | 1987-1988 | 1988-1989 | 1988-1989 |
| Projected (1992 Analysis) | 1988-1989 | 1989-1990 | 1989-1990 |

### 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:** Cohort analysis is the computational procedure used to estimate the survival, distribution, and exploitation rate for a CWT group. Cohort analysis simply reconstructs production of a CWT group by starting with the escapement and catch of the oldest age class and working backwards in time to calculate total production of age 2 chinook before fishing starts. These reconstructions are based on CWT recoveries by stock, age, and fishery. 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 which 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 which are consistent from year to year.

2) For age 2 and older fish, natural mortality is constant for each age class in all 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 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 legal sized 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 which 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.

**Survival Rate Indices:** Fishery exploitation rates, incidental mortality rates, and stock maturation rates are constant from year to year. Variations in fishery exploitation rates which are small compared to changes in survival should not adversely effect the survival index. Considerable variation in exploitation rates may occur when a large proportion of the age 2 or 3 fishing mortality occurs in fisheries directed at other species.

### 3.2.3 Reported Catch Versus Total Mortalities

Fishery indices are presented for both reported catch and total mortality. Management strategies have changed considerably for fisheries constrained by PSC catch ceilings. Regulatory changes which 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 cannot be estimated 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

### 3.3.1 Overview

Detailed exploitation rates and fishery index data are provided in Appendices D and E. Appendix D has tables of stock-specific indices for total mortality and Appendix E has similar tables for reported catch. Appendix D also includes graphs of the fishery indices versus year. The heavy black line indicates the estimated fishery index; the light vertical bars are used to display the central range[1] of fishery indices observed among individual stock/age strata. 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.

Estimates presented in this report for years prior to 1992 may differ from previous estimates, particularly for more recent years, due to a number of factors including: 1) addition of new stocks in the analysis, 2) revised estimates of nonretention mortality, 3) revised estimates of CWT recoveries, or 4) revised estimates of the cohort size for broods which were previously incomplete.

Table 3-4 provides a summary of the fishery indices for total fishing mortality for each year since 1985 as well as the 1985-1992 average and 1985 target reduction. For fisheries operating under PSC ceiling management, successful completion of the rebuilding program depends upon a substantial initial reduction in fishery harvest rates and stock exploitation rates combined with progressive reductions over time. The 1985 target reduction represents the expected change in the fishery index which would result from imposition of the ceiling if stock abundance were equal to the 1979-1982 average and is computed by subtracting the ratio of the 1985 catch ceiling to 1979-1982 average catch from one. Further reductions in harvest rates for PSC ceilinged fisheries were expected as the rebuilding program progressed due to decreases in fishing mortality rates and increases in production resulting from higher spawning escapements. The 1985 target reduction is used as a minimum expectation and is compared with present reductions because a method has not been developed to compute the time trend of expected reductions in harvest rates.

Indices are provided for a number of fisheries other than those to which the PST ceilings apply. These additional indices are provided in instances in which the information may be of assistance in evaluating the fishing regimes. Specific cases are discussed below.

1) NBC and CBC Troll. The PST ceiling is applicable to the combined NBC and CBC fisheries. However, 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.

2) GS Sport and GS Troll. The PST ceiling is applicable to the combined GS sport and troll fisheries. CWT data indicates that the stock composition of these fisheries differs, with the Harrison stock contributing more heavily to the troll fishery. Since the implementation of the PST, the catch in the troll fishery has been reduced to a greater extent than the sport fishery. Although a fishery index is presented for the GS troll fishery, the CTC is concerned that bias may exist in the estimate since only one stock (Big Qualicum) consistently provides sufficient recoveries to meet the CTC criteria for inclusion in the fishery index. The CTC is evaluating the need to modify the inclusion criteria.

[1] The central range is defined as follows:

| Stock-Age Combinations | Central Range |
|---|---|
| <10 | the range of indices |
| 10 to 19 | the range remaining after the lowest and highest values are excluded |
| 20 to 29 | the range remaining after the two lowest and two highest values are excluded |

3) South U.S. Ocean Troll and Sport. This fishery includes all troll and sport fisheries off the coasts of Washington, Oregon, and California and the troll fishery in the Strait of Juan de Fuca. Although a PST ceiling was not specified for these fisheries, the CTC is frequently asked questions regarding exploitation rates in these fisheries. Indices are presented separately for Columbia River and Puget Sound stocks since the majority of the harvest of Puget Sound stocks occurs in the Strait of Juan de Fuca.

CDFO has concerns regarding the reliability of Fishery Indices based on small numbers of observed recoveries and/or indicator stocks. In particular, this concern applies to CBC troll and GS fisheries.

Table 3-4. Percent change from the 1979-1982 base in the fishery index for ceiling fisheries for total AEQ mortality and 1985 target reductions.

| Fishery | Age | Change in Total Fishery Harvest Rates from Base Period[1/] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 85-92 Mean | 1985 Target |
| SEAK Troll | 3-5 | 13% | - 4% | 0% | - 23% | - 33% | - 16% | - 13% | - 31% | -13% | - 22% |
| NCBC Troll | 3-5 | - 8% | - 19% | - 17% | - 39% | - 33% | - 29% | - 27% | - 23% | -24% | - 16% |
| NBC Troll | 3-5 | 44% | - 16% | 0% | - 17% | - 2% | - 11% | - 14% | - 37% | -7% | 2/ |
| CBC Troll | 3-5 | - 75% | - 32% | - 53% | - 85% | - 90% | - 61% | - 49% | - 58% | -63% | 2/ |
| WCVI Troll | 3-5 | - 10% | - 6% | - 24% | - 5% | - 55% | - 18% | - 38% | - 10% | -21% | - 24% |
| Strait of Georgia | | | | | | | | | | | |
| Sport & Troll | 3-5 | - 40% | - 6% | - 38% | - 43% | - 25% | - 37% | 1% | 13% | -22% | - 47% |
| Troll | 3 | - 86% | - 48% | - 74% | - 93% | - 89% | - 57% | - 63% | - 26% | -67% | 2/ |
| Sport | 3-5 | - 6% | 20% | - 9% | - 24% | 11% | - 27% | 36% | 56% | 7% | 2/ |
| South Troll/Sport | | | | | | | | | | | |
| Columbia Stocks | 3-4 | - 37% | - 51% | - 37% | - 37% | - 10% | - 38% | - 49% | - 13% | - 34% | 2/ |
| P.S. Stocks | 3-4 | - 52% | 3/ | 12% | 326% | 356% | 402% | 297% | 238% | 226% | 2/ |

1/Changes in fishery indices for nonceiling fisheries are found in Table 3-6.
2/PST target reductions not specified for fishery.
3/No stocks satisfied CTC inclusion criteria.

### 3.3.2 Southeast Alaska

The fishery index for the SEAK troll fishery had a decrease from a high of +13% in 1985 to a low of -33% in 1989. This was followed by an increase in 1990 and 1991 to -13%. In 1992, the index dropped to -31%. The 1985-1992 average is -13%, 9 percentage points above the 1985 target harvest rate of -22%. The recent 5 year average is -23%, 1 percentage point below the 1985 target level.

### 3.3.3 North/Central B.C.

Consistent with expectations, the NCBC fishery indices declined from 1985 through 1988, reaching a reduction of 39%. Since 1988, the harvest rates have increased. The 1992 reduction in harvest rate was 23%, compared to the 1985 target of 16%. Since implementation of the PST, harvest rates have been reduced by an average of 24% from the base period.

The reduction has been disproportionate between the NBC and CBC troll fisheries, with reductions in the CBC fishery ranging from 32% to 90%, and averaging 63% for 1985-1992. In contrast, harvest rates in the NBC troll fishery decreased by an average of 7% for 1985-1992.

### 3.3.4 West Coast Vancouver Island Troll

The fishery index for the WCVI troll fishery has been variable. The harvest rate reductions met the 1985 target of 24% in 1987, 1989, and 1991, but were less than half the target in 1985, 1986, 1988, and 1992. Since 1985, the harvest rate for the WCVI troll fishery has been reduced on average by 21%, compared to the 1985 target reduction of 24%.

### 3.3.5 Strait of Georgia

The 1985 target reduction of 47% for the GS sport and troll fishery has never been achieved. Since 1985, the reduction has averaged 22%, but the fishery index for 1992 showed an increase of 13%. The increase in 1992 resulted from increases in both the GS troll fishery and in the GS sport fishery. The estimated reduction in index for the troll fishery in 1992 was 26% versus a treaty period average reduction of 67%. Similarly, the GS sport index for 1992 showed an increase of 56% versus a treaty period average of an increase of 7%.

### 3.3.6 U.S. South Ocean Troll and Sport

The index for the U.S. South Ocean Troll and Sport fishery is presented separately for Columbia River and Puget Sound stocks since they 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 index for the Columbia River stocks indicates that harvest rates has been reduced by an average of 34% since 1985, and the index for 1992 remained 13% below the base period level. In contrast, the index for the Puget Sound stocks indicates that harvest rates on these stocks have increased. The average increase since the 1985 is estimated as 226%.

### 3.3.7 Comparison of Total Mortality and Reported Catch Indices

The fishery index was computed for reported catch and total mortality. The total mortality index includes the mortality of legal sized fish from CNR fisheries and from sublegals in the retention and CNR periods. Given a stable age structure, the reported catch index and the total mortality index should give similar results in the absence of major regulatory changes. Results from the comparison of the two indices are consistent with this expectation. In fisheries in which management actions have not increased incidental mortality, the indices based on the two methods are similar (Table 3-5).

The effect of CNR regulations and changes in size limits on total mortalities can be most easily seen by comparing the indices for reported catch and total mortality in the pretreaty and treaty time periods. For the pretreaty period, the average indices for reported catch and total mortality are equal within each of the ceiling fisheries. Conversely, the average indices for total mortality exceed the indices for reported catch during the treaty period. The difference between the indices reflects the extent to which management actions taken since 1984 have increased incidental mortality. The average difference in the treaty period ranges from 2 percentage points in the NCBC troll fishery to 11 percentage points in the SEAK troll fishery. In addition, the relationship between the reported catch and total mortality indices within a fishery may vary as management actions are initiated. For example, the indices were approximately equal for the GS sport and troll fishery until 1989. However, since the change in the minimum size limit for the GS sport fishery in 1989, and the reinitiation of CNR periods in the troll fishery in 1991, an increasing difference between the two indices has been apparent.

Table 3-5. Comparison of fishery indices based on reported catch and total mortality.

| Year | SEAK Troll Ages 3-5 | | NCBC Troll AGES 3-5 | | WCVI TROLL Ages 3-5 | | GS Sport/Troll Ages 3-5 | |
|---|---|---|---|---|---|---|---|---|
| | Reported | Total | Reported | Total | Reported | Total | Reported | Total |
| 1979 | 1.06 | 1.03 | 0.98 | 0.98 | 1.02 | 1.01 | 0.83 | 0.78 |
| 1980 | 1.00 | 0.97 | 1.09 | 1.10 | 1.00 | 1.00 | 1.08 | 1.09 |
| 1981 | 1.09 | 1.07 | 1.16 | 1.16 | 0.83 | 0.83 | 1.40 | 1.43 |
| 1982 | 0.89 | 0.95 | 0.77 | 0.77 | 1.11 | 1.12 | 0.77 | 0.78 |
| 1983 | 1.30 | 1.35 | 0.91 | 0.91 | 1.26 | 1.25 | 0.78 | 0.78 |
| 1984 | 0.94 | 1.01 | 1.03 | 1.01 | 1.50 | 1.49 | 1.16 | 1.18 |
| 1979-1984 Average | 1.05 | 1.06 | 0.99 | 0.99 | 1.12 | 1.12 | 1.00 | 1.01 |
| 1985 | 1.00 | 1.13 | 0.93 | 0.92 | 0.89 | 0.90 | 0.60 | 0.60 |
| 1986 | 0.91 | 0.96 | 0.81 | 0.81 | 0.95 | 0.94 | 0.90 | 0.94 |
| 1987 | 0.85 | 1.00 | 0.79 | 0.83 | 0.67 | 0.76 | 0.65 | 0.62 |
| 1988 | 0.73 | 0.77 | 0.58 | 0.61 | 0.86 | 0.95 | 0.63 | 0.57 |
| 1989 | 0.59 | 0.67 | 0.66 | 0.68 | 0.43 | 0.46 | 0.70 | 0.75 |
| 1990 | 0.77 | 0.84 | 0.68 | 0.71 | 0.76 | 0.82 | 0.63 | 0.63 |
| 1991 | 0.72 | 0.87 | 0.71 | 0.73 | 0.57 | 0.62 | 0.90 | 1.01 |
| 1992 | 0.51 | 0.69 | 0.74 | 0.77 | 0.86 | 0.90 | 0.92 | 1.13 |
| 1985-1992 Average | 0.76 | 0.87 | 0.74 | 0.76 | 0.75 | 0.79 | 0.74 | 0.78 |

## 3.4 NONCEILING FISHERY INDICES

Estimates of the nonceiling fishery index for U.S. fisheries and Canadian fisheries are presented in Table 3-6. For U.S. nonceiling fisheries, indices which are 1.0 or less indicate that exploitation rates have been reduced relative to the base period. All U.S. nonceiling fisheries are included in the index with the exception of terminal net and sport freshwater fisheries (see Section 3.2.1).

The nonceiling fishery index for depressed U.S. stocks harvested in U.S. fisheries was less than or equal to 1.0 with the exception of the North Puget Sound Summer/Fall stock group in 1990 and 1992 and the WACO stock group in 1990. The average value of the nonceiling fishery index was 1.0 for the North Puget Sound Summer/Fall stock group and 0.6 for the WACO stock group.

For the Canadian nonceiling fisheries, indices which 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 but it is not likely to effect indices for these stock groups. Mean values of the index for Canadian stocks were less than 0.75, although year-specific indices exceeded the target value in two of the 14 stock-year combinations when passthrough would apply.

Table 3-6. Nonceiling fishery indices for depressed natural stocks in US and Canadian fisheries (NA: tag recoveries were insufficient to compute the nonceiling fishery index).

| Exploitation Indicator Stock Group | Depressed Natural Stock | Nonceiling Fishery | Nonceiling Fishery Index | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | MEAN |
| Upper GS Summer/Fall | Upper GS | U.S. | NA | NA | NA [1/] | NA | NA [1/] | NA | NA | NA | NA |
| | | Canada | 0.8 | 0.5 | 0.7 [1/] | 0.3 | 1.0 [1/] | 0.4 | 0.3 | 0.2 | 0.5 |
| Lower GS Fall | Lower GS | U.S. | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | Canada | 0.6 | 0.8 | 0.5 | 0.2 | 0.6 | 0.7 | 0.4 | 0.3 | 0.5 |
| North PS Summer/Fall [5/] | Skagit [2/] Stillaguamish Snohomish | U.S. | [2,3/] | [2,3/] | 0.8 | 0.7 | 0.8 | 1.2 [2/] | 1.0 | 1.3 | 1.0 |
| | | Canada | [2,3/] | [2,3/] | NA | NA | NA | NA [2/] | NA | NA | NA |
| WACO [6/] | Grays Harbor Fall [4/] Columbia R Summer | U.S. | 0.3 | 0.4 | 0.7 [4/] | 0.9 [4/] | 0.7 [4/] | 1.1 [4/] | 0.5 | 0.3 [4/] | 0.6 |
| | | Canada | NA | NA | NA | NA | NA | NA | NA | NA | NA |

[1/]Escapement greater than goal in 1987 and 1989; passthrough provision not applicable.
[2/]Escapement greater than goal in 1985, 1986, and 1990; passthrough provision not applicable.
[3/]No CWT groups.
[4/]Escapement greater than goal in 1987-1990, 1992; passthrough provision not applicable.
[5/]Index does not include Area 8 net, Area 8A net, freshwater net, or freshwater sport.
[6/]Index does not include freshwater net or freshwater sport.

## 3.5 BROOD EXPLOITATION RATES

Brood year exploitation rates for the indicator stocks are presented in Table 3-7 (ocean exploitation) and Table 3-8 (total exploitation). The tables provide estimates of the average brood exploitation rates during the base period, brood exploitation rates for brood years 1982-1988, and the average brood exploitation rate for brood years 1982-1988 (the 1983 brood is excluded for Robertson Creek as very poor survival likely resulted in a biased estimate of incidental mortality). The average brood exploitation rate for the spring-type indicator stocks (Alaska and Willamette) is based on brood years 1981-1987 because these stocks are generally caught at ages 4 to 6. The base period is defined as the 1976-1979 brood years for fall stocks (for Quinsam the base period is 1976-1980 due to the presence of an extra age class) and 1975-1978 for spring or yearling type stocks. 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 24 indicator stocks are included in the tables, comparisons with the base period can be made for only 17 of the stocks due to a lack of base period information. Graphs of ocean exploitation rates on a brood year basis for each stock are presented in Appendix F.

The 1982-1988 average brood year ocean exploitation rates for total mortality have declined from base period levels for 15 of the 17 stocks for which base period information is available (Table 3-7). The median decline in total ocean exploitation rate for all 17 stocks was 9 percentage points. For stocks that show a decline in average exploitation rates, the median reduction was 11 percentage points. Reductions ranged from 2 to 21 percentage points. The average 1982-1988 brood year ocean exploitation rates increased from base period levels for the George Adams (5 percentage points) and White River Spring (5 percentage points) stocks.

Average ocean incidental fishing mortalities increased relative to base period levels for 12 of the indicator stocks with base period information. The Lower Georgia Strait stocks showed the largest increase in incidental mortalities. Both the Big Qualicum and Puntledge stock increased by 12 percentage points compared to the base period. Average incidental mortalities decreased for only one stock, the Spring Creek Tule stock, which showed an average 3 percentage point reduction.

The 1982-1988 average brood year total (ocean and terminal) exploitation rates for total mortality have declined for 11 of the 17 indicator stocks that have adequate data for comparison (Table 3-8). The median reduction for all stocks was 5 percentage points. For stocks with a reduction, the median decline was 10 percentage points, with reductions ranging from 2 to 22 percentage points. Average total exploitation rates increased for three indicator stocks compared to base period rates. The Columbia River Upriver Bright stock showed the largest increase (21 percentage points).

Average total incidental mortalities increased compared to the base period for 14 stocks and decreased for two stocks. The two stocks with decreased incidental mortalities showed a reduction of one percentage point each; one stock showed no change from the base period.

Table 3-7. Brood year ocean exploitation rates for the exploitation rate indicator stocks. Associated stock group is provided in parentheses. Incomplete brood years are designated by an asterisk. See text for definition of brood years in the base period for individual stocks. The 1982-1988 average for Robertson Creek does not include the 1983 brood. The recent year average for Alaska and Willamette Spring stocks includes brood years 1981 to 1987.

| Stock | Base Period | Brood Year 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Avg 82-88 | Change from Base Percentage Points | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alaska Spring (SEAK Spring) | | | | | | | | | | | |
| Reported Catch | 40% | 34% | 29% | 27% | 24% | 43% | 25%* | NA | 29% | -11 | -27% |
| Incidental Mortalities | 12% | 20% | 17% | 21% | 18% | 21% | 33%* | NA | 20% | 8 | 67% |
| Total Mortalities | 52% | 54% | 46% | 48% | 42% | 64% | 58%* | NA | 50% | -3 | -5% |
| Robertson Creek (WCVI Fall) | | | | | | | | | | | |
| Reported Catch | 51% | 43% | 26% | 35% | 39% | 43% | 43% | 42%* | 41% | -10 | -20% |
| Incidental Mortalities | 13% | 32% | 58% | 11% | 10% | 13% | 18% | 22%* | 18% | 4 | 34% |
| Total Mortalities | 64% | 75% | 84% | 46% | 49% | 56% | 60% | 64%* | 58% | -6 | -9% |
| Quinsam (Upper GS Summer/Fall) | | | | | | | | | | | |
| Reported Catch | 61% | 44% | 39% | 34% | 33% | 37% | 41%* | NA | 38% | -23 | -38% |
| Incidental Mortalities | 11% | 13% | 30% | 22% | 22% | 23% | 27%* | NA | 23% | 12 | 107% |
| Total Mortalities | 72% | 58% | 69% | 56% | 54% | 60% | 67%* | NA | 61% | -12 | -16% |
| Big Qualicum (Lower GS Fall) | | | | | | | | | | | |
| Reported Catch | 65% | 53% | 59% | 41% | 46% | 44% | 40% | 45%* | 47% | -18 | -28% |
| Incidental Mortalities | 8% | 14% | 15% | 22% | 17% | 21% | 31% | 25%* | 21% | 12 | 146% |
| Total Mortalities | 73% | 67% | 74% | 63% | 63% | 64% | 70% | 70%* | 67% | -6 | -8% |
| Puntledge (Lower GS Fall) | | | | | | | | | | | |
| Reported Catch | 70% | 56% | 60% | 42% | 74% | 39% | 15% | 43%* | 47% | -23 | -33% |
| Incidental Mortalities | 7% | 13% | 16% | 20% | 14% | 17% | 24% | 24%* | 18% | 12 | 176% |
| Total Mortalities | 76% | 70% | 76% | 62% | 87% | 55% | 40% | 67%* | 65% | -11 | -15% |
| So. Puget Sound Fall Yearling | | | | | | | | | | | |
| Reported Catch | 72% | NA | NA | NA | NA | 50% | 52% | 49%* | 50% | -21 | -30% |
| Incidental Mortalities | 12% | NA | NA | NA | NA | 13% | 12% | 12%* | 13% | 1 | 5% |
| Total Mortalities | 84% | NA | NA | NA | NA | 63% | 65% | 62%* | 63% | -21 | -25% |
| Squaxin Pens Fall Yearling | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | NA | 50% | 48% | 52%* | 50% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | NA | 12% | 16% | 14%* | 14% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | NA | 62% | 64% | 66%* | 64% | NA | NA |
| Samish Fall Fingerling (North PS Summer/Fall) | | | | | | | | | | | |
| Reported Catch | 52% | NA | NA | NA | 37% | 42% | 45% | 51%* | 44% | -9 | -17% |
| Incidental Mortalities | 6% | NA | NA | NA | 8% | 12% | 11% | 15%* | 12% | 6 | 109% |
| Total Mortalities | 58% | NA | NA | NA | 46% | 54% | 56% | 66%* | 55% | -3 | -5% |
| George Adams Fall Fingerling | | | | | | | | | | | |
| Reported Catch | 48% | NA | NA | NA | 43% | 53% | 47% | 53%* | 49% | 1 | 1% |
| Incidental Mortalities | 8% | NA | NA | NA | 10% | 12% | 13% | 17%* | 13% | 5 | 57% |
| Total Mortalities | 57% | NA | NA | NA | 52% | 65% | 59% | 70%* | 62% | 5 | 9% |
| So. Puget Sound Fall Fingerling (South PS Summer/Fall) | | | | | | | | | | | |
| Reported Catch | 59% | 51% | 40% | 47% | 33% | 42% | 43% | 44%* | 43% | -16 | -27% |
| Incidental Mortalities | 8% | 11% | 10% | 14% | 10% | 11% | 12% | 13%* | 12% | 4 | 50% |
| Total Mortalities | 67% | 62% | 50% | 61% | 43% | 53% | 56% | 57%* | 55% | -12 | -18% |
| Skagit Spring Yearling (North PS Spring) | | | | | | | | | | | |
| Reported Catch | NA | 68% | 58% | 39% | 38% | 46% | 43% | NA | 49% | NA | NA |
| Incidental Mortalities | NA | 10% | 10% | 11% | 6% | 10% | 13% | NA | 10% | NA | NA |
| Total Mortalities | NA | 78% | 67% | 50% | 44% | 56% | 56% | NA | 59% | NA | NA |
| Nooksack Spring Yearling (North PS Spring) | | | | | | | | | | | |
| Reported Catch | NA | 69% | NA | 47% | NA | 34% | 36% | 44%* | 46% | NA | NA |
| Incidental Mortalities | NA | 8% | NA | 9% | NA | 7% | 14% | 14%* | 10% | NA | NA |
| Total Mortalities | NA | 76% | NA | 55% | NA | 41% | 49% | 58%* | 56% | NA | NA |

Table 3-7 continued

| Stock | Base Period | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Change from Base Avg 82-88 | Percentage Points | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hoko Fall Fingerling | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | 47% | 47% | 32%* | NA | 42% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | 11% | 13% | 13%* | NA | 12% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | 58% | 60% | 45%* | NA | 54% | NA | NA |
| White River Spring Yearling | | | | | | | | | | | |
| Reported Catch | 44% | 46% | 54% | 48% | 45% | 43% | 35% | 39%* | 44% | 0 | 0% |
| Incidental Mortalities | 6% | 10% | 9% | 14% | 11% | 12% | 13% | 12%* | 12% | 5 | 89% |
| Total Mortalities | 51% | 55% | 64% | 62% | 56% | 55% | 48% | 51%* | 56% | 5 | 11% |
| Cowlitz Fall Tule (CR Tule) | | | | | | | | | | | |
| Reported Catch | 53% | 39% | 32% | 31% | 36% | 30% | 27% | 36%* | 33% | -20 | -38% |
| Incidental Mortalities | 9% | 6% | 5% | 9% | 12% | 13% | 12% | 11%* | 10% | 0 | 4% |
| Total Mortalities | 63% | 46% | 37% | 40% | 48% | 43% | 39% | 48%* | 43% | -20 | -32% |
| Spring Creek Tule (CR Tule) | | | | | | | | | | | |
| Reported Catch | 54% | 31% | 26% | 37% | 45% | 36% | 38% | 32%* | 35% | -19 | -35% |
| Incidental Mortalities | 12% | 11% | 10% | 9% | 8% | 10% | 11% | 9%* | 10% | -3 | -21% |
| Total Mortalities | 66% | 42% | 36% | 46% | 53% | 45% | 49% | 41%* | 45% | -21 | -32% |
| Stayton Pond Tule (CR Tule) | | | | | | | | | | | |
| Reported Catch | 62% | 51% | 52% | 43% | 43% | 43% | 41% | 34%* | 44% | -18 | -29% |
| Incidental Mortalities | 14% | 13% | 11% | 16% | 23% | 16% | 10% | 8%* | 14% | 0 | 2% |
| Total Mortalities | 75% | 64% | 63% | 59% | 66% | 59% | 52% | 42%* | 58% | -18 | -23% |
| Sooes Fall Fingerling (WACO) | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | 39% | 25% | 35%* | NA | 33% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | 10% | 9% | 12%* | NA | 10% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | 49% | 34% | 47%* | NA | 43% | NA | NA |
| Columbia River Upriver Bright (WACO) | | | | | | | | | | | |
| Reported Catch | 34% | 28% | 33% | 28% | 22% | 26% | 17% | 25%* | 26% | -8 | -23% |
| Incidental Mortalities | 8% | 7% | 8% | 11% | 16% | 16% | 15% | 12%* | 12% | 5 | 60% |
| Total Mortalities | 41% | 36% | 42% | 39% | 38% | 41% | 32% | 38%* | 38% | -3 | -8% |
| Lyons Ferry (WACO) | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | 29% | 29% | 37% | 12% | 12%* | 24% | NA | NA |
| Incidental Mortalities | NA | NA | NA | 8% | 7% | 9% | 13% | 10%* | 9% | NA | NA |
| Total Mortalities | NA | NA | NA | 38% | 37% | 46% | 25% | 22%* | 33% | NA | NA |
| Hanford Wild Brights (WACO) | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | NA | 27% | 32% | 12%* | 24% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | NA | 7% | 13% | 10%* | 10% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | NA | 33% | 45% | 22%* | 33% | NA | NA |
| Lewis River Wild (WACO) | | | | | | | | | | | |
| Reported Catch | 29% | 22% | 27% | 19% | 21% | 20% | 19% | 19%* | 21% | -8 | -28% |
| Incidental Mortalities | 6% | 4% | 5% | 4% | 5% | 5% | 6% | 9%* | 6% | 0 | -1% |
| Total Mortalities | 35% | 26% | 33% | 23% | 26% | 25% | 25% | 28%* | 26% | -8 | -24% |
| Salmon River (WACO) | | | | | | | | | | | |
| Reported Catch | 36% | 36% | 21% | 30% | 32% | 39% | 27% | 26%* | 30% | -5 | -15% |
| Incidental Mortalities | 7% | 12% | 6% | 10% | 11% | 11% | 9% | 16%* | 11% | 3 | 48% |
| Total Mortalities | 43% | 48% | 27% | 40% | 44% | 50% | 36% | 42%* | 41% | -2 | -5% |
| Willamette Spring | | | | | | | | | | | |
| Reported Catch | 28% | 14% | 27% | 16% | 10% | 15% | 12%* | NA | 17% | -12 | -41% |
| Incidental Mortalities | 8% | 10% | 10% | 9% | 6% | 7% | 7%* | NA | 9% | 0 | 4% |
| Total Mortalities | 36% | 24% | 37% | 25% | 16% | 22% | 19%* | NA | 25% | -11 | -31% |

Table 3-8. Brood year <u>total</u> exploitation rates for the exploitation rate indicator stocks. Associated stock group is provided in parentheses. Incomplete brood years are designated by an asterisk. See text for definition of brood years in the base period for individual stocks. The 1982-1988 average for Robertson Creek does not include the 1983 brood. The recent year average for Alaska and Willamette Spring stocks includes brood years 1981 to 1987.

| Stock | Base Period | Brood Year 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Avg 82-88 | Change from Base Percentage Points | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Alaska Spring (SEAK Spring)** | | | | | | | | | | | |
| Reported Catch | 41% | 38% | 35% | 38% | 33% | 53% | 34%* | NA | 37% | -4 | -10% |
| Incidental Mortalities | 12% | 20% | 18% | 22% | 19% | 22% | 34%* | NA | 21% | 9 | 74% |
| Total Mortalities | 53% | 58% | 52% | 60% | 52% | 75% | 68%* | NA | 58% | 5 | 9% |
| **Robertson Creek (WCVI Fall)** | | | | | | | | | | | |
| Reported Catch | 73% | 53% | 31% | 61% | 76% | 76% | 66% | 61%* | 65% | -7 | -10% |
| Incidental Mortalities | 14% | 33% | 58% | 12% | 11% | 13% | 19% | 23%* | 19% | 5 | 36% |
| Total Mortalities | 87% | 87% | 89% | 73% | 87% | 89% | 85% | 84%* | 84% | -2 | -3% |
| **Quinsam (Upper GS Summer/Fall)** | | | | | | | | | | | |
| Reported Catch | 75% | 60% | 45% | 45% | 44% | 47% | 49%* | NA | 48% | -26 | -35% |
| Incidental Mortalities | 11% | 16% | 30% | 23% | 24% | 25% | 28%* | NA | 24% | 13 | 122% |
| Total Mortalities | 86% | 75% | 76% | 68% | 68% | 72% | 77%* | NA | 73% | -13 | -15% |
| **Big Qualicum (Lower GS Fall)** | | | | | | | | | | | |
| Reported Catch | 71% | 59% | 65% | 47% | 54% | 51% | 44% | 51%* | 53% | -18 | -25% |
| Incidental Mortalities | 9% | 15% | 15% | 23% | 18% | 22% | 31% | 26%* | 21% | 13 | 150% |
| Total Mortalities | 80% | 74% | 81% | 70% | 72% | 73% | 75% | 76%* | 74% | -5 | -6% |
| **Puntledge (Lower GS Fall)** | | | | | | | | | | | |
| Reported Catch | 70% | 56% | 63% | 43% | 74% | 43% | 24% | 43%* | 49% | -21 | -30% |
| Incidental Mortalities | 7% | 13% | 17% | 20% | 14% | 18% | 28% | 24%* | 19% | 13 | 189% |
| Total Mortalities | 77% | 70% | 81% | 63% | 87% | 61% | 52% | 67%* | 69% | -8 | -11% |
| **So. Puget Sound Fall Yearling** | | | | | | | | | | | |
| Reported Catch | 80% | NA | NA | NA | NA | 76% | 74% | 83%* | 77% | -3 | -4% |
| Incidental Mortalities | 13% | NA | NA | NA | NA | 17% | 14% | 15%* | 15% | 2 | 18% |
| Total Mortalities | 93% | NA | NA | NA | NA | 92% | 87% | 98%* | 93% | 0 | 0% |
| **Squaxin Pens Fall Yearling** | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | NA | 79% | 74% | 80%* | 78% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | NA | 17% | 23% | 18%* | 19% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | NA | 97% | 97% | 98%* | 97% | NA | NA |
| **Samish Fall Fingerling (North PS Summer/Fall)** | | | | | | | | | | | |
| Reported Catch | 81% | NA | NA | NA | 80% | 70% | 66% | 66%* | 70% | -11 | -13% |
| Incidental Mortalities | 7% | NA | NA | NA | 10% | 14% | 12% | 17%* | 13% | 6 | 82% |
| Total Mortalities | 89% | NA | NA | NA | 90% | 84% | 78% | 83%* | 84% | -5 | -6% |
| **George Adams Fall Fingerling** | | | | | | | | | | | |
| Reported Catch | 77% | NA | NA | NA | 79% | 80% | 71% | 74%* | 76% | -1 | -2% |
| Incidental Mortalities | 12% | NA | NA | NA | 12% | 14% | 16% | 20%* | 15% | 4 | 32% |
| Total Mortalities | 89% | NA | NA | NA | 91% | 93% | 87% | 93%* | 91% | 2 | 3% |
| **So. Puget Sound Fall Fingerling (South PS Summer/Fall)** | | | | | | | | | | | |
| Reported Catch | 80% | 59% | 53% | 59% | 50% | 66% | 63% | 64%* | 59% | -21 | -27% |
| Incidental Mortalities | 9% | 12% | 12% | 14% | 11% | 12% | 14% | 15%* | 13% | 4 | 46% |
| Total Mortalities | 89% | 71% | 65% | 73% | 62% | 78% | 76% | 79%* | 72% | -17 | -19% |
| **Skagit Spring Yearling (North PS Spring)** | | | | | | | | | | | |
| Reported Catch | NA | 74% | 82% | 66% | 63% | 63% | 57% | NA | 68% | NA | NA |
| Incidental Mortalities | NA | 10% | 10% | 12% | 7% | 10% | 14% | NA | 11% | NA | NA |
| Total Mortalities | NA | 84% | 92% | 78% | 70% | 74% | 71% | NA | 78% | NA | NA |
| **Nooksack Spring Yearling (North PS Spring)** | | | | | | | | | | | |
| Reported Catch | NA | 69% | NA | 57% | NA | 81% | 42% | 47%* | 59% | NA | NA |
| Incidental Mortalities | NA | 8% | NA | 10% | NA | 8% | 15% | 14%* | 11% | NA | NA |
| Total Mortalities | NA | 76% | NA | 67% | NA | 89% | 57% | 61%* | 70% | NA | NA |

Table 3-8 continued

| Stock | Base Period | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Avg 82-88 | Change from Base Percentage Points | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hoko Fall Fingerling** | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | 52% | 51% | 34%* | NA | 46% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | 11% | 13% | 13%* | NA | 12% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | 63% | 63% | 47%* | NA | 58% | NA | NA |
| **White River Spring Yearling** | | | | | | | | | | | |
| Reported Catch | 83% | 64% | 68% | 55% | 55% | 60% | 46% | 47%* | 56% | -26 | -32% |
| Incidental Mortalities | 8% | 11% | 11% | 15% | 12% | 14% | 13% | 14%* | 13% | 4 | 53% |
| Total Mortalities | 91% | 75% | 78% | 70% | 67% | 74% | 59% | 62%* | 69% | -22 | -24% |
| **Cowlitz Fall Tule (CR Tule)** | | | | | | | | | | | |
| Reported Catch | 64% | 64% | 67% | 61% | 62% | 38% | 35% | 40%* | 52% | -12 | -18% |
| Incidental Mortalities | 10% | 8% | 8% | 11% | 14% | 14% | 13% | 12%* | 11% | 1 | 15% |
| Total Mortalities | 74% | 71% | 75% | 71% | 76% | 52% | 48% | 51%* | 64% | -10 | -14% |
| **Spring Creek Tule (CR Tule)** | | | | | | | | | | | |
| Reported Catch | 74% | 54% | 68% | 65% | 79% | 66% | 60% | 58%* | 64% | -9 | -13% |
| Incidental Mortalities | 14% | 13% | 12% | 12% | 11% | 13% | 13% | 11%* | 12% | -1 | -10% |
| Total Mortalities | 87% | 67% | 80% | 77% | 90% | 79% | 73% | 70%* | 76% | -11 | -12% |
| **Stayton Pond Tule (CR Tule)** | | | | | | | | | | | |
| Reported Catch | 69% | 54% | 62% | 62% | 51% | 46% | 42% | 43%* | 51% | -18 | -26% |
| Incidental Mortalities | 14% | 14% | 12% | 19% | 24% | 17% | 11% | 11%* | 15% | 1 | 7% |
| Total Mortalities | 83% | 68% | 74% | 80% | 75% | 62% | 53% | 54%* | 66% | -17 | -20% |
| **Sooes Fall Fingerling (WACO)** | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | 43% | 30% | 38%* | NA | 37% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | 10% | 9% | 12%* | NA | 10% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | 53% | 38% | 50%* | NA | 47% | NA | NA |
| **Columbia River Upriver Bright (WACO)** | | | | | | | | | | | |
| Reported Catch | 41% | 63% | 63% | 69% | 61% | 54% | 36% | 43%* | 55% | 15 | 36% |
| Incidental Mortalities | 8% | 9% | 10% | 13% | 17% | 17% | 16% | 14%* | 14% | 6 | 75% |
| Total Mortalities | 48% | 71% | 73% | 82% | 78% | 71% | 52% | 56%* | 69% | 21 | 43% |
| **Lyons Ferry (WACO)** | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | 52% | 55% | 57% | 35% | 12%* | 42% | NA | NA |
| Incidental Mortalities | NA | NA | NA | 10% | 9% | 10% | 15% | 11%* | 11% | NA | NA |
| Total Mortalities | NA | NA | NA | 62% | 63% | 66% | 50% | 23%* | 53% | NA | NA |
| **Hanford Wild Brights (WACO)** | | | | | | | | | | | |
| Reported Catch | NA | NA | NA | NA | NA | 58% | 51% | 33%* | 47% | NA | NA |
| Incidental Mortalities | NA | NA | NA | NA | NA | 8% | 14% | 11%* | 11% | NA | NA |
| Total Mortalities | NA | NA | NA | NA | NA | 65% | 65% | 44%* | 58% | NA | NA |
| **Lewis River Wild (WACO)** | | | | | | | | | | | |
| Reported Catch | 45% | 53% | 61% | 41% | 41% | 36% | 33% | 41%* | 44% | -2 | -4% |
| Incidental Mortalities | 7% | 5% | 7% | 5% | 7% | 7% | 7% | 11%* | 7% | 0 | 2% |
| Total Mortalities | 52% | 58% | 68% | 46% | 47% | 42% | 40% | 52%* | 51% | -2 | -3% |
| **Salmon River (WACO)** | | | | | | | | | | | |
| Reported Catch | 52% | 51% | 41% | 50% | 50% | 59% | 47% | 44%* | 49% | -3 | -6% |
| Incidental Mortalities | 10% | 13% | 9% | 12% | 12% | 12% | 11% | 19%* | 13% | 3 | 29% |
| Total Mortalities | 62% | 65% | 51% | 62% | 62% | 71% | 57% | 63%* | 62% | 0 | 0% |
| **Willamette Spring** | | | | | | | | | | | |
| Reported Catch | 58% | 57% | 70% | 56% | 56% | 59% | 62%* | NA | 59% | 1 | 2% |
| Incidental Mortalities | 15% | 13% | 18% | 16% | 10% | 11% | 14%* | NA | 14% | -1 | -6% |
| Total Mortalities | 73% | 70% | 88% | 72% | 66% | 70% | 76%* | NA | 74% | 0 | 0% |

## 3.6 SURVIVAL RATE INDICES

Projected survival indices of major stock groups are provided in Table 3-9 (survival indices for individual stocks are graphed in Appendix G). The estimates for the "1991 analysis" differ from those previously published in the 1991 annual report (CTC 1992) since 1) the indices are now reported relative to the 1979 to 1982 base period and 2) stocks without escapement estimates have been deleted from the analysis.

Fisheries with PSC ceilings which account for at least 10% of a stock group's total fishing mortality are also noted. All stock groups with available data are projected to have survivals below the base period average, with the exception of SEAK Spring. The largest reductions are for Lower GS Falls (-95%), North PS Summer/Falls (-94%), and Upper GS Summer/Falls (-90%). Two of these stock groups contribute to GS fisheries.

Since these projections are for survival indices of major hatchery 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 natural stocks would be expected to increase in the short term.

Table 3-9. Short-term survival index projections of stock groups to fisheries operating under PSC ceilings.

| Stock Group | Acronym | 1991 Analysis | 1992 Analysis | Fisheries | | | |
|---|---|---|---|---|---|---|---|
| | | | | SEAK | NCBC | WCVI | GS |
| Southeast Alaska/Transboundary Rivers-Inside | SEAK/TBR-I | 143% | 29% | X | | | |
| Southeast Alaska/Transboundary Rivers-Outside | SEAK/TBR-O | NA | NA | X | | | |
| North/Central B.C. Spring/Summer | NCBC | NA | NA | X | X | | |
| West Coast Vancouver Island Fall | WCVI | -37% | -78% | X | X | | |
| Upper Strait of Georgia Summer/Fall | UGS | -86% | -90% | X | X | | |
| Lower Strait of Georgia Fall | LGS | -91% | -94% | X | X | | X |
| Upper Fraser Spring/Summer | UFR | NA | NA | X | X | | |
| Lower Fraser (Harrison) Fall | LFR | NA | NA | | | X | X |
| North Puget Sound Spring | NPS-Sp | NA | NA | | | | X |
| North Puget Sound Summer/Fall | NPS-S/F | -98% | -94% | | | X | X |
| South Puget Sound Summer/Fall | SPS | -84% | -77% | | | X | X |
| Columbia River Upriver Spring | CUS | NA | NA | | | | |
| Washington Coastal Spring/Summer/Fall, Columbia River Summer/Fall, Oregon Coastal Fall North Migrating | WACO | -58% | -42% | X | X | X | |
| Columbia R Hatchery Tule Fall (not a stock group) | | -58% | -61% | | | X | |

## 3.7 STOCK CATCH DISTRIBUTION

The annual distribution of reported catch and total fishing mortality for the exploitation rate indicator stocks may be found in Appendix H. The distribution of total mortality by stock may differ between Appendix H and Appendix K (Chinook Model Estimates of Stock Composition of Total Fishing Mortality in Ceiling Fisheries and Percent of Total Stock Mortality Occurring in Fishery, and Status of Associated Escapement Indicator Stock). Appendix K presents results from the model while Appendix H presents results from the exploitation rate analysis. Estimates of the stock 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 analysis uses annual coded wire tag (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 DISCUSSION AND SUMMARY

### 3.8.1 Fishery Indices

A basic premise of the chinook rebuilding program is that fixed ceilings would act in concert with increases in abundance to progressively reduce harvest rates. 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., 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 effort or bag limits to control harvest rates.

For all ceiling fisheries, the initial objective was to achieve the 1985 target reduction in harvest rates. Further reductions in harvest rates were expected to occur in subsequent years as abundance increased. The fishery indices indicate that only the NCBC fishery has consistently achieved these objectives.

The WCVI troll has shown mixed results with respect to fishery index changes. Since 1985, there have been 4 years with fishery index changes greater than or equal to the 1985 target reduction, 1 year near the target, and 3 years less or much less than the 1985 target reduction. Since 1990, catch in the WCVI troll fishery has been controlled primarily through restrictions in fishing areas and by limiting the 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. In that year, 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 ranged from 3.7 for age 3 fish to 8.0 for age 5 fish while indices for most other stocks were less than 1.0. If the WCVI wild stock has a similar temporal and geographic distribution as Robertson Creek, the rate of rebuilding will be further retarded if this fishing pattern persists.

For the SEAK troll fishery, the 1985 target harvest rate reduction has been achieved on average since 1985 for reported catch but not for total mortality. This is due to the high chinook availability and/or abundance and the management regime for 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 fishery index was lowest during 1988 and 1989 due to an increased abundance of fish coupled with low encounter rates during the CNR fishery. The index increased in 1990 and 1991, likely due to reductions in the abundance of fish and ceiling adjustments of +39,000 and +10,000 fish, respectively. In 1992, the length of the general summer troll season was the shortest (4.5 days) since the inception of the PST while the CNR period was the longest (67.5 days versus an average of 54.5 since 1985). The short duration of the summer chinook fishery resulted from a reduction of the number of fish available for harvest due to: 1) a large catch during the winter troll fishery (71,800); 2) the need to bring the cumulative deviation for the SEAK fisheries back within the 7.5% management range; and 3) a domestic reallocation of a portion of the chinook catch to the sport fishery.

Harvest rates in the combined GS sport and troll fishery were greater than the base period average in both 1991 and 1992. Management actions which have been taken in the sport fishery are summarized in Chapter 1. Despite these actions, the harvest rate in the sport fishery was estimated to be an average of 47% greater than the base period in 1991 and 1992. Harvest rate indices for the GS troll fishery increased in 1991 and 1992 relative to previous years as well. This is likely in response to both increases in reported catch (37,000 in 1992 versus 20,000 in 1988) and nonretention mortality. No nonretention fisheries were conducted from 1987 to 1990; however, in 1991, 29% of the total gear days occurred during nonretention periods and in 1992 the nonretention period accounted for 39% of the gear days.

### 3.8.2 Nonceiling Fishery Indices

The passthrough provision of the Chinook Annex of the PST requires that nonceiling fisheries in Alaska, British Columbia, Washington, Oregon, and Idaho be managed "so that the bulk of depressed stocks preserved by the conservation program set out herein principally accrue to the spawning escapement."

The nonceiling fishery indices included in this chapter were computed using methods suggested by the CTC in 1991. Although these methods are consistent with assumptions used by the CTC in previous analyses of fishery management regimes, we emphasize that the PSC has not provided the CTC with a definition of passthrough which can be used to analytically assess if the passthrough provision of the PST has been satisfied. In addition, the indices reported in this chapter do not include the WCVI sport fishery and some terminal sport and net fisheries. These fisheries were excluded in instances in which the exploitation rate indicator stock was of hatchery origin and subject to terminal fisheries designed to harvest surplus hatchery production. Additional information on harvest rates in terminal fisheries may be found in Chapter 5.

The analysis indicates that exploitation rates in nonceiling fisheries harvesting depressed natural stocks in the WACO stock group have generally been reduced. However, from 1990 to 1992, the U.S nonceiling fishery index for the North Puget Sound Summer/Fall stock group increased by 17% from the base period. Target reductions in Canadian nonceiling fisheries have generally been exceeded and, on average, are twice the target value.

### 3.8.3 Brood Exploitation Rates

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 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.

Initial analyses of the ad hoc CTC 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, the reductions necessary in 1984 to rebuild by 1998 were more substantial. For example, brood exploitation rates for the LGS stock exceeded the MSY ER by 16 percentage points, but a 26 percentage point reduction was required for the LGS stock to rebuild by 1998. Similarly, ocean brood exploitation rates were expected to be reduced by 1998 by 31 for a stock represented by Robertson Creek Hatchery and by 19 percentage points for the Columbia Upriver Bright stock.

The 1992 analysis indicates that brood exploitation rates have declined, but not to the extent expected in 1984. This is particularly true for rates associated with total mortality. For example, the average Big Qualicum and Puntledge (exploitation indicator stocks for Lower GS) brood exploitation rate for reported catch in all fisheries has declined by 21 percentage points, but the brood exploitation rate for total mortality in all fisheries has declined by only 7 percentage points. Similarly, ocean exploitation rates for reported catch for the Robertson Creek and Columbia Upriver Bright stock have declined by 8 to 10 percentage points, but brood exploitation rates for total mortality have declined by only 3 to 6 percentage points.

The technical analyses upon which the current ceiling levels are based assumed that exploitation rates associated with incidental fishing mortality would decline at the same rate as for reported catch. It is apparent that this assumption was not justified given subsequent management regimes. Compared to the base period, 1982-1988 average ocean incidental mortality increased for 15 stocks and decreased for 2 stocks. The median increase in incidental mortality for all stocks was 4 percentage points (range -3 to +14 points). Incidental mortality on SEAK and Canadian stocks increased an average of 10 percentage points over the base period.

### 3.8.4 Survival Indicies

The Committee emphasizes that to maintain reductions or further reduce brood year exploitation rates under a fixed catch ceiling policy, the abundance of chinook in the fishing areas must equal or exceed recent abundances. Future abundances will be determined by the escapement of natural stocks, hatchery production, and survival rates. The Exploitation Rate Assessment provides survival indices for indicator stocks and broods which will contribute to fisheries in 1993 and 1994. With the exception of SEAK/TBR-I, all stocks groups are projected to have significant reductions in survival rates, ranging from -42% for the WACO group to -98% for the NPS S/F group. Although most of the indicator stocks are of hatchery origin, natural 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.

# CHAPTER 4. CHINOOK MODEL ASSESSMENT

## 4.1 INTRODUCTION

The PSC Chinook Model is the primary tool employed by the Chinook Technical Committee (CTC) to evaluate impacts of proposed fishery regimes and enhancement upon 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 29 stocks and 25 fisheries and is capable of assessing the 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, nonretention periods). 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 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

### 4.2.1 Model Calibration and Prediction

All model assessments presented in this report rely upon the October calibration (93AC) of the chinook model. Data used were similar to the data used for the previous March 1993 calibration, including estimates of fishery harvest rates through 1991, estimates of terminal runs or escapement through 1992, and predictions of terminal runs for 1993. In general, future brood survival rates (1991 through 1996 for most stocks) were set equal to the long-term average for each stock.

One difference from model analyses conducted in the winter of 1992 and spring of 1993 was that some future brood year survivals were adjusted based upon the professional judgement of local managers. In these instances, short-term projected brood year survivals were based on the last estimated brood year survival rate. The following changes from long-term averages were employed for future projections:

1) Upper Georgia Strait. The projected survival for the 1990 brood year was set equal to the 1989 brood year's estimated survival, based upon results of the exploitation rate assessment.

2) WCVI Hatchery and WCVI Natural. The projected survivals for the 1991 and 1992 broods were set equal to the estimated survival for the 1990 brood year due to impacts of mackerel predation.

3) Columbia River Upriver Bright, Spring Creek Tule, Bonneville Tule, Cowlitz Tule, and Lewis River Wild. Projected survivals for the 1991 brood year were set equal to estimated survivals for the 1990 brood year in response to observed low numbers of jack returns to the Columbia River in 1993.

Model projections assumed no changes in 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) A 10% reduction in 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).

#### 4.2.2 Abundance Estimates

Fishery abundance was estimated using the methods described in "Notes on Index Development", provided by the AWG to the Chinook Work Group in November, 1989, with the exception that all indices were reported relative to the size limit in effect in the fishery in 1993. The model abundance estimates 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. 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, and abundance projections. Through the calibration process, the model estimates brood year survivals for each stock represented in the model. Survivals are then combined with base period stock-fishery exploitation rates, production estimates for wild and hatchery stocks, and regulatory measures (e.g., size limits) to estimate the total abundance of all stocks available to a fishery. An index of abundance was computed by dividing the abundance in any year by the average abundance during the base period (1979-1982).

More specifically, the abundance ($K_f$) during the base period (1979-1982) was first computed as

$$K_f = \frac{\sum_{y=1979}^{1982} \sum_{s=1}^{S} \sum_{a=2}^{A} v_{saf} \, (1-PNV_{af}) \, N_{say}}{4}$$

where:

- $s$ : stock (1...,S)
- $f$ : fishery (1...,F)
- $a$ : age (1...,A)
- $y$ : year (1...,Y)
- $v_{saf}$ : base period exploitation rate on the vulnerable cohort;
- $N_{say}$ : cohort size after natural mortality
- $PNV_{af}$ : proportion nonvulnerable, i.e., the proportion of the cohort recruited to the fishery but less than the size limit currently in effect.

A fishery abundance index was then computed by dividing the fishery abundance in any year by the base period average abundance:

$$(Abundance\ Index)_{fy} = \frac{\sum_{s=1}^{S} \sum_{a=2}^{A} v_{saf} \, (1-PNV_{af}) \, N_{say}}{K_f}$$

Abundance indices are provided for the SEAK troll, NCBC troll, WCVI troll, and the combined GS sport and troll fisheries.

### 4.2.3 Fishery Indices

Because the model is deterministic and does not simulate any measurement error for any variables or parameters, all model stocks and ages can be employed to estimate a model equivalent of the Fishery Index presented in Chapter 3. The stock exploitation rate (*u*) is defined as follows:

$$u_{safy} = \frac{(C_{safy}+I_{safy})AEQ_{say}}{N_{say}}$$

where:

- $s$ : stock (1...,S)
- $f$ : fishery (1...,F)
- $a$ : age (3...,5)
- $y$ : year (1...,Y)
- $u_{safy}$ : adult equivalent exploitation rate
- $AEQ_{say}$ : adult equivalent factor
- $C_{safy}$ : catch

$I_{safy}$ : incidental mortality loss (shakers and CNR)
$N_{say}$ : cohort size after natural mortality

The base period average exploitation rate (*B*) is defined as:

$$B_{saf} = \frac{\sum_{y=1979}^{1982} u_{safy}}{4}$$

The model fishery index is defined as:

$$(Model\ Fishery\ Index)_{fy} = \frac{\sum_{s=1}^{S}\sum_{a=3}^{5} u_{safy}}{\sum_{s=1}^{S}\sum_{a=3}^{5} B_{saf}}$$

### 4.2.4 Incidental Mortality Estimates

Sources of incidental mortality included in the model are:

1) Shaker mortality in sport and troll fisheries associated with the release of fish smaller than the minimum size limit;

2) CNR mortality in troll and net fisheries;

3) Drop-out and squisher mortality in net fisheries.

The total incidental mortality loss associated with a given fishery in a given year was estimated by adding these sources of incidental mortality for each stock included in the model. The estimate of incidental mortality will be biased low for fisheries harvesting stocks which are not represented in the model. An index was created by dividing the incidental mortality in any given year by the average incidental mortality during the period 1979-1982.

Parameters used to estimate encounters during CNR periods are provided in Appendix C. Mortality rates applied to fish encountered and subsequently released are as follows:

Troll = 30%
Sport = 30%
Net = 90%

The CTC analyses and justifications for these rates were previously reported (CTC 1987b).

### 4.2.5 Stock Distribution and Stock Composition

Model estimates of the stock composition and distribution of AEQ total mortality were computed based upon model estimates of stock mortality. A discussion of why model estimates of the distribution of mortality may differ from CWT estimates is presented in Chapter 3, Section 3.7. Note that estimates of stock composition are only for the stocks included in the model.

### 4.2.6 Assumptions of the Analyses

Assumptions 2 through 6 of the cohort analysis (Chapter 3, Section 3.2.2) are applicable to the chinook model, as well as the following:

1) The temporal and spatial distributions of stocks in and among fisheries are stable from year to year;

2) Either fish are randomly distributed temporally and spatially within each fishery or the temporal and spatial distribution of the fishery has remained constant since the base period;

3) Estimates of escapement and/or terminal run are unbiased;

4) Current escapement goals are equal to the escapement at MSY;

5) 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

In the SEAK and NCBC fisheries, the model estimates of the fishery abundance have been greater than the base period level in each year since 1982 (Fig. 4-1 and Appendix M). For the SEAK troll fishery, the model estimates of abundance increased from 1981 to 1988, reaching a peak which was approximately 230% of the base period level. Since 1988, abundance has declined and is predicted to be only 26% above the base period level in 1994 (28% lower than the 1992 level). The extent of the increase in abundance was not as great in the NCBC troll fishery. At the maximum value in 1988, the abundance was estimated to have increased to 150% of the base period level. The index has declined in subsequent years, and abundance in 1994 is predicted to be only 9% above the base period level (21% lower than the 1992 level).

In contrast, the model estimates of the fishery abundance indices for the WCVI troll and GS sport and troll fisheries since 1985 have been less than the base period level in most years (Fig. 4-2) and Appendix M). The reduction in abundance was greatest in GS, where the estimated abundance in 1987 was reduced by 52%. Since then, abundance has shown a generally increasing trend, and in 1994 is predicted to reach 96% of the base period level (16% increase relative to 1992). The fishery abundance index for the WCVI troll fishery is estimated to have remained near the base period level through 1986. After increasing by 26% in 1987, the index begin a steady decline, reaching a value 27% below the base period level in 1991. Abundance in 1994 is predicted to remain more than 15% below the base period level (2% increase from 1992).

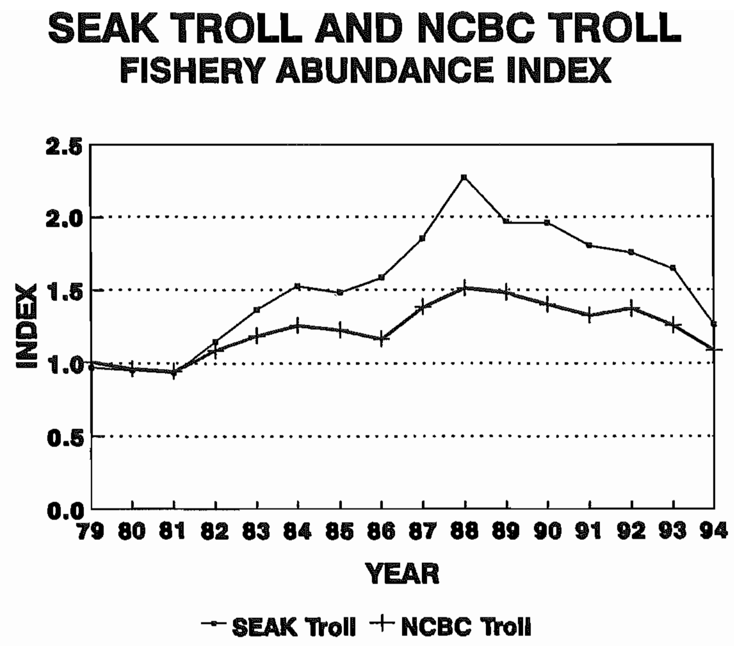



Figure 4-1. Fishery abundance indices for the SEAK and NCBC troll fisheries.

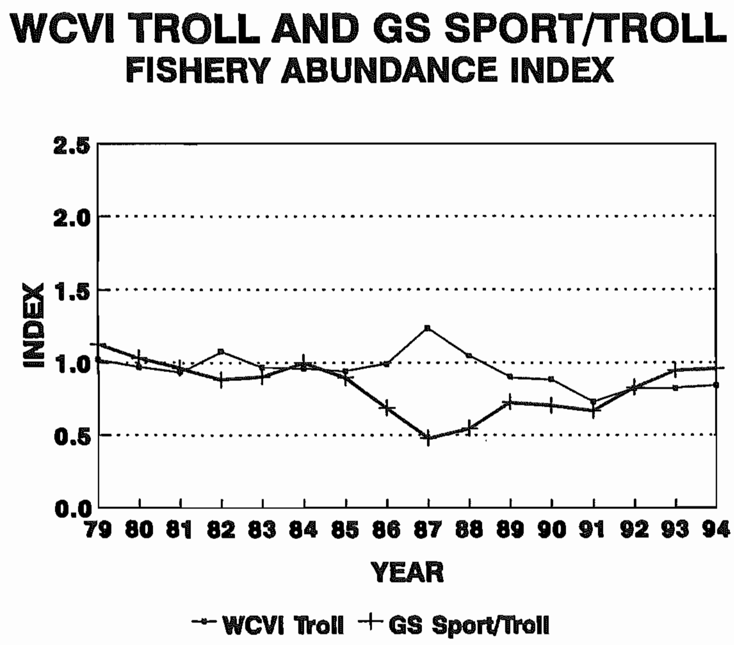



Figure 4-2. Fishery abundance indices for the WCVI troll and GS sport and troll fisheries.

### 4.3.2 Model Estimates of Fishery Indices

Model estimates of the fishery indices for the ceiling fisheries are shown in Figures 4-3 through 4-6. For comparative purposes, the indices obtained from the Exploitation Rate Assessment are included as well.

For the SEAK troll fishery, the model estimates indicate that the harvest rates in the fishery declined by 31% with the imposition of ceilings in 1985. Further reductions occurred through 1988, when the model estimates that the fishery harvest rate was reduced by 57% from the base period level. Since 1985, the model estimates that the average reduction of the harvest rate has been 39%, or 15 percentage points greater than the 1985 target reduction.

The model estimates that harvest rates have been reduced in NCBC troll fishery as well, though not to the extent as for the SEAK troll fishery. Since 1985, the average reduction in the harvest rate from the base period has been 32% (1985 target reduction of 16%) with a range of reductions from 21% to 46%.

Based upon the model estimates of the fishery indices, harvest rates in the WCVI fishery have been highly variable since 1985. The estimates range from a reduction of 30% in 1989 to an increase of 14% in 1988 and 1992. The average reduction since 1985 is estimated by the model to be 10%, compared with a 1985 target reduction of 24%.

The model indicates that harvest rates in the GS sport and troll fisheries have been reduced but not to the 1985 target level. The average reduction from 1985-1992 of 20% is less than half of the 1985 target reduction of 47%.

### 4.3.3 Model Estimates of Incidental Mortality

Model estimates of the total AEQ incidental mortality are provided in Appendix K for the ceiling and nonceiling fisheries. The ratios of AEQ incidental mortalities to AEQ catch (incidental mortality ratio) are presented in Figures 4-7A and B for the SEAK troll, NCBC troll, WCVI troll, GS troll, GS sport, and nonceilinged U.S. troll fisheries. The ratio may be simply interpreted as the number of fish which 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 which were landed.

Fisheries grouped in Figure 4-7A have a fairly stable value for the incidental mortality ratio while those in part B show an increasing trend. For the fisheries with an increasing trend, the ratio for the GS sport fishery has increased from near 0.0 in 1979 to over 0.8 in 1992; for the GS troll fishery the ratio has increased from approximately 0.1 to 0.5; and for the SEAK troll fishery the ratio has increased from 0.2 to approximately 0.9.

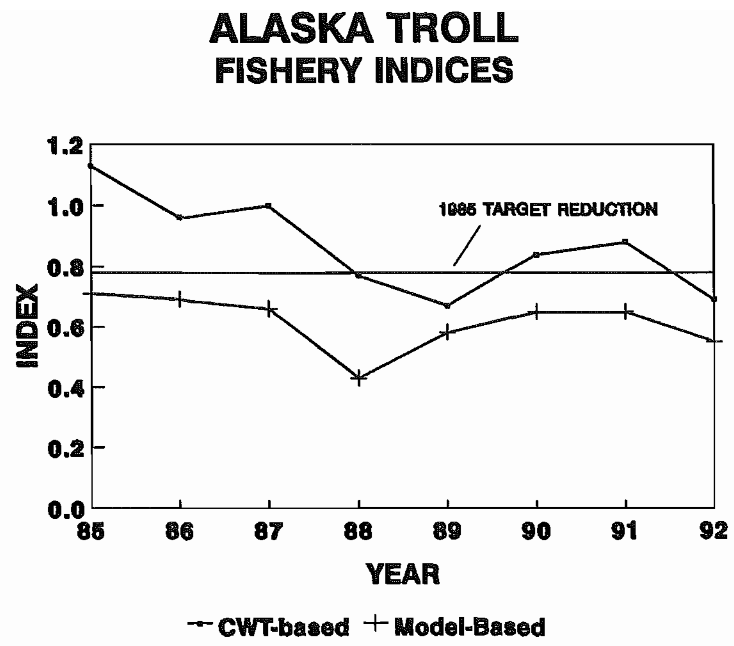



Figure 4-3. Model and CWT estimates (Exploitation Rate Assessment) of the fishery indices for the SEAK troll fishery.

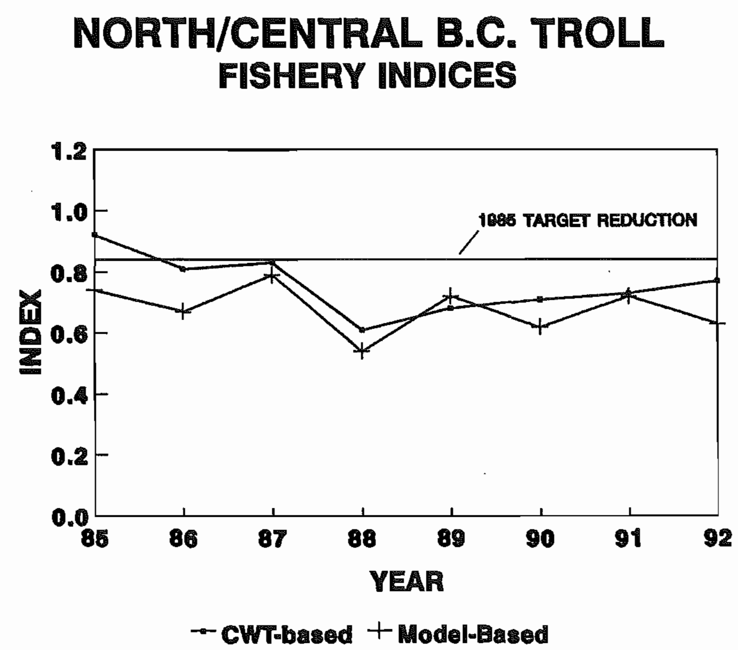



Figure 4-4. Model and CWT estimates (Exploitation Rate Assessment) of the fishery indices for the NCBC troll fishery.

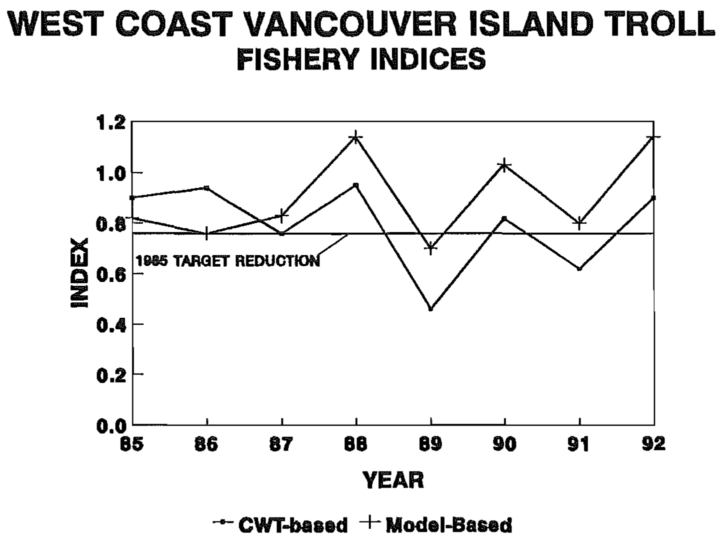



Figure 4-5. Model and CWT estimates (Exploitation Rate Assessment) of the fishery index for the WCVI troll fishery.

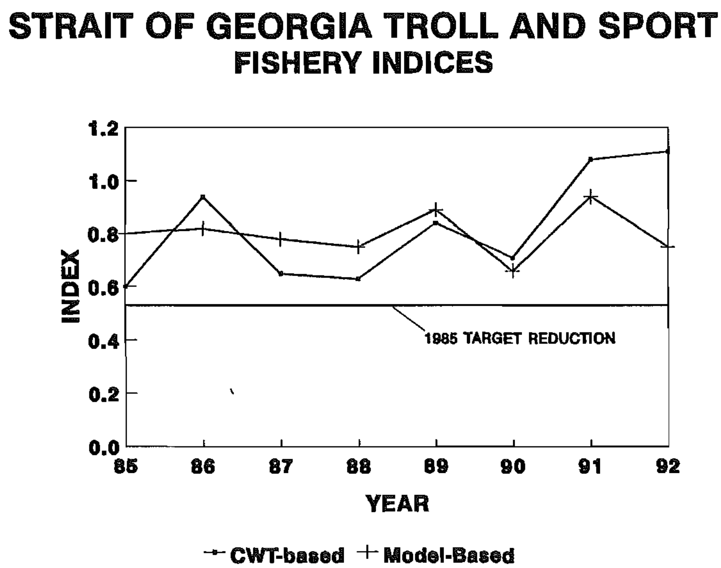



Figure 4-6. Model and CWT estimates (Exploitation Rate Assessment) of the fishery indices for the GS sport and troll fishery.

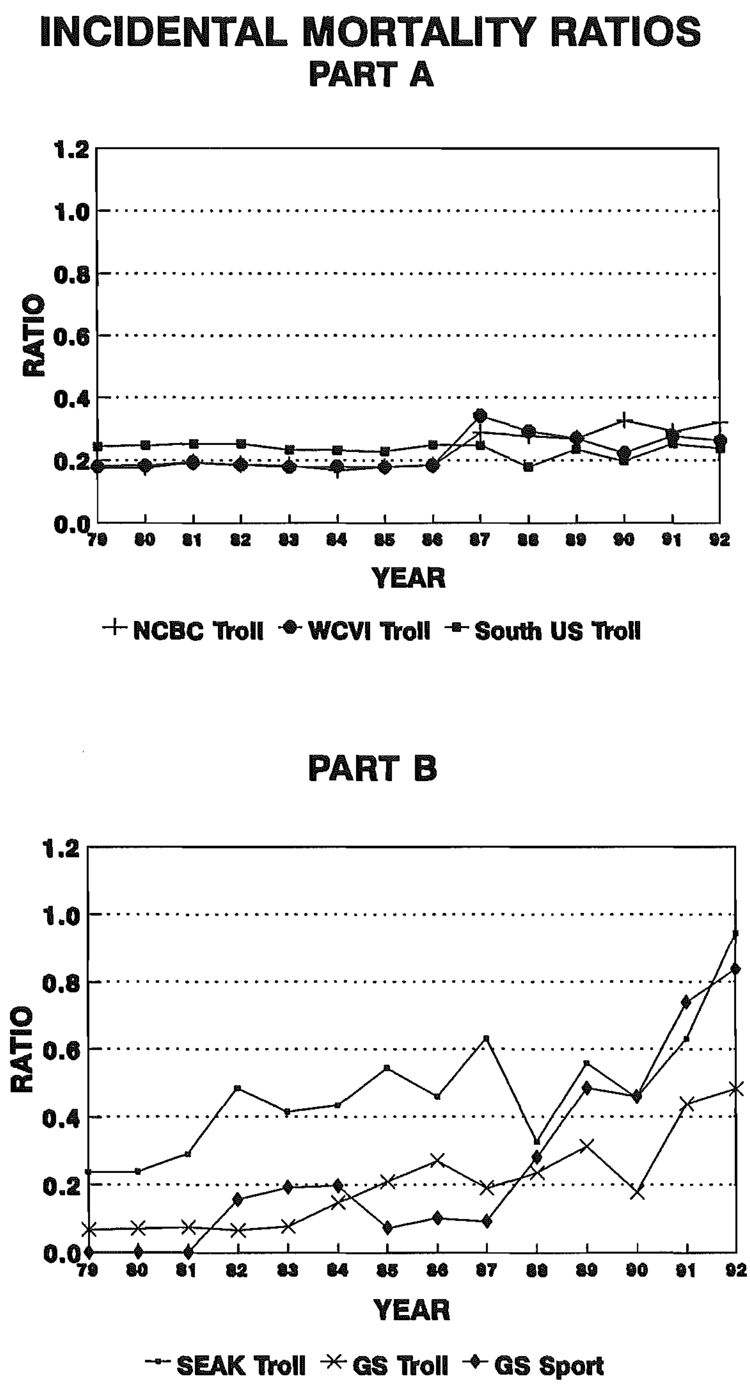



Figure 4-7. Model estimates of the ratio of AEQ incidental mortalities to the AEQ reported catch for the NCBC troll, WCVI troll, and Southern U.S. troll fisheries (Part A) and the SEAK troll, GS troll, and GS sport fisheries (Part B).

Figure 4-8A shows the total AEQ incidental mortality for ceiling fisheries in SEAK, ceiling and nonceiling fisheries in Canada, and nonceiling fisheries in the Southern U.S. Since the inception of the

PST in 1985, model estimates of the AEQ incidental mortality show a decreasing trend in the Southern U.S., have remained relatively stable for the SEAK fisheries after an initial increase in the early 1980s, and show an increasing trend for Canadian fisheries. The recent increases in AEQ incidental mortalities in Canada (Fig. 4-8A) are attributable to increased mortalities in the Georgia Strait Sport fishery and in Canadian ceiling fisheries during years with CNR periods (Fig. 4-8B).

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

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

## 4.4 DISCUSSION

Since the early 1980s, the PSC 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 represents an abstraction of theoretical relationships, observational data, and assumptions.

Analysis of alternative management strategies using an early version of the model formed the underpinnings for the coastwide 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), as an indicator for far-north migrating fall-type stocks originating in Washington and Oregon; 2) Columbia River Tule (represented by Spring Creek), an indicator for early-maturing chinook stocks harvested off the coast of WCVI and Washington; 3) WCVI fall (represented by Robertson Creek Hatchery stock), as an indicator for far-north, fall-type stocks originating in Canada; and 4) GS fall (represented by Big Qualicum Hatchery stock), as 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 Columbia 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.

The chinook model has changed substantially since the implementation of the PST in response to emerging information and the need to evaluate a number of important developments. For the first time, detailed results generated by the chinook model are presented in a separate chapter to supplement CTC evaluations provided in previous 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. Such comparisons can provide insight into model performance and can validate results of CTC analytical procedures.

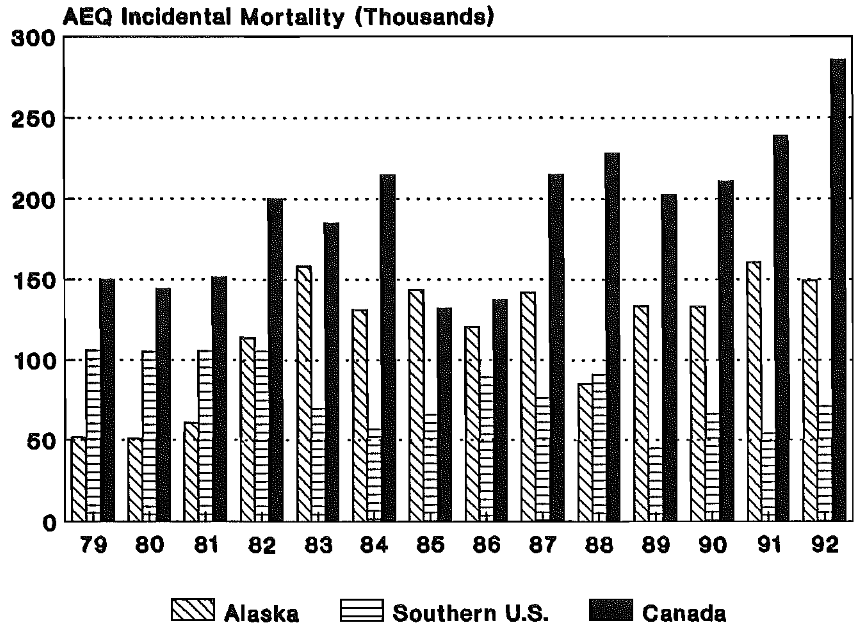



Figure 4-8A. Model estimates of total AEQ incidental mortalities by region.

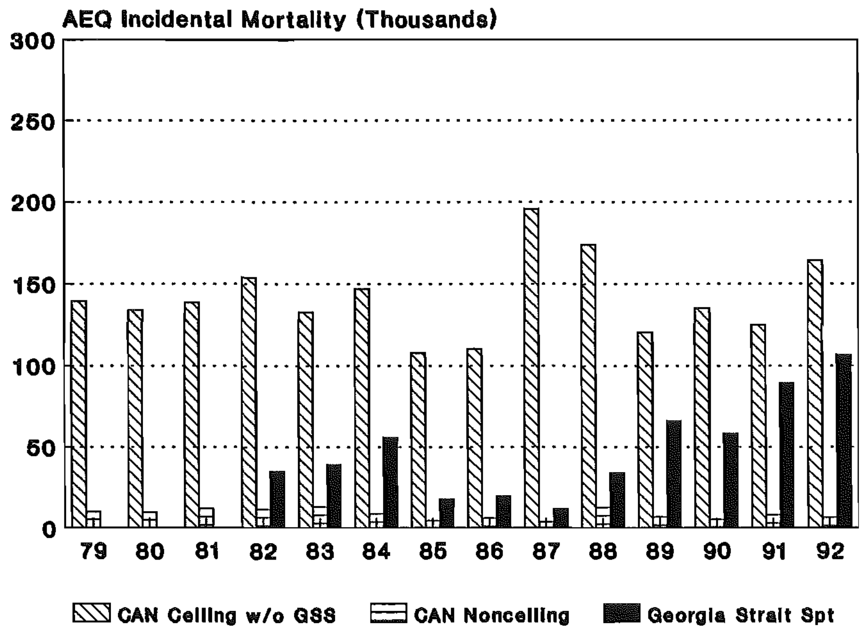



Figure 4-8B. Model estimates of Canadian total AEQ incidental mortalities by select fishery groups.

### 4.4.1 Incidental Mortality

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., nonretention and size limit increases. Algorithms were incorporated into the model to estimate and account for these unanticipated sources of incidental mortality.

Although the theory underlying estimation of incidental mortalities is identical for both model representation and CWT-based exploitation rate assessment, stock-specific estimates will not be identical because of differences in application. The model estimates incidental mortalities on a fishery basis and then distributes those mortalities across all stocks harvested by the fishery, in proportion to the abundance of individual age classes. In contrast, CWT analysis is performed on individual stocks without knowledge of the abundance of other stocks.

Model estimates indicate that incidental AEQ mortalities have: 1) remained relatively stable for the SEAK troll fishery after an initial increase during the early 1980s, 2) decreased and remained relatively stable at a lower level in southern U.S. fisheries since the early 1980s, and 3) been increasing in Canadian fisheries. These changes in incidental mortality have resulted from both changes in minimum size limits (Table 4-1) and periods of CNR (Appendix J).

Table 4-1. Changes in minimum size limits in troll and sport fisheries since 1979.

| Fishery | Base Minimum Size Limit | Changes in Minimum Size Limit | |
|---|---|---|---|
| | | Year of Change | New Minimum Size Limit |
| North B.C. Troll<br>Central B.C. Troll<br>WCVI Troll | 62 cm Fork Length | 1987 | 67 cm Fork Length |
| Georgia Strait Troll | 48 cm Fork Length | 1983<br>1986 | 54 cm Fork Length<br>62 cm Fork Length |
| Georgia Strait Sport | 30 cm Fork Length | 1981<br>1989 | 45 cm Fork Length<br>62 cm Fork Length |
| Puget Sound Sport | 51 cm Total Length | 1982 | 56 cm Total Length |

### 4.4.2 Model Estimates of Fishery Indices

Although the model represents an abstraction of actual fishery harvests mechanisms, it can be used to estimate fishery indices analogous to those obtained from the CWT-based Exploitation Rate Assessment. Fishery indices estimated from the model show similar patterns to CWT-based fishery indices, but the magnitude of the indices differ for some fisheries. These differences may be related to three primary factors: 1) Stocks included in the index, 2) the use of annual CWT recovery data versus base period recovery data, and 3) procedures used in model development.

1) Stocks Included. The model and CWT estimates of the fishery index use different stocks. The CWT-based index relies only upon CWT recoveries from the indicator stock program while the model includes a number of additional stocks (e.g., NCBC spring/summer chinook, Columbia Upriver Summers).

2) Annual CWT Recoveries versus Base Period Recoveries. 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 necessarily mask year to year variations in both the spatial distribution of stocks and harvest patterns within a fishery. Although the model has the capability to simulate changes in harvest patterns within a fishery, this option has generally not been used because of the difficulty of obtaining parameter estimates.

3) Model Procedures. Procedures used to develop input data and calibrate the model may result in fishery indices which are similar in pattern but differ in magnitude from the estimates obtained from the CWT-based analysis. These procedures include the following: 1) Aggregation of tag groups during the model base period, 2) scaling of stock abundance in the initial year represented in the model (1979), and 3) scaling of exploitation rates following the base period to the imposition of ceilings in 1985.

The CWT-based estimates presented in Chapter 3 are based on direct measures of impacts and are considered the best available for this purpose. Conversely, the model estimates are useful for examining historical trends within a fishery since 1985 and for predicting the effect of future changes in stock abundance upon the fishery indices. The model may also be useful for assessing changes in harvest rate in fisheries which harvest significant numbers of fish not represented by an exploitation rate indicator stock. However, use of the model in this context will require careful evaluation of model calibration procedures.

### 4.4.3 Predictions for Fishery Abundance and Fishery Indices

The chinook model is the only method which the CTC currently has to predict the 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 stock abundance may be obtained directly from the model 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.

The model predicts that abundance will continue to decrease in the SEAK and NCBC troll fisheries, as it has since 1988, remain relatively stable at recent levels for the WCVI troll fishery, and increase in the GS sport and troll fisheries. The predicted increase in GS is due primarily to a predicted increase in the abundance of the Harrison stock.

These abundance predictions suggest that, if fishery regimes are unchanged, fishery indices, relative to 1992: 1) can be expected to increase for the SEAK and NCBC troll fisheries and 2) remain unchanged for the WCVI troll and GS fisheries.

It should be noted, however, that there are early indications of abnormally low survivals for several stocks. Consequently, it is recommended that data available through 1993, and forecasts of abundance for 1994, be incorporated into the model before future management regimes are established.

# CHAPTER 5. INTEGRATED ASSESSMENT FOR NATURAL STOCK GROUPINGS

## 5.1 INTRODUCTION

This chapter identifies 13 groups of naturally spawning stocks, and summarizes, within these stock groups, the stock-specific information from previous chapters. Stock groups used in the integrated analyses include wild and hatchery chinook 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 delineated 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 per 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 assessment 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 changes that have occurred since the 1991 assessment.

Information contained in the summary tables is divided into four major parts:
- Part A - Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding;
- Part B - MSY Exploitation Rates and Brood Exploitation Rates;
- Part C - Fishing Mortalities; and
- Part D - Model Abundance and CWT Estimated Survival Indices.

Note that in the summary tables, the notation NA indicates that the data are not available while NR indicates that the data available are not representative for the stock grouping.

**Part A - Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

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

The indicator stock is followed by an index of the harvest rate in the terminal area relative to the 1979-1982 base period used in the Exploitation Rate Assessment (Chapter 3). 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 1979-1982. These annual indices are then averaged for years with valid data during the 1985-1992 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.

The third column contains the rebuilding status for the indicator stock as reported in Chapter 2. This is followed by the escapement goal established for the stock and the average base escapement and last three year (1990-1992) average escapement 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 predicted year in which the stock will 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 achieved and met in each subsequent year through 1998.

The rebuilding predictions were developed using procedures in Chapter 4.

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

Part B presents information on both the estimated maximum sustainable yield (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 adult equivalent (AEQ) exploitation rate that is sustainable when spawning escapement is maintained at the established escapement goal for a stock (=MSY ER). The 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 estimates were derived using the following procedure:

1) Estimate the stock-specific intrinsic rate of increase (Ricker A value) for a Ricker type stock/recruitment function. A procedure was developed for adjusting an initial estimate of stock productivity using available information on exploitation patterns and observed trends in escapement (CTC-AWG Model Documentation 1989). This approach uses the following key assumptions:

   a) harvest rates (as estimated from coded-wire-tag (CWT) recovery data on the stock group of interest) and annual production and survival were constant during the base period and the four years prior to the base period;

   b) escapement is 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, estimates of marine survival during the first year are generated by fitting observed stock abundance data. This time series of first year marine survival is used to correct the initial productivity estimate.

The MSY ER is computed using the following formulas. First, the AEQ returning run size ($R_o$) at optimum escapement is estimated as:

$$R_o = O * s * \exp^{(A * (1 - \frac{O}{B}))}$$

where :

$O$ : optimum escapement

$A,B$ : Ricker stock productivity parameters

$s$ : average productivity adjustment factor

The MSY ER is then computed as:

$$MSY\ ER = 1 - \frac{O}{R_o}$$

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 rate 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 may require reductions in total exploitation to be substantially below the MSY exploitation rate.

**Part C - Fishing Mortalities.**

Part C presents results from the Exploitation Rate Assessment, distribution of total fishing mortality and indices of exploitation rates (i.e., Stock, Fishery and Nonceiling Indices).

For the Southeast Alaska (SEAK) and North/Central B.C. (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. Fisheries included in the total fishing mortality distribution and the Fishery Index are:

| Ceiling Fishery | Fisheries Included in Distribution of Total Mortality | Fisheries 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 |

The total fishing mortality distribution data presented in the summary tables differ from those referenced in Appendix H. Terminal catches are not included in instances when the exploitation rate indicator stock (generally a hatchery stock) was subject to terminal fisheries from which the associated natural stock was exempt. Fisheries excluded from total fishing mortality distribution and stock index data are:

| Exploitation Indicator Stock(s) | Fishery(ies) Excluded from Mortality Distribution |
|---|---|
| Robertson Creek | WCVI net and WCVI sport fisheries. |
| Samish, Stillaguamish, South Puget Sound Fingerling | Puget Sound terminal net fisheries. |
| Queets, Sooes | Washington coastal net fisheries. |
| Columbia River Upriver Bright, Lewis River, Lyons Ferry, Hanford Bright | Columbia River net and sport fisheries. |

<u>Distribution of Total Fishing Mortality.</u> The first column lists the ceiling and nonceiling fisheries. The second column reports the 1985-1992 average distribution of total AEQ fishing mortality for the exploitation rate indicator stocks.

<u>Stock Index.</u> The first column lists the 1985 target reduction for the ceiling fisheries of the stock index. It is similar in concept to the 1985 target reduction used to evaluate the fishery index for the ceiling fisheries. In the case of the stock index, however, the target reductions for each ceiling fishery are weighted by the distribution of total fishing mortality to obtain a composite target reduction for the stock. The 1985 target reductions are then averaged across the PSC model stocks associated with each stock group. The second column lists the 1985-1992 mean stock index calculated for the stock for each fishery. A stock index was not calculated for fisheries in which the stock had a low incidence of occurrence (equal or less than 1% of the total mortality).

<u>Fishery Index.</u> The first column lists the 1985 target reduction for the ceiling fisheries. The second column presents the 1985-1992 mean for the fisheries as depicted by gear type in Table 3-4 (Chapter 3) of the exploitation rate assessment.

Nonceiling Index. The remaining columns of this section list the Nonceiling Fishery Index. Values are obtained from Table 3-6 (Chapter 3).

**Part D - Model Abundance and Survival Indices.**

Graphs of model estimates of relative abundance and CWT survival are presented in Part D. An index of abundance is created by dividing the model estimates of annual abundance of age 2 cohort (age 3 for spring stocks which reside in freshwater for 1 full year) by the average cohort size for the 1977 through 1979 broods (1976 through 1979 for spring stocks). Survival indices are based upon CWT recovery data for exploitation rate indicator stocks and computed using the methods discussed in Chapter 3, Section 3.1.1. Survival is presented for the age 2 cohort (age 3 for spring stocks which reside in freshwater for 1 full year) by the average cohort size for the 1977 through 1979 broods (1976 through 1979 for spring stocks). The survival indices plotted in this section have been standardized by dividing them by the average index value for the base-period brood years (see table in Chapter 3, Section 3.2.1). The two graphs are presented to provide an indication of changes in 1) the brood abundance expected to contribute to fisheries in 1993 and 1994 and 2) the survival rates during the rebuilding period.

## 5.3 RESULTS AND DISCUSSION

For each stock group, three types of information are presented: 1) the Synopsis, 2) three tables and two figures of summarized results, and 3) Comments. The Synopsis highlights results presented in the tables and provides additional information that may assist in the interpretation of the results. The tables, which integrate results from the Escapement Assessment, Exploitation Rate Assessment, and the Model Analyses, are described in greater detail in Section 5.2. Finally the Comments section provides additional information which may further clarify the results or note data limitations.

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

*Synopsis. Unpublished results from ADF&G tagging of four of the escapement indicator stocks in the 1980s indicate that ocean rearing of fish from stocks in this group occurs primarily in SEAK inside waters. These stocks have shown a mixed response to rebuilding. Andrew Creek is Above Goal while the other five are classified as Probably Not Rebuilding. All five, but particularly the four Behm Canal stocks, responded rapidly in the mid-1980s with escapements in the four systems above goal in several years. Counts have dropped sharply in the last 2-5 years; ADF&G is currently evaluating possible causes for these declines. These stocks are predominantly harvested in SEAK fisheries, with a minor portion in the NCBC fisheries. Although the fishery index has declined in both SEAK and NCBC, the stock index has not. The stock index may not be indicative of wild stock harvest rates because of limited base period data and because of some misclassification of terminal net and sport fish harvests. The troll component for the SEAK stock index has decreased by 11% since the base period.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

Escapement Indicator Stocks / PSC Chinook Model

| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
|---|---|---|---|---|---|---|---|
| Andrew Creek | NA | Above Goal | 750 | 51% | 131% | Alaska South SE | 1996 |
| Keta | NA | Prob Not Reb | 800 | 51% | 73% | | |
| King Salmon | NA | Prob Not Reb | 250 | 37% | 56% | | |
| Chickamin | NA | Prob Not Reb | 1,440 | 23% | 52% | | |
| Unuk | NA | Prob Not Reb | 2,880 | 51% | 39% | | |
| Blossom | NA | Prob Not Reb | 1,280 | 13% | 27% | | |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

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

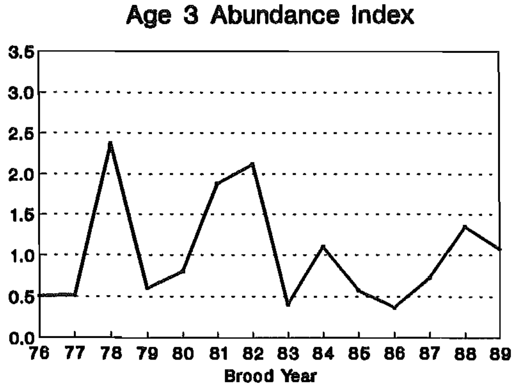
| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates Base 1976-1979 | Brood Exploitation Rates Rebuilding 1981-1987 |
|---|---|---|---|---|
| Alaska South SE | 0.55 | Ocean | 0.52 | 0.50 |
| | | Total | 0.53 | 0.58 |

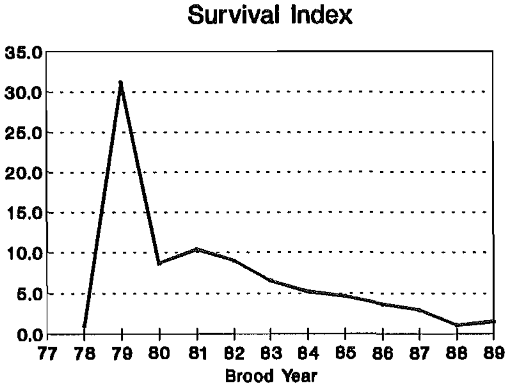
**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

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

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 98.0% | -22% | 27% | -22% | -13% | | |
| NCBC | 2.0% | -16% | 7% | -16% | -24% | | |
| WCVI | 0.0% | Low incidence | | -24% | -21% | | |
| GS | 0.0% | Low incidence | | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 0.0% | None | Low incidence | | | -25% | Low incidence |
| US | 0.0% | None | Low incidence | | | 0% | Low incidence |

D. Abundance and Survival Indices




**Comments.** Large-scale time and area reductions in the SEAK troll and gillnet fisheries during spring contributed to the high escapements in the mid-1980s. These conservation measures remain in place. Since the mid-1980s, Andrew Creek counts have remained above goal, King Salmon River counts have remained relatively static, and counts in the four Behm Canal rivers have dropped almost back to base levels. Without virtual elimination of some fisheries, few management options remained to further reduce harvest pressure. Behm Canal stock assessment is currently under review by ADF&G. Preliminary results indicate that the large escapements and reduced marine survival may be the principal factors causing the decline.

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

***Synopsis.*** *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 1987; Hubartt and Kissner 1987; NMFS unpublished data). The Situk is Above Goal, the Taku is Probably Rebuilding and the Stikine is Rebuilding. The Alsek has shown no response, and is Not Rebuilding. These stocks are harvested as mature fish in SEAK fisheries and (with the exception of the Situk) in Canadian inriver fisheries. Because no stocks are currently marked that can be used as exploitation rate indicators, it is not possible to directly estimate exploitation rates and changes in harvest impacts. However, information on run timing and distribution from past tagging experiments does indicate that current ocean harvest of these stocks is probably low. Preliminary indications are that harvest in Alaskan salmon fisheries is not a factor in the lack of rebuilding in the Alsek.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Situk | 0.73 | Above Goal | 600 | 217% | 165% | None | |
| Stikine (TBR) | NA | Rebuilding | 5,300 | 37% | 98% | | |
| Taku (TBR) | NA | Prob Reb | 13,200 | 35% | 84% | | |
| Alsek (TBR) | NA | Not Rebuild | 4,700 | 57% | 37% | | |

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

**Comments.** The Taku and Stikine stocks, the largest in the SEAK region, have both responded very well during the rebuilding period. Prior to rebuilding, these stocks were targeted primarily in SEAK troll and terminal gillnet fisheries. Beginning in 1980 the troll fishery underwent progressive time restrictions in the spring. The troll fishery in the outside area presently does not begin until July 1. Fishwheels on the Taku River at mile 12 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. Since 1975, the spring SEAK terminal gillnet fisheries have been delayed until late June since 1975. Some small harvests remain in SEAK June troll hatchery access, terminal gillnet, sport fisheries and in the Canadian inriver fishery.

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 inriver fisheries; the SEAK gillnet fishery at the rivermouth is restricted 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. The Situk spawner-recruit database (having the most complete set of data for SEAK stocks) was examined in 1991 and it was found that harvest rates were too low, not too high, and that the MSY escapement goal was 600, instead of the previous goal of 2,000. The new escapement goal indicated that the Situk was not ever depressed. It is not obvious why the Alsek has not met the escapement goal, but it is apparent that harvest rates are low. Over the last century, much of Dry Bay, at the Alsek river mouth, has filled with sediment; this may have reduced salmon habitat.

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

***Synopsis.*** *Rebuilding of the most northerly stocks in this group has been strong with the spawning escapements of Yakoun and Skeena chinook stocks exceeding their goals. The Nass stock is, however, classified as Indeterminate. The 1985-1992 average terminal harvest rates on this stock were approximately twice the base period level. In the central coast, Rivers Inlet is Rebuilding but other stocks (Area 6, Area 8, and Smith Inlet) have not shown positive rebuilding responses. Unfortunately, a thorough assessment of the reasons for this lack of response is not possible because escapement data are not available for the exploitation rate indicator stock for this group.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Yakoun | NA | Above Goal | 1,580 | 50% | 124% | North/Cent BC | 1992 |
| Skeena | 0.75 | Above Goal | 41,770 | 50% | 137% | | |
| Rivers Inlet | NA | Rebuilding | 4,950 | 50% | 139% | | |
| Nass | 1.96 | Indeterminate | 15,890 | 50% | 49% | | |
| Area 8 Index | NA | Prob Not Reb | 5,450 | 50% | 50% | | |
| Smith Inlet | NA | Prob Not Reb | 2,110 | 50% | 24% | | |
| Area 6 Index | NA | Not Rebuild | 5,520 | 50% | 8% | | |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

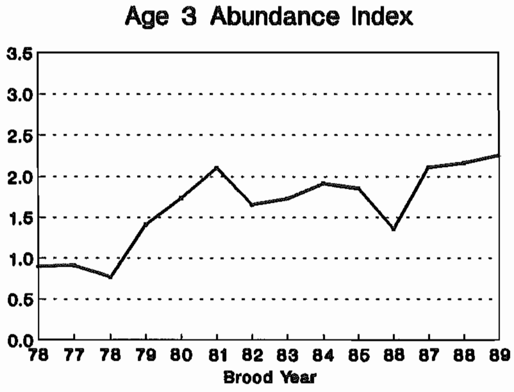
| PSC Chinook Model | | Exploitation Rate Assessment (NCBC Stock Group) | | |
|---|---|---|---|---|
| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates Base 1976-1979 | Brood Exploitation Rates Rebuilding 1982-1988 |
| North/Cent BC | 0.57 | Ocean Total | No exploitation indicator stock | |

**C. Fishing Mortalities and Catch Distribution**

Exploitation Rate Assessment (NCBC Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 45.5% | -22% | NA | -22% | -13% | | |
| NCBC | 42.6% | -16% | NA | -16% | -24% | | |
| WCVI | 0.2% | Low incidence | | -24% | -21% | | |
| GS | 0.0% | Low incidence | | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 11.6% | None | NA | | | -25% | NA |
| US | 0.0% | None | Low incidence | | | 0% | Low incidence |

D. Abundance and Survival Indices




**Comments.** Terminal area exclusion catches have been included in the Skeena terminal run and harvest rate estimates. Terminal runs to the Nass River have been increasing since the base period but increases in terminal catch, particularly in 1991 and 1992, have resulted in reduced spawning numbers. These reduced escapements are the basis for the rebuilding assessment of Inteterminate. The reason for the poorer response of the three CBC stocks is unknown, but may be associated with the run timing of the stocks and the timing of local net fisheries (Area 8 and Smith Inlet); however, in the absence of any stock identification program this can not be verified. The Area 6 assessment is highly uncertain because of inconsistent escapement surveys, particularly for the largest stock in this group, the Kemano River. Kemano River escapements were not estimated in two of the past three years and are, generally, highly uncertain due to the glacial nature of this river. By contrast, enhanced stock returns to Area 6 have increased substantially since the base period. It is the opinion of the local CDFO staff that escapement enumeration for the Area 6 (Natural) Index has been too inconsistent for use in an escapement trend analysis.

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

***Synopsis.*** *This stock is classified as Probably Not Rebuilding and is predicted to be only 3% of the goal by 1998. This major change from last year's assessment is based upon the extremely low survival of the 1990 brood and projected low survivals for the 1991 and 1992 broods. These low survivals are due to the intrusion of unusually warm water off of Vancouver Island and an associated heavy predation by mackerel. If this projection is incorrect and stock production for the 1991 and 1992 broods was similar to the long-term average survival rate, then this stock would be within 13% of its rebuilding goal by 1998. Regrettably, preliminary indications of juvenile chinook salmon abundance in Barkley Sound suggest that the poorer survival projections are more likely.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| WCVI | NA | Prob Not Reb | 11,665 | 50% | 54% | WCVI wild | 3% |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

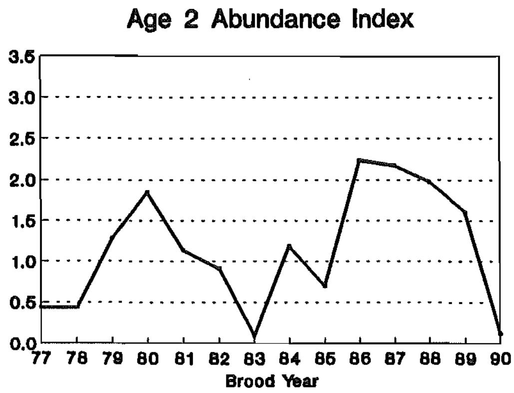
| PSC Chinook Model | | Exploitation Rate Assessment (WCVI Stock Group) | | |
|---|---|---|---|---|
| | | | Brood Exploitation Rates | |
| Indicator Stocks | MSY ER | Type | Base 1976-1979 | Rebuilding 1982-1988 |
| WCVI Wild | 0.69 | Ocean | 0.64 | 0.62 |
| | | Total | NR | NR |

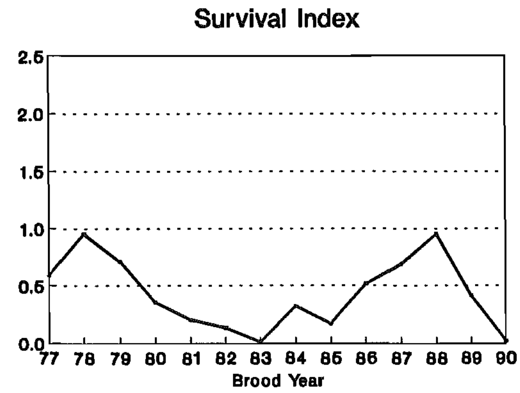
**C. Fishing Mortalities and Catch Distribution**

Exploitation Rate Assessment (WCVI Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 54.3% | -22% | -11% | -22% | -13% | | |
| NCBC | 30.1% | -16% | 0% | -16% | -24% | | |
| WCVI | 11.0% | -24% | 29% | -24% | -21% | | |
| GS | 1.3% | -47% | NA | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 2.2% | None | -4% | | | -25% | NA |
| US | 1.1% | None | NA | | | 0% | NA |

D. Abundance and Survival Indices




**Comments.** Rebuilding assessment of this stock continues to be confounded by the effect of enhancement on many of the indicator streams. No terminal harvest rate data are available, but terminal harvests do occur by both native and sport fisheries. The ocean exploitation level is slightly below the MSY ER levels; however, if the sport and native fishery data were included in the exploitation rate assessment, then the rate could be above the MSY level.

The WCVI stock index showed a large increase in 1992. This resulted in a 1985-1992 average of +29%, a 53 percentage point increase from the 1985-1991 average stock index of 0.76. The increase in the WCVI troll fishery was due to a later summer fishery which harvested large numbers of mature Robertson Creek chinook in the NWVI catch region. The terminal run of Robertson Creek chinook was approximately two weeks late in 1992 and probably contributed to the vulnerability of this stock to the outside troll fishery. A large catch of this stock in that fishery has been unusual. The fisheries (SEAK, NCBC and WCVI) that impacted this stock group showed variable results in 1992:

a) the SEAK fishery index of -31% was well below the 1985 target reduction of -22%;
b) the NCBC fishery index of -23% was near the 1985 target reduction of -16%; and
c) the WCVI fishery index of -10% was only 42% of its 1985 target reduction of -24%.

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

***Synopsis.*** *While the exploitation rate has been substantially reduced, this stock continues to be classified as Indeterminate. This classification is largely a result of the highly variable returns (Appendices A and B). In the last three years, the escapements have increased and in 1992 the escapement was slightly above goal. The average total exploitation rate remains higher than the MSY ER value. The SEAK stock index has increased, but other stock indices are substantially below the 1985 target levels. It is of particular concern that survival is projected to be very low, a prediction which is supported by preliminary 1993 returns. If low survivals occur as predicted, then the rebuilding progress seen in the last few years would be slowed.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Upper Geor St | NA | Indeterminate | 5,100 | 50% | 70% | Upper Geor St | 97% |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

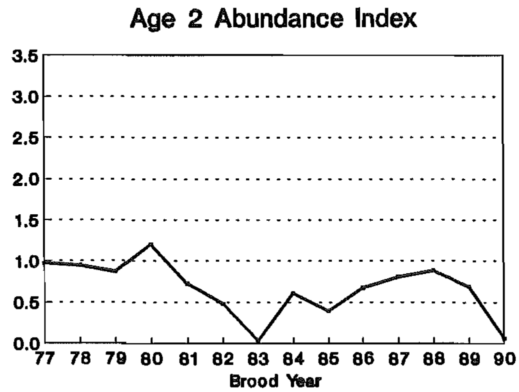
| PSC Chinook Model | | Exploitation Rate Assessment (UGS Stock Group) | | |
|---|---|---|---|---|
| | | | Brood Exploitation Rates | |
| Indicator Stocks | MSY ER | Type | Base 1976-1979 | Rebuilding 1982-1988 |
| Upper Geor St | 0.67 | Ocean | 0.72 | 0.61 |
| | | Total | 0.86 | 0.73 |

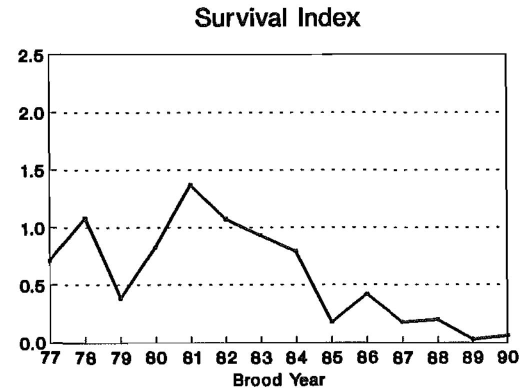
**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

Exploitation Rate Assessment (UGS Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 52.4% | -22% | 48% | -22% | -13% | | |
| NCBC | 33.7% | -16% | -38% | -16% | -24% | | |
| WCVI | 0.6% | Low incidence | | -24% | -21% | | |
| GS | 6.2% | -28% | -81% | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 6.9% | None | NA | | | -25% | -48% |
| US | 0.0% | None | Low incidence | | | 0% | Low incidence |

D. Abundance and Survival Indices




**Comments.** While no terminal harvest rate information is available for these indicators stocks, the terminal harvests are believed to be low. In recent years, the fishery indices have been reduced to near or below the 1985 target reduction levels in the two fisheries (SEAK and NCBC) that harvest about 85% of the stock. The nonceiling fishery index for the third significant harvester, Johnstone Strait net fisheries, indicates that the impact of this fishery has been reduced far below the target level of 25%. Apparently, the major reason not achieving the MSY ER level in brood year exploitation is the substantial increase in incidental mortality impacts (see Table 3-8, Chapter 3). The major concern with this stock is continued projection of low survival.

In last year's annual report (CTC 1992) it was noted that the use of Quinsam as the exploitation/survival indicator stock could misrepresent the natural stocks, which include mainland inlet chinook stocks and the Nimpkish River. There are still no suitable alternative or additional exploitation rate indicators.

## 5.3.6 Lower Strait of Georgia Fall (LGS)

***Synopsis.*** *The escapement indicator stock is classified as Probably Not Rebuilding.* Brood year exploitation rates continue to be substantially above the estimated MSY ER, and the 1990-1992 average escapement has shown little change from the base period. There are, however, three encouraging indicators: escapements have increased from the extremely low 1987 levels; the nonceiling fishery index was reduced by over 50%; and model projections indicate that the stock could rebuild in 1998 if survivals improve to the long-term average level and supplementation efforts prove successful. In view of the projected lower survival rates and presistent high exploitation levels in fisheries and contrary to the PSC model prediction, however, it seems unlikely that this suite of stocks will rebuild by 1998 without further management actions.

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Lower Geor St | 1.32* | Prob Not Reb | 22,280 | 50% | 47% | 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**

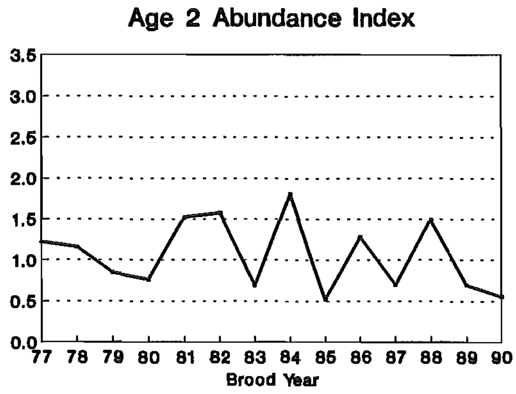
| PSC Chinook Model | | Exploitation Rate Assessment (LGS Stock Group) | | |
|---|---|---|---|---|
| | | | Brood Exploitation Rates | |
| Indicator Stocks | MSY ER | Type | Base 1976-1979 | Rebuilding 1982-1987 |
| Lower Geor St | 0.59 | Ocean | 0.75 | 0.66 |
| | | Total | 0.78 | 0.72 |

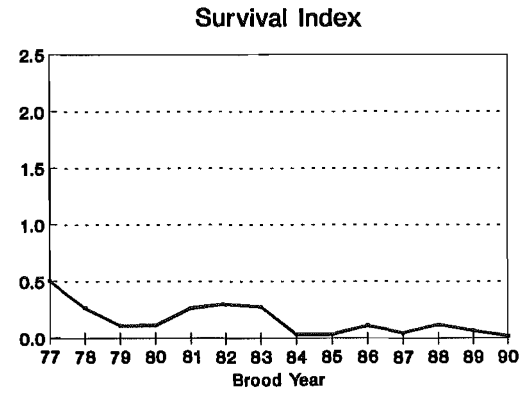
**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

Exploitation Rate Assessment (LGS Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 19.8% | -22% | NA | -22% | -13% | | |
| NCBC | 21.0% | -16% | -18% | -16% | -24% | | |
| WCVI | 2.1% | -24% | NA | -24% | -21% | | |
| GS | 46.7% | -37% | -11% | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 9.7% | None | -29% | | | -25% | -49% |
| US | 0.8% | None | NA | | | 0% | NA |

D. Abundance and Survival Indices




**Comments.** The rebuilding of this stock continues to be limited by poor survivals and a failure to achieve measurable reductions in the GS sport fishery exploitation rate. Major increases in the incidental mortality rates on this group account for a large portion of the GS sport fishery index, particularly for the 1991 and 1992 catch years. The recent period of poor survivals also account for the relative low MSY ER estimated for this stock. Given the age-at-maturity for this stock group, the MSY ER would normally be expected to be higher than the UGS stock group.

Survival rates remain poor and substantially less than the level assumed during design of the rebuilding program. Survival is projected to remain poor on the indicator stock and model estimates of abundance continue to indicate low abundance. In view of these projections and present exploitation pressures, it seems unlikely that this stock will rebuild by 1998. The model projection to achieve rebuilding by 1998 results from a forecast of an improvement in survival to long-term average levels and anticipated increased enhancement efforts. Survivals of the enhanced production should be monitored to determine whether the production required for rebuilding is being achieved.

A change from previous evaluations (CTC 1992) is the addition of the Puntledge River summers as a second exploitation rate indicator stock in this group (along with Big Qualicum River). The results presented in the tables are an average of the two indicator stocks. The inclusion of a summer chinook stock was intended to make the exploitation rate indicators more representative of the mainland inlet chinook populations, e.g. the Squamish River.

## 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 Indeterminate. 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 likely has been achieved through reductions in ocean exploitation and terminal harvest rates, and changes in fishing seasons which have benefited spring and summer stocks. This group is not represented by an exploitation rate indicator stock; therefore, direct measures of exploitation rate cannot be made.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

Escapement Indicator Stocks / PSC Chinook Model

| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
|---|---|---|---|---|---|---|---|
| Upper Fraser | 0.48 | Above Goal | 24,460 | 50% | 119% | Fraser Early | 1985 |
| Middle Fraser | 0.48 | Above Goal | 21,130 | 50% | 112% | | |
| Thompson | 0.48 | Indeterminate | 55,710 | 50% | 70% | | |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

PSC Chinook Model / Exploitation Rate Assessment (UFR Stock Group)

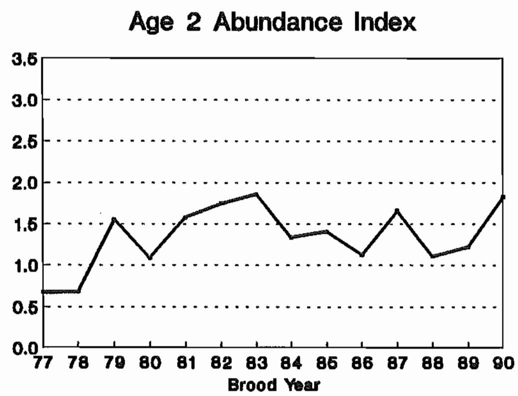
| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates Base 1976-1979 | Brood Exploitation Rates Rebuilding 1982-1988 |
|---|---|---|---|---|
| Fraser early | 0.65 | Ocean<br>Total | No indicator stock | |

**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)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 28.3% | -22% | No indicator | -22% | -13% | | |
| NCBC | 33.7% | -16% | No indicator | -16% | -24% | | |
| WCVI | 7.9% | -24% | No indicator | -24% | -21% | | |
| GS | 4.7% | -27% | No indicator | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 13.8% | None | No indicator | | | -25% | No indicator |
| US | 11.5% | None | No indicator | | | 0% | No indicator |

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 gillnet 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 CWTs could not be recovered from the inriver native fishery. Recent changes under Canada's Aboriginal Fisheries Strategy should permit the development of several exploitation rate indicator stocks in the near future.

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

***Synopsis.** The Harrison River stock is classified as Probably Not Rebuilding because escapements during the rebuilding period have been trendless and have averaged only 48% 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 long-term average.*

*Harrison chinook are harvested primarily in the GS and WCVI fisheries, fisheries that have, for the most part, not achieved the 1985 target harvest rate reductions. The group is not represented by an exploitation rate indicator stock. Direct measures of the current exploitation rate are unavailable; therefore, comparisons with the MSY exploitation rate cannot be made.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Harrison | 0.50 | Prob Not Reb | 241,700 | 50% | 55% | Fraser Late | 1998 |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

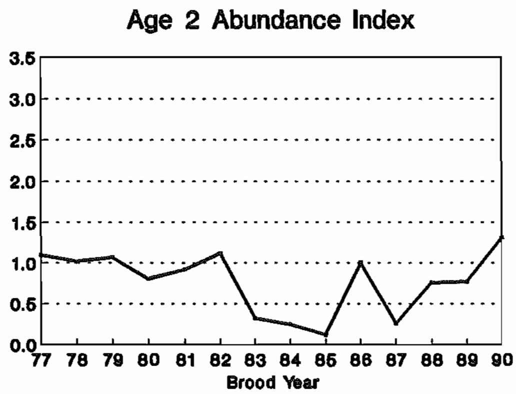
| PSC Chinook Model | | Exploitation Rate Assessment (LFR Stock Group) | | |
|---|---|---|---|---|
| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates: Base 1976-1979 | Brood Exploitation Rates: Rebuilding 1982-1988 |
| Fraser Late | 0.73 | Ocean<br>Total | No indicator stock | |

**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

Exploitation Rate Assessment (LFR Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 1.4% | -22% | No indicator | -22% | -13% | | |
| NCBC | 3.1% | -16% | No indicator | -16% | -24% | | |
| WCVI | 27.5% | -24% | No indicator | -24% | -21% | | |
| GS | 39.7% | -43% | No indicator | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 6.9% | None | No indicator | | | -25% | No indicator |
| US | 21.4% | None | No 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 bycatch in the commercial gillnet fishery. Distribution estimates show that most fishing mortality for this group occurs in the GS and WCVI ceiling fisheries (neither of which have achieved the 1985 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 the group is not represented by an exploitation rate indicator stock. An exploitation rate indicator stock can be developed if more CWTs 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. The LGS group shows increasing exploitation rates (calculated from total mortalities) since 1984 for one indicator stock and decreasing exploitation rates for the other. Big Qualicum ocean exploitation rates were 70% for the 1987-1988 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 reached the 1985 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 the LGS stock is more prevalent. Current exploitation rates on Harrison River chinook, therefore, probably exceed the MSY ER for this stock.

Survival of this stock during the rebuilding period was very low; however, model projections are for survival to exceed the long-term average. 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 poor 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. This stock is currently classified as Probably Not Rebuilding. The stock group is harvested primarily by GS fisheries, which have have not come close to achieving the 1985 target exploitation rate reduction level, and by U.S. nonceiling fisheries.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Skagit Spr | NA | Prob Not Reb | 3,000 | 42% | 45% | Nooksack | NR |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

| PSC Chinook Model | | Exploitation Rate Assessment (NPS-Sp Stock Group) | | |
|---|---|---|---|---|
| | | | Brood Exploitation Rates | |
| Indicator Stocks | MSY ER | Type | Base 1976-1979 | Rebuilding 1982-1988 |
| Nooksack | NR | Ocean | NA | 0.58 |
| | | Total | NA | 0.74 |

**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

Exploitation Rate Assessment (NPS-Sp Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 0.5% | Low incidence | | -22% | -13% | | |
| NCBC | 4.1% | -16% | NA | -16% | -24% | | |
| WCVI | 7.6% | -24% | NA | -24% | -21% | | |
| GS | 40.5% | -52% | NA | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 8.7% | None | NA | | | -25% | NA |
| US | 38.4% | None | NA | | | 0% | NA |

**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 1985-1992 average stock index. The Nooksack model stock does provide harvest distribution information that can also be used to estimate the 1985 stock index target, but the lack of terminal run data (used for model calibration) make the estimated rebuilding date from the model unusable.

For many years, conservation measures have been taken in Puget Sound recreational and commercial fisheries 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 intent of these efforts is to minimize impacts on the maturing component of the run.

The Skagit spring stock has failed to achieve its escapement objectives for three consecutive years. This triggered a PFMC review which 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).

This stock 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 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 Probably Not Rebuilding or Not Rebuilding, with recent year average escapements less than 70% of goal. The model currently predicts that only one of the three stocks, Stillaguamish, will rebuild by 1998, and even this prediction is likely optimistic. The stock index indicates that the 1985 target has been met in WCVI fishery, although not in GS fisheries, where much of this stock group is harvested. Harvest rates in nonceiling and terminal fisheries have also been reduced, by 5% and 25-43%, respectively. On average, the U.S. nonceiling fishery index has been reduced by 3%, although from 1990-1992 this index was 17% above the base period level. Despite these reductions, brood exploitation rates in ocean fisheries alone remain near the MSY ER level. If terminal harvests were included in the escapement rate assessment, total exploitation rates would likely exceed the MSY ER. This stock group has experienced extremely poor survival, with recent brood survival less than 10% of base period levels. Abundance has been gradually declining since the early 1980s to below base period levels. Given the poor survival and low abundance of this group, additional harvest restrictions and/or other management measures will be needed to rebuild by 1998.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Skagit Sum/Fall | 0.57 | Prob Not Reb | 14,900 | 89% | 69% | Skagit | 86% |
| Stillaguamish | 0.63 | Prob Not Reb | 2,000 | 41% | 54% | Stillaguamish | 1998 |
| Snohomish | 0.75 | Not Rebuild | 5,250 | 96% | 62% | Snohomish | 84% |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

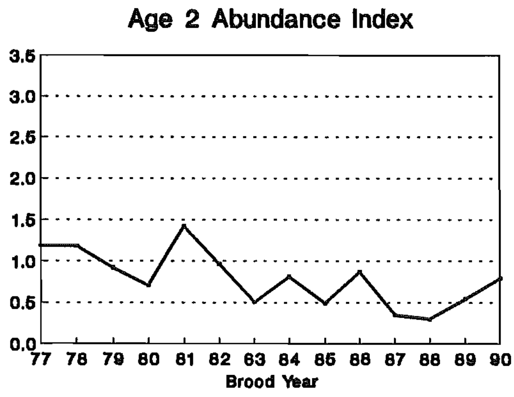
| PSC Chinook Model | | Exploitation Rate Assessment (NPS-S/F Stock Group) | | |
|---|---|---|---|---|
| Indicator Stocks | MSY ER | Type | Brood Exploitation Rates Base 1976-1979 | Brood Exploitation Rates Rebuilding 1982-1988 |
| Skagit | 0.45 | Ocean | 0.58 | 0.55 |
| Stillaguamish | 0.60 | Total | NR | NR |
| Snohomish | 0.59 | | | |

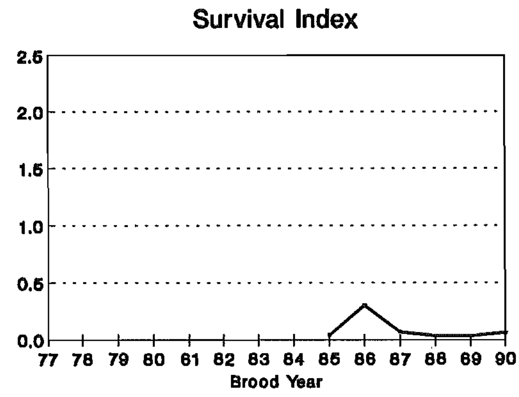
**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

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

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 2.5% | -22% | NA | -22% | -13% | | |
| NCBC | 3.8% | -16% | NA | -16% | -24% | | |
| WCVI | 24.2% | -24% | -37% | -24% | -21% | | |
| GS | 23.7% | -29% | -11% | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 6.5% | None | NA | | | -25% | NA |
| US | 39.2% | None | -5% | | | 0% | -3% |

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. However, the increased Stillaguamish escapement may result from a natural stock supplementation program conducted in this system.

While terminal harvest rates have declined substantially for this stock 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 is probably inaccurate. Better estimates of terminal and preterminal harvest of this stock group would be very useful.

The Stilliguamish and Snohomish summer/fall stocks have failed to achieve their escapement objectives for three consecutive years. This triggered a PFMC review which 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).

This stock 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 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. Although escapement declined in 1992, falling slightly below the escapement goal, the stock is still classified as Above Goal. 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 18 percentage points since the base period.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Green | 1.12 | Above Goal | 5,800 | 99% | 131% | P Sound Finglng | NR |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

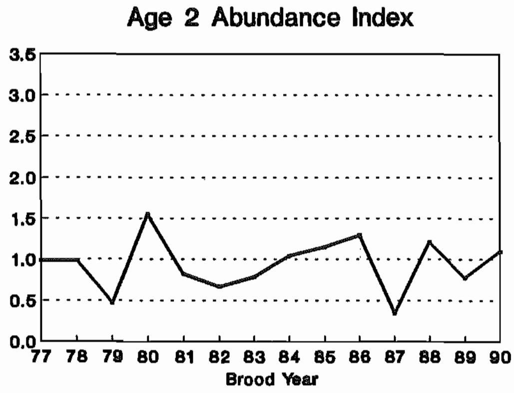
| PSC Chinook Model | | Exploitation Rate Assessment (SPS Stock Group) | | |
|---|---|---|---|---|
| | | | Brood Exploitation Rates | |
| Indicator Stocks | MSY ER | Type | Base 1976-1979 | Rebuilding 1982-1988 |
| P Sound Finglng | NR | Ocean | 0.73 | 0.55 |
| | | Total | NR | NR |

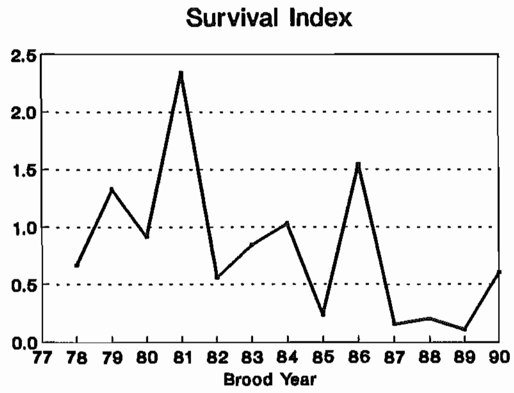
**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

Exploitation Rate Assessment (SPS Stock Group)

| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 0.4% | Low incidence | | -22% | -13% | | |
| NCBC | 1.9% | -16% | NA | -16% | -24% | | |
| WCVI | 21.2% | -24% | -26% | -24% | -21% | | |
| GS | 11.1% | -32% | -39% | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 4.4% | None | NA | | | -25% | Above |
| US | 61.1% | None | 11% | | | 0% | Goal |

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 1991 Annual Report (CTC 1992), returns per spawner declined substantially in 1992, and escapements fell below goal for the first time since 1986. Continued poor survival is predicted for the next few years.

Like the NPS-S/F stock group, 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 many other stocks.

### 5.3.12 Columbia River Upriver Spring (CUS)

***Synopsis.*** *This stock group is classified as Probably Not Rebuilding. Although the 1992 ocean escapement of 28,700 adult wild Columbia Upriver Springs was an improvement over the record low return in 1991, the 1992 terminal run was only 650 fish above the base period average escapement. Although the terminal harvest rate index has increased compared to base period levels, very little harvest occurred in the base period, and the index reflects little additional harvest. There have been no inriver commercial fisheries targeting upriver spring chinook since 1977, and recent inriver harvest rates have typically been less than 10%. Recent spawning escapements (1990-1992) have declined from base period levels despite these severe restrictions on terminal harvest. A lack of ocean tag recoveries may also indicate low exploitation rates in intensively sampled ocean fisheries. The Snake River component of Columbia Upriver Springs has been listed (with Snake River summers) as threatened under the U.S. Endangered Species Act (ESA). To rebuild Columbia Upriver Springs, actions which substantially increase inriver survival and production will be required.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

| Escapement Indicator Stocks | | | | | | PSC Chinook Model | |
|---|---|---|---|---|---|---|---|
| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | 1990-1992 | Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
| Col UpR Spr | 1.65 | Prob Not Reb | 84,000 | 33% | 25% | None | |

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

**Comments.** No exploitation rate or model information is available for this stock group due to very few tag recoveries in ocean fisheries. Some components of this stock have been tagged at levels of 300,000 juveniles for several years. Either increased tagging levels or improved juvenile survival rates will be needed to obtain sufficient CWT recoveries to assess these stocks.

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

***Synopsis.*** *Stocks in this group benefitted from greater than average survivals for the 1983 and 1984 broods which subsequently resulted in large increases in abundance. This increase in abundance helped reduce exploitation rates in the ceiling fisheries (ocean brood exploitation rates have been reduced by 5 percentage points or 12%), increase the allowable harvest in terminal fisheries, and increase escapements. All of the stocks with goals (except Columbia Upriver Summers) are classified as Above Goal or Probably Rebuilding. Survival rates have subsequently declined, and the survival index for the 1990 brood is predicted to be approximately 70% of the base period level. The Age 2 Abundance Index for recent broods has returned to near base period levels and the escapement floors for two stocks in this group (Hoh and Queets spring/suumer) were not achieved in 1992. Jack returns in 1993 indicate the survival rate for the 1991 brood of Upriver Brights is further reduced. The 1994 preliminary preseason prediction is for a river mouth run size which is 26% of the 1985-1992 average.*

*In contrast to other stocks within this group, recent escapements of Columbia Upriver Summers were only 23% of the escapement goal. Despite the absence of directed fisheries within the river (inriver harvest rates have not exceeded 4% since 1982), the 1992 Bonneville Dam count was the lowest since counts began in 1938, and the stock is predicted to achieve only 35% of its escapement goal by 1998 with the current management regime. In concert with harvest management, actions to substantially increase inriver survival and production will be necessary to rebuild Columbia Upriver Summers.*

**A. Analysis of Escapement, Terminal Harvest Rates, and Predicted Date of Rebuilding**

Escapement Indicator Stocks

| Indicator Stocks | 1985-1992 Terminal HR Index | Status | Goal | % of Goal Base | % of Goal 1990-1992 |
|---|---|---|---|---|---|
| Quillayute Sum | 0.67 | Above Goal | 1,200 | 104% | 103% |
| Grays Hbr Fall | 1.06 | Above Goal | 14,600 | 59% | 108% |
| Col UpR Bright | 1.79 | Above Goal | 40,000 | 71% | 124% |
| Lewis River | 1.03 | Above Goal | 5,700 | 228% | 192% |
| Grays Hbr Spr | 0.16 | Prob Rebuild | 1,400 | 32% | 110% |
| Col UpR Sum | 0.61 | Prob Not Reb | 85,000 | 27% | 23% |
| Quillayute Fall | 1.17 | NA | NA | NA | NA |
| Hoh Spr/Sum | 1.20 | NA | NA | NA | NA |
| Hoh Fall | 1.54 | NA | NA | NA | NA |
| Queets Spr/Sum | 1.10 | NA | NA | NA | NA |
| Queets Fall | 0.66 | NA | NA | NA | NA |
| Oregon Coastal | NA | NA | NA | NA | NA |

PSC Chinook Model

| Indicator Stocks | Year Rebuilt or % of Goal in 1998 |
|---|---|
| WA Coastal Wild | NA |
| Col UpR Sum | 35% |
| Col UpR Bright | 1983 |
| Lewis | 1979 |
| Oregon Coastal | NA |

**B. MSY Exploitation Rates and Brood Exploitation Rates**

PSC Chinook Model

| Indicator Stocks | MSY ER |
|---|---|
| Washington Coastal Wild | 0.79 |
| Columbia Upriver Summer | 0.23 |
| Columbia Upriver Bright | NR |
| Lewis | 0.84 |
| Oregon Coastal | NA |

Exploitation Rate Assessment (WACO Stock Group)

| Type | Brood Exploitation Rates: Base 1976-1979 | Brood Exploitation Rates: Rebuilding 1982-1988 |
|---|---|---|
| Ocean | 0.40 | 0.35 |
| Total | NR | NR |

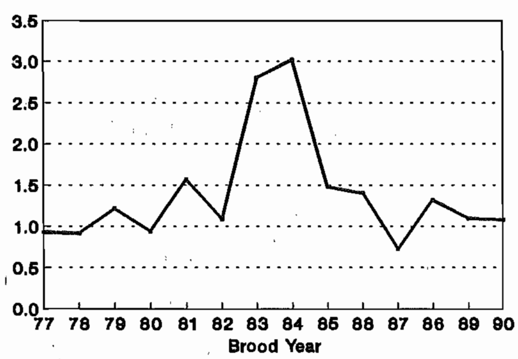
**C. Distribution of Fishing Mortality and Fishery Exploitation Rates**

Exploitation Rate Assessment (WACO Stock Group)

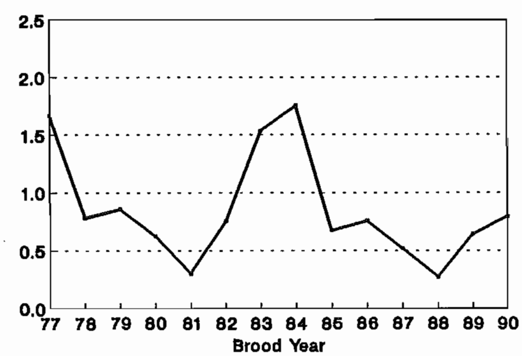
| Fishery | Distrib Total AEQ Mortality 1985-1992 | Stock Index 1985 Target | Stock Index 1985-1992 Mean | Fishery Index 1985 Target | Fishery Index 1985-1992 Mean | Nonceiling Index Target | Nonceiling Index 1985-1992 Mean |
|---|---|---|---|---|---|---|---|
| Ceiling Fisheries | | | | | | | |
| SEAK | 33.1% | -22% | -2% | -22% | -13% | | |
| NCBC | 23.8% | -16% | -2% | -16% | -24% | | |
| WCVI | 25.5% | -24% | 0% | -24% | -21% | | |
| GS | 0.6% | Low incidence | | -47% | -22% | | |
| Nonceiling Fisheries | | | | | | | |
| Canada | 2.5% | None | NA | | | -25% | NA |
| US | 14.5% | None | NA | | | 0% | -39% |

**D. Abundance and Survival Indices**

Age 2 Abundance Index




Survival Index




**Comments.** The Snake River component of the Columbia Upriver Summers has been listed as threatened (with Snake River springs) and the Mid-Columbia component has been petitioned for listing under the U.S. ESA. Snake River fall chinook have also been listed as threatened under the U.S. ESA. Snake River chinook are subject to extremely high freshwater nonfishing mortality and upriver migration mortality of Snake River fall chinook has resulted in an average passage loss of 66% (1988-1992). The CTC uses Lyons Ferry Hatchery CWT releases of fingerling, nontransported fall chinook to represent Snake River wild fall chinook in both the exploitation rate assessment and the PSC chinook model.

In the model, a single stock is used to represent mid-Columbia bright hatchery production, Priest Rapids Hatchery production and natural stock production. The MSY ER for the Columbia Upriver Bright stock is not representative because the escapement goal used in the model is for only the natural stock component.

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# APPENDIX A

## Tables of Escapements and Terminal Runs

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1992.

| Year | Southeast Alaska | | | | | |
|---|---|---|---|---|---|---|
| | Situk esc. | Situk t.run | King Salmon esc. | Andrew esc. | Blossom esc. | Keta esc. |
| 1975 | 1510 | 2099 | 53 | 416 | 234 | 325 |
| 1976 | 1433 | 2676 | 81 | 404 | 109 | 134 |
| 1977 | 1732 | 2833 | 168 | 456 | 179 | 368 |
| 1978 | 814 | 1456 | 71 | 388 | 229 | 627 |
| 1979 | 1400 | 2735 | 89 | 327 | 86 | 682 |
| 1980 | 905 | 2284 | 88 | 282 | 142 | 307 |
| 1981 | 702 | 1752 | 113 | 536 | 254 | 526 |
| 1982 | 434 | 772 | 286 | 672 | 552 | 1206 |
| 1983 | 592 | 1043 | 245 | 366 | 942 | 1315 |
| 1984 | 1726 | 2439 | 250 | 389 | 813 | 976 |
| 1985 | 1521 | 2597 | 171 | 510 | 1134 | 998 |
| 1986 | 2067 | 2393 | 245 | 1131 | 2045 | 1104 |
| 1987 | 1884 | 2698 | 193 | 1261 | 2158 | 1229 |
| 1988 | 885 | 1453 | 206 | 760 | 614 | 920 |
| 1989 | 652 | 1081 | 238 | 848 | 550 | 1848 |
| 1990 | 700 | 1214 | 168 | 1062 | 411 | 970 |
| 1991 | 875 | 1865 | 134 | 640 | 382 | 435 |
| 1992 | 1400 | 2912 | 117 | 1245 | 240 | 347 |
| Goal | 600 | | 250 | 750 | 1280 | 800 |

| Year | Transboundary Rivers | | | | |
|---|---|---|---|---|---|
| | Alsek (Klukshu) esc. | Taku (6 stocks) esc. | Stikine (L.Tahltan) esc. | Unuk esc. | Chickamin esc. |
| 1975 | | 2089 | 1400 | 1469 | 558 |
| 1976 | 1153 | 4726 | 800 | 1469 | 147 |
| 1977 | 2894 | 5671 | 1600 | 1558 | 363 |
| 1978 | 2676 | 3305 | 1264 | 1770 | 290 |
| 1979 | 4274 | 4156 | 2332 | 922 | 224 |
| 1980 | 2487 | 7544 | 4274 | 1626 | 418 |
| 1981 | 1963 | 9786 | 6668 | 1170 | 614 |
| 1982 | 1969 | 4813 | 5660 | 2162 | 914 |
| 1983 | 2237 | 2062 | 1188 | 1800 | 922 |
| 1984 | 1572 | 3909 | 2588 | 2939 | 1763 |
| 1985 | 1283 | 7208 | 3114 | 1894 | 1530 |
| 1986 | 2607 | 7520 | 2891 | 3402 | 2683 |
| 1987 | 2491 | 5743 | 4783 | 3157 | 1560 |
| 1988 | 1994 | 8626 | 7292 | 2794 | 1258 |
| 1989 | 2289 | 9480 | 4715 | 1838 | 1494 |
| 1990 | 1742 | 12249 | 4392 | 946 | 902 |
| 1991 | 2248 | 10153 | 4506 | 1048 | 779 |
| 1992 | 1246 | 11058 | 6627 | 1400 | 554 |
| Goal | 4700 | 13200 | 5300 | 2880 | 1440 |

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1992 (continued).

| Year | Northern B.C. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | AREA 1 Yakoun esc. | AREA 3 Nass esc. | AREA 3 Nass t.run | AREA 4 Skeena esc. | AREA 4 Skeena t.run | AREA 6 Index | AREA 8 Index | AREA 9 Rivers Inlet | AREA 10 Smith 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 |
| Goal | 1580 | 15890 | | 41770 | | 5520 | 5450 | 4950 | 2110 |

| Year | Southern B.C. | | | | Fraser River | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | W. Coast Vancouver I. esc. | Lower Geo. Strait esc. | Lower Geo. Strait t.run | Upper Geo. Strait esc. | Upper Fraser esc. | Middle Fraser esc. | Thompson esc. | Fraser spr/sum t.run | Harrison esc. | Harrison 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 | 78038 | 81025 |
| 1988 | 5500 | 7040 | 9353 | 3300 | 34400 | 24164 | 47103 | 126894 | 35116 | 39487 |
| 1989 | 8480 | 6830 | 9389 | 6607 | 25310 | 15095 | 37975 | 107136 | 74685 | 75090 |
| 1990 | 5760 | 7635 | 10117 | 2200 | 35552 | 25510 | 41704 | 132831 | 177375 | 180758 |
| 1991 | 5756 | 12895 | 16063 | 3276 | 27317 | 21170 | 36460 | 112524 | 90638 | 93472 |
| 1992 | 7300 | 10893 | 15165 | 5268 | 24330 | 24474 | 39406 | 105776 | 130310 | 132377 |
| Goal | 11665 | 22280 | | 5100 | 24460 | 21130 | 55710 | | 241700 | |

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1992 (continued).

| Year | Puget Sound | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Skagit spring | | Skagit sum/fall | | Stillaguamish | | Snohomish | | Green | |
| | esc | t.run | esc | t.run | esc | t.run | esc | t.run | esc | t.run |
| 1975 | 803 | 803 | 11555 | 24625 | 1198 | 1635 | 4485 | 6123 | 3394 | 6217 |
| 1976 | 812 | 812 | 14479 | 23306 | 2140 | 4002 | 5315 | 9889 | 3140 | 7679 |
| 1977 | 1049 | 1049 | 9497 | 17693 | 1475 | 2549 | 5565 | 9618 | 3804 | 5339 |
| 1978 | 1220 | 1220 | 13209 | 20030 | 1232 | 1959 | 7931 | 12591 | 3304 | 4337 |
| 1979 | 968 | 968 | 13605 | 21243 | 1042 | 2366 | 5903 | 12706 | 9704 | 10725 |
| 1980 | 1803 | 1803 | 20345 | 28938 | 821 | 2647 | 6460 | 16688 | 7743 | 10537 |
| 1981 | 1250 | 1250 | 8670 | 19675 | 630 | 2783 | 3368 | 8968 | 3606 | 4898 |
| 1982 | 965 | 965 | 10439 | 21022 | 773 | 3058 | 4379 | 8470 | 1840 | 3822 |
| 1983 | 710 | 710 | 9080 | 14671 | 387 | 925 | 4549 | 10386 | 3679 | 13244 |
| 1984 | 747 | 747 | 13239 | 15005 | 374 | 883 | 3762 | 8480 | 3353 | 5339 |
| 1985 | 3249 | 3249 | 16298 | 25075 | 1409 | 2641 | 4873 | 9005 | 2908 | 7417 |
| 1986 | 1978 | 1978 | 18127 | 21585 | 1277 | 2416 | 4534 | 8267 | 4792 | 5770 |
| 1987 | 1979 | 1979 | 9647 | 13037 | 1321 | 1906 | 4689 | 6670 | 10338 | 11666 |
| 1988 | 2064 | 2064 | 11954 | 14647 | 717 | 1176 | 4513 | 7389 | 7994 | 9185 |
| 1989 | 1515 | 1924 | 6776 | 12787 | 811 | 1642 | 3138 | 6142 | 11512 | 14993 |
| 1990 | 1592 | 1627 | 17206 | 19172 | 842 | 1739 | 4209 | 8345 | 7035 | 15200 |
| 1991 | 1411 | 1448 | 6014 | 8425 | 1632 | 2913 | 2783 | 4964 | 10548 | 14971 |
| 1992 | 1001 | 1013 | 7671 | 9164 | 780 | 1253 | 2708 | 4316 | 5267 | 9961 |
| 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 | |
| | esc. | t.run | esc | t.run | esc | t.run | esc | t.run | esc | t.run | esc | t.run | esc | t.run | esc. | t.run |
| 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 | 3900 | 5300 | 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 | 1600 | 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 | 11100 | 2100 | 2400 | 26400 | 56000 |
| 1990 | 1500 | 1900 | 13700 | 16800 | 3900 | 5700 | 4200 | 6400 | 1800 | 2500 | 10100 | 12300 | 1600 | 1700 | 17500 | 39600 |
| 1991 | 1200 | 1500 | 6300 | 7600 | 1100 | 1800 | 1400 | 2600 | 600 | 800 | 4500 | 5900 | 1300 | 1500 | 13600 | 29500 |
| 1992 | 1000 | 1300 | 6300 | 7900 | 800 | 1400 | 4000 | 5200 | 400 | 500 | 4700 | 6400 | 1700 | 1800 | 16200 | 30300 |
| Goal | 1200 | | NA | | NA | | NA | | NA | | NA | | 1400 | | 14600 | |

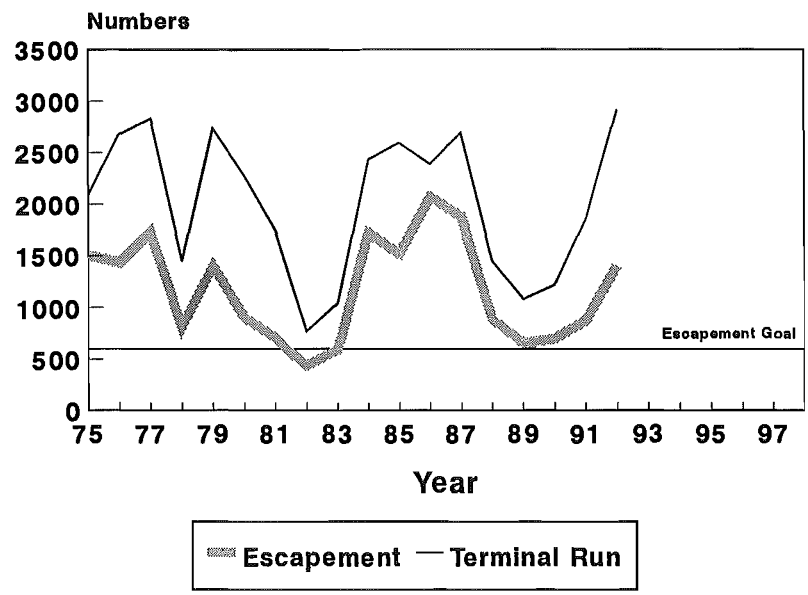
Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1992 (continued).

| Year | Columbia River | | | | | | | | Oregon |
|---|---|---|---|---|---|---|---|---|---|
| | Col. Upriver spring | | Col. Upriver summer | | Col. Upriver bright | | Lewis River | | Oregon Coastal |
| | esc. | t.run | esc. | t.run | esc. | t.run | esc. | t.run | Index esc. |
| 1975 | | | 33000 | 33000 | 29600 | 112500 | 13859 | 36800 | 60 |
| 1976 | | | 26600 | 26700 | 28800 | 115100 | 3371 | 14900 | 50 |
| 1977 | 64900 | 92700 | 33300 | 34300 | 37600 | 95100 | 6930 | 29800 | 73 |
| 1978 | 89600 | 95300 | 37600 | 38700 | 27300 | 85300 | 5363 | 18500 | 77 |
| 1979 | 22300 | 23300 | 26700 | 27800 | 31200 | 89200 | 8023 | 32700 | 90 |
| 1980 | 26700 | 27600 | 25800 | 27000 | 29900 | 76800 | 16394 | 38800 | 95 |
| 1981 | 31500 | 33700 | 21100 | 22400 | 21100 | 66600 | 19297 | 25000 | 81 |
| 1982 | 31700 | 34800 | 18800 | 20100 | 31100 | 79000 | 8370 | 13000 | 99 |
| 1983 | 23600 | 25200 | 17700 | 18000 | 48700 | 86100 | 13540 | 16800 | 49 |
| 1984 | 18600 | 20400 | 22100 | 22400 | 61000 | 131400 | 7132 | 13300 | 100 |
| 1985 | 27200 | 28800 | 22400 | 24200 | 90800 | 196400 | 7491 | 13300 | 133 |
| 1986 | 36500 | 39800 | 25500 | 26200 | 109900 | 281500 | 11983 | 24500 | 135 |
| 1987 | 41400 | 45000 | 30900 | 33000 | 149700 | 420600 | 12935 | 37900 | 131 |
| 1988 | 35100 | 40700 | 29000 | 31300 | 110400 | 340000 | 12059 | 41700 | 221 |
| 1989 | 27000 | 30000 | 28700 | 28800 | 92900 | 261100 | 21199 | 38600 | 151 |
| 1990 | 20100 | 22900 | 25000 | 25000 | 55200 | 153600 | 17506 | 20300 | 125 |
| 1991 | 15500 | 17300 | 18800 | 18900 | 44400 | 102100 | 9060 | 19900 | 169 |
| 1992 | 26500 | 28700 | 15000 | 15100 | 48800 | 80600 | 6307 | 12600 | 141 |
| Goal | 84000 | | 85000 | | 40000 | | 5700 | | NA |

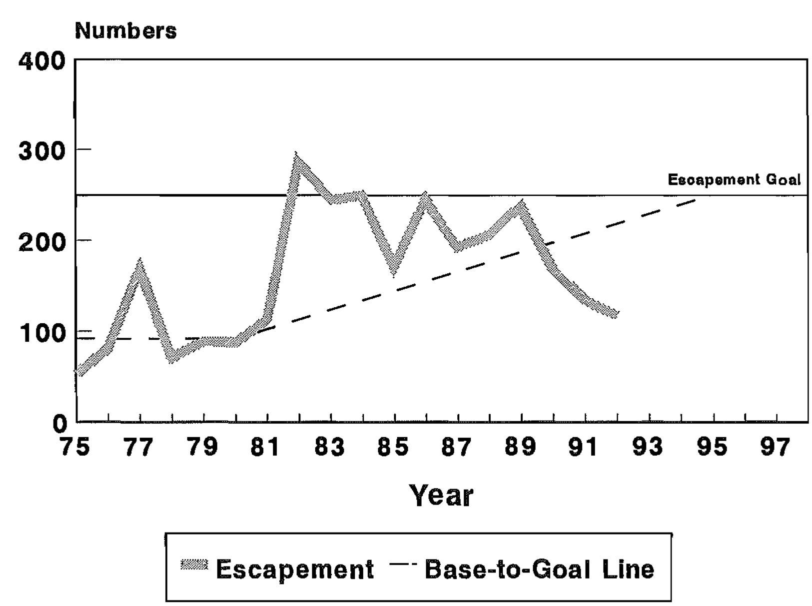
## APPENDIX B

### Stock Specific Chinook Escapement Figures

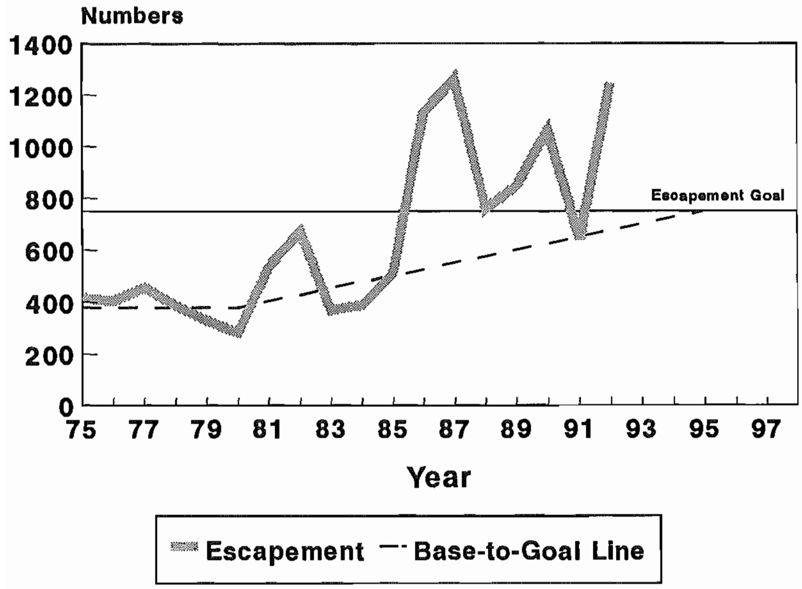
## Situk Chinook Escapements
### Above Goal



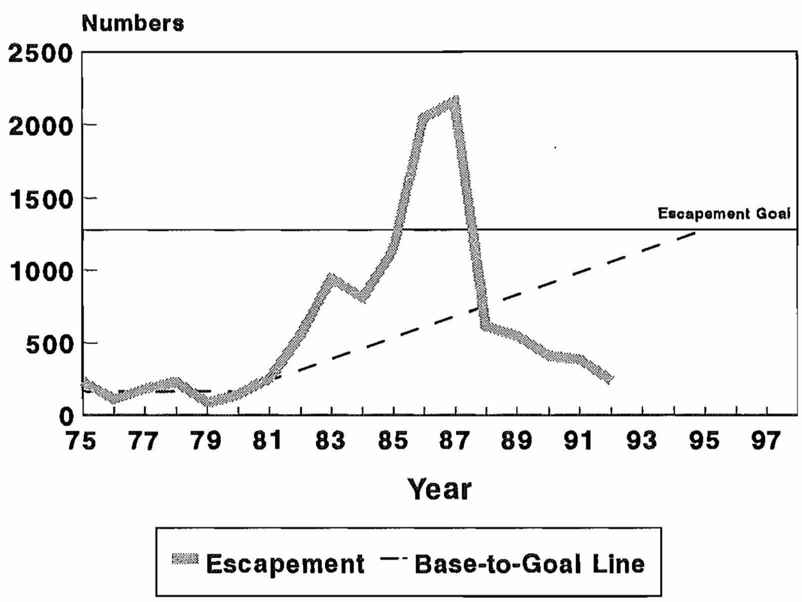

## King Salmon Chinook Escapements
### Probably Not Rebuilding



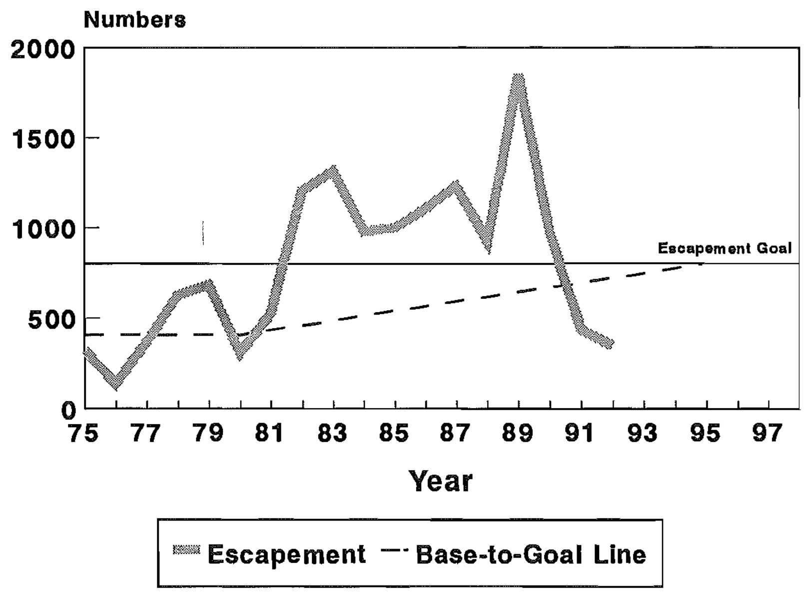
## Andrew Creek Chinook Escapements
### Above Goal



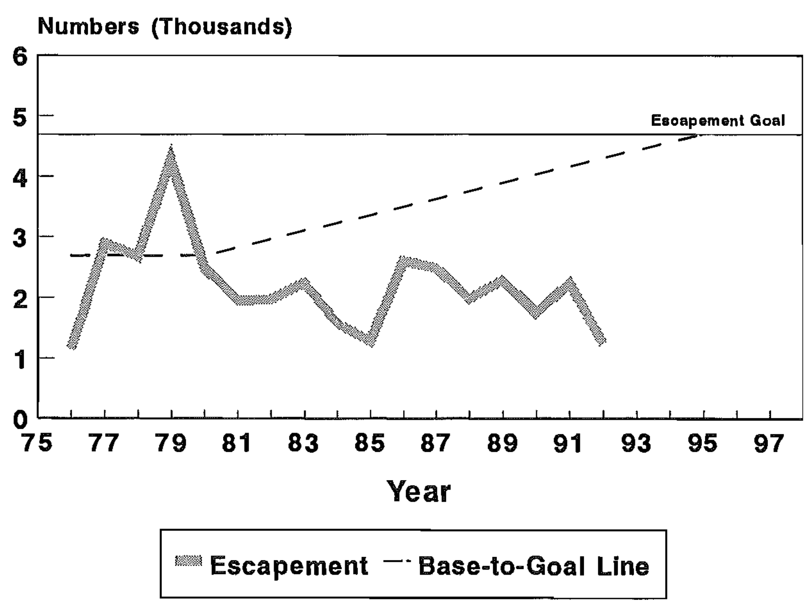

## Blossom River Chinook Escapements
### Probably Not Rebuilding

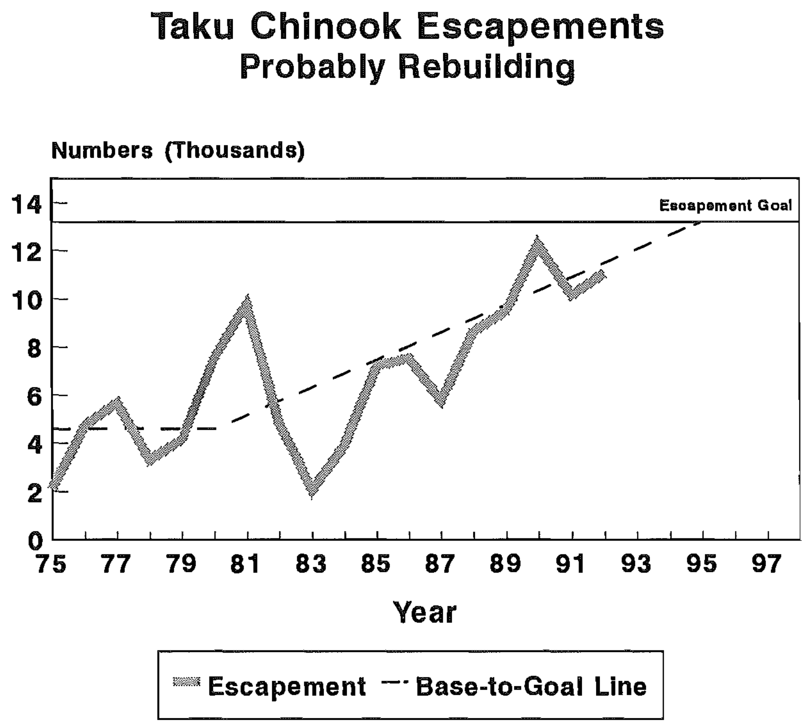


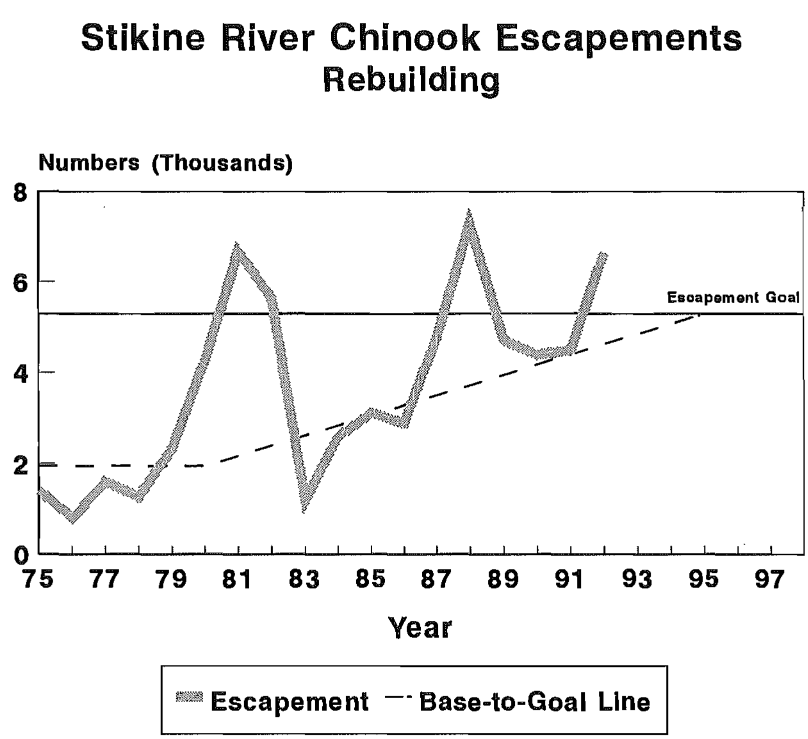
## Keta River Chinook Escapements
### Probably Not Rebuilding



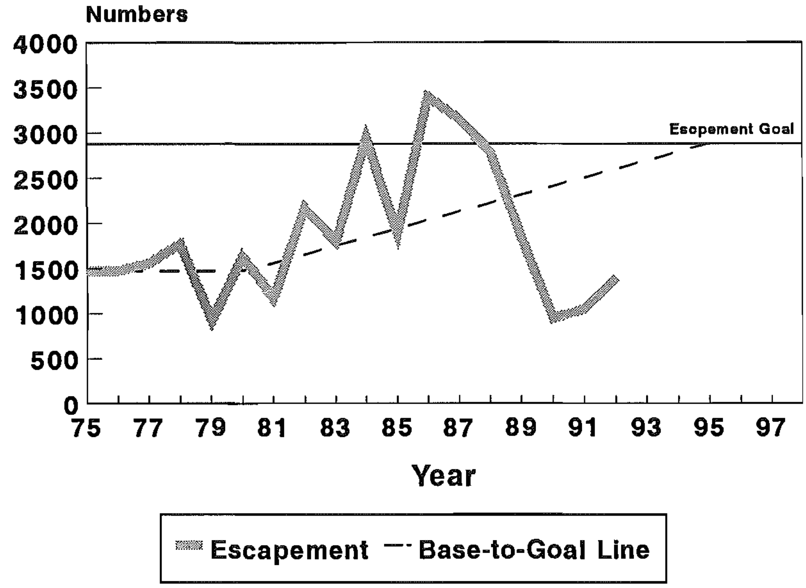

## Alsek R. Chinook Escapements
### Not Rebuilding



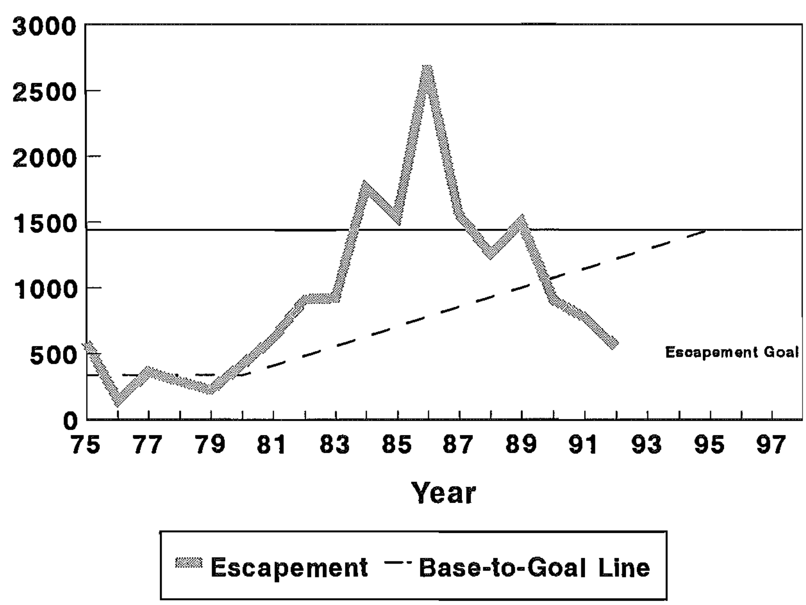

Taku Chinook Escapements
Probably Rebuilding
Numbers (Thousands)
14
12
10
8
6
4
2
0
Escapement Goal
75
77
79
81
83
85
87
89
91
93
95
97
Year
Escapement
Base-to-Goal Line

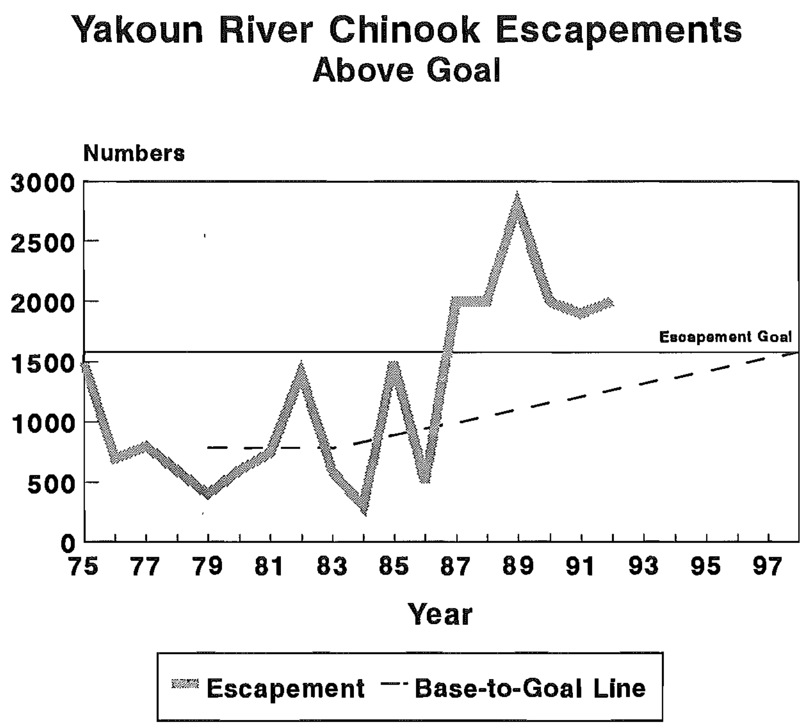

Stikine River Chinook Escapements
Rebuilding
Numbers (Thousands)
8
6
4
2
0
Escapement Goal
75
77
79
81
83
85
87
89
91
93
95
97
Year
Escapement
Base-to-Goal Line

## Unuk River Chinook Escapements
### Probably Not Rebuilding

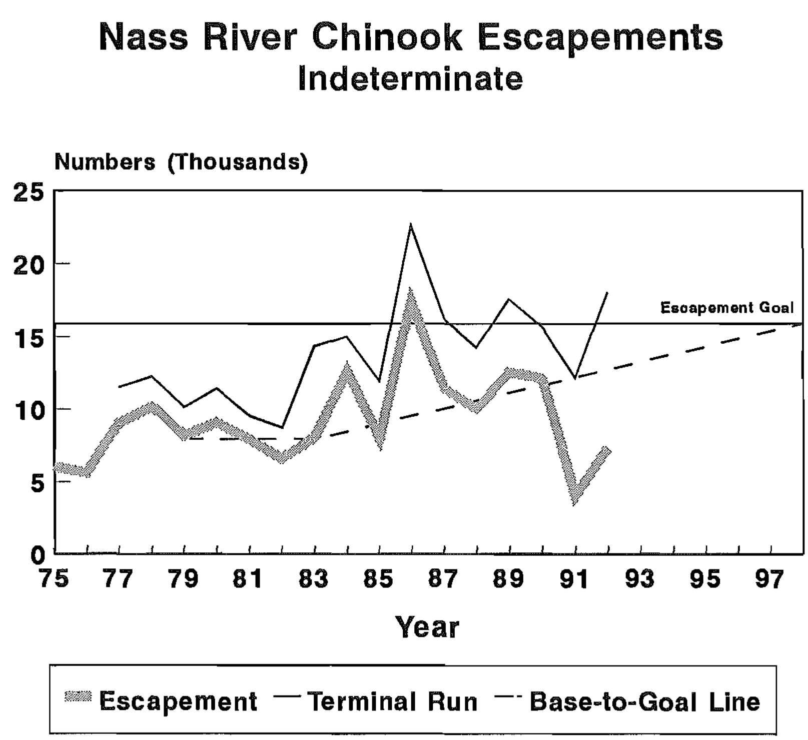



## Chickamin River Chinook Escapements
### Probably Not Rebuilding



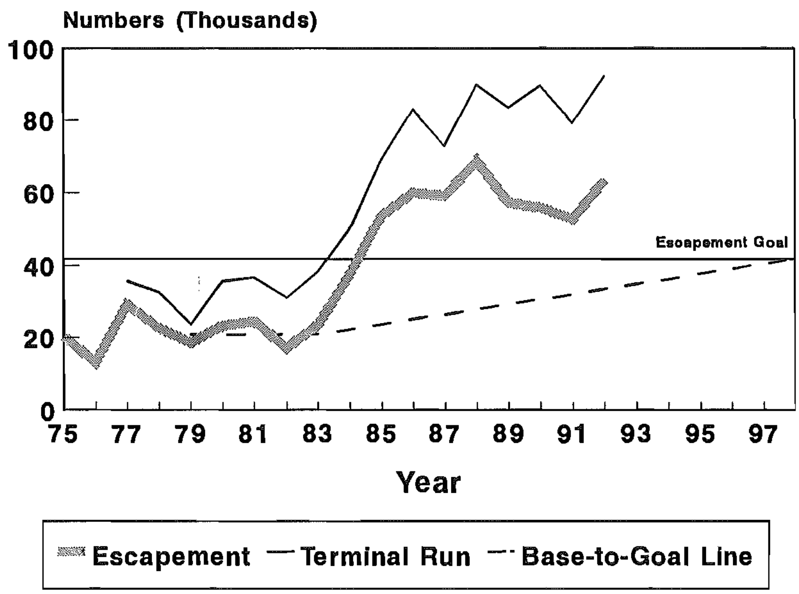


Yakoun River Chinook Escapements
Above Goal
Numbers
3000
2500
2000
1500
1000
500
0
Escapement Goal
75
77
79
81
83
85
87
89
91
93
95
97
Year
Escapement
Base-to-Goal Line

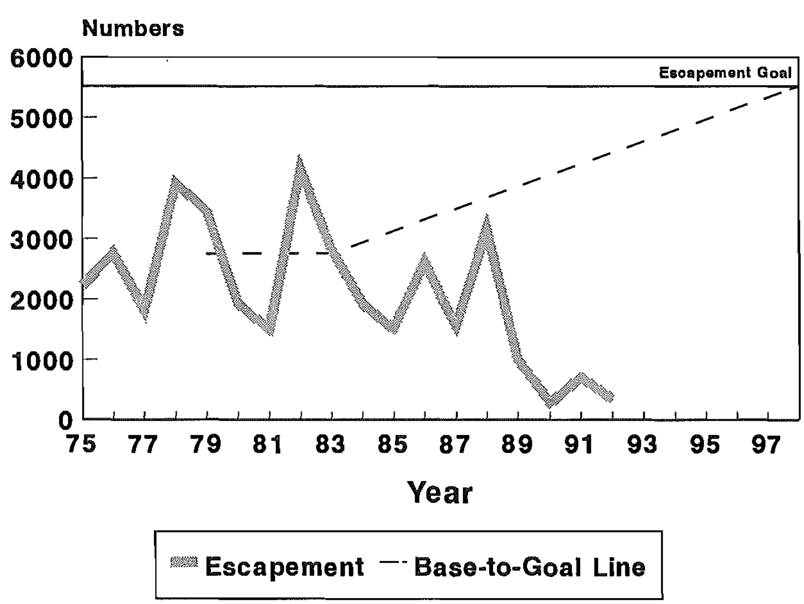



Nass River Chinook Escapements
Indeterminate
Numbers (Thousands)
25
20
15
10
5
0
Escapement Goal
75
77
79
81
83
85
87
89
91
93
95
97
Year
Escapement
Terminal Run
Base-to-Goal Line

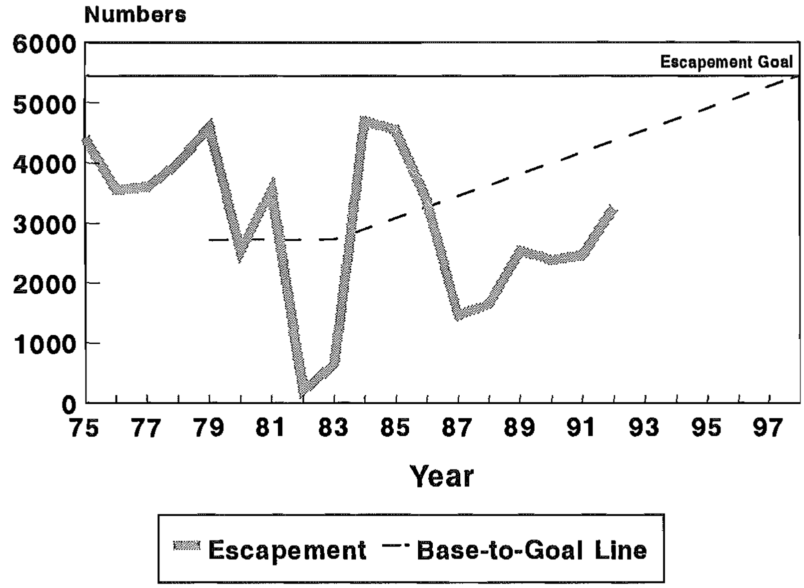
## Skeena River Chinook Escapements
### Above Goal



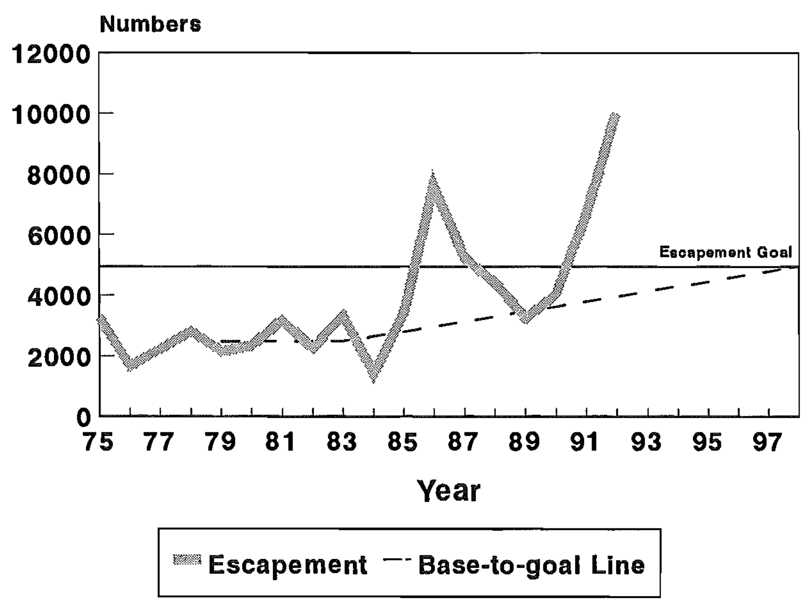

## Area 6 Index Chinook Escapements
### Not Rebuilding

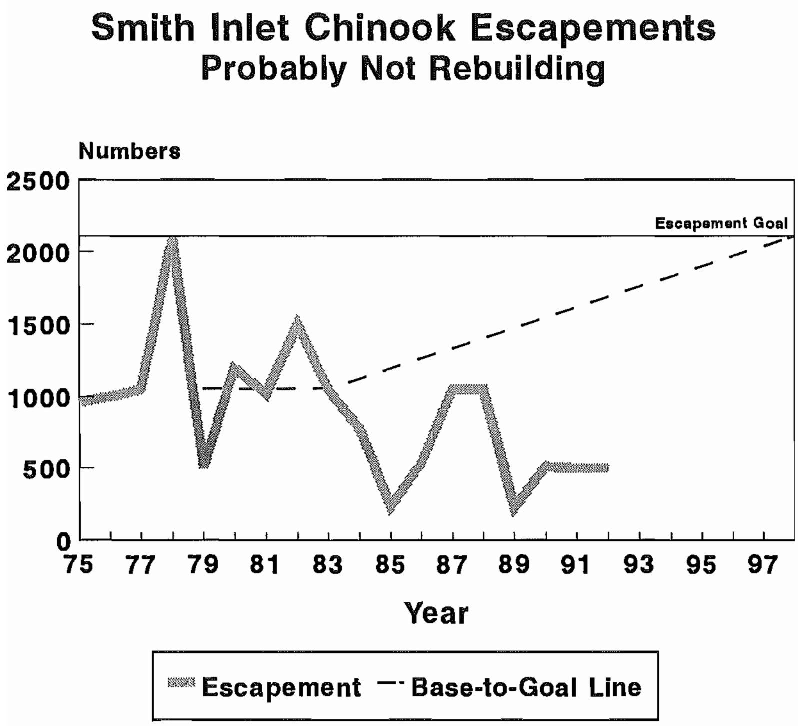


## Area 8 Index Chinook Escapements
### Probably Not Rebuilding

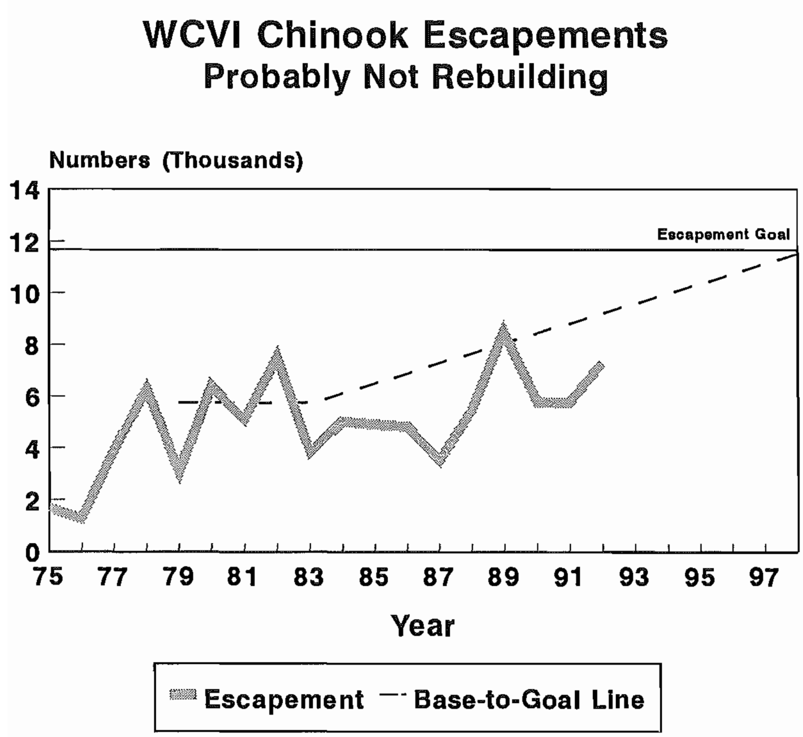



## Rivers Inlet Chinook Escapements
### Rebuilding



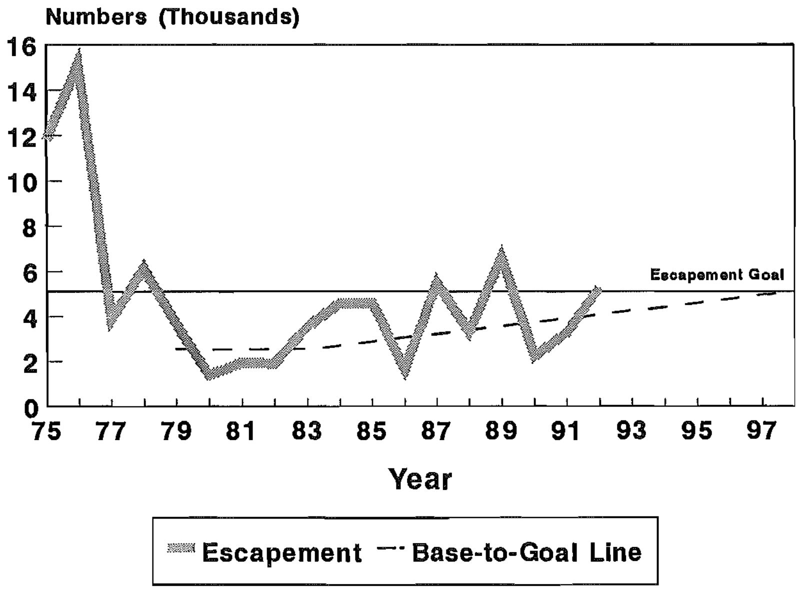


Smith Inlet Chinook Escapements
Probably Not Rebuilding
Numbers
2500
2000
1500
1000
500
0
Escapement Goal
75 77 79 81 83 85 87 89 91 93 95 97
Year
Escapement
Base-to-Goal Line

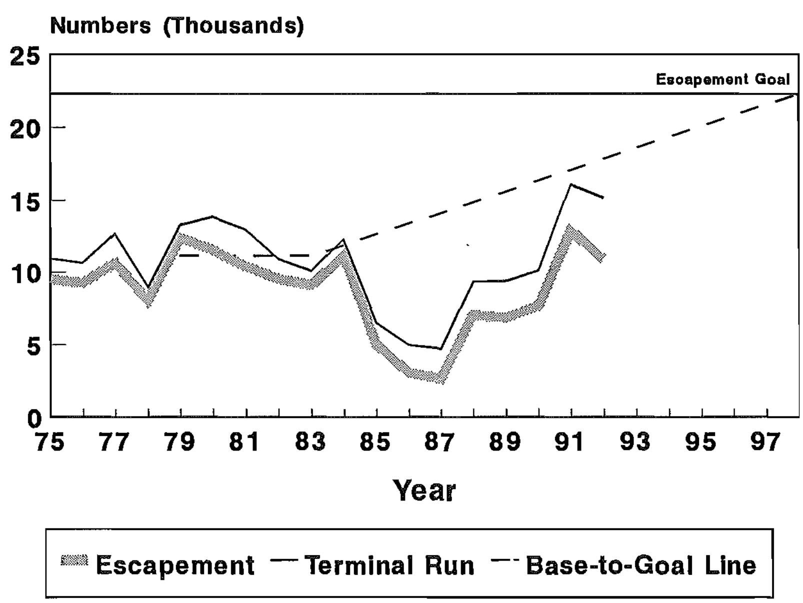



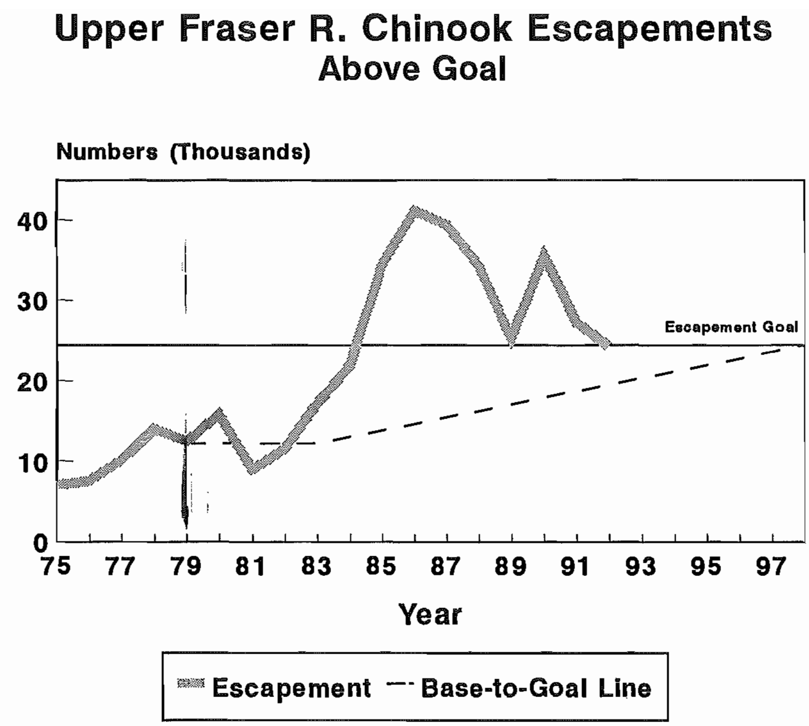
WCVI Chinook Escapements
Probably Not Rebuilding
Numbers (Thousands)
14
12
10
8
6
4
2
0
Escapement Goal
75 77 79 81 83 85 87 89 91 93 95 97
Year
Escapement
Base-to-Goal Line

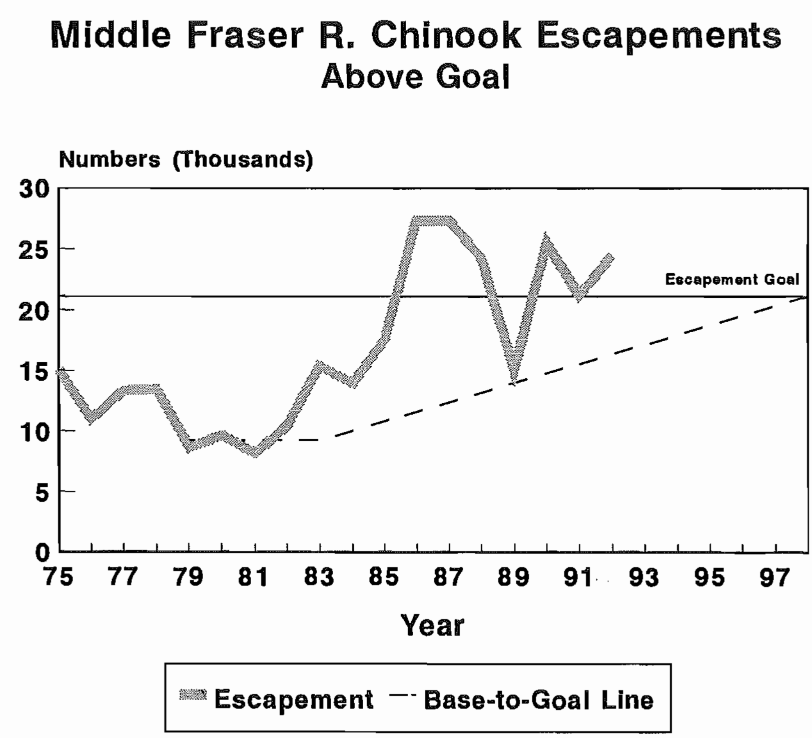
## Upper Georgia Str. Chinook Escapements
### Indeterminate

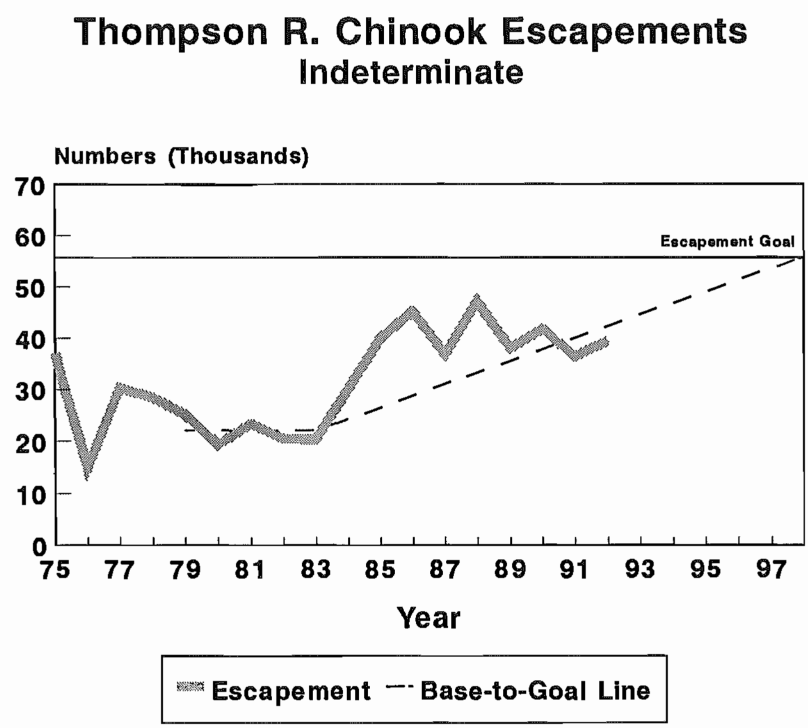


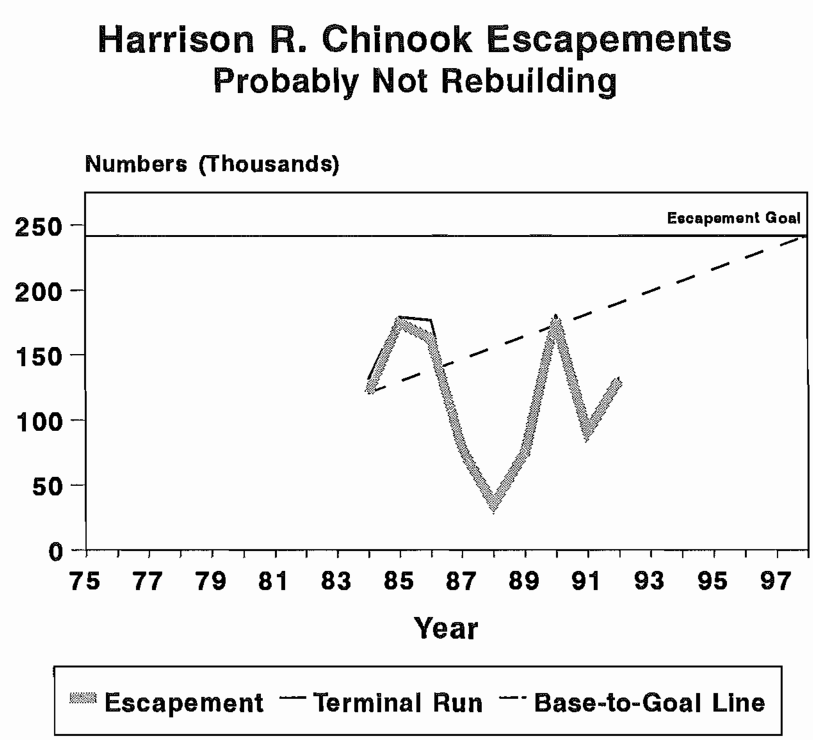

## Lower Georgia Str. Chinook Escapements
### Probably Not Rebuilding



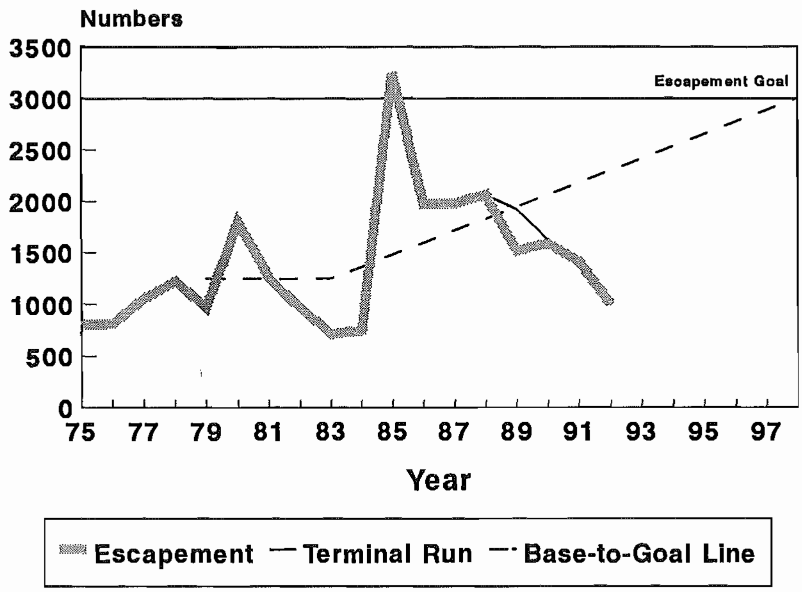

Upper Fraser R. Chinook Escapements
Above Goal
Numbers (Thousands)
40
30
20
10
0
Escapement Goal
75 77 79 81 83 85 87 89 91 93 95 97
Year
Escapement
Base-to-Goal Line


Middle Fraser R. Chinook Escapements
Above Goal
Numbers (Thousands)
30
25
20
15
10
5
0
Escapement Goal
75 77 79 81 83 85 87 89 91 93 95 97
Year
Escapement
Base-to-Goal Line

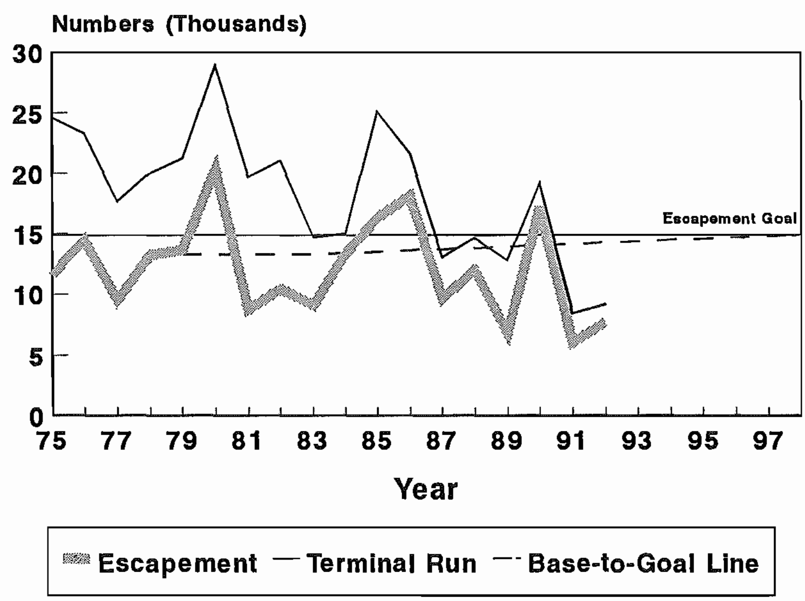

Thompson R. Chinook Escapements
Indeterminate
Numbers (Thousands)
70
60
50
40
30
20
10
0
Escapement Goal
75 77 79 81 83 85 87 89 91 93 95 97
Year
Escapement
Base-to-Goal Line


Harrison R. Chinook Escapements
Probably Not Rebuilding
Numbers (Thousands)
250
200
150
100
50
0
Escapement Goal
75 77 79 81 83 85 87 89 91 93 95 97
Year
Escapement
Terminal Run
Base-to-Goal Line

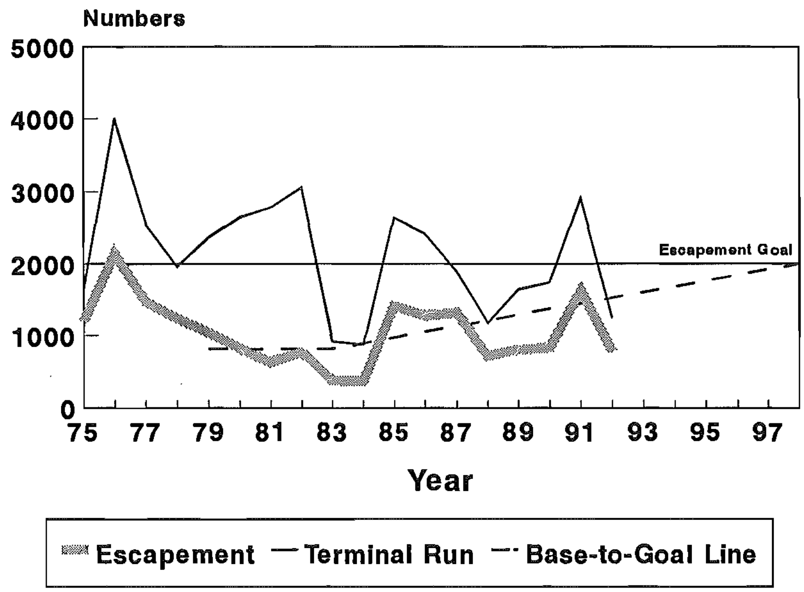
## Skagit Spring Chinook Escapements
### Probably Not Rebuilding



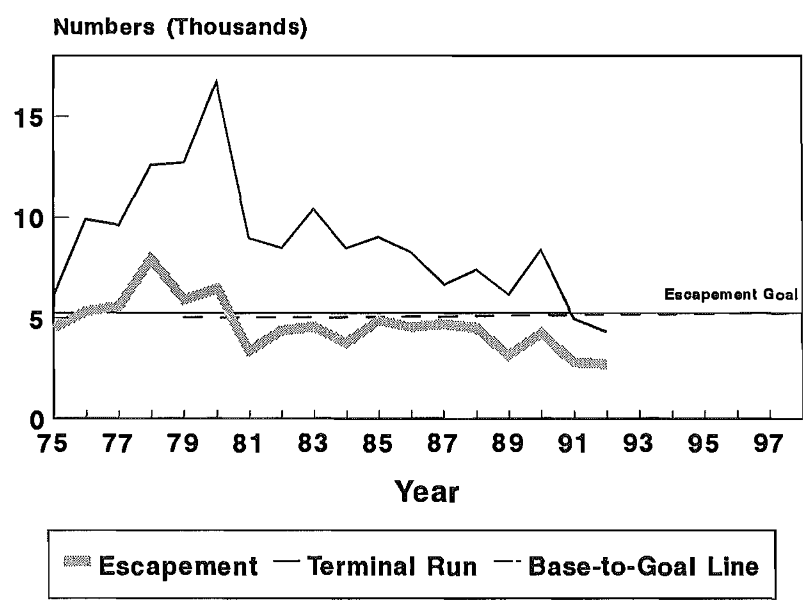

## Skagit Sum./Fall Chinook Escapements
### Probably Not Rebuilding



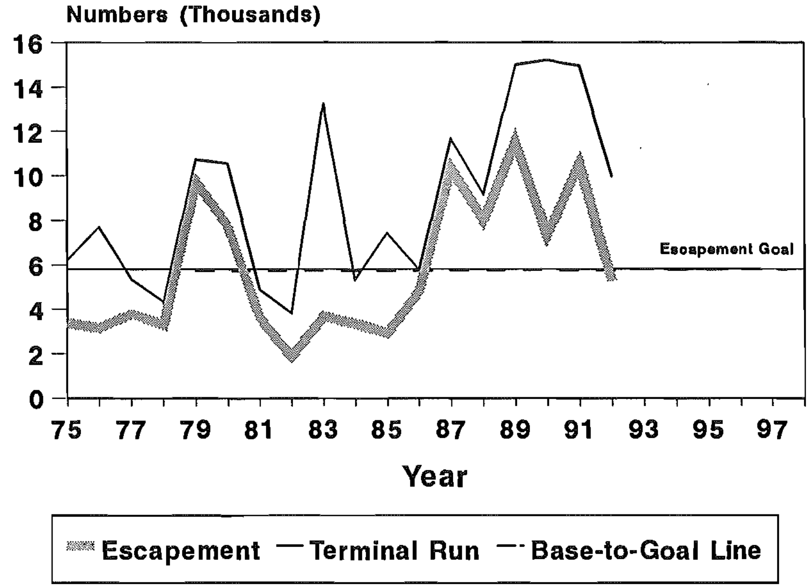
## Stillaguamish River Chinook Escapements
### Probably Not Rebuilding



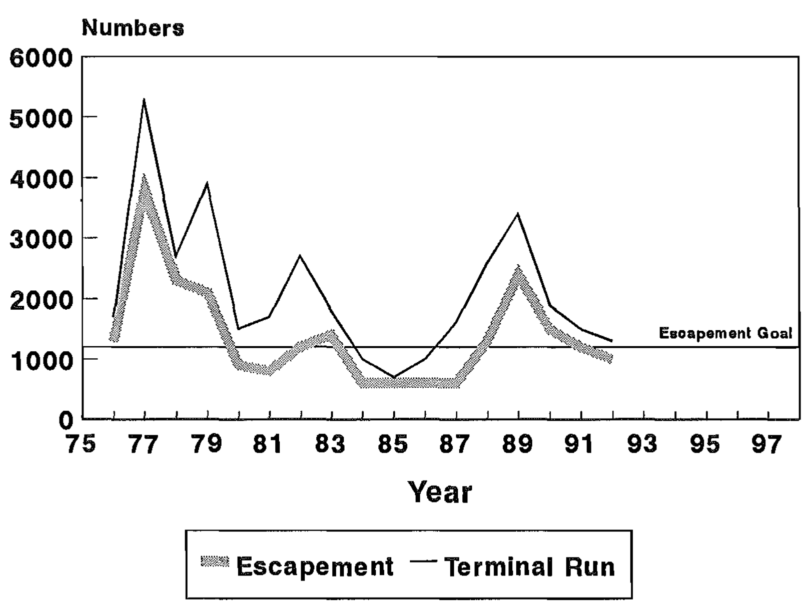

## Snohomish River Chinook Escapements
### Not Rebuilding



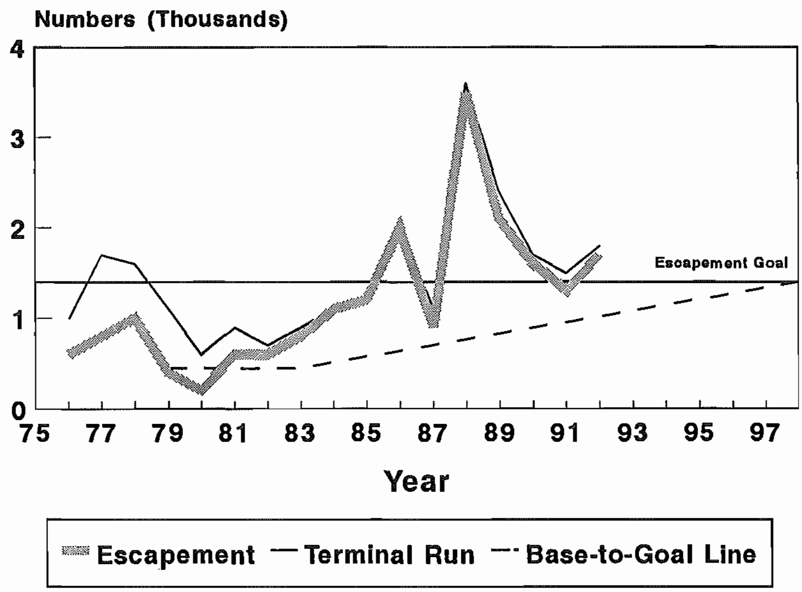
## Green River Chinook Escapements
### Above Goal



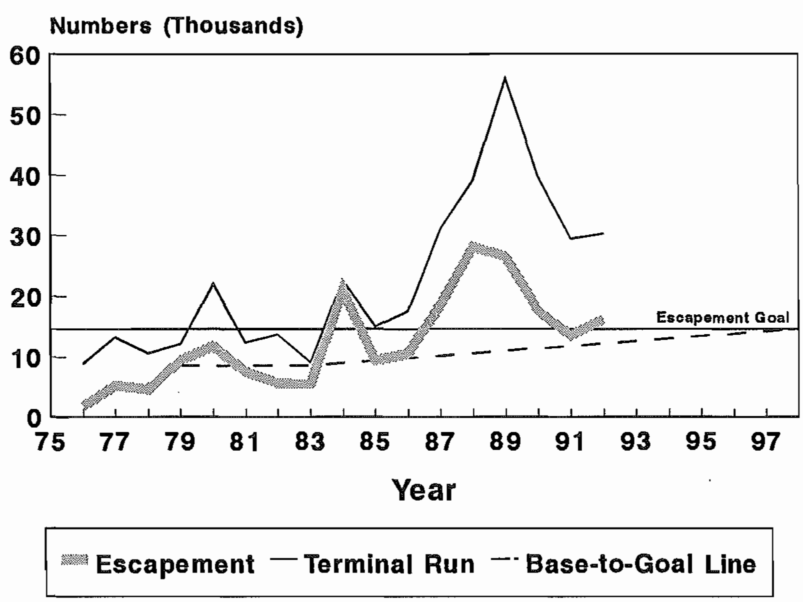

## Quillayute Summer Chinook Escapements
### Above Goal



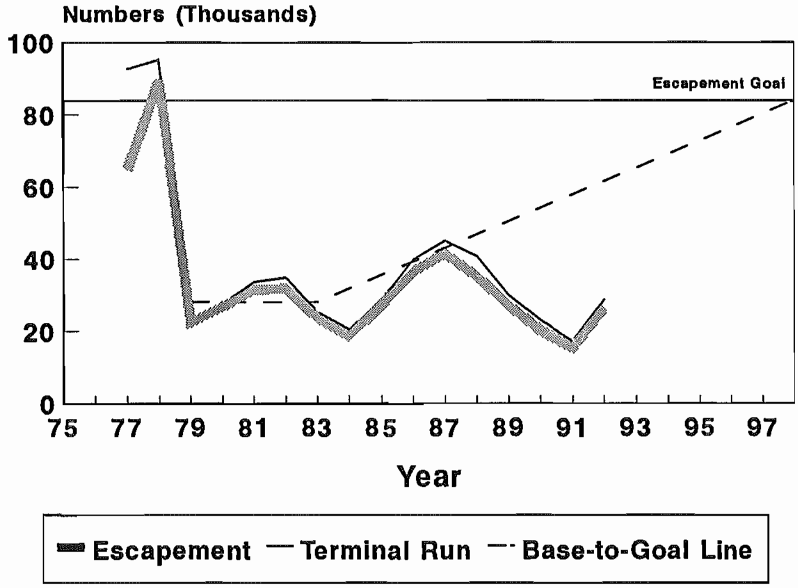
## Grays Harbor Spring Chinook Escapement
### Above Goal



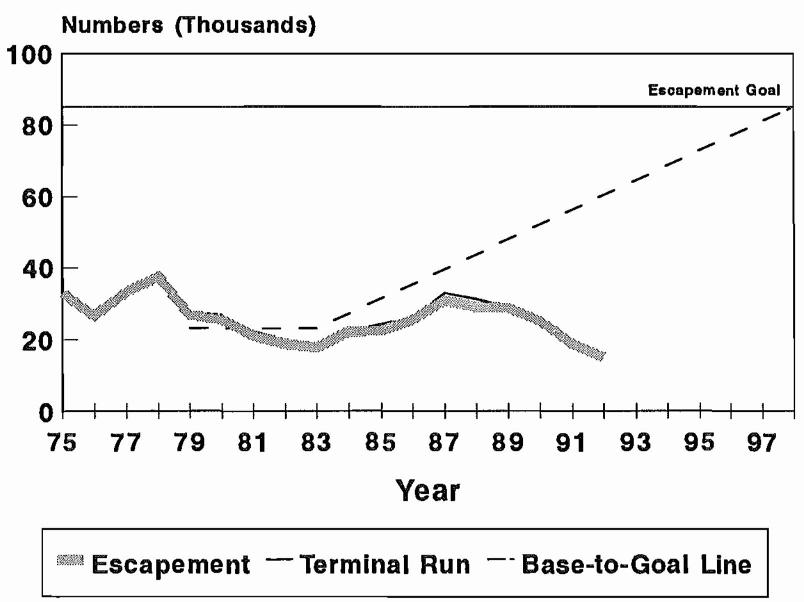

## Grays Harbor Fall Chinook Escapements
### Above Goal



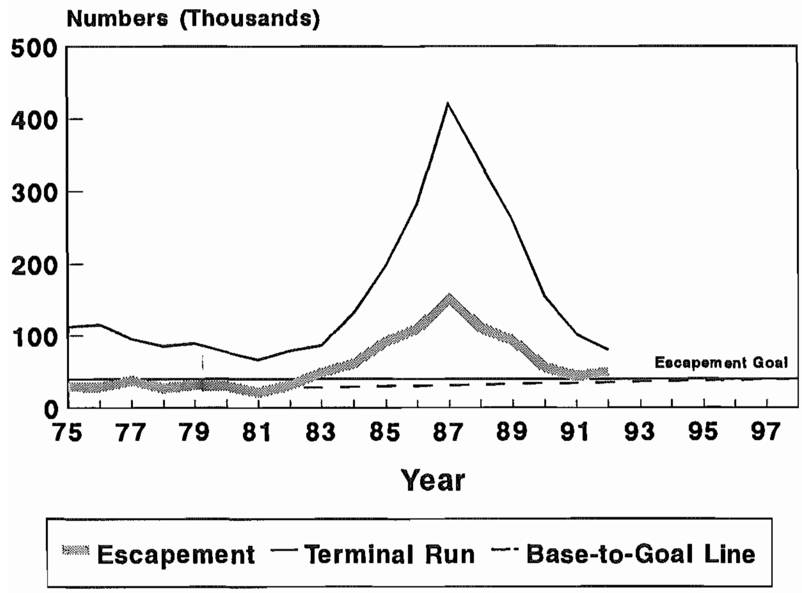
## Columbia R. Spring Chinook Escapements
### Probably Not Rebuilding



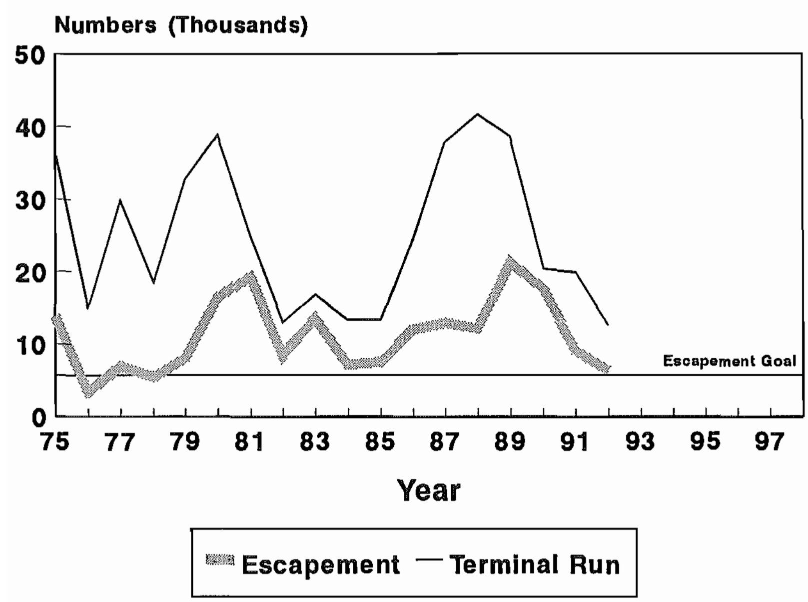

## Columbia R. Summer Chinook Escapements
### Probably Not Rebuilding



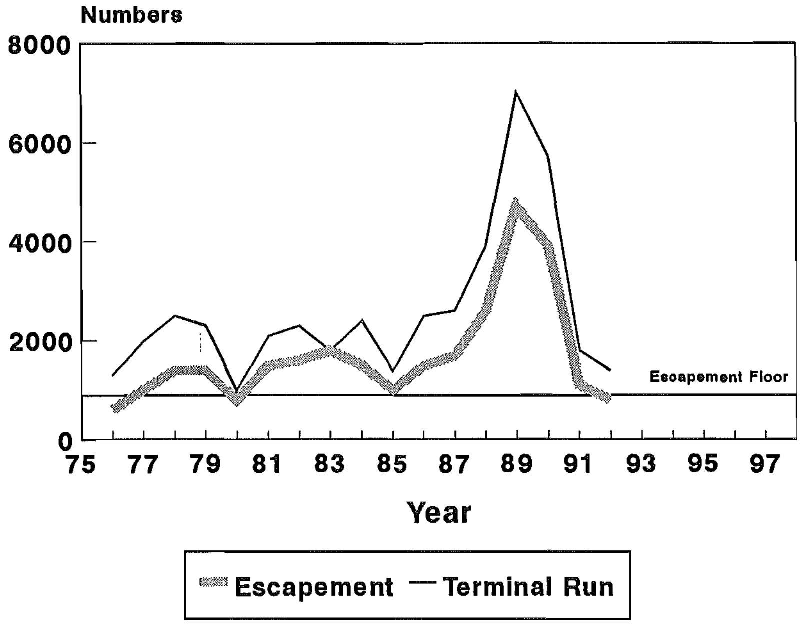
## Columbia R. Bright Chinook Escapements
### Above Goal



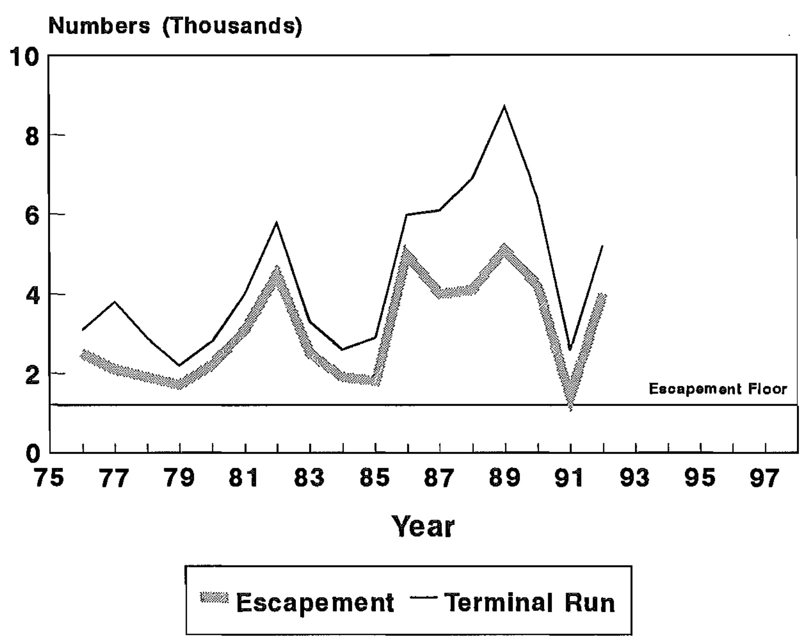

## Lewis R. Fall Chinook Escapements
### Above Goal

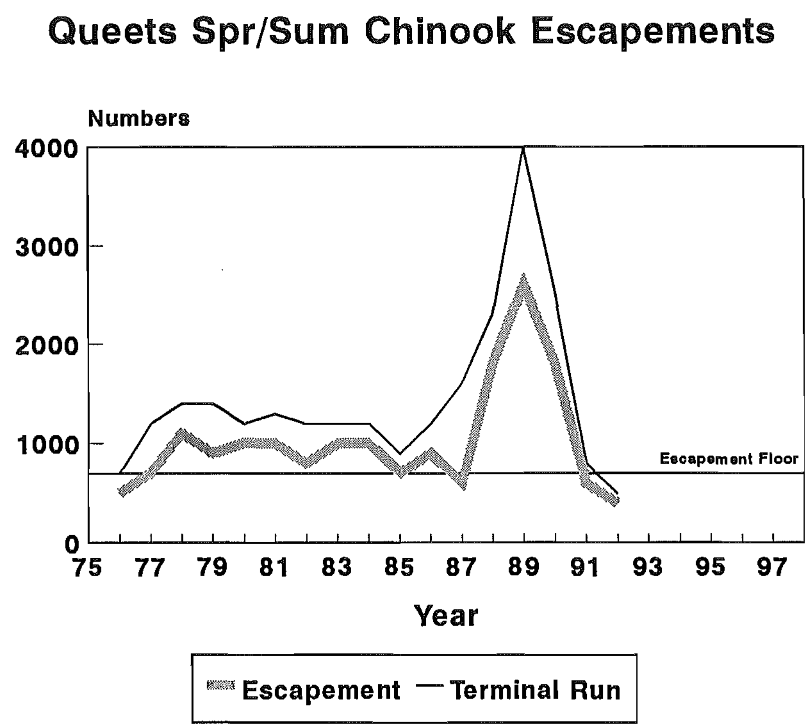


## Hoh Spr/Sum Chinook Escapements

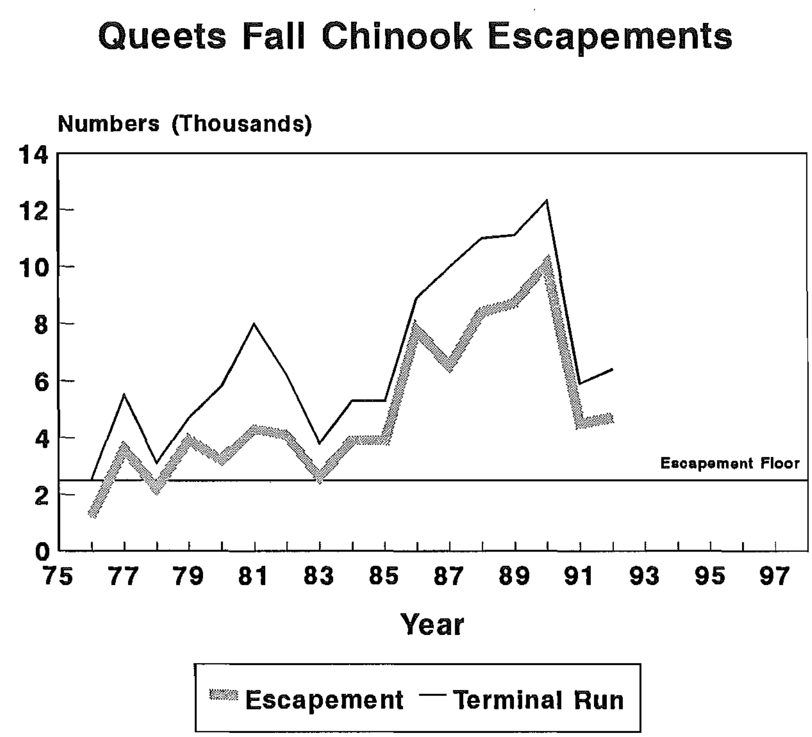



## Hoh Fall Chinook Escapements



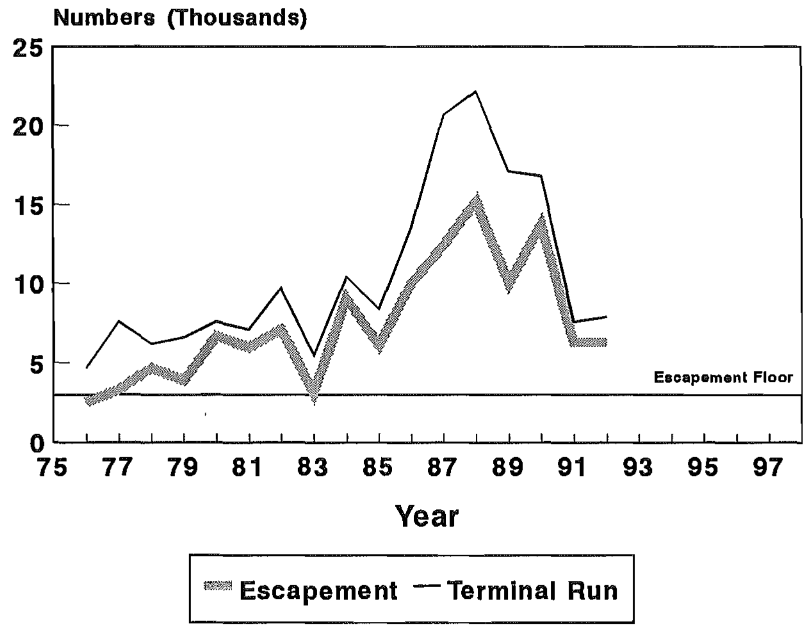


Queets Spr/Sum Chinook Escapements
Numbers
4000
3000
2000
1000
0
Escapement Floor
75
77
79
81
83
85
87
89
91
93
95
97
Year
Escapement
Terminal Run

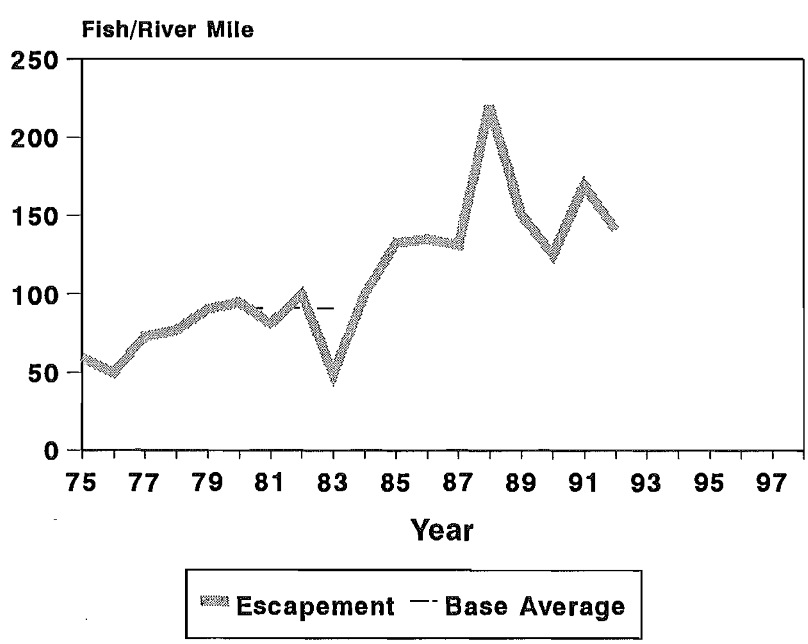



Queets Fall Chinook Escapements
Numbers (Thousands)
14
12
10
8
6
4
2
0
Escapement Floor
75
77
79
81
83
85
87
89
91
93
95
97
Year
Escapement
Terminal Run

## Quillayute Fall Chinook Escapements




## Oregon Coastal Chinook Escapements



## APPENDIX C

### Estimates and Sources of Chinook Nonretention Mortality

Sources and estimates of legal and sublegal encounters in the SEAK troll fishery during chinook nonretention fisheries.

| Year | Legal CNR Encounters | Sublegal CNR Encounters | Source |
|---|---|---|---|
| 1981 | 18,225 | 18,578 | a/ |
| 1982 | 89,100 | 90,827 | a/ |
| 1983 | 74,925 | 76,378 | a/ |
| 1984 | 87,075 | 88,763 | a/ |
| 1985 | 118,191 | 131,011 | b/ |
| 1986 | 78,763 | 104,820 | c/ |
| 1987 | 191,956 | 171,156 | d/ |
| 1988 | 60,900 | 91,200 | e/ |
| 1989 | 150,600 | 162,900 | f/ |
| 1990 | 117,807 | 116,523 | g/ |
| 1991 | 179,131 | 185,851 | g/ |
| 1992 | 135,735 | 198,456 | 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 1990-1992 were estimated from a linear regression (see text for description).

Sources and estimates of legal and sublegal encounters in the SEAK net fishery during chinook nonretention fisheries.

| Year | Legal CNR Encounters | Sublegal CNR Encounters | Source |
|---|---|---|---|
| 1985 | 12,352 | 60,506 | a/ |
| 1986 | 13,773 | 26,850 | b/ |
| 1987 | 4,497 | 13,923 | c/ |
| 1988 | 9,429 | 31,184 | d/ |
| 1989 | 10,096 | 33,392 | d/ |
| 1990 | 11,760 | 38,640 | d/ |
| 1991 | 13,860 | 45,540 | d/ |
| 1992 | 13,482 | 44,298 | d/ |

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-ABC-00142. 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-ABH-00025. 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.

d/ Computed by multiplying 1985-1987 average ratio of legal (or sublegal) encounters by the reported catch.

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

| Year | Chinook Retention | Chinook Nonretention | Source |
|---|---|---|---|
| 1987 | 60 | 9 | a/ |
| 1988 | 43 | 17 | b/ |
| 1989 | 66 | 9 | c/ |
| 1990 | 18,964 | 6,431 | d/ |
| 1991 | 26,754 | 3,042 | d/ |
| 1992 | 15,798 | 5,778 | 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.

Number of days or gear days of chinook retention, chinook nonretention fishery, and source of information for the CBC troll fishery.

| Year | Chinook Retention | Chinook Nonretention | Source |
|---|---|---|---|
| 1987 | 60 | 9 | a/ |
| 1988 | 43 | 17 | b/ |
| 1989 | 66 | 9 | c/ |
| 1990 | 6,032 | 1,591 | d/ |
| 1991 | 4,891 | 641 | d/ |
| 1992 | 5,739 | 1,070 | 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.

Number of days of chinook retention, chinook nonretention fishery, and source of information for the WCVI troll fishery.

| Year | Chinook Retention | Chinook Nonretention | Source |
|---|---|---|---|
| 1985 | 105 | 5 | a/ |
| 1987 | 47 | 7 | b/ |
| 1988 | 55 | 15 | c/ |

a/ Anonymous. 1986. 1985 Canadian agency report on chinook salmon. Canadian Department of Fisheries and Oceans, unpublished report.

b/ Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, 1987 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.

Sources and estimates of CNR parameters for the GS troll fishery.

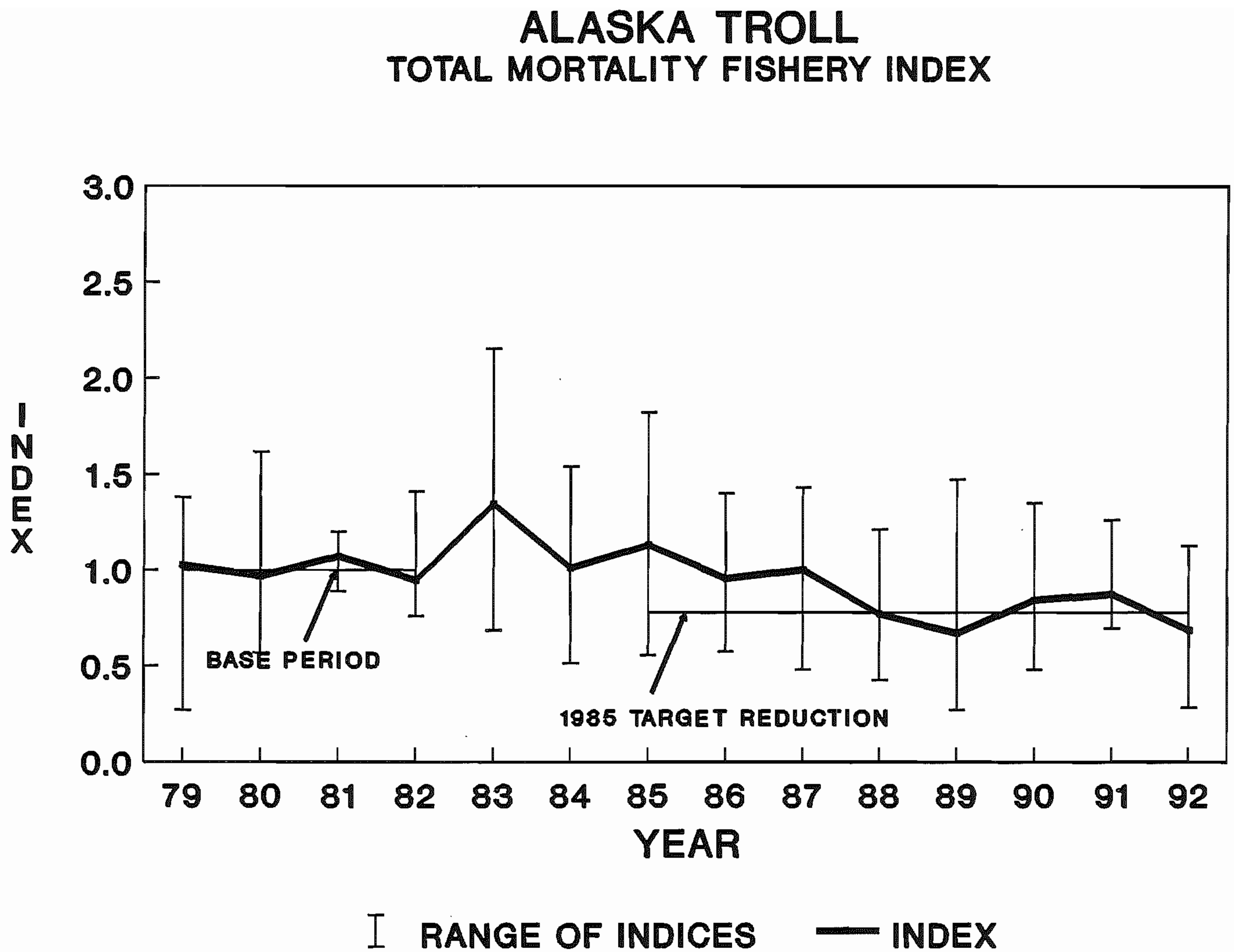
| Year | Legal CNR | Sublegal CNR | Gear Days Retention | Gear Days Nonretention | Source |
|---|---|---|---|---|---|
| 1985 | 12,412 | 12,184 | | | a/ |
| 1986 | 5,151 | 17,834 | | | a/ |
| 1991 | | | 4,589 | 1,867 | b/ |
| 1992 | | | 3,744 | 2,414 | b/ |

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.

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 and Graphs


ALASKA TROLL
TOTAL MORTALITY FISHERY INDEX
INDEX
3.0
2.5
2.0
1.5
1.0
0.5
0.0
BASE PERIOD
1985 TARGET REDUCTION
79
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR
RANGE OF INDICES
INDEX

## Fishery: Southeast Alaska Troll

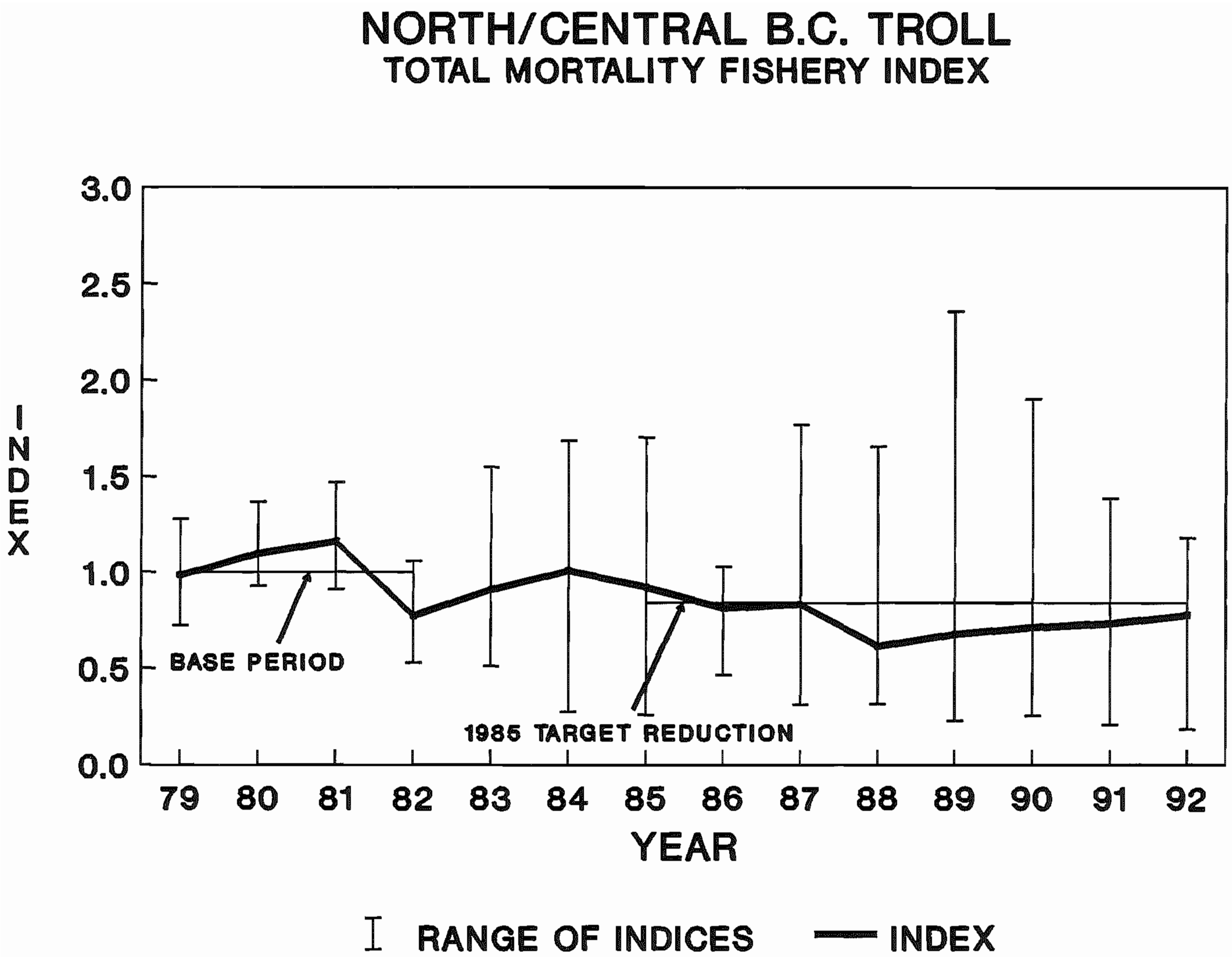
TOTAL MORTALITY EXPLOITATION RATES

| Year | AKS Age 4 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.025 | 0.090 | 0.067 | 0.264 | 0.543 | NA | NA | 0.014 | 0.159 | NA | NA |
| 80 | NA | 0.107 | 0.058 | 0.073 | 0.275 | 0.324 | NA | NA | 0.045 | 0.140 | 0.260 | 0.143 |
| 81 | NA | 0.102 | 0.107 | 0.082 | 0.339 | 0.405 | 0.123 | NA | NA | 0.188 | 0.238 | 0.094 |
| 82 | 0.136 | 0.127 | 0.155 | 0.069 | 0.272 | 0.299 | 0.123 | 0.142 | 0.025 | 0.141 | 0.204 | 0.080 |
| 83 | 0.134 | 0.195 | 0.202 | 0.073 | 0.307 | 0.454 | 0.066 | 0.418 | 0.019 | 0.218 | NA | 0.120 |
| 84 | 0.102 | 0.109 | 0.203 | 0.112 | 0.309 | 0.249 | 0.061 | 0.143 | 0.019 | 0.199 | 0.333 | 0.054 |
| 85 | 0.099 | 0.165 | 0.237 | 0.109 | 0.148 | 0.351 | NA | 0.257 | 0.016 | 0.156 | 0.258 | 0.182 |
| 86 | 0.117 | 0.094 | 0.144 | NA | 0.316 | NA | 0.142 | NA | 0.016 | 0.104 | 0.175 | NA |
| 87 | 0.091 | 0.129 | 0.142 | 0.035 | NA | NA | 0.050 | 0.207 | 0.030 | 0.134 | 0.247 | 0.130 |
| 88 | 0.106 | 0.110 | 0.087 | 0.011 | 0.160 | NA | 0.067 | 0.253 | 0.022 | 0.067 | 0.192 | 0.067 |
| 89 | 0.082 | 0.113 | 0.154 | 0.025 | 0.163 | 0.216 | 0.031 | 0.209 | NA | 0.043 | 0.168 | 0.039 |
| 90 | 0.186 | 0.177 | 0.112 | 0.059 | 0.201 | 0.274 | 0.054 | 0.152 | NA | 0.136 | 0.113 | 0.093 |
| 91 | 0.152 | 0.099 | 0.129 | 0.055 | 0.214 | 0.291 | 0.094 | 0.229 | NA | NA | 0.163 | 0.048 |
| 92 | 0.139 | 0.067 | 0.123 | 0.082 | 0.202 | 0.338 | 0.027 | 0.040 | NA | 0.045 | NA | 0.045 |
| Base | 0.136 | 0.090 | 0.102 | 0.073 | 0.288 | 0.393 | 0.123 | 0.142 | 0.028 | 0.157 | 0.234 | 0.106 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | AKS Age 4 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.273 | 0.878 | 0.921 | 0.918 | 1.382 | NA | NA | 0.484 | 1.011 | NA | NA | 1.026 |
| 80 | NA | 1.186 | 0.571 | 1.007 | 0.955 | 0.825 | NA | NA | 1.616 | 0.891 | 1.111 | 1.351 | 0.969 |
| 81 | NA | 1.132 | 1.040 | 1.120 | 1.180 | 1.031 | 0.999 | NA | NA | 1.200 | 1.016 | 0.892 | 1.072 |
| 82 | 1.000 | 1.409 | 1.511 | 0.953 | 0.946 | 0.762 | 1.001 | 1.000 | 0.900 | 0.898 | 0.873 | 0.757 | 0.948 |
| 83 | 0.979 | 2.154 | 1.971 | 0.995 | 1.066 | 1.156 | 0.536 | 2.946 | 0.685 | 1.392 | NA | 1.139 | 1.346 |
| 84 | 0.748 | 1.206 | 1.976 | 1.539 | 1.076 | 0.635 | 0.497 | 1.007 | 0.670 | 1.271 | 1.424 | 0.514 | 1.012 |
| 85 | 0.729 | 1.823 | 2.310 | 1.495 | 0.513 | 0.894 | NA | 1.812 | 0.558 | 0.997 | 1.102 | 1.722 | 1.131 |
| 86 | 0.859 | 1.046 | 1.402 | NA | 1.098 | NA | 1.158 | NA | 0.576 | 0.664 | 0.748 | NA | 0.957 |
| 87 | 0.663 | 1.431 | 1.386 | 0.481 | NA | NA | 0.404 | 1.461 | 1.091 | 0.853 | 1.053 | 1.229 | 1.003 |
| 88 | 0.775 | 1.214 | 0.850 | 0.158 | 0.556 | NA | 0.543 | 1.786 | 0.804 | 0.426 | 0.819 | 0.636 | 0.772 |
| 89 | 0.598 | 1.250 | 1.502 | 0.337 | 0.566 | 0.549 | 0.256 | 1.472 | NA | 0.271 | 0.716 | 0.366 | 0.673 |
| 90 | 1.367 | 1.958 | 1.097 | 0.808 | 0.698 | 0.698 | 0.443 | 1.069 | NA | 0.865 | 0.482 | 0.877 | 0.844 |
| 91 | 1.115 | 1.099 | 1.262 | 0.748 | 0.745 | 0.741 | 0.768 | 1.613 | NA | NA | 0.698 | 0.454 | 0.874 |
| 92 | 1.018 | 0.740 | 1.196 | 1.129 | 0.703 | 0.859 | 0.224 | 0.285 | NA | 0.288 | NA | 0.424 | 0.688 |

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


NORTH/CENTRAL B.C. TROLL
TOTAL MORTALITY FISHERY INDEX
3.0
2.5
2.0
1.5
1.0
0.5
0.0
INDEX
BASE PERIOD
1985 TARGET REDUCTION
79
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR
RANGE OF INDICES
INDEX

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

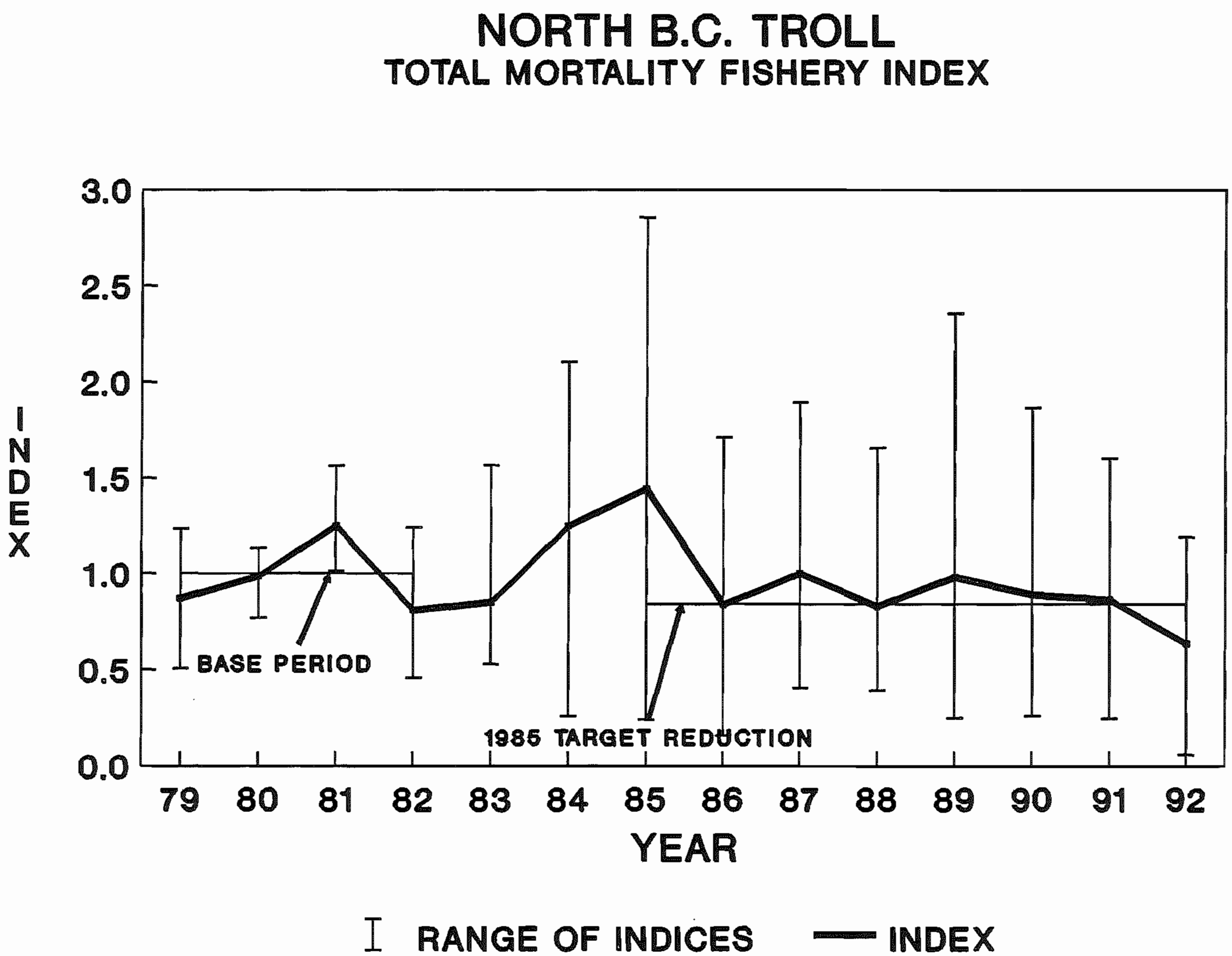
TOTAL MORTALITY EXPLOITATION RATES

| Year | AKS Age 4 | BQR Age 3 | BQR Age 4 | QUI Age 3 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.084 | 0.094 | 0.047 | 0.170 | 0.114 | 0.107 | 0.162 | 0.117 | NA | NA | NA | 0.011 | 0.091 | NA | NA |
| 80 | NA | 0.095 | 0.083 | 0.049 | 0.162 | 0.216 | 0.088 | 0.151 | 0.155 | 0.077 | NA | NA | 0.027 | 0.069 | 0.071 | 0.138 |
| 81 | NA | 0.094 | 0.097 | 0.076 | 0.172 | 0.185 | 0.062 | 0.140 | 0.226 | 0.112 | 0.158 | NA | NA | 0.079 | 0.090 | 0.105 |
| 82 | 0.005 | 0.067 | 0.085 | 0.032 | 0.078 | 0.117 | 0.070 | 0.163 | 0.124 | 0.040 | 0.123 | 0.081 | 0.028 | 0.045 | NA | 0.028 |
| 83 | 0.008 | NA | 0.097 | 0.062 | 0.144 | 0.214 | 0.081 | 0.123 | 0.079 | 0.034 | 0.091 | 0.098 | 0.034 | 0.074 | NA | 0.060 |
| 84 | 0.005 | 0.066 | NA | 0.011 | 0.064 | 0.080 | 0.043 | 0.152 | 0.263 | NA | 0.095 | 0.316 | 0.024 | 0.104 | NA | 0.024 |
| 85 | 0.004 | 0.034 | NA | 0.015 | 0.046 | 0.036 | 0.074 | 0.262 | 0.208 | 0.042 | NA | 0.232 | 0.024 | 0.082 | 0.074 | 0.023 |
| 86 | 0.003 | 0.062 | 0.194 | 0.048 | 0.079 | 0.082 | NA | 0.148 | NA | 0.020 | 0.065 | NA | 0.020 | 0.071 | 0.083 | NA |
| 87 | 0.003 | 0.016 | 0.075 | 0.026 | 0.073 | 0.121 | 0.048 | NA | NA | 0.031 | 0.069 | 0.204 | 0.038 | 0.101 | 0.143 | 0.028 |
| 88 | 0.008 | NA | NA | 0.016 | 0.048 | 0.021 | 0.032 | 0.086 | NA | NA | 0.055 | 0.189 | 0.018 | 0.056 | 0.093 | 0.039 |
| 89 | 0.004 | 0.023 | NA | 0.024 | 0.035 | 0.036 | 0.033 | 0.107 | 0.159 | 0.018 | 0.038 | 0.191 | NA | 0.053 | 0.192 | 0.015 |
| 90 | 0.009 | 0.029 | 0.106 | 0.026 | 0.096 | 0.047 | 0.032 | 0.113 | 0.106 | 0.021 | 0.035 | 0.225 | NA | 0.065 | 0.113 | 0.017 |
| 91 | 0.003 | 0.017 | NA | 0.028 | 0.114 | 0.086 | 0.045 | 0.104 | 0.216 | 0.018 | 0.057 | 0.196 | NA | NA | NA | 0.012 |
| 92 | NA | 0.036 | 0.205 | NA | 0.104 | 0.167 | 0.049 | 0.126 | 0.143 | 0.014 | 0.028 | 0.096 | NA | NA | NA | 0.005 |
| Base | 0.005 | 0.085 | 0.090 | 0.051 | 0.146 | 0.158 | 0.082 | 0.154 | 0.156 | 0.076 | 0.140 | 0.081 | 0.022 | 0.071 | 0.081 | 0.090 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | AKS Age 4 | BQR Age 3 | BQR Age 4 | QUI Age 3 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.986 | 1.045 | 0.922 | 1.167 | 0.721 | 1.312 | 1.051 | 0.751 | NA | NA | NA | 0.495 | 1.277 | NA | NA | 0.983 |
| 80 | NA | 1.121 | 0.929 | 0.953 | 1.113 | 1.369 | 1.072 | 0.981 | 0.999 | 1.004 | NA | NA | 1.245 | 0.968 | 0.884 | 1.530 | 1.096 |
| 81 | NA | 1.108 | 1.078 | 1.491 | 1.184 | 1.170 | 0.759 | 0.910 | 1.453 | 1.468 | 1.125 | NA | NA | 1.120 | 1.116 | 1.163 | 1.158 |
| 82 | 1.000 | 0.784 | 0.948 | 0.635 | 0.537 | 0.739 | 0.857 | 1.058 | 0.798 | 0.528 | 0.875 | 1.000 | 1.259 | 0.635 | NA | 0.306 | 0.772 |
| 83 | 1.628 | NA | 1.084 | 1.219 | 0.992 | 1.356 | 0.988 | 0.796 | 0.510 | 0.445 | 0.647 | 1.213 | 1.548 | 1.041 | NA | 0.671 | 0.908 |
| 84 | 1.054 | 0.783 | NA | 0.221 | 0.439 | 0.507 | 0.522 | 0.988 | 1.688 | NA | 0.673 | 3.901 | 1.108 | 1.472 | NA | 0.271 | 1.007 |
| 85 | 0.781 | 0.405 | NA | 0.299 | 0.317 | 0.229 | 0.909 | 1.704 | 1.339 | 0.555 | NA | 2.857 | 1.077 | 1.151 | 0.923 | 0.258 | 0.921 |
| 86 | 0.701 | 0.731 | 2.164 | 0.933 | 0.543 | 0.519 | NA | 0.958 | NA | 0.259 | 0.465 | NA | 0.910 | 0.997 | 1.026 | NA | 0.811 |
| 87 | 0.537 | 0.186 | 0.838 | 0.515 | 0.505 | 0.768 | 0.593 | NA | NA | 0.408 | 0.491 | 2.512 | 1.741 | 1.428 | 1.770 | 0.312 | 0.830 |
| 88 | 1.656 | NA | NA | 0.315 | 0.330 | 0.132 | 0.392 | 0.562 | NA | NA | 0.395 | 2.330 | 0.803 | 0.787 | 1.153 | 0.435 | 0.613 |
| 89 | 0.782 | 0.275 | NA | 0.463 | 0.240 | 0.225 | 0.400 | 0.697 | 1.024 | 0.234 | 0.273 | 2.357 | NA | 0.750 | 2.383 | 0.166 | 0.675 |
| 90 | 1.900 | 0.347 | 1.179 | 0.513 | 0.657 | 0.294 | 0.389 | 0.732 | 0.679 | 0.276 | 0.250 | 2.772 | NA | 0.920 | 1.400 | 0.190 | 0.709 |
| 91 | 0.690 | 0.205 | NA | 0.553 | 0.784 | 0.546 | 0.554 | 0.677 | 1.388 | 0.230 | 0.403 | 2.413 | NA | NA | NA | 0.130 | 0.733 |
| 92 | NA | 0.420 | 2.279 | NA | 0.717 | 1.055 | 0.601 | 0.817 | 0.921 | 0.180 | 0.202 | 1.180 | NA | NA | NA | 0.055 | 0.773 |

AKS = ALASKA SPRING BQR = BIG QUALICUM QUI = QUINSAM RBT = ROBERTSON CREEK SRH = SALMON RIVER
URB = COLUMBIA UPRIVER BRIGHT WSH = WILLAMETTE SPRING


NORTH B.C. TROLL
TOTAL MORTALITY FISHERY INDEX
3.0
2.5
2.0
1.5
1.0
0.5
0.0
INDEX
BASE PERIOD
1985 TARGET REDUCTION
79
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR
RANGE OF INDICES
INDEX

**Fishery: North B.C. Troll**

TOTAL MORTALITY EXPLOITATION RATES

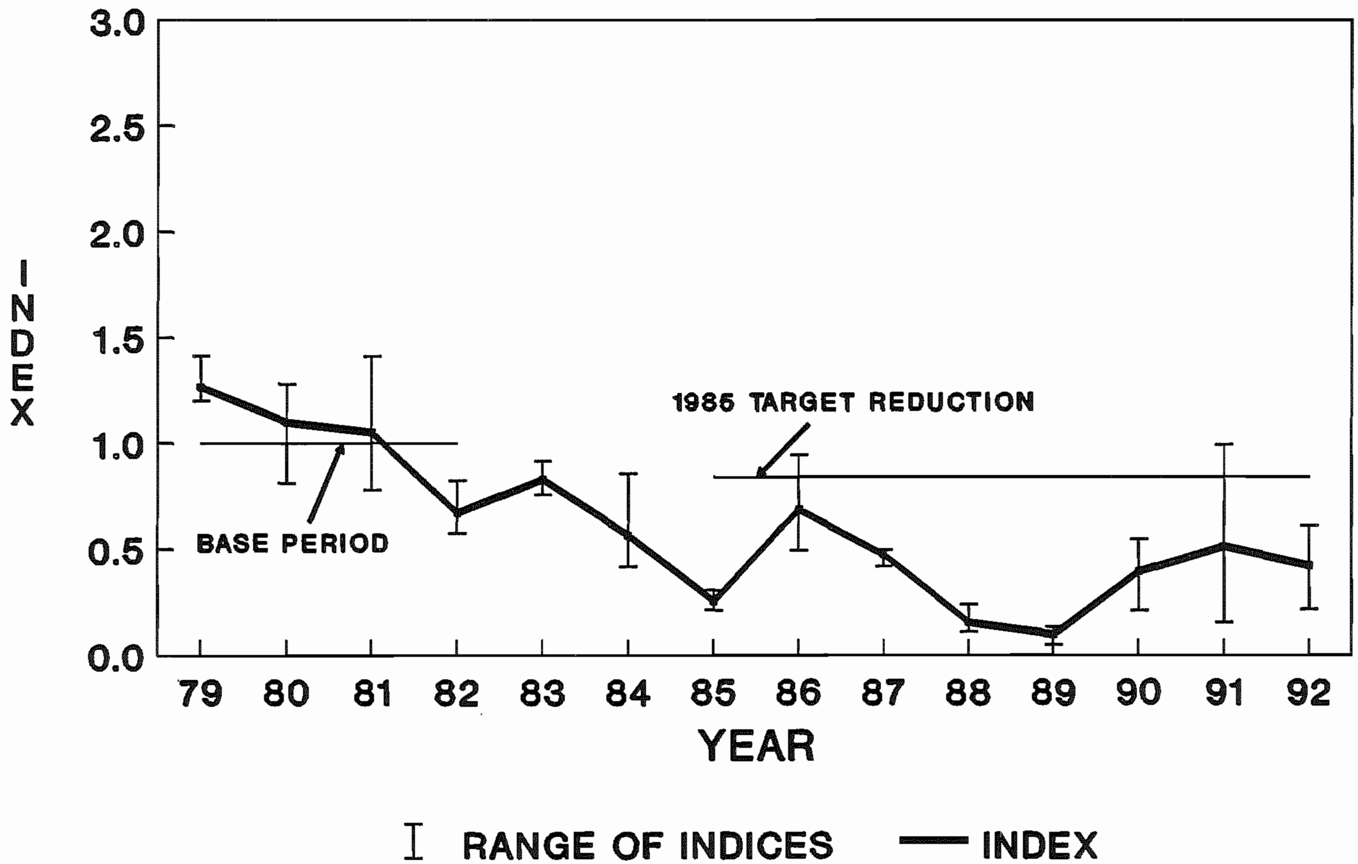
| Year | AKS Age 4 | QUI Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.021 | NA | 0.056 | 0.078 | 0.082 | NA | NA | NA | 0.009 | 0.059 | NA | NA |
| 80 | NA | 0.028 | 0.057 | 0.049 | 0.073 | 0.081 | 0.070 | NA | NA | 0.021 | 0.052 | 0.061 | 0.134 |
| 81 | NA | 0.068 | 0.080 | 0.033 | 0.087 | 0.164 | 0.112 | 0.151 | NA | NA | 0.066 | 0.079 | 0.101 |
| 82 | 0.005 | 0.028 | 0.029 | 0.044 | 0.107 | NA | 0.033 | 0.123 | 0.081 | 0.025 | 0.045 | NA | 0.028 |
| 83 | 0.008 | 0.041 | 0.082 | 0.048 | 0.064 | 0.058 | 0.034 | 0.085 | 0.098 | 0.029 | 0.062 | NA | 0.060 |
| 84 | 0.005 | 0.009 | 0.025 | 0.031 | 0.124 | 0.230 | NA | 0.083 | 0.259 | 0.016 | 0.090 | NA | 0.022 |
| 85 | 0.004 | 0.008 | 0.029 | 0.066 | 0.262 | 0.208 | 0.036 | NA | 0.232 | 0.021 | 0.079 | 0.074 | 0.021 |
| 86 | 0.003 | 0.029 | 0.038 | NA | 0.148 | NA | 0.011 | 0.065 | NA | 0.017 | 0.061 | 0.073 | NA |
| 87 | 0.003 | 0.015 | 0.033 | 0.033 | NA | NA | 0.029 | 0.069 | 0.204 | 0.030 | 0.091 | 0.132 | 0.024 |
| 88 | 0.008 | 0.010 | 0.036 | 0.023 | 0.079 | NA | NA | 0.055 | 0.157 | 0.016 | 0.051 | 0.089 | 0.034 |
| 89 | 0.004 | 0.016 | 0.024 | 0.028 | 0.102 | 0.145 | 0.018 | 0.038 | 0.191 | NA | 0.050 | 0.192 | 0.015 |
| 90 | 0.009 | 0.016 | 0.051 | 0.024 | 0.092 | 0.091 | 0.020 | 0.035 | 0.225 | NA | 0.060 | 0.106 | 0.015 |
| 91 | 0.003 | 0.014 | 0.033 | 0.034 | 0.081 | 0.175 | 0.018 | 0.056 | 0.190 | NA | NA | NA | 0.012 |
| 92 | NA | NA | 0.066 | 0.039 | 0.085 | 0.101 | 0.012 | 0.028 | 0.088 | NA | NA | NA | 0.005 |
| Base | 0.005 | 0.036 | 0.055 | 0.046 | 0.086 | 0.109 | 0.072 | 0.137 | 0.081 | 0.018 | 0.055 | 0.070 | 0.087 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | AKS Age 4 | QUI Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.574 | NA | 1.233 | 0.900 | 0.755 | NA | NA | NA | 0.506 | 1.059 | NA | NA | 0.869 |
| 80 | NA | 0.769 | 1.029 | 1.068 | 0.846 | 0.742 | 0.981 | NA | NA | 1.133 | 0.937 | 0.873 | 1.535 | 0.985 |
| 81 | NA | 1.884 | 1.448 | 0.729 | 1.012 | 1.503 | 1.563 | 1.103 | NA | NA | 1.189 | 1.127 | 1.150 | 1.248 |
| 82 | 1.000 | 0.772 | 0.524 | 0.969 | 1.241 | NA | 0.456 | 0.897 | 1.000 | 1.361 | 0.814 | NA | 0.315 | 0.806 |
| 83 | 1.628 | 1.138 | 1.485 | 1.046 | 0.739 | 0.528 | 0.474 | 0.622 | 1.213 | 1.566 | 1.127 | NA | 0.682 | 0.848 |
| 84 | 1.054 | 0.236 | 0.456 | 0.686 | 1.435 | 2.103 | NA | 0.609 | 3.188 | 0.880 | 1.629 | NA | 0.257 | 1.248 |
| 85 | 0.781 | 0.221 | 0.520 | 1.456 | 3.039 | 1.907 | 0.501 | NA | 2.857 | 1.128 | 1.425 | 1.069 | 0.238 | 1.443 |
| 86 | 0.701 | 0.809 | 0.693 | NA | 1.709 | NA | 0.157 | 0.477 | NA | 0.937 | 1.104 | 1.051 | NA | 0.836 |
| 87 | 0.537 | 0.422 | 0.591 | 0.733 | NA | NA | 0.406 | 0.504 | 2.512 | 1.627 | 1.652 | 1.896 | 0.271 | 1.001 |
| 88 | 1.656 | 0.278 | 0.646 | 0.513 | 0.916 | NA | NA | 0.405 | 1.932 | 0.847 | 0.928 | 1.283 | 0.391 | 0.826 |
| 89 | 0.782 | 0.456 | 0.432 | 0.610 | 1.184 | 1.324 | 0.249 | 0.280 | 2.357 | NA | 0.903 | 2.760 | 0.171 | 0.981 |
| 90 | 1.865 | 0.439 | 0.920 | 0.530 | 1.069 | 0.837 | 0.279 | 0.257 | 2.772 | NA | 1.084 | 1.520 | 0.175 | 0.887 |
| 91 | 0.690 | 0.391 | 0.590 | 0.741 | 0.938 | 1.603 | 0.245 | 0.408 | 2.343 | NA | NA | NA | 0.133 | 0.861 |
| 92 | NA | NA | 1.188 | 0.850 | 0.980 | 0.927 | 0.171 | 0.207 | 1.089 | NA | NA | NA | 0.057 | 0.630 |

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

# CENTRAL B.C. TROLL
## TOTAL MORTALITY FISHERY INDEX



**Fishery: Central B.C. Troll**

TOTAL MORTALITY EXPLOITATION RATES

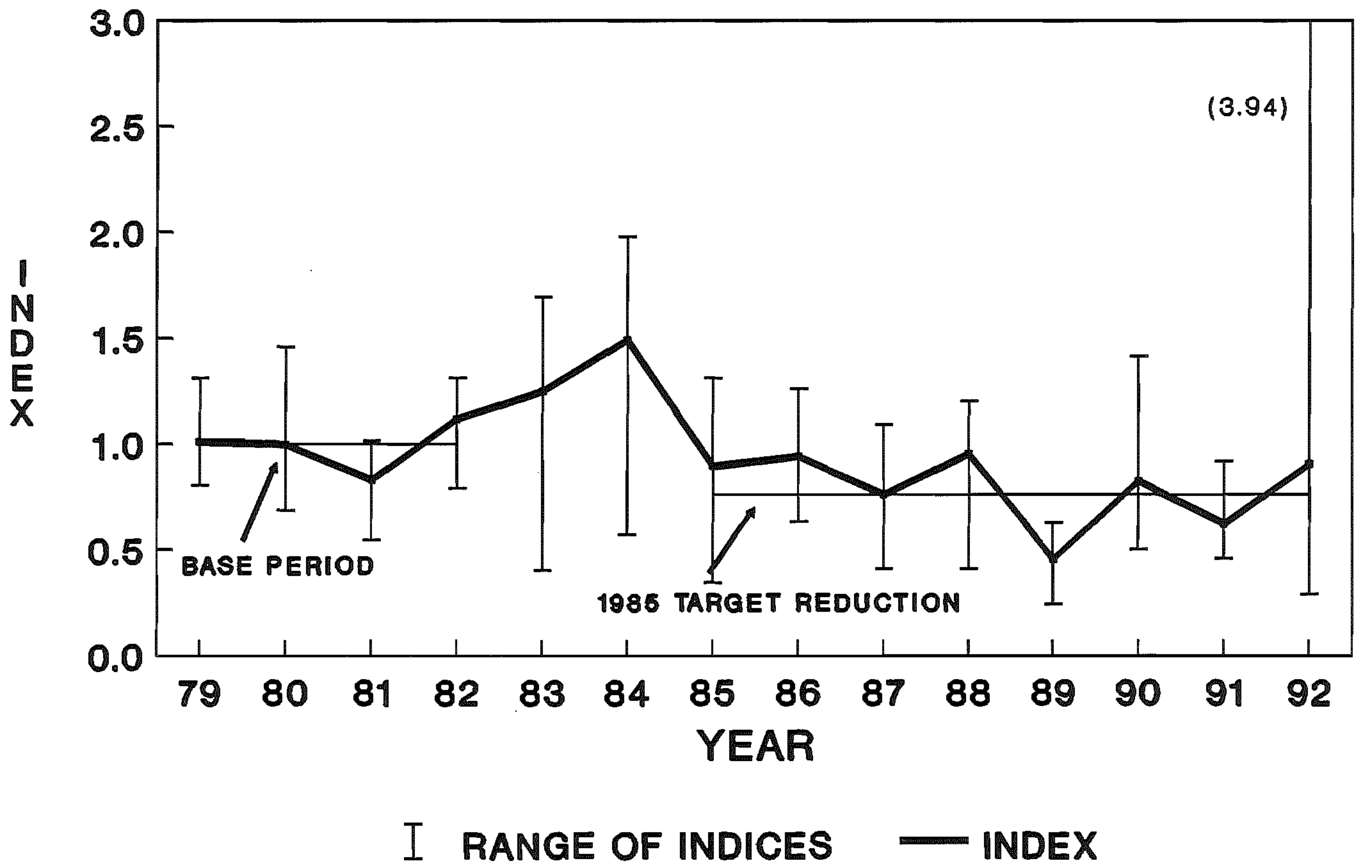
| Year | BQR Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 |
|---|---|---|---|---|
| 79 | 0.072 | NA | 0.051 | 0.084 |
| 80 | 0.049 | 0.105 | 0.039 | 0.078 |
| 81 | 0.085 | 0.092 | 0.029 | 0.053 |
| 82 | 0.035 | 0.049 | 0.026 | 0.056 |
| 83 | NA | 0.062 | 0.033 | 0.059 |
| 84 | 0.052 | 0.039 | NA | 0.028 |
| 85 | 0.018 | 0.017 | NA | NA |
| 86 | 0.057 | 0.041 | NA | NA |
| 87 | NA | 0.041 | 0.015 | NA |
| 88 | NA | 0.012 | 0.009 | 0.007 |
| 89 | 0.003 | 0.011 | 0.005 | 0.005 |
| 90 | NA | 0.045 | 0.008 | 0.020 |
| 91 | 0.009 | 0.081 | 0.011 | 0.023 |
| 92 | 0.013 | 0.039 | 0.010 | 0.041 |
| Base | 0.060 | 0.082 | 0.036 | 0.068 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | BQR Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 | Fishery |
|---|---|---|---|---|---|
| 79 | 1.200 | NA | 1.412 | 1.244 | 1.265 |
| 80 | 0.814 | 1.279 | 1.076 | 1.152 | 1.100 |
| 81 | 1.410 | 1.122 | 0.797 | 0.780 | 1.051 |
| 82 | 0.576 | 0.599 | 0.715 | 0.825 | 0.672 |
| 83 | NA | 0.758 | 0.914 | 0.870 | 0.829 |
| 84 | 0.857 | 0.471 | NA | 0.417 | 0.564 |
| 85 | 0.307 | 0.212 | NA | NA | 0.252 |
| 86 | 0.942 | 0.495 | NA | NA | 0.684 |
| 87 | NA | 0.497 | 0.417 | NA | 0.473 |
| 88 | NA | 0.151 | 0.239 | 0.110 | 0.153 |
| 89 | 0.050 | 0.135 | 0.135 | 0.076 | 0.098 |
| 90 | NA | 0.544 | 0.210 | 0.302 | 0.391 |
| 91 | 0.153 | 0.992 | 0.319 | 0.344 | 0.510 |
| 92 | 0.215 | 0.471 | 0.286 | 0.609 | 0.419 |

BQR = BIG QUALICUM   QUI = QUINSAM
RBT = ROBERTSON CREEK

# WEST COAST VANCOUVER ISLAND TROLL
## TOTAL MORTALITY FISHERY INDEX



## Fishery: West Coast Vancouver Island Troll

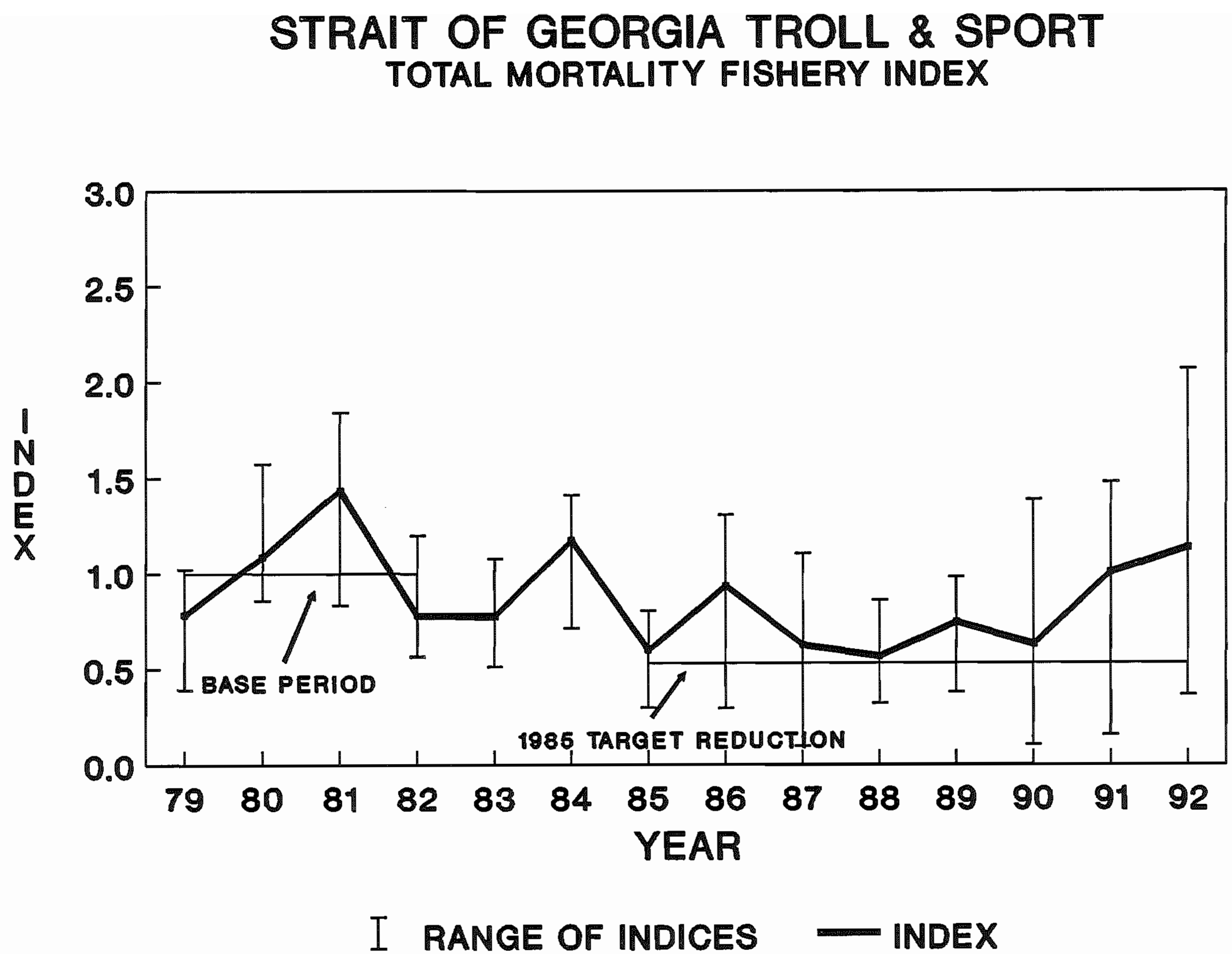
TOTAL MORTALITY EXPLOITATION RATES

| Year | BON Age 3 | BON Age 4 | CWF Age 4 | GAD Age 3 | GAD Age 4 | LRW Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SAM Age 3 | SAM Age 4 | SPR Age 3 | SPR Age 4 | SPS Age 3 | SPS Age 4 | STP Age 3 | STP Age 4 | URB Age 3 | URB Age 4 | UWA Age 3 | UWA Age 4 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.226 | NA | NA | NA | NA | NA | 0.036 | 0.067 | NA | NA | 0.215 | 0.198 | 0.178 | NA | 0.257 | NA | NA | 0.044 | 0.084 | 0.072 | 0.168 | NA |
| 80 | 0.110 | 0.152 | NA | NA | NA | NA | 0.041 | 0.075 | NA | NA | NA | 0.231 | 0.301 | NA | NA | NA | NA | 0.043 | 0.051 | 0.149 | 0.130 | 0.063 |
| 81 | 0.176 | 0.159 | 0.132 | 0.041 | NA | 0.060 | 0.020 | 0.028 | 0.030 | NA | NA | 0.183 | 0.145 | 0.058 | NA | 0.254 | NA | NA | 0.053 | 0.093 | 0.182 | 0.015 |
| 82 | 0.285 | 0.352 | 0.201 | 0.079 | 0.213 | 0.086 | 0.024 | 0.035 | NA | 0.060 | NA | 0.192 | 0.258 | 0.103 | 0.201 | 0.246 | 0.304 | 0.033 | 0.028 | 0.142 | 0.217 | 0.051 |
| 83 | 0.343 | 0.303 | 0.230 | 0.102 | 0.293 | 0.070 | 0.012 | 0.035 | 0.074 | NA | 0.198 | 0.292 | 0.219 | 0.121 | 0.203 | 0.359 | 0.505 | 0.010 | 0.021 | 0.087 | 0.208 | 0.027 |
| 84 | 0.293 | 0.550 | 0.218 | 0.118 | NA | NA | 0.054 | 0.053 | 0.059 | NA | NA | 0.251 | 0.313 | 0.113 | 0.231 | 0.436 | 0.527 | 0.023 | 0.061 | 0.201 | 0.163 | 0.020 |
| 85 | 0.262 | 0.294 | 0.150 | NA | 0.178 | NA | 0.025 | 0.000 | NA | NA | NA | 0.112 | 0.248 | 0.058 | 0.162 | 0.226 | 0.198 | 0.021 | 0.049 | 0.103 | 0.223 | 0.015 |
| 86 | NA | NA | 0.210 | NA | NA | 0.032 | NA | NA | NA | NA | NA | 0.215 | 0.159 | 0.065 | 0.265 | 0.202 | 0.227 | 0.039 | 0.034 | 0.100 | 0.242 | NA |
| 87 | 0.217 | NA | 0.138 | NA | NA | 0.105 | 0.012 | NA | NA | NA | NA | 0.083 | NA | 0.072 | 0.148 | 0.230 | NA | 0.034 | 0.049 | 0.055 | 0.095 | 0.018 |
| 88 | NA | 0.266 | 0.153 | 0.035 | NA | 0.078 | 0.020 | 0.042 | NA | 0.044 | NA | 0.200 | NA | 0.031 | 0.183 | 0.263 | 0.317 | 0.016 | 0.098 | NA | 0.173 | 0.023 |
| 89 | NA | NA | 0.090 | 0.026 | 0.112 | 0.043 | 0.008 | 0.022 | 0.000 | 0.022 | 0.136 | 0.120 | 0.097 | 0.032 | 0.097 | 0.061 | 0.110 | NA | 0.046 | NA | NA | 0.016 |
| 90 | NA | NA | 0.128 | 0.085 | 0.213 | 0.091 | 0.025 | 0.041 | NA | 0.044 | 0.195 | 0.170 | 0.145 | 0.077 | 0.223 | 0.219 | 0.089 | NA | 0.084 | NA | NA | 0.022 |
| 91 | NA | NA | NA | 0.032 | 0.209 | 0.058 | 0.028 | 0.034 | 0.024 | 0.027 | 0.131 | 0.114 | 0.124 | 0.038 | 0.140 | 0.134 | NA | NA | NA | NA | NA | 0.002 |
| 92 | NA | NA | 0.224 | NA | 0.125 | 0.035 | 0.112 | 0.204 | 0.237 | 0.056 | 0.054 | 0.100 | 0.167 | 0.062 | 0.179 | 0.136 | NA | 0.012 | NA | NA | NA | 0.019 |
| Base | 0.199 | 0.221 | 0.166 | 0.060 | 0.213 | 0.073 | 0.030 | 0.051 | 0.030 | 0.060 | 0.215 | 0.201 | 0.220 | 0.080 | 0.229 | 0.250 | 0.304 | 0.040 | 0.054 | 0.114 | 0.174 | 0.043 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | BON Age 3 | BON Age 4 | CWF Age 4 | GAD Age 3 | GAD Age 4 | LRW Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SAM Age 3 | SAM Age 4 | SPR Age 3 | SPR Age 4 | SPS Age 3 | SPS Age 4 | STP Age 3 | STP Age 4 | URB Age 3 | URB Age 4 | UWA Age 3 | UWA Age 4 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 1.133 | NA | NA | NA | NA | NA | 1.198 | 1.312 | NA | NA | 1.000 | 0.983 | 0.807 | NA | 1.121 | NA | NA | 1.107 | 1.555 | 0.629 | 0.963 | NA | 1.010 |
| 80 | 0.552 | 0.687 | NA | NA | NA | NA | 1.346 | 1.464 | NA | NA | NA | 1.151 | 1.365 | NA | NA | NA | NA | 1.067 | 0.945 | 1.307 | 0.744 | 1.458 | 0.998 |
| 81 | 0.885 | 0.718 | 0.793 | 0.688 | NA | 0.824 | 0.666 | 0.546 | 1.000 | NA | NA | 0.911 | 0.659 | 0.716 | NA | 1.015 | NA | NA | 0.979 | 0.818 | 1.047 | 0.358 | 0.828 |
| 82 | 1.430 | 1.595 | 1.207 | 1.312 | 1.000 | 1.176 | 0.791 | 0.678 | NA | 1.000 | NA | 0.955 | 1.168 | 1.284 | 0.879 | 0.985 | 1.000 | 0.826 | 0.521 | 1.246 | 1.246 | 1.184 | 1.117 |
| 83 | 1.721 | 1.372 | 1.382 | 1.693 | 1.378 | 0.958 | 0.402 | 0.688 | 2.475 | NA | 0.922 | 1.455 | 0.992 | 1.508 | 0.885 | 1.437 | 1.660 | 0.259 | 0.395 | 0.766 | 1.195 | 0.634 | 1.251 |
| 84 | 1.470 | 2.487 | 1.308 | 1.958 | NA | NA | 1.775 | 1.041 | 1.979 | NA | NA | 1.248 | 1.417 | 1.411 | 1.007 | 1.747 | 1.733 | 0.571 | 1.126 | 1.763 | 0.933 | 0.467 | 1.492 |
| 85 | 1.314 | 1.331 | 0.900 | NA | 0.835 | NA | 0.831 | 0.000 | NA | NA | NA | 0.557 | 1.125 | 0.722 | 0.707 | 0.903 | 0.650 | 0.517 | 0.906 | 0.904 | 1.281 | 0.344 | 0.896 |
| 86 | NA | NA | 1.261 | NA | NA | 0.442 | NA | NA | NA | NA | NA | 1.069 | 0.720 | 0.812 | 1.158 | 0.811 | 0.747 | 0.990 | 0.634 | 0.875 | 1.389 | NA | 0.940 |
| 87 | 1.092 | NA | 0.826 | NA | NA | 1.440 | 0.409 | NA | NA | NA | NA | 0.415 | NA | 0.891 | 0.645 | 0.922 | NA | 0.847 | 0.908 | 0.486 | 0.546 | 0.406 | 0.759 |
| 88 | NA | 1.204 | 0.921 | 0.586 | NA | 1.069 | 0.661 | 0.813 | NA | 0.734 | NA | 0.993 | NA | 0.389 | 0.800 | 1.054 | 1.041 | 0.409 | 1.813 | NA | 0.992 | 0.528 | 0.953 |
| 89 | NA | NA | 0.543 | 0.428 | 0.525 | 0.592 | 0.254 | 0.436 | 0.000 | 0.370 | 0.632 | 0.598 | 0.438 | 0.395 | 0.424 | 0.244 | 0.361 | NA | 0.846 | NA | NA | 0.364 | 0.455 |
| 90 | NA | NA | 0.770 | 1.414 | 1.003 | 1.250 | 0.833 | 0.803 | NA | 0.732 | 0.907 | 0.848 | 0.657 | 0.958 | 0.972 | 0.878 | 0.291 | NA | 1.545 | NA | NA | 0.500 | 0.822 |
| 91 | NA | NA | NA | 0.535 | 0.982 | 0.795 | 0.919 | 0.668 | 0.792 | 0.456 | 0.610 | 0.568 | 0.560 | 0.472 | 0.611 | 0.535 | NA | NA | NA | NA | NA | 0.048 | 0.623 |
| 92 | NA | NA | 1.345 | NA | 0.588 | 0.476 | 3.678 | 3.971 | 7.953 | 0.926 | 0.250 | 0.499 | 0.758 | 0.769 | 0.782 | 0.544 | NA | 0.289 | NA | NA | NA | 0.430 | 0.904 |

BON = BONNEVILLE TULE  CWF = COWLITZ FALL TULE  GAD = G ADAMS FALL FING  LRW = LEWIS RIVER WILD  RBT = ROBERTSON CREEK  SAM = SAMISH FALL FING
SPR = SPRING CREEK TULE  SPS = SO SOUND FALL FING  STP = STAYTON POND TULE  URB = COLUMBIA UPRIVER BRIGHT  UWA = U OF W FALL ACCEL
WSH = WILLAMETTE SPRING



STRAIT OF GEORGIA TROLL & SPORT
TOTAL MORTALITY FISHERY INDEX
3.0
2.5
2.0
1.5
1.0
0.5
0.0
INDEX
BASE PERIOD
1985 TARGET REDUCTION
79
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR
RANGE OF INDICES
INDEX

## Fishery: Strait of Georgia Troll and Sport

TOTAL MORTALITY EXPLOITATION RATES

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.199 | 0.115 | 0.235 | 0.060 | NA | 0.095 | NA | 0.061 | 0.041 |
| 80 | 0.266 | 0.173 | 0.265 | NA | NA | NA | NA | NA | 0.063 |
| 81 | 0.304 | 0.369 | 0.291 | 0.254 | NA | NA | 0.064 | NA | 0.034 |
| 82 | 0.144 | 0.145 | 0.148 | 0.144 | 0.106 | NA | 0.056 | 0.092 | 0.023 |
| 83 | 0.185 | 0.167 | 0.198 | 0.086 | NA | 0.103 | 0.031 | 0.042 | 0.035 |
| 84 | 0.271 | 0.283 | 0.271 | NA | NA | NA | 0.055 | 0.055 | 0.052 |
| 85 | 0.163 | 0.118 | 0.146 | 0.046 | NA | NA | NA | 0.054 | 0.032 |
| 86 | 0.245 | 0.180 | 0.307 | 0.045 | NA | NA | NA | NA | 0.025 |
| 87 | 0.154 | 0.222 | 0.081 | 0.015 | NA | NA | 0.065 | NA | 0.035 |
| 88 | 0.196 | 0.095 | NA | 0.049 | 0.056 | NA | 0.027 | NA | NA |
| 89 | 0.163 | 0.187 | 0.231 | 0.060 | 0.076 | 0.088 | 0.023 | 0.034 | NA |
| 90 | 0.188 | 0.142 | NA | 0.016 | 0.051 | 0.132 | 0.014 | 0.037 | NA |
| 91 | 0.260 | 0.296 | 0.253 | NA | 0.120 | 0.059 | 0.011 | 0.012 | NA |
| 92 | 0.329 | 0.236 | 0.250 | NA | 0.066 | 0.197 | 0.030 | 0.028 | NA |
| Base | 0.228 | 0.200 | 0.235 | 0.153 | 0.106 | 0.095 | 0.060 | 0.077 | 0.040 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.874 | 0.573 | 1.003 | 0.393 | NA | 1.000 | NA | 0.798 | 1.024 | 0.785 |
| 80 | 1.166 | 0.862 | 1.131 | NA | NA | NA | NA | NA | 1.576 | 1.091 |
| 81 | 1.331 | 1.841 | 1.238 | 1.663 | NA | NA | 1.070 | NA | 0.837 | 1.435 |
| 82 | 0.629 | 0.724 | 0.629 | 0.944 | 1.000 | NA | 0.930 | 1.202 | 0.563 | 0.780 |
| 83 | 0.810 | 0.836 | 0.843 | 0.562 | NA | 1.080 | 0.513 | 0.547 | 0.879 | 0.778 |
| 84 | 1.188 | 1.412 | 1.156 | NA | NA | NA | 0.919 | 0.715 | 1.306 | 1.176 |
| 85 | 0.714 | 0.589 | 0.621 | 0.301 | NA | NA | NA | 0.700 | 0.805 | 0.599 |
| 86 | 1.073 | 0.897 | 1.306 | 0.297 | NA | NA | NA | NA | 0.622 | 0.936 |
| 87 | 0.675 | 1.107 | 0.344 | 0.097 | NA | NA | 1.078 | NA | 0.878 | 0.624 |
| 88 | 0.860 | 0.473 | NA | 0.320 | 0.524 | NA | 0.448 | NA | NA | 0.565 |
| 89 | 0.714 | 0.932 | 0.983 | 0.394 | 0.712 | 0.920 | 0.378 | 0.447 | NA | 0.746 |
| 90 | 0.822 | 0.707 | NA | 0.102 | 0.477 | 1.386 | 0.226 | 0.482 | NA | 0.629 |
| 91 | 1.139 | 1.477 | 1.076 | NA | 1.130 | 0.614 | 0.187 | 0.153 | NA | 1.008 |
| 92 | 1.444 | 1.179 | 1.065 | NA | 0.623 | 2.066 | 0.498 | 0.365 | NA | 1.135 |

BQR = BIG QUALICUM   PNT = PUNTLEDGE   QUI = QUINSAM   SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING   UWA = U OF W FALL ACCEL

## Fishery: Strait of Georgia Troll

| TOTAL MORTALITY EXPLOITATION RATES | | | |
|---|---|---|---|
| | BQR | PNT | SAM |
| Year | Age 3 | Age 3 | Age 3 |
| 79 | 0.157 | 0.154 | NA |
| 80 | 0.156 | 0.126 | NA |
| 81 | 0.121 | 0.117 | NA |
| 82 | 0.080 | NA | 0.017 |
| 83 | 0.113 | 0.099 | NA |
| 84 | 0.085 | NA | NA |
| 85 | 0.019 | NA | NA |
| 86 | 0.067 | NA | NA |
| 87 | 0.034 | NA | NA |
| 88 | 0.009 | NA | NA |
| 89 | 0.011 | NA | 0.005 |
| 90 | 0.056 | NA | NA |
| 91 | 0.048 | NA | NA |
| 92 | 0.095 | NA | NA |
| Base | 0.128 | 0.132 | 0.017 |

| TOTAL MORTALITY EXPL RATE INDEX | | | | |
|---|---|---|---|---|
| | BQR | PNT | SAM | |
| Year | Age 3 | Age 3 | Age 3 | Fishery |
| 79 | 1.220 | 1.166 | NA | 1.193 |
| 80 | 1.212 | 0.948 | NA | 1.078 |
| 81 | 0.945 | 0.886 | NA | 0.915 |
| 82 | 0.623 | NA | 1.000 | 0.667 |
| 83 | 0.878 | 0.747 | NA | 0.812 |
| 84 | 0.660 | NA | NA | 0.660 |
| 85 | 0.144 | NA | NA | 0.144 |
| 86 | 0.519 | NA | NA | 0.519 |
| 87 | 0.264 | NA | NA | 0.264 |
| 88 | 0.072 | NA | NA | 0.072 |
| 89 | 0.088 | NA | 0.313 | 0.114 |
| 90 | 0.432 | NA | NA | 0.432 |
| 91 | 0.374 | NA | NA | 0.374 |
| 92 | 0.742 | NA | NA | 0.742 |

BQR = BIG QUALICUM PNT = PUNTLEDGE
SAM = SAMISH FALL FING

## Fishery: Strait of Georgia Sport

TOTAL MORTALITY EXPLOITATION RATES

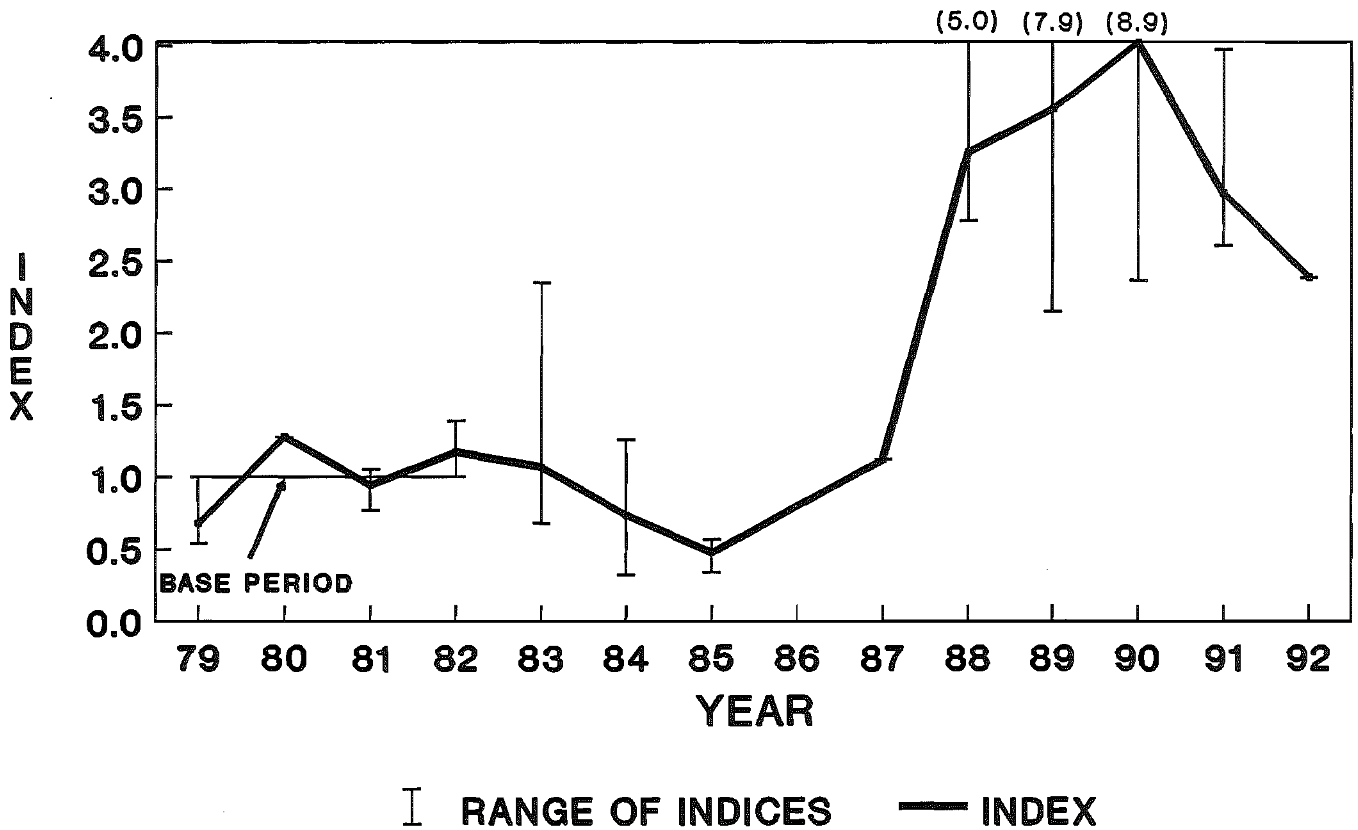
| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.043 | 0.053 | 0.081 | 0.060 | NA | 0.075 | NA | 0.052 | 0.027 |
| 80 | 0.111 | 0.089 | 0.140 | NA | NA | NA | NA | NA | 0.060 |
| 81 | 0.182 | 0.290 | 0.173 | 0.228 | NA | NA | 0.059 | NA | 0.029 |
| 82 | 0.063 | 0.060 | 0.061 | 0.144 | 0.089 | NA | 0.052 | 0.058 | 0.022 |
| 83 | 0.072 | 0.121 | 0.099 | 0.086 | NA | 0.093 | 0.029 | 0.037 | 0.025 |
| 84 | 0.186 | NA | 0.163 | NA | NA | NA | 0.046 | 0.055 | 0.047 |
| 85 | 0.144 | 0.118 | 0.146 | 0.046 | NA | NA | NA | 0.050 | 0.032 |
| 86 | 0.178 | 0.176 | 0.196 | 0.045 | NA | NA | NA | NA | 0.025 |
| 87 | 0.120 | 0.215 | 0.081 | 0.015 | NA | NA | 0.065 | NA | 0.026 |
| 88 | 0.187 | 0.074 | NA | 0.049 | 0.052 | NA | 0.026 | NA | NA |
| 89 | 0.152 | 0.187 | 0.231 | 0.060 | 0.070 | 0.088 | 0.022 | 0.032 | NA |
| 90 | 0.132 | 0.142 | NA | 0.016 | 0.027 | 0.107 | 0.011 | 0.035 | NA |
| 91 | 0.212 | 0.296 | NA | NA | 0.099 | 0.049 | 0.009 | 0.012 | NA |
| 92 | 0.234 | 0.216 | 0.217 | NA | 0.051 | 0.179 | 0.030 | 0.028 | NA |
| Base | 0.100 | 0.123 | 0.114 | 0.144 | 0.089 | 0.075 | 0.055 | 0.055 | 0.035 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.427 | 0.428 | 0.712 | 0.417 | NA | 1.000 | NA | 0.951 | 0.769 | 0.604 |
| 80 | 1.108 | 0.727 | 1.228 | NA | NA | NA | NA | NA | 1.744 | 1.078 |
| 81 | 1.829 | 2.357 | 1.521 | 1.583 | NA | NA | 1.069 | NA | 0.851 | 1.686 |
| 82 | 0.636 | 0.488 | 0.540 | 1.000 | 1.000 | NA | 0.931 | 1.049 | 0.636 | 0.769 |
| 83 | 0.723 | 0.981 | 0.868 | 0.595 | NA | 1.246 | 0.528 | 0.679 | 0.722 | 0.802 |
| 84 | 1.870 | NA | 1.430 | NA | NA | NA | 0.833 | 0.996 | 1.351 | 1.386 |
| 85 | 1.448 | 0.959 | 1.281 | 0.319 | NA | NA | NA | 0.915 | 0.933 | 0.941 |
| 86 | 1.786 | 1.435 | 1.721 | 0.315 | NA | NA | NA | NA | 0.721 | 1.205 |
| 87 | 1.204 | 1.749 | 0.709 | 0.103 | NA | NA | 1.172 | NA | 0.754 | 0.914 |
| 88 | 1.876 | 0.604 | NA | 0.339 | 0.586 | NA | 0.464 | NA | NA | 0.759 |
| 89 | 1.520 | 1.517 | 2.026 | 0.417 | 0.787 | 1.178 | 0.396 | 0.583 | NA | 1.114 |
| 90 | 1.323 | 1.151 | NA | 0.108 | 0.298 | 1.440 | 0.192 | 0.641 | NA | 0.731 |
| 91 | 2.125 | 2.404 | NA | NA | 1.113 | 0.658 | 0.165 | 0.213 | NA | 1.362 |
| 92 | 2.348 | 1.757 | 1.903 | NA | 0.565 | 2.405 | 0.541 | 0.508 | NA | 1.562 |

BQR = BIG QUALICUM   PNT = PUNTLEDGE   QUI = QUINSAM   SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING   UWA = U OF W FALL ACCEL

# U.S. SOUTH OCEAN TROLL & SPORT
# PUGET SOUND STOCKS
## TOTAL MORTALITY FISHERY INDEX



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

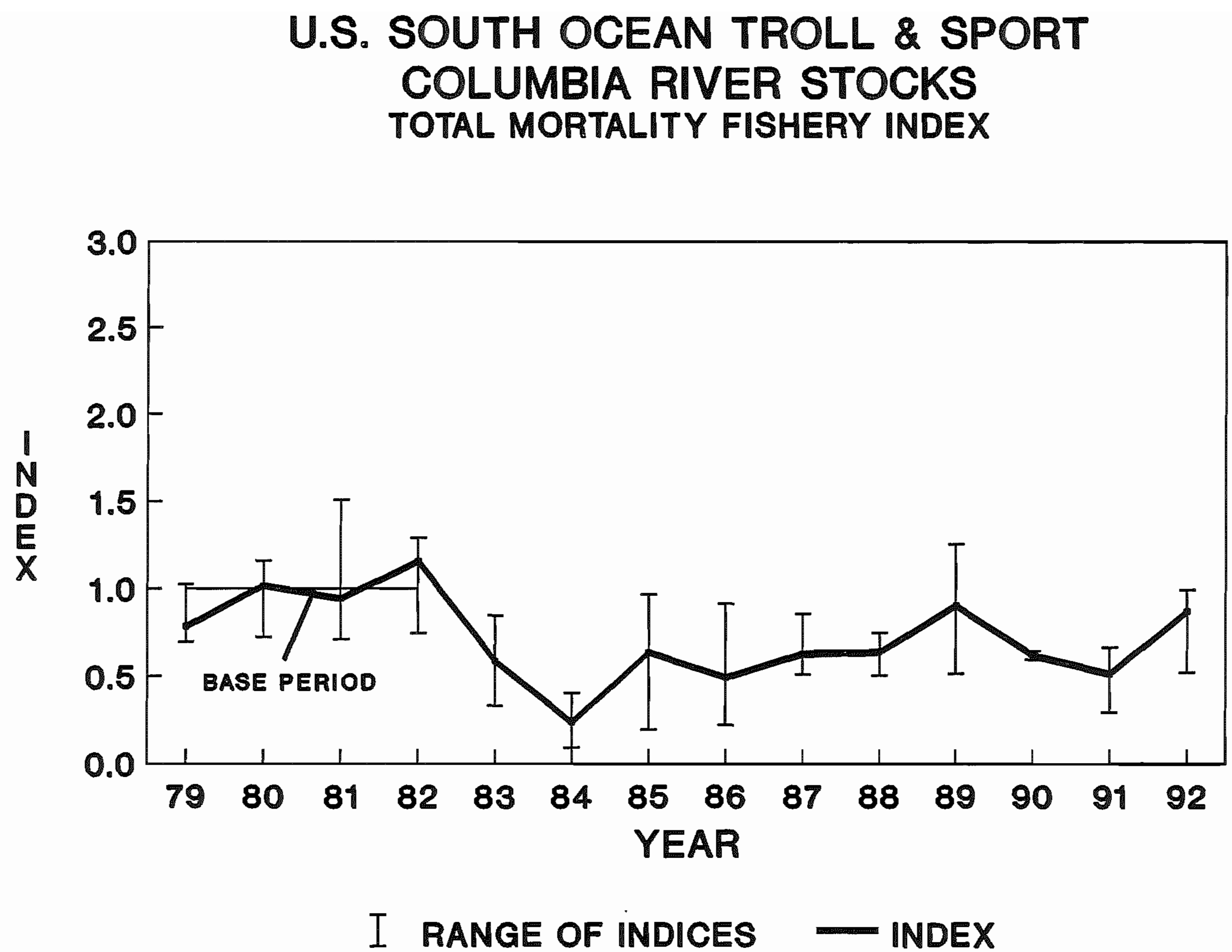
TOTAL MORTALITY EXPLOITATION RATES

| Year | GAD Age 3 | GAD Age 4 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 |
|---|---|---|---|---|---|---|---|
| 79 | NA | NA | NA | 0.017 | NA | 0.021 | 0.013 |
| 80 | NA | NA | NA | NA | NA | NA | 0.031 |
| 81 | 0.012 | NA | NA | NA | 0.006 | NA | 0.025 |
| 82 | 0.019 | 0.031 | 0.009 | NA | 0.007 | 0.048 | 0.027 |
| 83 | NA | NA | NA | 0.039 | 0.005 | 0.027 | 0.016 |
| 84 | 0.019 | NA | NA | NA | 0.007 | 0.025 | 0.008 |
| 85 | NA | 0.010 | NA | NA | NA | 0.019 | 0.014 |
| 86 | NA | NA | NA | NA | NA | NA | NA |
| 87 | NA | NA | NA | NA | NA | NA | 0.027 |
| 88 | 0.043 | NA | 0.025 | NA | 0.033 | NA | NA |
| 89 | 0.070 | 0.123 | 0.028 | 0.055 | 0.053 | 0.075 | NA |
| 90 | 0.078 | 0.113 | 0.046 | 0.079 | 0.059 | 0.082 | NA |
| 91 | NA | 0.084 | NA | 0.066 | 0.023 | 0.091 | NA |
| 92 | NA | NA | NA | NA | NA | 0.083 | NA |
| Base | 0.015 | 0.031 | 0.009 | 0.017 | 0.007 | 0.035 | 0.024 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | GAD Age 3 | GAD Age 4 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 | Fishery |
|---|---|---|---|---|---|---|---|---|
| 79 | NA | NA | NA | 1.000 | NA | 0.613 | 0.541 | 0.676 |
| 80 | NA | NA | NA | NA | NA | NA | 1.278 | 1.278 |
| 81 | 0.768 | NA | NA | NA | 0.937 | NA | 1.050 | 0.939 |
| 82 | 1.232 | 1.000 | 1.000 | NA | 1.063 | 1.387 | 1.131 | 1.171 |
| 83 | NA | NA | NA | 2.348 | 0.788 | 0.767 | 0.676 | 1.064 |
| 84 | 1.257 | NA | NA | NA | 1.080 | 0.712 | 0.321 | 0.731 |
| 85 | NA | 0.339 | NA | NA | NA | 0.534 | 0.567 | 0.476 |
| 86 | NA | NA | NA | NA | NA | NA | NA | |
| 87 | NA | NA | NA | NA | NA | NA | 1.119 | 1.119 |
| 88 | 2.775 | NA | 2.829 | NA | 4.973 | NA | NA | 3.258 |
| 89 | 4.521 | 3.986 | 3.154 | 3.295 | 7.948 | 2.148 | NA | 3.559 |
| 90 | 5.032 | 3.654 | 5.103 | 4.742 | 8.853 | 2.362 | NA | 4.024 |
| 91 | NA | 2.710 | NA | 3.976 | 3.504 | 2.604 | NA | 2.966 |
| 92 | NA | NA | NA | NA | NA | 2.381 | NA | 2.381 |

GAD = G ADAMS FALL FING SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING UWA = U OF W FALL ACCEL



U.S. SOUTH OCEAN TROLL & SPORT
COLUMBIA RIVER STOCKS
TOTAL MORTALITY FISHERY INDEX
3.0
2.5
2.0
1.5
1.0
0.5
0.0
INDEX
BASE PERIOD
79
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR
RANGE OF INDICES
INDEX

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

TOTAL MORTALITY EXPLOITATION RATES

| Year | BON Age 3 | CWF Age 3 | CWF Age 4 | SPR Age 3 | SPR Age 4 | STP Age 3 |
|---|---|---|---|---|---|---|
| 79 | 0.125 | NA | NA | 0.193 | 0.145 | NA |
| 80 | 0.208 | 0.122 | NA | 0.296 | 0.103 | NA |
| 81 | 0.203 | 0.095 | 0.162 | 0.271 | 0.215 | 0.197 |
| 82 | 0.183 | 0.157 | 0.272 | 0.323 | 0.106 | 0.358 |
| 83 | 0.097 | 0.070 | 0.183 | 0.090 | NA | 0.186 |
| 84 | 0.073 | 0.011 | 0.040 | 0.075 | NA | 0.055 |
| 85 | 0.174 | 0.087 | 0.042 | 0.159 | NA | 0.216 |
| 86 | NA | 0.114 | 0.052 | 0.060 | 0.034 | 0.245 |
| 87 | 0.154 | 0.066 | 0.116 | 0.192 | NA | 0.142 |
| 88 | NA | 0.072 | 0.149 | 0.136 | NA | 0.208 |
| 89 | NA | 0.064 | 0.271 | 0.208 | NA | 0.258 |
| 90 | NA | NA | 0.138 | 0.161 | 0.091 | 0.171 |
| 91 | NA | 0.063 | NA | 0.179 | 0.042 | 0.134 |
| 92 | NA | NA | NA | 0.269 | 0.074 | 0.257 |
| Base | 0.180 | 0.124 | 0.217 | 0.271 | 0.142 | 0.278 |

TOTAL MORTALITY EXPLOITATION RATE INDEX

| Year | BON Age 3 | CWF Age 3 | CWF Age 4 | SPR Age 3 | SPR Age 4 | STP Age 3 | Fishery |
|---|---|---|---|---|---|---|---|
| 79 | 0.694 | NA | NA | 0.713 | 1.022 | NA | 0.781 |
| 80 | 1.159 | 0.980 | NA | 1.093 | 0.724 | NA | 1.017 |
| 81 | 1.131 | 0.760 | 0.746 | 1.000 | 1.510 | 0.710 | 0.943 |
| 82 | 1.017 | 1.260 | 1.254 | 1.194 | 0.745 | 1.290 | 1.154 |
| 83 | 0.538 | 0.565 | 0.845 | 0.333 | NA | 0.670 | 0.586 |
| 84 | 0.405 | 0.091 | 0.185 | 0.277 | NA | 0.198 | 0.238 |
| 85 | 0.967 | 0.698 | 0.196 | 0.588 | NA | 0.778 | 0.634 |
| 86 | NA | 0.914 | 0.242 | 0.223 | 0.242 | 0.883 | 0.491 |
| 87 | 0.856 | 0.530 | 0.534 | 0.708 | NA | 0.512 | 0.626 |
| 88 | NA | 0.582 | 0.686 | 0.504 | NA | 0.748 | 0.635 |
| 89 | NA | 0.516 | 1.251 | 0.769 | NA | 0.930 | 0.901 |
| 90 | NA | NA | 0.637 | 0.595 | 0.643 | 0.616 | 0.619 |
| 91 | NA | 0.509 | NA | 0.663 | 0.295 | 0.481 | 0.513 |
| 92 | NA | NA | NA | 0.993 | 0.521 | 0.925 | 0.869 |

BON = BONNEVILLE TULE   CWF = COWLITZ FALL TULE
SPR = SPRING CREEK TULE   STP = STAYTON POND TULE

# APPENDIX E

## Reported Catch Exploitation Rate and Fishery Index Data

## Fishery: Southeast Alaska Troll

REPORTED CATCH EXPLOITATION RATES

| Year | AKS Age 4 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.025 | 0.088 | 0.034 | 0.262 | 0.543 | NA | NA | 0.000 | 0.158 | NA | NA |
| 80 | NA | 0.106 | 0.058 | 0.047 | 0.273 | 0.324 | NA | NA | 0.025 | 0.139 | 0.260 | 0.121 |
| 81 | NA | 0.099 | 0.104 | 0.055 | 0.331 | 0.397 | 0.119 | NA | NA | 0.183 | 0.233 | 0.073 |
| 82 | 0.091 | 0.114 | 0.139 | 0.031 | 0.243 | 0.270 | 0.111 | 0.128 | 0.006 | 0.127 | 0.183 | 0.060 |
| 83 | 0.087 | 0.178 | 0.186 | 0.023 | 0.281 | 0.418 | 0.060 | 0.385 | 0.001 | 0.200 | NA | 0.093 |
| 84 | 0.058 | 0.097 | 0.181 | 0.053 | 0.276 | 0.223 | 0.053 | 0.129 | 0.004 | 0.179 | 0.299 | 0.040 |
| 85 | 0.061 | 0.140 | 0.203 | 0.047 | 0.126 | 0.304 | NA | 0.220 | 0.005 | 0.134 | 0.221 | 0.111 |
| 86 | 0.076 | 0.085 | 0.130 | NA | 0.287 | NA | 0.127 | NA | 0.005 | 0.094 | 0.159 | NA |
| 87 | 0.031 | 0.103 | 0.115 | 0.020 | NA | NA | 0.039 | 0.167 | 0.004 | 0.107 | 0.199 | 0.084 |
| 88 | 0.048 | 0.101 | 0.080 | 0.004 | 0.147 | NA | 0.061 | 0.235 | 0.000 | 0.061 | 0.177 | 0.046 |
| 89 | 0.041 | 0.094 | 0.129 | 0.011 | 0.137 | 0.181 | 0.024 | 0.176 | NA | 0.034 | 0.140 | 0.026 |
| 90 | 0.121 | 0.157 | 0.101 | 0.032 | 0.177 | 0.243 | 0.048 | 0.135 | NA | 0.120 | 0.101 | 0.065 |
| 91 | 0.044 | 0.081 | 0.108 | 0.017 | 0.176 | 0.242 | 0.077 | 0.190 | NA | NA | 0.135 | 0.031 |
| 92 | 0.026 | 0.054 | 0.103 | 0.007 | 0.162 | 0.275 | 0.022 | 0.033 | NA | 0.040 | NA | 0.023 |
| Base | 0.091 | 0.086 | 0.097 | 0.042 | 0.277 | 0.383 | 0.115 | 0.128 | 0.010 | 0.152 | 0.225 | 0.085 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | AKS Age 4 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.288 | 0.905 | 0.819 | 0.945 | 1.416 | NA | NA | 0.000 | 1.040 | NA | NA | 1.059 |
| 80 | NA | 1.236 | 0.601 | 1.129 | 0.985 | 0.846 | NA | NA | 2.412 | 0.916 | 1.153 | 1.432 | 0.997 |
| 81 | NA | 1.152 | 1.069 | 1.323 | 1.194 | 1.034 | 1.037 | NA | NA | 1.208 | 1.036 | 0.857 | 1.090 |
| 82 | 1.000 | 1.325 | 1.425 | 0.729 | 0.877 | 0.704 | 0.963 | 1.000 | 0.588 | 0.836 | 0.812 | 0.711 | 0.888 |
| 83 | 0.962 | 2.071 | 1.910 | 0.545 | 1.011 | 1.090 | 0.522 | 3.001 | 0.100 | 1.321 | NA | 1.097 | 1.304 |
| 84 | 0.642 | 1.132 | 1.866 | 1.255 | 0.995 | 0.582 | 0.466 | 1.007 | 0.394 | 1.179 | 1.329 | 0.475 | 0.942 |
| 85 | 0.669 | 1.628 | 2.086 | 1.132 | 0.453 | 0.792 | NA | 1.716 | 0.441 | 0.884 | 0.980 | 1.305 | 0.996 |
| 86 | 0.840 | 0.989 | 1.339 | NA | 1.034 | NA | 1.104 | NA | 0.500 | 0.620 | 0.707 | NA | 0.915 |
| 87 | 0.348 | 1.204 | 1.187 | 0.469 | NA | NA | 0.338 | 1.303 | 0.422 | 0.705 | 0.883 | 0.993 | 0.845 |
| 88 | 0.532 | 1.172 | 0.824 | 0.088 | 0.532 | NA | 0.532 | 1.831 | 0.000 | 0.400 | 0.786 | 0.542 | 0.734 |
| 89 | 0.449 | 1.092 | 1.322 | 0.267 | 0.493 | 0.473 | 0.212 | 1.367 | NA | 0.224 | 0.622 | 0.307 | 0.590 |
| 90 | 1.334 | 1.823 | 1.036 | 0.765 | 0.640 | 0.633 | 0.417 | 1.050 | NA | 0.792 | 0.449 | 0.770 | 0.773 |
| 91 | 0.484 | 0.949 | 1.108 | 0.407 | 0.636 | 0.630 | 0.670 | 1.479 | NA | NA | 0.598 | 0.368 | 0.720 |
| 92 | 0.288 | 0.628 | 1.059 | 0.169 | 0.584 | 0.718 | 0.191 | 0.257 | NA | 0.265 | NA | 0.272 | 0.512 |

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

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

REPORTED CATCH EXPLOITATION RATES

| Year | AKS Age 4 | BQR Age 3 | BQR Age 4 | QUI Age 3 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.074 | 0.094 | 0.039 | 0.170 | 0.112 | 0.093 | 0.160 | 0.117 | NA | NA | NA | 0.008 | 0.090 | NA | NA |
| 80 | NA | 0.087 | 0.083 | 0.039 | 0.161 | 0.211 | 0.079 | 0.150 | 0.155 | 0.068 | NA | NA | 0.023 | 0.068 | 0.071 | 0.121 |
| 81 | NA | 0.084 | 0.097 | 0.065 | 0.170 | 0.185 | 0.055 | 0.140 | 0.226 | 0.103 | 0.156 | NA | NA | 0.079 | 0.090 | 0.091 |
| 82 | 0.004 | 0.059 | 0.085 | 0.028 | 0.077 | 0.117 | 0.060 | 0.162 | 0.124 | 0.034 | 0.120 | 0.081 | 0.025 | 0.045 | NA | 0.022 |
| 83 | 0.007 | NA | 0.097 | 0.056 | 0.143 | 0.214 | 0.071 | 0.122 | 0.079 | 0.027 | 0.089 | 0.098 | 0.029 | 0.072 | NA | 0.053 |
| 84 | 0.005 | 0.061 | NA | 0.009 | 0.064 | 0.080 | 0.031 | 0.151 | 0.263 | NA | 0.095 | 0.316 | 0.021 | 0.104 | NA | 0.020 |
| 85 | 0.003 | 0.032 | NA | 0.012 | 0.045 | 0.036 | 0.057 | 0.260 | 0.208 | 0.036 | NA | 0.232 | 0.021 | 0.082 | 0.074 | 0.021 |
| 86 | 0.003 | 0.050 | 0.191 | 0.043 | 0.079 | 0.082 | NA | 0.148 | NA | 0.014 | 0.063 | NA | 0.017 | 0.070 | 0.083 | NA |
| 87 | 0.002 | 0.005 | 0.074 | 0.015 | 0.071 | 0.121 | 0.039 | NA | NA | 0.014 | 0.065 | 0.200 | 0.022 | 0.098 | 0.141 | 0.018 |
| 88 | 0.006 | NA | NA | 0.010 | 0.046 | 0.021 | 0.025 | 0.083 | NA | NA | 0.052 | 0.184 | 0.006 | 0.053 | 0.091 | 0.029 |
| 89 | 0.003 | 0.018 | NA | 0.017 | 0.033 | 0.036 | 0.024 | 0.105 | 0.157 | 0.007 | 0.035 | 0.189 | NA | 0.049 | 0.190 | 0.012 |
| 90 | 0.007 | 0.018 | 0.103 | 0.015 | 0.091 | 0.047 | 0.019 | 0.108 | 0.103 | 0.010 | 0.032 | 0.219 | NA | 0.063 | 0.111 | 0.012 |
| 91 | 0.002 | 0.012 | NA | 0.014 | 0.110 | 0.086 | 0.029 | 0.100 | 0.215 | 0.006 | 0.054 | 0.194 | NA | NA | NA | 0.009 |
| 92 | NA | 0.019 | 0.201 | NA | 0.101 | 0.167 | 0.024 | 0.119 | 0.140 | 0.007 | 0.027 | 0.093 | NA | NA | NA | 0.003 |
| Base | 0.004 | 0.076 | 0.090 | 0.043 | 0.144 | 0.156 | 0.072 | 0.153 | 0.156 | 0.068 | 0.138 | 0.081 | 0.019 | 0.071 | 0.081 | 0.078 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | AKS Age 4 | BQR Age 3 | BQR Age 4 | QUI Age 3 | QUI Age 4 | QUI Age 5 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.970 | 1.047 | 0.916 | 1.175 | 0.718 | 1.299 | 1.046 | 0.751 | NA | NA | NA | 0.420 | 1.276 | NA | NA | 0.978 |
| 80 | NA | 1.142 | 0.923 | 0.913 | 1.114 | 1.349 | 1.104 | 0.981 | 0.999 | 0.992 | NA | NA | 1.225 | 0.961 | 0.884 | 1.553 | 1.091 |
| 81 | NA | 1.104 | 1.080 | 1.520 | 1.177 | 1.185 | 0.765 | 0.915 | 1.453 | 1.510 | 1.130 | NA | NA | 1.125 | 1.116 | 1.169 | 1.163 |
| 82 | 1.000 | 0.783 | 0.950 | 0.650 | 0.534 | 0.749 | 0.832 | 1.059 | 0.798 | 0.498 | 0.870 | 1.000 | 1.355 | 0.638 | NA | 0.277 | 0.774 |
| 83 | 1.746 | NA | 1.086 | 1.308 | 0.989 | 1.373 | 0.996 | 0.794 | 0.510 | 0.403 | 0.643 | 1.213 | 1.587 | 1.023 | NA | 0.684 | 0.912 |
| 84 | 1.148 | 0.804 | NA | 0.213 | 0.442 | 0.514 | 0.437 | 0.988 | 1.688 | NA | 0.683 | 3.901 | 1.140 | 1.467 | NA | 0.263 | 1.025 |
| 85 | 0.824 | 0.418 | NA | 0.288 | 0.314 | 0.232 | 0.794 | 1.695 | 1.339 | 0.527 | NA | 2.857 | 1.124 | 1.156 | 0.923 | 0.267 | 0.932 |
| 86 | 0.751 | 0.661 | 2.134 | 0.999 | 0.547 | 0.525 | NA | 0.964 | NA | 0.207 | 0.458 | NA | 0.900 | 0.996 | 1.026 | NA | 0.809 |
| 87 | 0.530 | 0.069 | 0.821 | 0.345 | 0.490 | 0.777 | 0.540 | NA | NA | 0.203 | 0.467 | 2.467 | 1.195 | 1.383 | 1.751 | 0.236 | 0.790 |
| 88 | 1.565 | NA | NA | 0.234 | 0.317 | 0.134 | 0.350 | 0.541 | NA | NA | 0.377 | 2.273 | 0.330 | 0.749 | 1.131 | 0.375 | 0.584 |
| 89 | 0.804 | 0.241 | NA | 0.408 | 0.231 | 0.228 | 0.329 | 0.684 | 1.008 | 0.102 | 0.252 | 2.330 | NA | 0.693 | 2.349 | 0.152 | 0.662 |
| 90 | 1.658 | 0.239 | 1.148 | 0.352 | 0.633 | 0.298 | 0.268 | 0.706 | 0.661 | 0.148 | 0.234 | 2.702 | NA | 0.887 | 1.370 | 0.156 | 0.679 |
| 91 | 0.608 | 0.162 | NA | 0.329 | 0.759 | 0.552 | 0.404 | 0.656 | 1.381 | 0.083 | 0.392 | 2.393 | NA | NA | NA | 0.110 | 0.711 |
| 92 | NA | 0.257 | 2.239 | NA | 0.698 | 1.068 | 0.333 | 0.776 | 0.898 | 0.106 | 0.192 | 1.150 | NA | NA | NA | 0.041 | 0.743 |

AKS = ALASKA SPRING   BQR = BIG QUALICUM   QUI = QUINSAM   RBT = ROBERTSON CREEK   SRH = SALMON RIVER
URB = COLUMBIA UPRIVER BRIGHT   WSH = WILLAMETTE SPRING

## Fishery: North B.C. Troll

REPORTED CATCH EXPLOITATION RATES

| Year | AKS Age 4 | QUI Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.018 | NA | 0.049 | 0.077 | 0.082 | NA | NA | NA | 0.007 | 0.058 | NA | NA |
| 80 | NA | 0.024 | 0.056 | 0.044 | 0.073 | 0.081 | 0.062 | NA | NA | 0.017 | 0.051 | 0.061 | 0.118 |
| 81 | NA | 0.062 | 0.079 | 0.029 | 0.087 | 0.164 | 0.103 | 0.149 | NA | NA | 0.066 | 0.079 | 0.088 |
| 82 | 0.004 | 0.025 | 0.029 | 0.037 | 0.107 | NA | 0.028 | 0.120 | 0.081 | 0.023 | 0.045 | NA | 0.022 |
| 83 | 0.007 | 0.038 | 0.082 | 0.042 | 0.063 | 0.058 | 0.027 | 0.083 | 0.098 | 0.025 | 0.061 | NA | 0.053 |
| 84 | 0.005 | 0.007 | 0.025 | 0.023 | 0.123 | 0.230 | NA | 0.083 | 0.259 | 0.013 | 0.089 | NA | 0.019 |
| 85 | 0.003 | 0.007 | 0.028 | 0.049 | 0.260 | 0.208 | 0.029 | NA | 0.232 | 0.018 | 0.079 | 0.074 | 0.018 |
| 86 | 0.003 | 0.026 | 0.038 | NA | 0.148 | NA | 0.007 | 0.063 | NA | 0.015 | 0.061 | 0.073 | NA |
| 87 | 0.002 | 0.010 | 0.031 | 0.026 | NA | NA | 0.012 | 0.065 | 0.200 | 0.016 | 0.088 | 0.131 | 0.015 |
| 88 | 0.006 | 0.005 | 0.034 | 0.018 | 0.076 | NA | NA | 0.052 | 0.152 | 0.005 | 0.048 | 0.088 | 0.025 |
| 89 | 0.003 | 0.012 | 0.022 | 0.020 | 0.100 | 0.142 | 0.007 | 0.035 | 0.189 | NA | 0.046 | 0.190 | 0.012 |
| 90 | 0.007 | 0.010 | 0.049 | 0.014 | 0.089 | 0.089 | 0.009 | 0.032 | 0.219 | NA | 0.057 | 0.104 | 0.011 |
| 91 | 0.002 | 0.009 | 0.031 | 0.021 | 0.078 | 0.174 | 0.006 | 0.053 | 0.188 | NA | NA | NA | 0.009 |
| 92 | NA | NA | 0.063 | 0.020 | 0.079 | 0.098 | 0.006 | 0.027 | 0.086 | NA | NA | NA | 0.003 |
| Base | 0.004 | 0.032 | 0.055 | 0.040 | 0.086 | 0.109 | 0.064 | 0.135 | 0.081 | 0.015 | 0.055 | 0.070 | 0.076 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | AKS Age 4 | QUI Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SRH Age 3 | SRH Age 4 | SRH Age 5 | URB Age 3 | URB Age 4 | URB Age 5 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | NA | 0.557 | NA | 1.221 | 0.892 | 0.755 | NA | NA | NA | 0.438 | 1.059 | NA | NA | 0.861 |
| 80 | NA | 0.745 | 1.030 | 1.114 | 0.848 | 0.742 | 0.968 | NA | NA | 1.100 | 0.928 | 0.873 | 1.557 | 0.976 |
| 81 | NA | 1.917 | 1.442 | 0.726 | 1.017 | 1.503 | 1.602 | 1.107 | NA | NA | 1.195 | 1.127 | 1.159 | 1.255 |
| 82 | 1.000 | 0.782 | 0.529 | 0.939 | 1.243 | NA | 0.431 | 0.893 | 1.000 | 1.462 | 0.818 | NA | 0.285 | 0.809 |
| 83 | 1.746 | 1.172 | 1.500 | 1.062 | 0.737 | 0.528 | 0.428 | 0.617 | 1.213 | 1.609 | 1.103 | NA | 0.692 | 0.847 |
| 84 | 1.148 | 0.227 | 0.461 | 0.570 | 1.434 | 2.103 | NA | 0.618 | 3.188 | 0.870 | 1.622 | NA | 0.248 | 1.273 |
| 85 | 0.824 | 0.203 | 0.517 | 1.227 | 3.023 | 1.907 | 0.459 | NA | 2.857 | 1.173 | 1.432 | 1.069 | 0.242 | 1.463 |
| 86 | 0.751 | 0.823 | 0.700 | NA | 1.718 | NA | 0.110 | 0.470 | NA | 0.945 | 1.103 | 1.051 | NA | 0.842 |
| 87 | 0.530 | 0.302 | 0.572 | 0.656 | NA | NA | 0.194 | 0.480 | 2.467 | 1.035 | 1.604 | 1.874 | 0.196 | 0.951 |
| 88 | 1.565 | 0.156 | 0.625 | 0.442 | 0.884 | NA | NA | 0.387 | 1.876 | 0.309 | 0.880 | 1.257 | 0.330 | 0.785 |
| 89 | 0.804 | 0.383 | 0.407 | 0.494 | 1.160 | 1.301 | 0.108 | 0.258 | 2.330 | NA | 0.830 | 2.721 | 0.156 | 0.963 |
| 90 | 1.626 | 0.295 | 0.891 | 0.348 | 1.033 | 0.811 | 0.145 | 0.240 | 2.702 | NA | 1.042 | 1.486 | 0.142 | 0.853 |
| 91 | 0.608 | 0.271 | 0.569 | 0.526 | 0.909 | 1.593 | 0.088 | 0.396 | 2.323 | NA | NA | NA | 0.113 | 0.838 |
| 92 | NA | NA | 1.157 | 0.498 | 0.924 | 0.900 | 0.094 | 0.197 | 1.058 | NA | NA | NA | 0.042 | 0.592 |

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

## Fishery: Central B.C. Troll

REPORTED CATCH EXPLOITATION RATES

| Year | BQR Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 |
|---|---|---|---|---|
| 79 | 0.064 | NA | 0.044 | 0.084 |
| 80 | 0.044 | 0.105 | 0.035 | 0.077 |
| 81 | 0.076 | 0.091 | 0.026 | 0.053 |
| 82 | 0.030 | 0.048 | 0.022 | 0.055 |
| 83 | NA | 0.061 | 0.029 | 0.058 |
| 84 | 0.048 | 0.039 | NA | 0.028 |
| 85 | 0.016 | 0.017 | NA | NA |
| 86 | 0.045 | 0.041 | NA | NA |
| 87 | NA | 0.039 | 0.012 | NA |
| 88 | NA | 0.012 | 0.007 | 0.007 |
| 89 | 0.002 | 0.011 | 0.004 | 0.005 |
| 90 | NA | 0.043 | 0.005 | 0.019 |
| 91 | 0.007 | 0.079 | 0.008 | 0.022 |
| 92 | 0.006 | 0.038 | 0.004 | 0.040 |
| Base | 0.054 | 0.081 | 0.032 | 0.067 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | BQR Age 3 | QUI Age 4 | RBT Age 3 | RBT Age 4 | Fishery |
|---|---|---|---|---|---|
| 79 | 1.190 | NA | 1.397 | 1.242 | 1.256 |
| 80 | 0.822 | 1.286 | 1.092 | 1.151 | 1.115 |
| 81 | 1.420 | 1.121 | 0.814 | 0.784 | 1.051 |
| 82 | 0.567 | 0.593 | 0.697 | 0.823 | 0.667 |
| 83 | NA | 0.748 | 0.913 | 0.868 | 0.822 |
| 84 | 0.896 | 0.476 | NA | 0.419 | 0.568 |
| 85 | 0.296 | 0.209 | NA | NA | 0.243 |
| 86 | 0.847 | 0.500 | NA | NA | 0.638 |
| 87 | NA | 0.485 | 0.393 | NA | 0.459 |
| 88 | NA | 0.143 | 0.233 | 0.102 | 0.144 |
| 89 | 0.038 | 0.137 | 0.122 | 0.076 | 0.095 |
| 90 | NA | 0.525 | 0.167 | 0.288 | 0.374 |
| 91 | 0.134 | 0.966 | 0.251 | 0.333 | 0.496 |
| 92 | 0.121 | 0.461 | 0.127 | 0.588 | 0.374 |

BQR = BIG QUALICUM QUI = QUINSAM
RBT = ROBERTSON CREEK

# Fishery: West Coast Vancouver Island Troll

REPORTED CATCH EXPLOITATION RATES

| Year | BON Age 3 | BON Age 4 | CWF Age 4 | GAD Age 3 | GAD Age 4 | LRW Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SAM Age 3 | SAM Age 4 | SPR Age 3 | SPR Age 4 | SPS Age 3 | SPS Age 4 | STP Age 3 | STP Age 4 | URB Age 3 | URB Age 4 | UWA Age 3 | UWA Age 4 | WSH Age 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.210 | NA | NA | NA | NA | NA | 0.032 | 0.066 | NA | NA | 0.213 | 0.181 | 0.173 | NA | 0.254 | NA | NA | 0.041 | 0.083 | 0.065 | 0.165 | NA |
| 80 | 0.100 | 0.152 | NA | NA | NA | NA | 0.037 | 0.074 | NA | NA | NA | 0.215 | 0.297 | NA | NA | NA | NA | 0.039 | 0.050 | 0.139 | 0.127 | 0.055 |
| 81 | 0.159 | 0.154 | 0.129 | 0.034 | NA | 0.059 | 0.018 | 0.028 | 0.030 | NA | NA | 0.171 | 0.144 | 0.049 | NA | 0.232 | NA | NA | 0.052 | 0.087 | 0.182 | 0.012 |
| 82 | 0.263 | 0.349 | 0.197 | 0.067 | 0.211 | 0.084 | 0.021 | 0.034 | NA | 0.052 | NA | 0.167 | 0.252 | 0.092 | 0.199 | 0.225 | 0.299 | 0.030 | 0.028 | 0.126 | 0.213 | 0.046 |
| 83 | 0.313 | 0.303 | 0.225 | 0.093 | 0.293 | 0.069 | 0.010 | 0.034 | 0.074 | NA | 0.196 | 0.276 | 0.214 | 0.110 | 0.200 | 0.332 | 0.500 | 0.009 | 0.020 | 0.079 | 0.207 | 0.025 |
| 84 | 0.274 | 0.541 | 0.215 | 0.107 | NA | NA | 0.048 | 0.052 | 0.059 | NA | NA | 0.240 | 0.313 | 0.101 | 0.227 | 0.402 | 0.516 | 0.021 | 0.061 | 0.191 | 0.159 | 0.017 |
| 85 | 0.224 | 0.294 | 0.150 | NA | 0.172 | NA | 0.022 | 0.000 | NA | NA | NA | 0.095 | 0.241 | 0.050 | 0.159 | 0.201 | 0.193 | 0.018 | 0.048 | 0.096 | 0.223 | 0.014 |
| 86 | NA | NA | 0.210 | NA | NA | 0.032 | NA | NA | NA | NA | NA | 0.195 | 0.155 | 0.058 | 0.265 | 0.199 | 0.227 | 0.036 | 0.033 | 0.091 | 0.238 | NA |
| 87 | 0.177 | NA | 0.131 | NA | NA | 0.101 | 0.010 | NA | NA | NA | NA | 0.075 | NA | 0.047 | 0.139 | 0.153 | NA | 0.024 | 0.044 | 0.040 | 0.087 | 0.015 |
| 88 | NA | 0.243 | 0.139 | 0.023 | NA | 0.073 | 0.016 | 0.039 | NA | 0.029 | NA | 0.177 | NA | 0.019 | 0.172 | 0.187 | 0.281 | 0.002 | 0.089 | NA | 0.162 | 0.019 |
| 89 | NA | NA | 0.087 | 0.013 | 0.108 | 0.042 | 0.006 | 0.022 | 0.000 | 0.010 | 0.131 | 0.099 | 0.092 | 0.022 | 0.093 | 0.047 | 0.110 | NA | 0.041 | NA | NA | 0.014 |
| 90 | NA | NA | 0.118 | 0.056 | 0.201 | 0.086 | 0.020 | 0.039 | NA | 0.019 | 0.184 | 0.150 | 0.138 | 0.048 | 0.210 | 0.190 | 0.076 | NA | 0.081 | NA | NA | 0.018 |
| 91 | NA | NA | NA | 0.000 | 0.196 | 0.054 | 0.023 | 0.032 | 0.023 | 0.012 | 0.125 | 0.097 | 0.117 | 0.022 | 0.133 | 0.126 | NA | NA | NA | NA | NA | 0.001 |
| 92 | NA | NA | 0.216 | NA | 0.116 | 0.032 | 0.077 | 0.189 | 0.231 | 0.051 | 0.054 | 0.080 | 0.159 | 0.048 | 0.173 | 0.113 | NA | 0.006 | NA | NA | NA | 0.015 |
| Base | 0.183 | 0.218 | 0.163 | 0.051 | 0.211 | 0.072 | 0.027 | 0.051 | 0.030 | 0.052 | 0.213 | 0.183 | 0.216 | 0.071 | 0.227 | 0.229 | 0.299 | 0.036 | 0.053 | 0.104 | 0.172 | 0.038 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | BON Age 3 | BON Age 4 | CWF Age 4 | GAD Age 3 | GAD Age 4 | LRW Age 4 | RBT Age 3 | RBT Age 4 | RBT Age 5 | SAM Age 3 | SAM Age 4 | SPR Age 3 | SPR Age 4 | SPS Age 3 | SPS Age 4 | STP Age 3 | STP Age 4 | URB Age 3 | URB Age 4 | UWA Age 3 | UWA Age 4 | WSH Age 4 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 1.148 | NA | NA | NA | NA | NA | 1.161 | 1.308 | NA | NA | 1.000 | 0.988 | 0.801 | NA | 1.121 | NA | NA | 1.111 | 1.552 | 0.627 | 0.962 | NA | 1.012 |
| 80 | 0.546 | 0.696 | NA | NA | NA | NA | 1.378 | 1.465 | NA | NA | NA | 1.172 | 1.373 | NA | NA | NA | NA | 1.058 | 0.942 | 1.333 | 0.738 | 1.457 | 1.002 |
| 81 | 0.868 | 0.706 | 0.791 | 0.680 | NA | 0.827 | 0.675 | 0.554 | 1.000 | NA | NA | 0.931 | 0.663 | 0.695 | NA | 1.015 | NA | NA | 0.979 | 0.834 | 1.061 | 0.327 | 0.828 |
| 82 | 1.438 | 1.598 | 1.209 | 1.320 | 1.000 | 1.173 | 0.786 | 0.673 | NA | 1.000 | NA | 0.909 | 1.163 | 1.305 | 0.879 | 0.985 | 1.000 | 0.831 | 0.527 | 1.206 | 1.239 | 1.215 | 1.113 |
| 83 | 1.711 | 1.388 | 1.384 | 1.847 | 1.388 | 0.967 | 0.360 | 0.679 | 2.475 | NA | 0.922 | 1.506 | 0.986 | 1.551 | 0.881 | 1.450 | 1.673 | 0.255 | 0.369 | 0.753 | 1.203 | 0.669 | 1.258 |
| 84 | 1.494 | 2.475 | 1.321 | 2.123 | NA | NA | 1.779 | 1.027 | 1.979 | NA | NA | 1.313 | 1.443 | 1.421 | 1.003 | 1.756 | 1.728 | 0.568 | 1.141 | 1.826 | 0.925 | 0.456 | 1.507 |
| 85 | 1.221 | 1.347 | 0.920 | NA | 0.816 | NA | 0.815 | 0.000 | NA | NA | NA | 0.521 | 1.111 | 0.711 | 0.700 | 0.878 | 0.644 | 0.496 | 0.892 | 0.918 | 1.298 | 0.362 | 0.886 |
| 86 | NA | NA | 1.289 | NA | NA | 0.452 | NA | NA | NA | NA | NA | 1.062 | 0.714 | 0.819 | 1.170 | 0.871 | 0.760 | 0.999 | 0.624 | 0.869 | 1.384 | NA | 0.953 |
| 87 | 0.969 | NA | 0.808 | NA | NA | 1.404 | 0.374 | NA | NA | NA | NA | 0.409 | NA | 0.658 | 0.614 | 0.670 | NA | 0.665 | 0.832 | 0.381 | 0.506 | 0.395 | 0.670 |
| 88 | NA | 1.113 | 0.853 | 0.455 | NA | 1.020 | 0.605 | 0.775 | NA | 0.566 | NA | 0.967 | NA | 0.268 | 0.759 | 0.816 | 0.940 | 0.056 | 1.671 | NA | 0.943 | 0.493 | 0.861 |
| 89 | NA | NA | 0.537 | 0.261 | 0.512 | 0.589 | 0.232 | 0.429 | 0.000 | 0.199 | 0.614 | 0.543 | 0.424 | 0.313 | 0.412 | 0.205 | 0.367 | NA | 0.777 | NA | NA | 0.365 | 0.430 |
| 90 | NA | NA | 0.726 | 1.111 | 0.954 | 1.207 | 0.751 | 0.773 | NA | 0.367 | 0.865 | 0.819 | 0.637 | 0.676 | 0.928 | 0.828 | 0.254 | NA | 1.516 | NA | NA | 0.477 | 0.759 |
| 91 | NA | NA | NA | 0.000 | 0.927 | 0.758 | 0.831 | 0.635 | 0.756 | 0.231 | 0.587 | 0.530 | 0.538 | 0.307 | 0.586 | 0.550 | NA | NA | NA | NA | NA | 0.036 | 0.575 |
| 92 | NA | NA | 1.329 | NA | 0.550 | 0.449 | 2.820 | 3.734 | 7.752 | 0.970 | 0.252 | 0.435 | 0.734 | 0.672 | 0.763 | 0.495 | NA | 0.175 | NA | NA | NA | 0.395 | 0.858 |

BON = BONNEVILLE TULE   CWF = COWLITZ FALL TULE   GAD = G ADAMS FALL FING   LRW = LEWIS RIVER WILD   RBT = ROBERTSON CREEK   SAM = SAMISH FALL FING
SPR = SPRING CREEK TULE   SPS = SO SOUND FALL FING   STP = STAYTON POND TULE   URB = COLUMBIA UPRIVER BRIGHT   UWA = U OF W FALL ACCEL
WSH = WILLAMETTE SPRING

## Fishery: Strait of Georgia Troll and Sport

REPORTED CATCH EXPLOITATION RATES

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.198 | 0.115 | 0.234 | 0.060 | NA | 0.095 | NA | 0.061 | 0.041 |
| 80 | 0.266 | 0.171 | 0.265 | NA | NA | NA | NA | NA | 0.063 |
| 81 | 0.303 | 0.369 | 0.291 | 0.254 | NA | NA | 0.064 | NA | 0.034 |
| 82 | 0.144 | 0.145 | 0.148 | 0.144 | 0.106 | NA | 0.056 | 0.092 | 0.023 |
| 83 | 0.185 | 0.167 | 0.198 | 0.086 | NA | 0.103 | 0.031 | 0.042 | 0.035 |
| 84 | 0.269 | 0.283 | 0.264 | NA | NA | NA | 0.055 | 0.055 | 0.052 |
| 85 | 0.160 | 0.118 | 0.146 | 0.046 | NA | NA | NA | 0.054 | 0.032 |
| 86 | 0.229 | 0.176 | 0.291 | 0.045 | NA | NA | NA | NA | 0.025 |
| 87 | 0.149 | 0.222 | 0.081 | 0.015 | NA | NA | 0.065 | NA | 0.034 |
| 88 | 0.193 | 0.095 | NA | 0.049 | 0.055 | NA | 0.027 | NA | NA |
| 89 | 0.116 | 0.179 | 0.160 | 0.060 | 0.058 | 0.088 | 0.016 | 0.034 | NA |
| 90 | 0.153 | 0.136 | NA | 0.016 | 0.032 | 0.129 | 0.008 | 0.036 | NA |
| 91 | 0.190 | 0.287 | 0.192 | NA | 0.101 | 0.055 | 0.008 | 0.012 | NA |
| 92 | 0.249 | 0.220 | 0.183 | NA | 0.038 | 0.194 | 0.023 | 0.028 | NA |
| Base | 0.228 | 0.200 | 0.234 | 0.153 | 0.106 | 0.095 | 0.060 | 0.077 | 0.040 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.872 | 0.574 | 0.999 | 0.393 | NA | 1.000 | NA | 0.798 | 1.024 | 0.784 |
| 80 | 1.167 | 0.856 | 1.132 | NA | NA | NA | NA | NA | 1.576 | 1.090 |
| 81 | 1.331 | 1.844 | 1.239 | 1.663 | NA | NA | 1.070 | NA | 0.837 | 1.436 |
| 82 | 0.630 | 0.726 | 0.629 | 0.944 | 1.000 | NA | 0.930 | 1.202 | 0.563 | 0.781 |
| 83 | 0.812 | 0.837 | 0.844 | 0.562 | NA | 1.080 | 0.513 | 0.547 | 0.879 | 0.779 |
| 84 | 1.183 | 1.414 | 1.124 | NA | NA | NA | 0.909 | 0.715 | 1.306 | 1.165 |
| 85 | 0.704 | 0.590 | 0.622 | 0.301 | NA | NA | NA | 0.700 | 0.805 | 0.597 |
| 86 | 1.004 | 0.883 | 1.243 | 0.297 | NA | NA | NA | NA | 0.622 | 0.897 |
| 87 | 0.654 | 1.109 | 0.344 | 0.097 | NA | NA | 1.078 | NA | 0.846 | 0.617 |
| 88 | 0.849 | 0.473 | NA | 0.320 | 0.517 | NA | 0.448 | NA | NA | 0.561 |
| 89 | 0.512 | 0.896 | 0.684 | 0.394 | 0.546 | 0.920 | 0.271 | 0.438 | NA | 0.617 |
| 90 | 0.671 | 0.678 | NA | 0.102 | 0.306 | 1.354 | 0.138 | 0.470 | NA | 0.555 |
| 91 | 0.834 | 1.436 | 0.819 | NA | 0.954 | 0.580 | 0.140 | 0.153 | NA | 0.845 |
| 92 | 1.094 | 1.101 | 0.782 | NA | 0.361 | 2.029 | 0.381 | 0.365 | NA | 0.935 |

BQR = BIG QUALICUM   PNT = PUNTLEDGE   QUI = QUINSAM   SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING   UWA = U OF W FALL ACCEL

## Fishery: Strait of Georgia Troll

| REPORTED CATCH EXPLOITATION RATES | | | |
|---|---|---|---|
| | BQR | PNT | SAM |
| Year | Age 3 | Age 3 | Age 3 |
| 79 | 0.156 | 0.153 | NA |
| 80 | 0.155 | 0.126 | NA |
| 81 | 0.121 | 0.117 | NA |
| 82 | 0.080 | NA | 0.017 |
| 83 | 0.113 | 0.099 | NA |
| 84 | 0.083 | NA | NA |
| 85 | 0.016 | NA | NA |
| 86 | 0.051 | NA | NA |
| 87 | 0.031 | NA | NA |
| 88 | 0.006 | NA | NA |
| 89 | 0.009 | NA | 0.004 |
| 90 | 0.051 | NA | NA |
| 91 | 0.039 | NA | NA |
| 92 | 0.074 | NA | NA |
| Base | 0.128 | 0.132 | 0.017 |

| REPORTED CATCH EXPLOITATION RATE INDEX | | | | |
|---|---|---|---|---|
| | BQR | PNT | SAM | |
| Year | Age 3 | Age 3 | Age 3 | Fishery |
| 79 | 1.219 | 1.161 | NA | 1.189 |
| 80 | 1.213 | 0.951 | NA | 1.080 |
| 81 | 0.943 | 0.888 | NA | 0.915 |
| 82 | 0.626 | NA | 1.000 | 0.669 |
| 83 | 0.882 | 0.749 | NA | 0.814 |
| 84 | 0.648 | NA | NA | 0.648 |
| 85 | 0.124 | NA | NA | 0.124 |
| 86 | 0.398 | NA | NA | 0.398 |
| 87 | 0.245 | NA | NA | 0.245 |
| 88 | 0.048 | NA | NA | 0.048 |
| 89 | 0.073 | NA | 0.232 | 0.091 |
| 90 | 0.398 | NA | NA | 0.398 |
| 91 | 0.302 | NA | NA | 0.302 |
| 92 | 0.575 | NA | NA | 0.575 |

BQR = BIG QUALICUM PNT = PUNTLEDGE
SAM = SAMISH FALL FING

## Fishery: Strait of Georgia Sport

REPORTED CATCH EXPLOITATION RATES

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.043 | 0.053 | 0.081 | 0.060 | NA | 0.075 | NA | 0.052 | 0.027 |
| 80 | 0.111 | 0.089 | 0.140 | NA | NA | NA | NA | NA | 0.060 |
| 81 | 0.182 | 0.290 | 0.173 | 0.228 | NA | NA | 0.059 | NA | 0.029 |
| 82 | 0.063 | 0.060 | 0.061 | 0.144 | 0.089 | NA | 0.052 | 0.058 | 0.022 |
| 83 | 0.072 | 0.121 | 0.099 | 0.086 | NA | 0.093 | 0.029 | 0.037 | 0.025 |
| 84 | 0.186 | NA | 0.163 | NA | NA | NA | 0.046 | 0.055 | 0.047 |
| 85 | 0.144 | 0.118 | 0.146 | 0.046 | NA | NA | NA | 0.050 | 0.032 |
| 86 | 0.178 | 0.176 | 0.196 | 0.045 | NA | NA | 0.065 | NA | 0.025 |
| 87 | 0.117 | 0.215 | 0.081 | 0.015 | NA | NA | 0.065 | NA | 0.025 |
| 88 | 0.187 | 0.074 | NA | 0.049 | 0.052 | NA | 0.026 | NA | NA |
| 89 | 0.107 | 0.179 | 0.160 | 0.060 | 0.054 | 0.088 | 0.016 | 0.031 | NA |
| 90 | 0.102 | 0.136 | NA | 0.016 | 0.012 | 0.105 | 0.005 | 0.034 | NA |
| 91 | 0.151 | 0.287 | NA | NA | 0.084 | 0.046 | 0.007 | 0.012 | NA |
| 92 | 0.176 | 0.204 | 0.158 | NA | 0.026 | 0.176 | 0.023 | 0.028 | NA |
| Base | 0.100 | 0.123 | 0.114 | 0.144 | 0.089 | 0.075 | 0.055 | 0.055 | 0.035 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | BQR Age 3 | BQR Age 4 | PNT Age 3 | QUI Age 5 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 | Fishery |
|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.427 | 0.429 | 0.712 | 0.417 | NA | 1.000 | NA | 0.951 | 0.769 | 0.605 |
| 80 | 1.108 | 0.722 | 1.228 | NA | NA | NA | NA | NA | 1.744 | 1.077 |
| 81 | 1.829 | 2.360 | 1.521 | 1.583 | NA | NA | 1.069 | NA | 0.851 | 1.687 |
| 82 | 0.636 | 0.489 | 0.540 | 1.000 | 1.000 | NA | 0.931 | 1.049 | 0.636 | 0.769 |
| 83 | 0.723 | 0.982 | 0.868 | 0.595 | NA | 1.246 | 0.528 | 0.679 | 0.722 | 0.803 |
| 84 | 1.870 | NA | 1.430 | NA | NA | NA | 0.829 | 0.996 | 1.351 | 1.385 |
| 85 | 1.448 | 0.961 | 1.281 | 0.319 | NA | NA | NA | 0.915 | 0.933 | 0.941 |
| 86 | 1.781 | 1.437 | 1.721 | 0.315 | NA | NA | 1.178 | NA | 0.721 | 1.202 |
| 87 | 1.178 | 1.752 | 0.709 | 0.103 | NA | NA | 1.172 | NA | 0.735 | 0.909 |
| 88 | 1.876 | 0.605 | NA | 0.339 | 0.587 | NA | 0.464 | NA | NA | 0.760 |
| 89 | 1.075 | 1.459 | 1.407 | 0.417 | 0.605 | 1.178 | 0.283 | 0.569 | NA | 0.922 |
| 90 | 1.021 | 1.104 | NA | 0.108 | 0.140 | 1.410 | 0.096 | 0.624 | NA | 0.640 |
| 91 | 1.518 | 2.337 | NA | NA | 0.942 | 0.616 | 0.127 | 0.213 | NA | 1.182 |
| 92 | 1.761 | 1.661 | 1.390 | NA | 0.293 | 2.357 | 0.414 | 0.508 | NA | 1.295 |

BQR = BIG QUALICUM   PNT = PUNTLEDGE   QUI = QUINSAM   SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING   UWA = U OF W FALL ACCEL

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

REPORTED CATCH EXPLOITATION RATES

| Year | GAD Age 3 | GAD Age 4 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 |
|---|---|---|---|---|---|---|---|
| 79 | NA | NA | NA | 0.017 | NA | 0.020 | 0.011 |
| 80 | NA | NA | NA | NA | NA | NA | 0.028 |
| 81 | 0.010 | NA | NA | NA | 0.004 | NA | 0.023 |
| 82 | 0.017 | 0.031 | 0.007 | NA | 0.006 | 0.048 | 0.023 |
| 83 | NA | NA | NA | 0.039 | 0.004 | 0.026 | 0.015 |
| 84 | 0.017 | NA | NA | NA | 0.006 | 0.025 | 0.006 |
| 85 | NA | 0.010 | NA | NA | NA | 0.018 | 0.013 |
| 86 | NA | NA | NA | NA | NA | NA | NA |
| 87 | NA | NA | NA | NA | NA | NA | 0.022 |
| 88 | 0.035 | NA | 0.020 | NA | 0.028 | NA | NA |
| 89 | 0.060 | 0.120 | 0.023 | 0.053 | 0.042 | 0.071 | NA |
| 90 | 0.062 | 0.107 | 0.037 | 0.076 | 0.049 | 0.079 | NA |
| 91 | NA | 0.080 | NA | 0.063 | 0.016 | 0.088 | NA |
| 92 | NA | NA | NA | NA | NA | 0.082 | NA |
| Base | 0.013 | 0.031 | 0.007 | 0.017 | 0.005 | 0.034 | 0.021 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | GAD Age 3 | GAD Age 4 | SAM Age 3 | SAM Age 4 | SPS Age 3 | SPS Age 4 | UWA Age 3 | Fishery |
|---|---|---|---|---|---|---|---|---|
| 79 | NA | NA | NA | 1.000 | NA | 0.601 | 0.534 | 0.674 |
| 80 | NA | NA | NA | NA | NA | NA | 1.297 | 1.297 |
| 81 | 0.749 | NA | NA | NA | 0.796 | NA | 1.086 | 0.937 |
| 82 | 1.251 | 1.000 | 1.000 | NA | 1.204 | 1.399 | 1.083 | 1.176 |
| 83 | NA | NA | NA | 2.312 | 0.758 | 0.768 | 0.688 | 1.081 |
| 84 | 1.307 | NA | NA | NA | 1.201 | 0.729 | 0.294 | 0.738 |
| 85 | NA | 0.339 | NA | NA | NA | 0.527 | 0.585 | 0.474 |
| 86 | NA | NA | NA | NA | NA | NA | NA | \| |
| 87 | NA | NA | NA | NA | NA | NA | 1.038 | 1.038 |
| 88 | 2.633 | NA | 2.880 | NA | 5.849 | NA | NA | 3.309 |
| 89 | 4.485 | 3.902 | 3.237 | 3.192 | 8.888 | 2.088 | NA | 3.464 |
| 90 | 4.653 | 3.461 | 5.153 | 4.532 | 10.318 | 2.329 | NA | 3.835 |
| 91 | NA | 2.603 | NA | 3.787 | 3.395 | 2.595 | NA | 2.873 |
| 92 | NA | NA | NA | NA | NA | 2.400 | NA | 2.400 |

GAD = G ADAMS FALL FING   SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING   UWA = U OF W FALL ACCEL

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

REPORTED CATCH EXPLOITATION RATES

| Year | BON Age 3 | CWF Age 3 | CWF Age 4 | SPR Age 3 | SPR Age 4 | STP Age 3 |
|---|---|---|---|---|---|---|
| 79 | 0.113 | NA | NA | 0.175 | 0.141 | NA |
| 80 | 0.186 | 0.110 | NA | 0.272 | 0.095 | NA |
| 81 | 0.169 | 0.083 | 0.152 | 0.248 | 0.209 | 0.179 |
| 82 | 0.173 | 0.143 | 0.268 | 0.277 | 0.093 | 0.328 |
| 83 | 0.086 | 0.065 | 0.183 | 0.084 | NA | 0.173 |
| 84 | 0.068 | 0.008 | 0.039 | 0.071 | NA | 0.049 |
| 85 | 0.144 | 0.085 | 0.042 | 0.131 | NA | 0.192 |
| 86 | NA | 0.105 | 0.049 | 0.054 | 0.034 | 0.242 |
| 87 | 0.139 | 0.057 | 0.113 | 0.183 | NA | 0.116 |
| 88 | NA | 0.055 | 0.143 | 0.128 | NA | 0.189 |
| 89 | NA | 0.043 | 0.265 | 0.181 | NA | 0.235 |
| 90 | NA | NA | 0.138 | 0.146 | 0.088 | 0.156 |
| 91 | NA | 0.059 | NA | 0.164 | 0.037 | 0.130 |
| 92 | NA | NA | NA | 0.237 | 0.066 | 0.231 |
| Base | 0.160 | 0.112 | 0.210 | 0.243 | 0.134 | 0.254 |

REPORTED CATCH EXPLOITATION RATE INDEX

| Year | BON Age 3 | CWF Age 3 | CWF Age 4 | SPR Age 3 | SPR Age 4 | STP Age 3 | Fishery |
|---|---|---|---|---|---|---|---|
| 79 | 0.704 | NA | NA | 0.719 | 1.045 | NA | 0.796 |
| 80 | 1.160 | 0.982 | NA | 1.121 | 0.709 | NA | 1.021 |
| 81 | 1.055 | 0.745 | 0.724 | 1.021 | 1.556 | 0.707 | 0.935 |
| 82 | 1.081 | 1.273 | 1.276 | 1.139 | 0.690 | 1.293 | 1.151 |
| 83 | 0.538 | 0.584 | 0.873 | 0.346 | NA | 0.681 | 0.605 |
| 84 | 0.426 | 0.068 | 0.185 | 0.292 | NA | 0.194 | 0.240 |
| 85 | 0.899 | 0.760 | 0.202 | 0.539 | NA | 0.756 | 0.607 |
| 86 | NA | 0.942 | 0.234 | 0.221 | 0.255 | 0.956 | 0.509 |
| 87 | 0.869 | 0.509 | 0.541 | 0.755 | NA | 0.457 | 0.622 |
| 88 | NA | 0.493 | 0.681 | 0.526 | NA | 0.747 | 0.630 |
| 89 | NA | 0.382 | 1.265 | 0.744 | NA | 0.926 | 0.884 |
| 90 | NA | NA | 0.658 | 0.603 | 0.654 | 0.616 | 0.629 |
| 91 | NA | 0.528 | NA | 0.676 | 0.277 | 0.512 | 0.526 |
| 92 | NA | NA | NA | 0.975 | 0.489 | 0.911 | 0.846 |

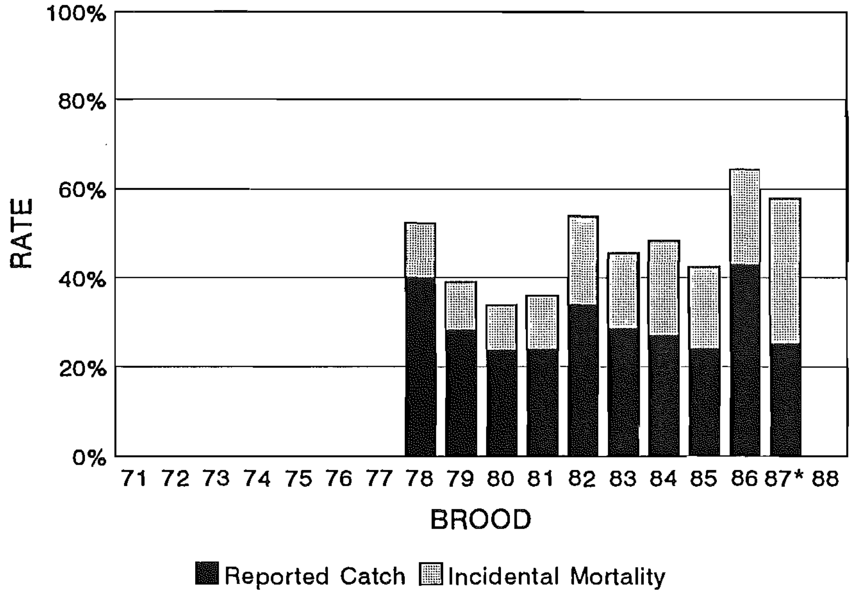
BON = BONNEVILLE TULE  CWF = COWLITZ FALL TULE
SPR = SPRING CREEK TULE  STP = STAYTON POND TULE

## APPENDIX F

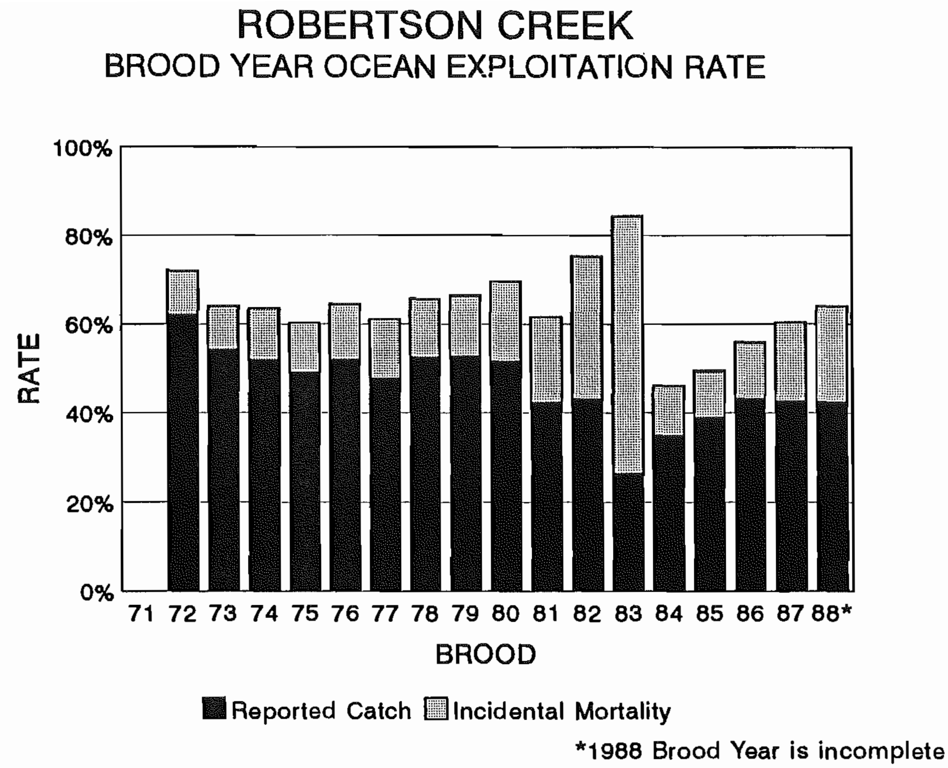
### Brood Year Ocean Exploitation Rate Figures

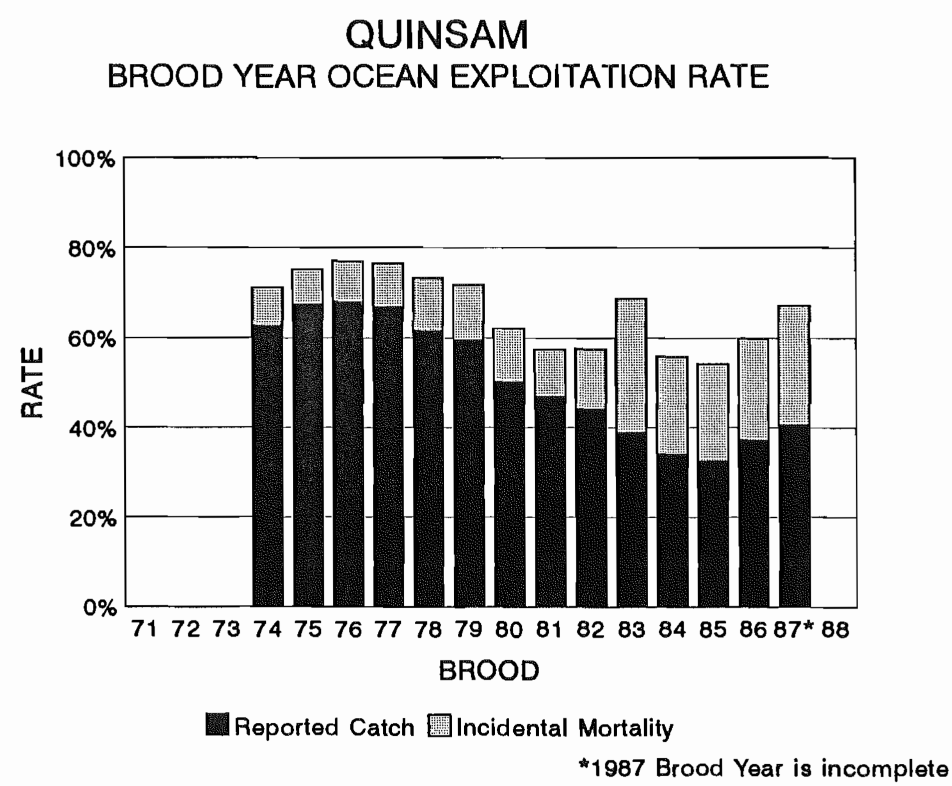
# ALASKA SPRING

## BROOD YEAR OCEAN EXPLOITATION RATE

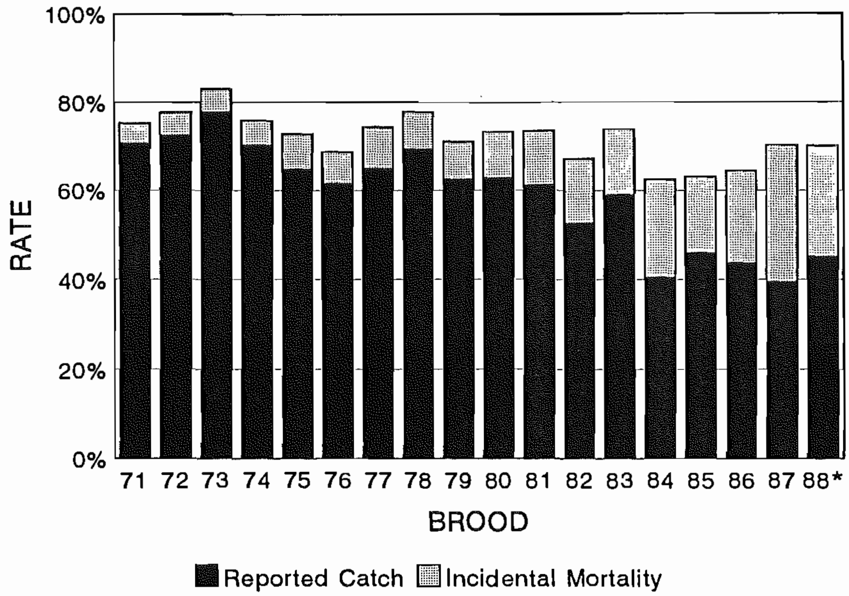



*1987 Brood Year is incomplete


ROBERTSON CREEK
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88*
BROOD
Reported Catch
Incidental Mortality
*1988 Brood Year is incomplete

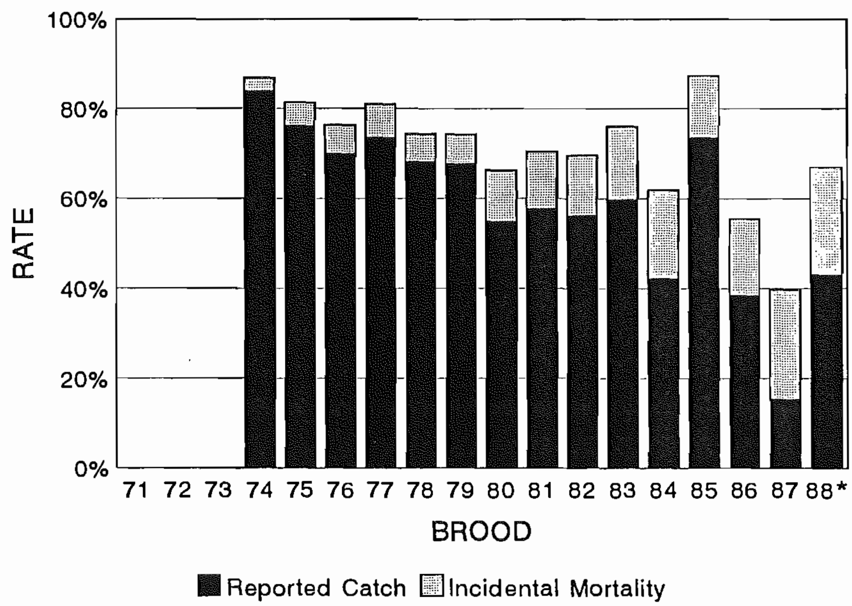

QUINSAM
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87* 88
BROOD
Reported Catch
Incidental Mortality
*1987 Brood Year is incomplete

# BIG QUALICAM
## BROOD YEAR OCEAN EXPLOITATION RATE



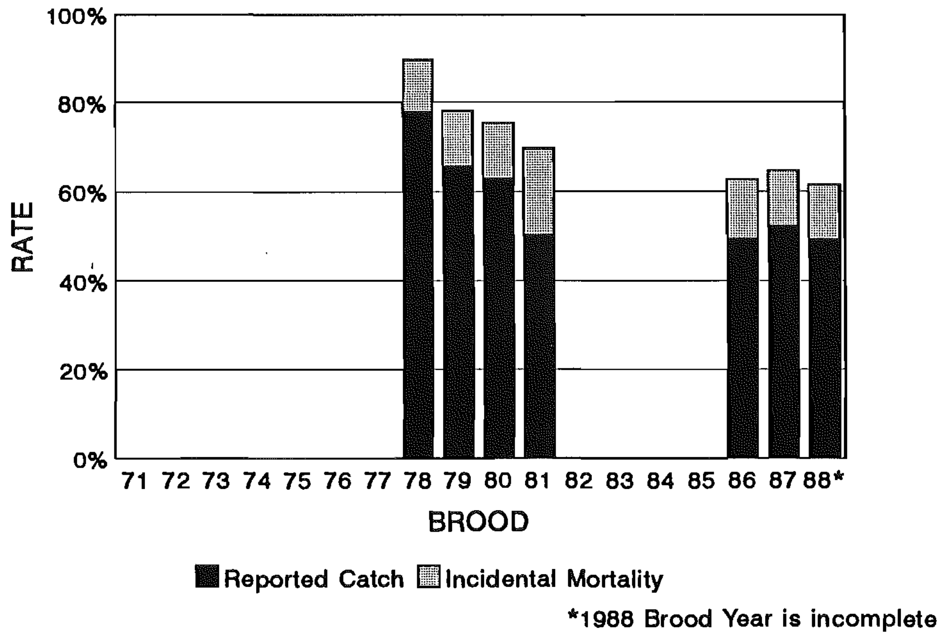

*1988 Brood Year is incomplete

# PUNTLEDGE
## BROOD YEAR OCEAN EXPLOITATION RATE

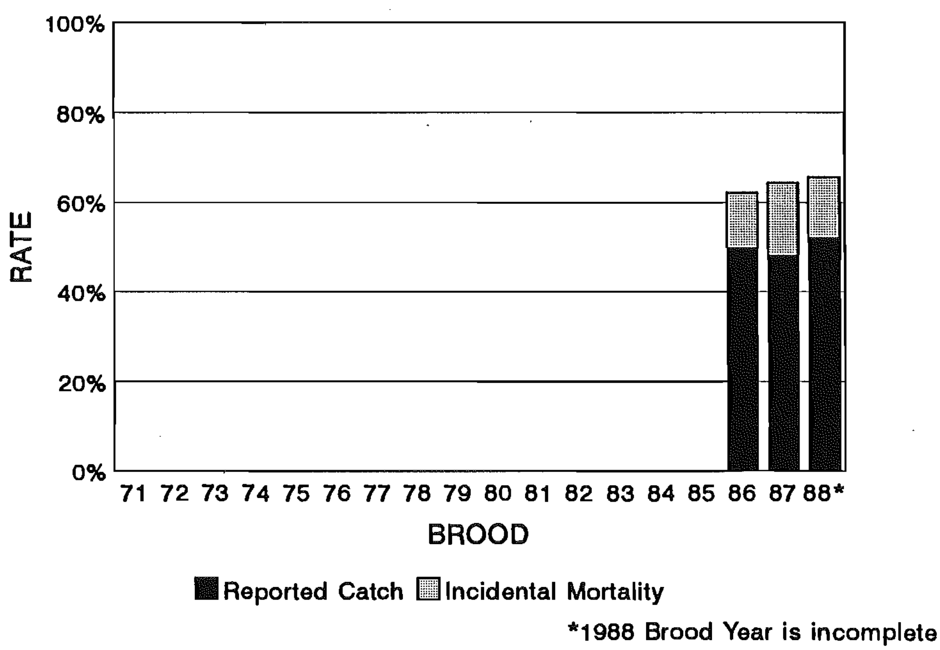



*1988 Brood Year is incomplete

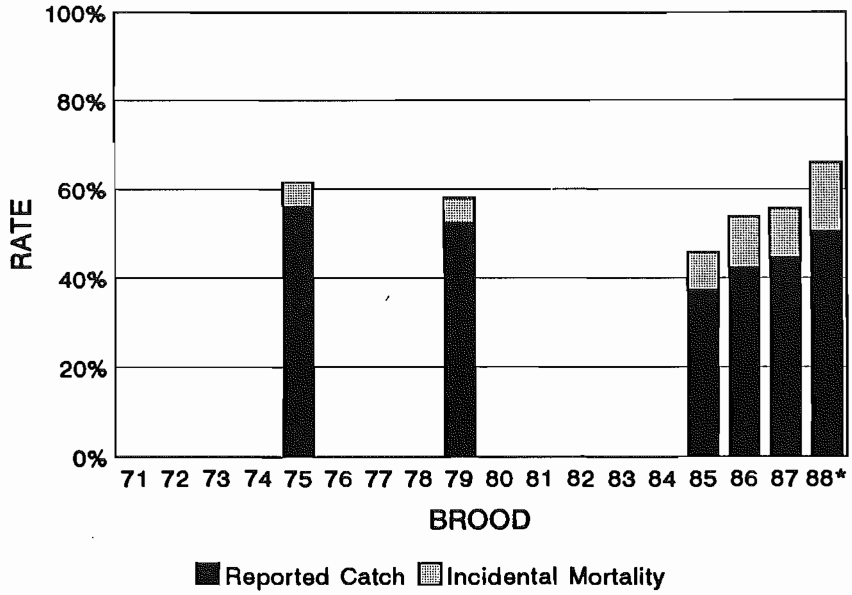
## SOUTH PUGET SOUND FALL YEARLING
### BROOD YEAR OCEAN EXPLOITATION RATE




## SQUAXIN PENS FALL YEARLING
### BROOD YEAR OCEAN EXPLOITATION RATE

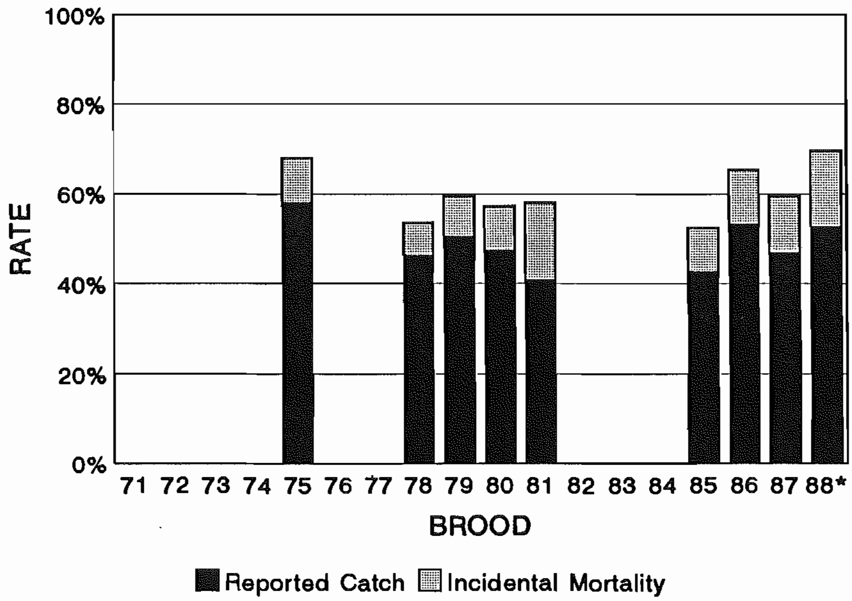


## SAMISH FALL FINGERLING
BROOD YEARD OCEAN EXPLOITATION RATE



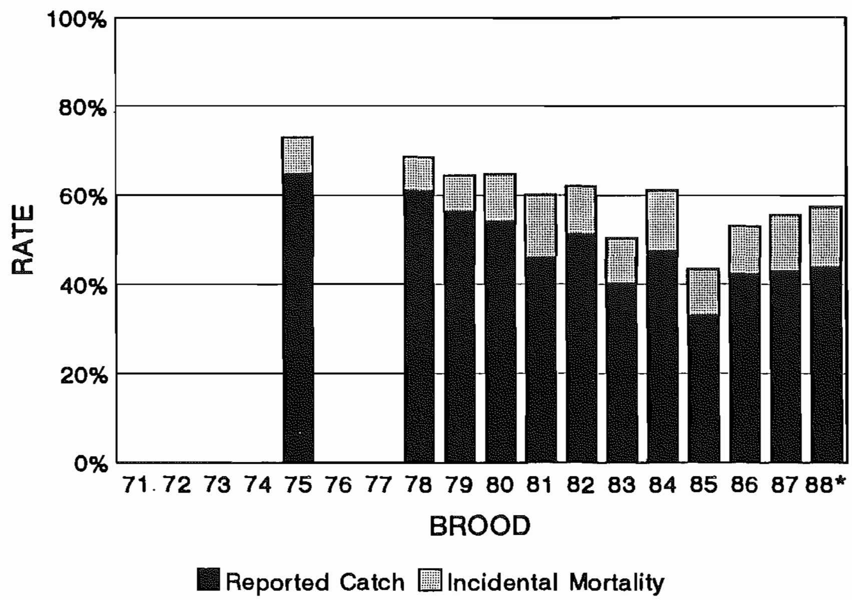

*1988 BROOD YEAR IS INCOMPLETE

## GEORGE ADAMS FALL FINGERLING
BROOD YEAR OCEAN EXPLOITATION RATE



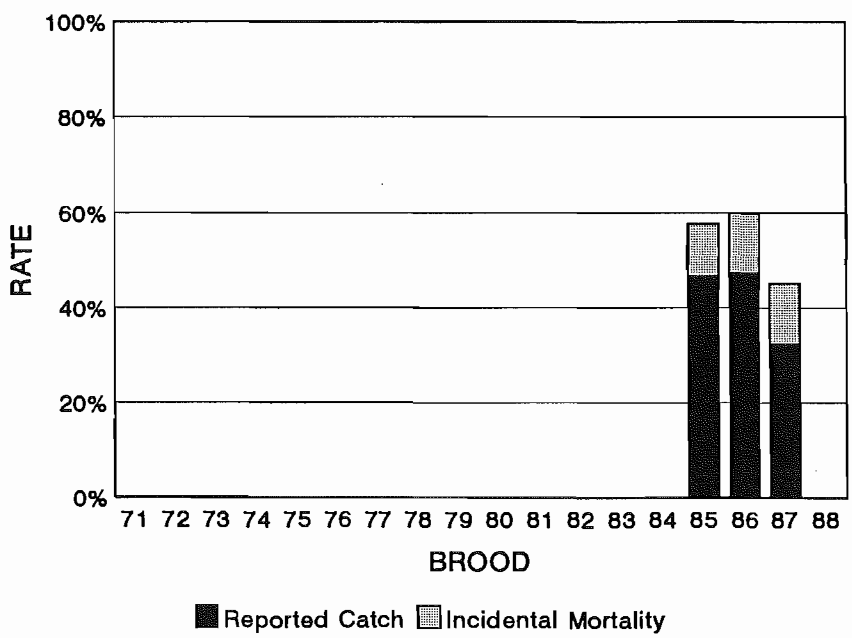

*1988 Brood Year is incomplete

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

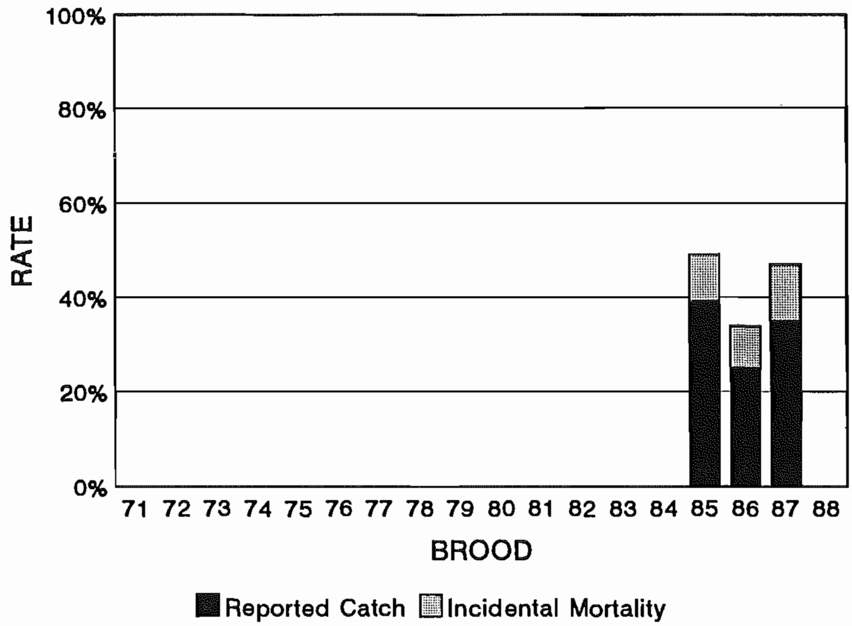



*1988 Brood Year is incomplete

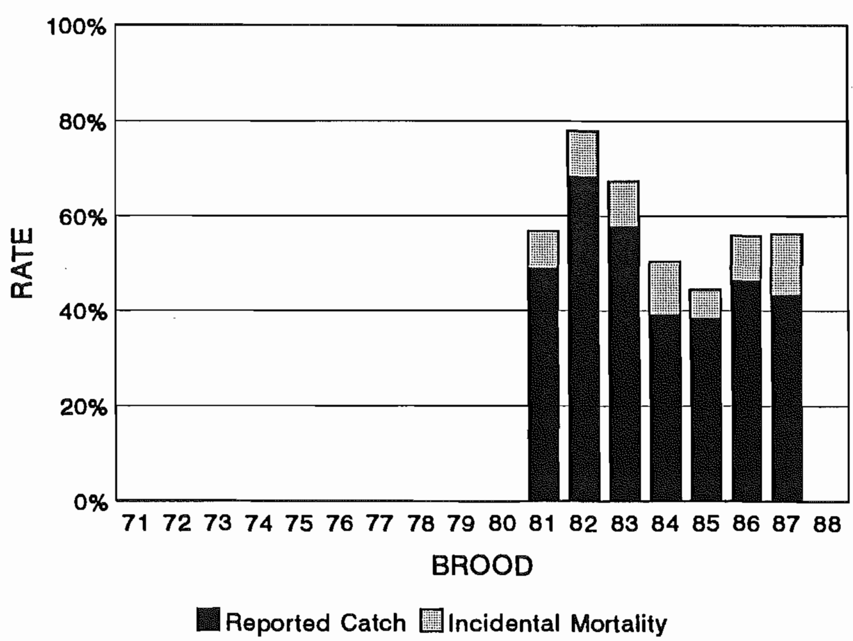
## HOKO FALL FINGERLING
### BROOD YEAR OCEAN EXPLOITATION RATE



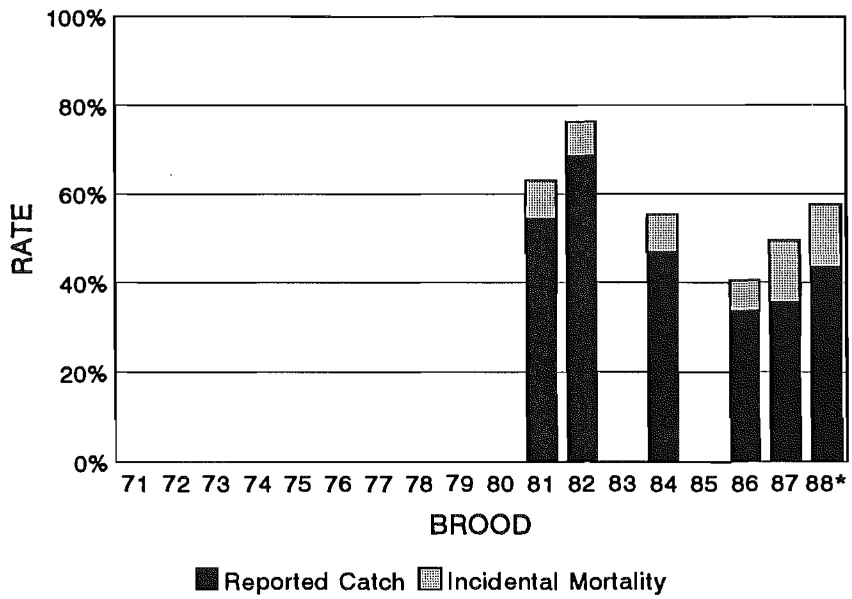
## SOOES FALL FINGERLING
BROOD YEAR OCEAN EXPLOITATION RATE




## SKAGIT SPRING YEARLING
BROOD YEAR OCEAN EXPLOITATION RATE

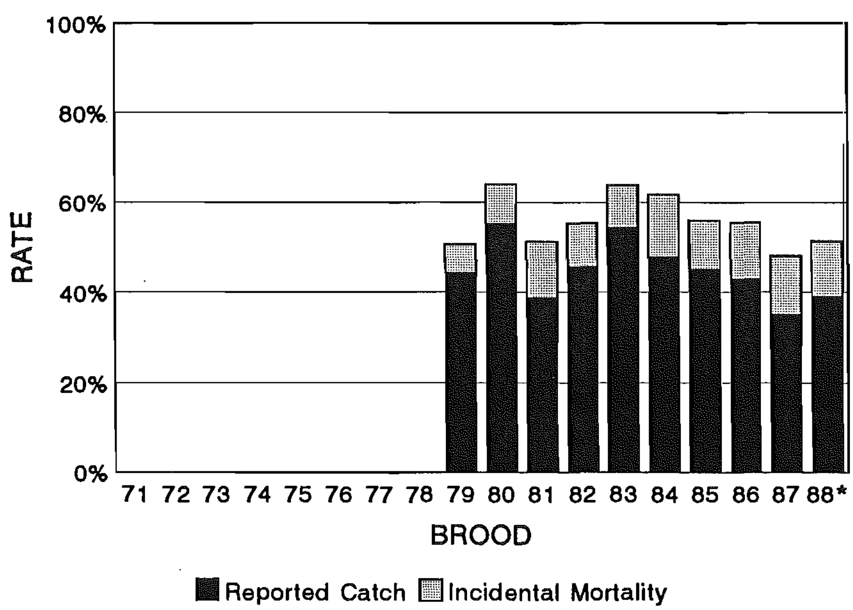


## NOOKSACK SPRING YEARLING
### BROOD YEAR OCEAN EXPLOITATION RATE

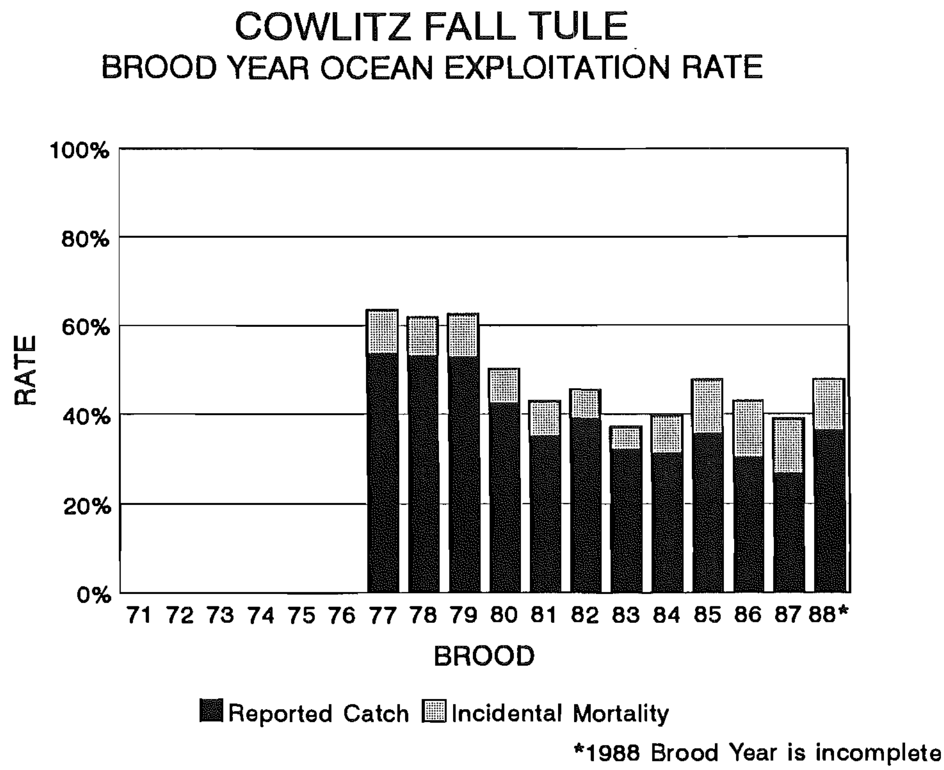


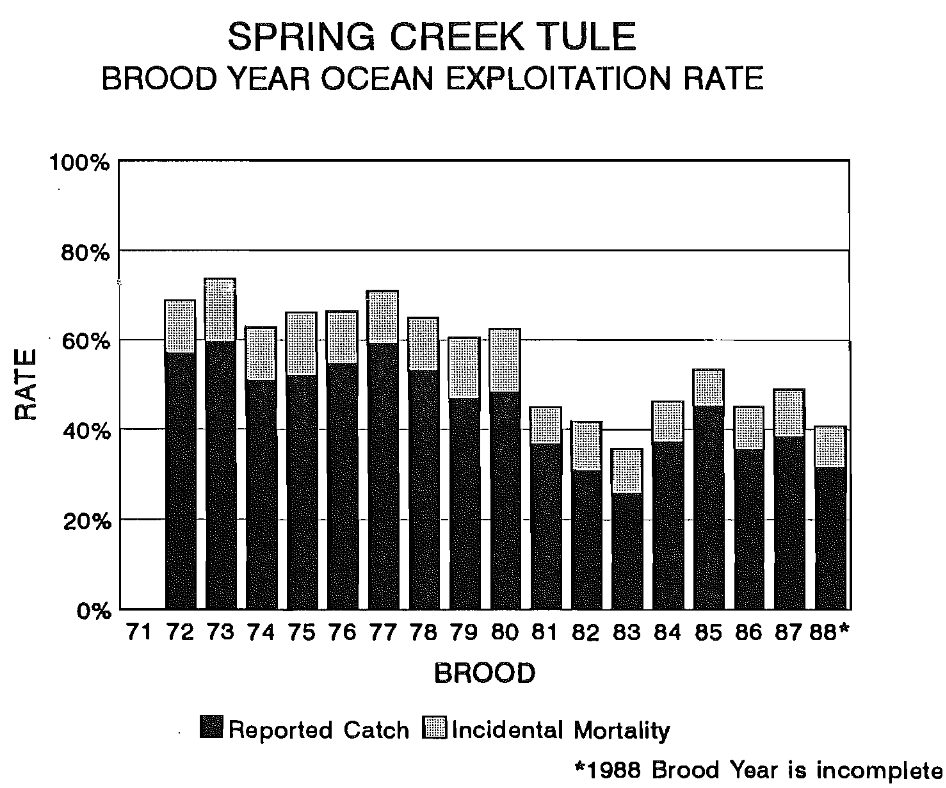

*1988 BROOD YEAR IS INCOMPLETE

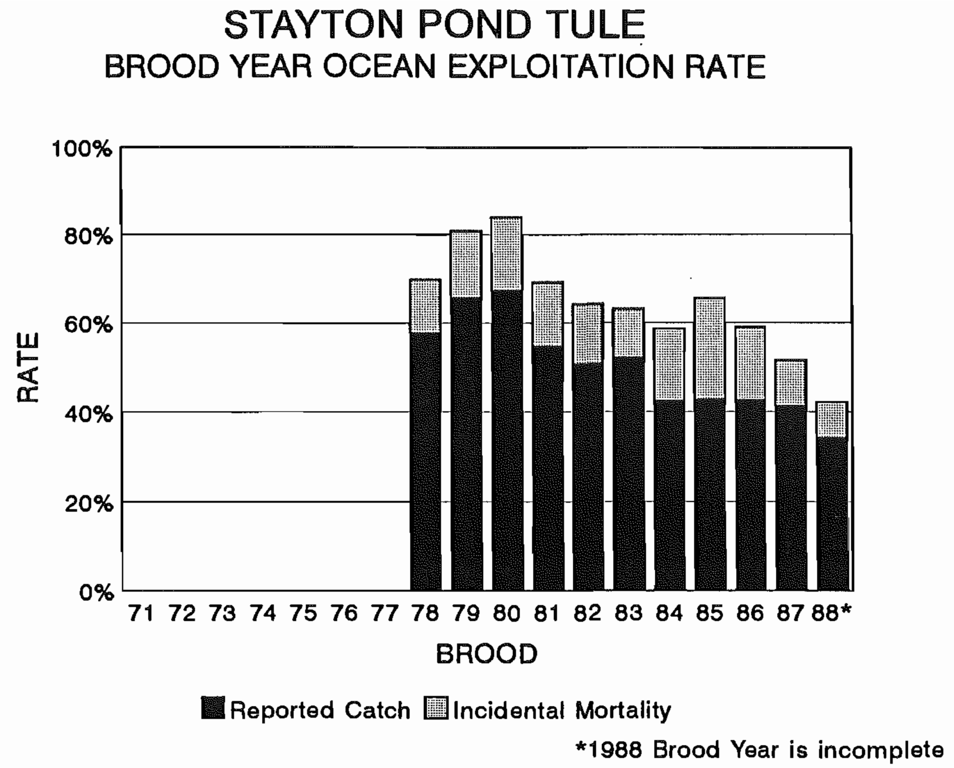
## WHITE RIVER SPRING YEARLING
### BROOD YEAR OCEAN EXPLOITATION RATE

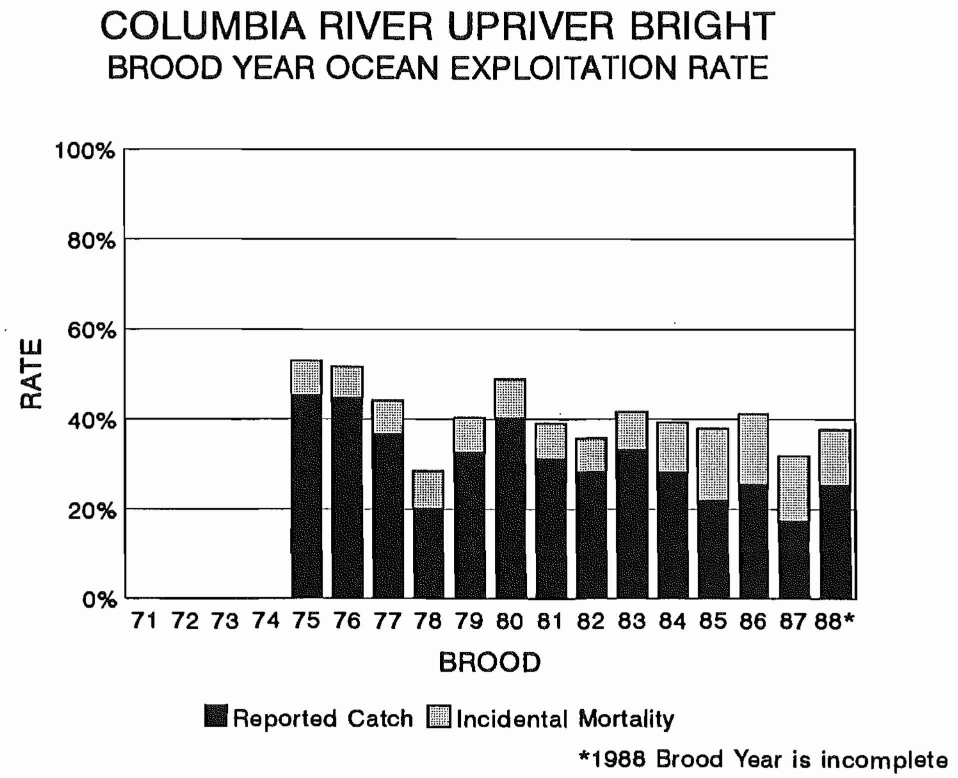



*1988 BROOD YEAR IS INCOMPLETE

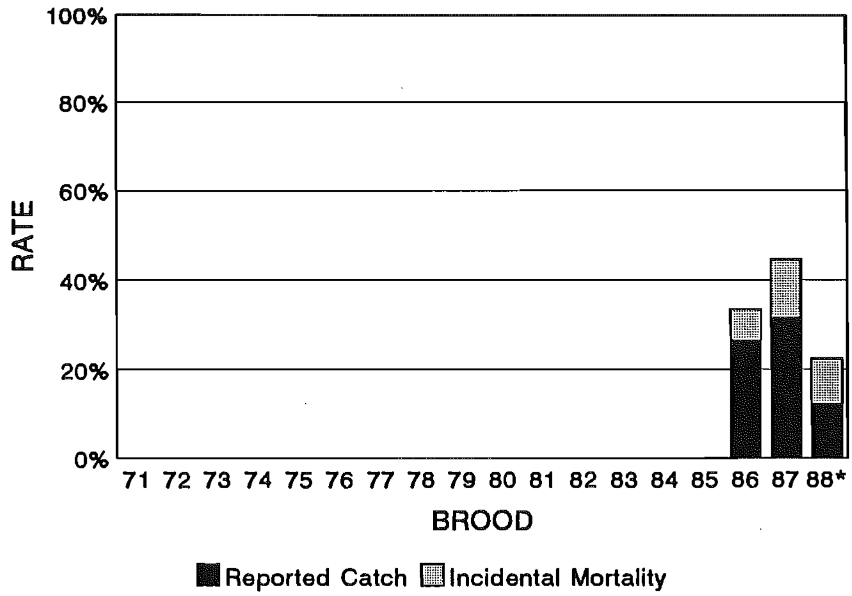

COWLITZ FALL TULE
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88*
BROOD
Reported Catch
Incidental Mortality
*1988 Brood Year is incomplete


SPRING CREEK TULE
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88*
BROOD
Reported Catch
Incidental Mortality
*1988 Brood Year is incomplete


STAYTON POND TULE
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88*
BROOD
Reported Catch
Incidental Mortality
*1988 Brood Year is incomplete

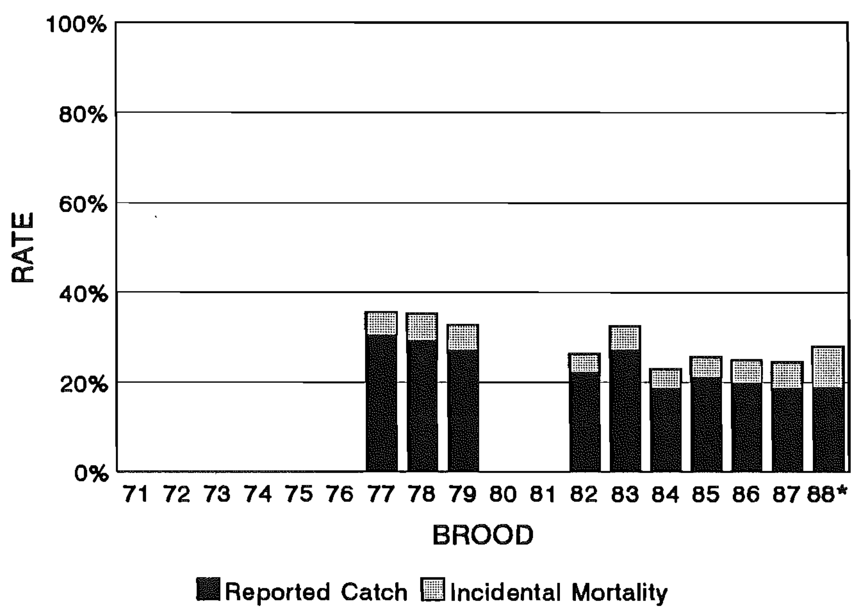

COLUMBIA RIVER UPRIVER BRIGHT
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88*
BROOD
Reported Catch
Incidental Mortality
*1988 Brood Year is incomplete

# HANFORD WILD BRIGHTS
## BROOD YEAR OCEAN EXPLOITATION RATE

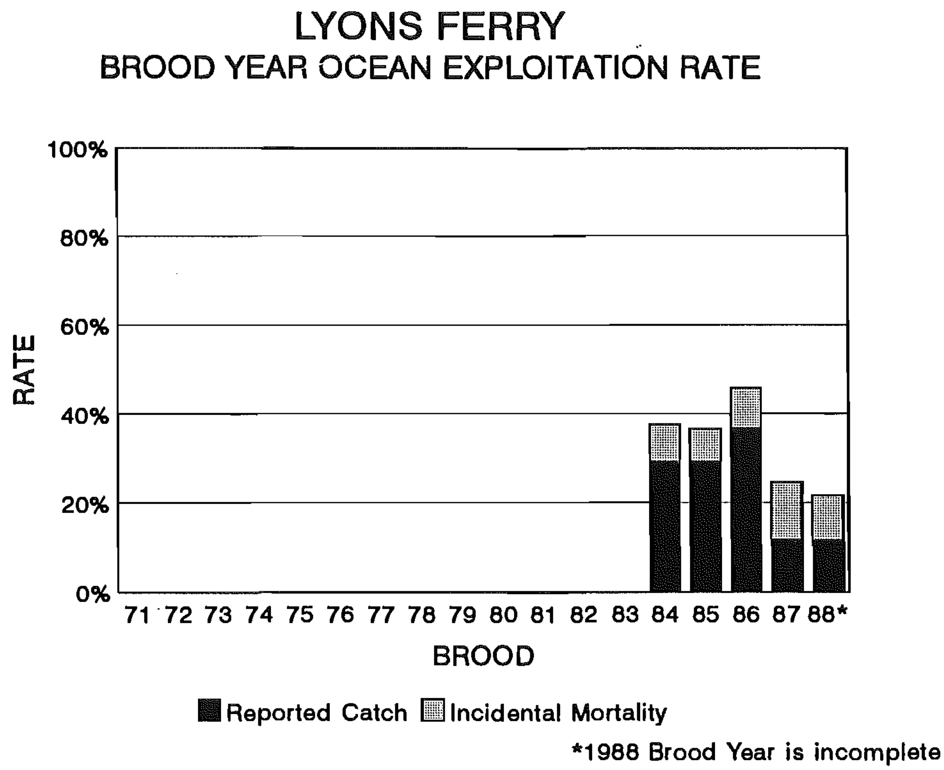



*1988 Brood Year is incomplete

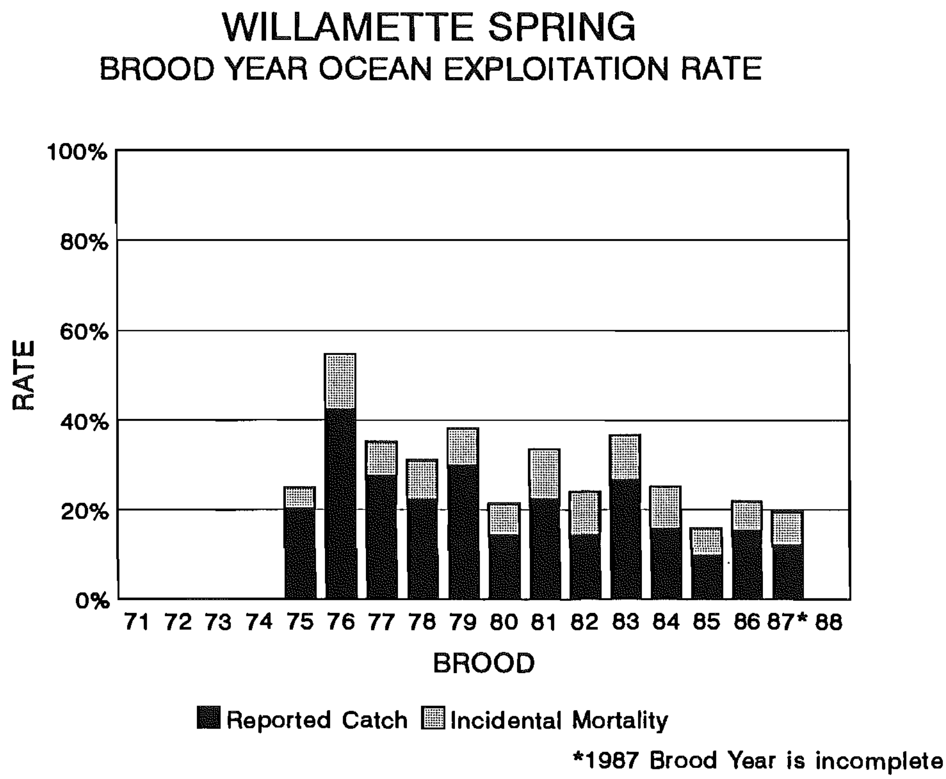
# LEWIS RIVER WILD
## BROOD YEAR OCEAN EXPLOITATION RATE




*1988 Brood Year is incomplete

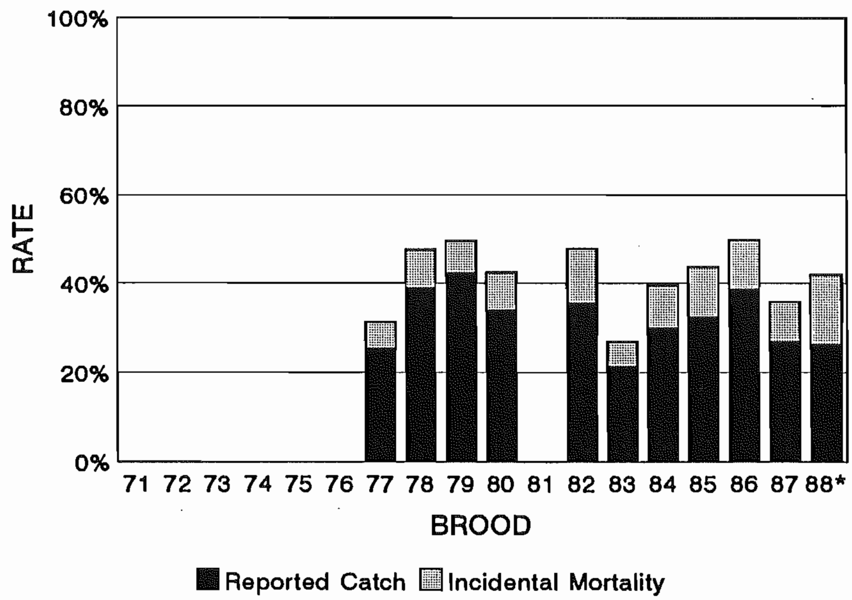


LYONS FERRY
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88*
BROOD
Reported Catch
Incidental Mortality
*1988 Brood Year is incomplete

WILLAMETTE SPRING
BROOD YEAR OCEAN EXPLOITATION RATE
100%
80%
60%
40%
20%
0%
RATE
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87* 88
BROOD
Reported Catch
Incidental Mortality
*1987 Brood Year is incomplete

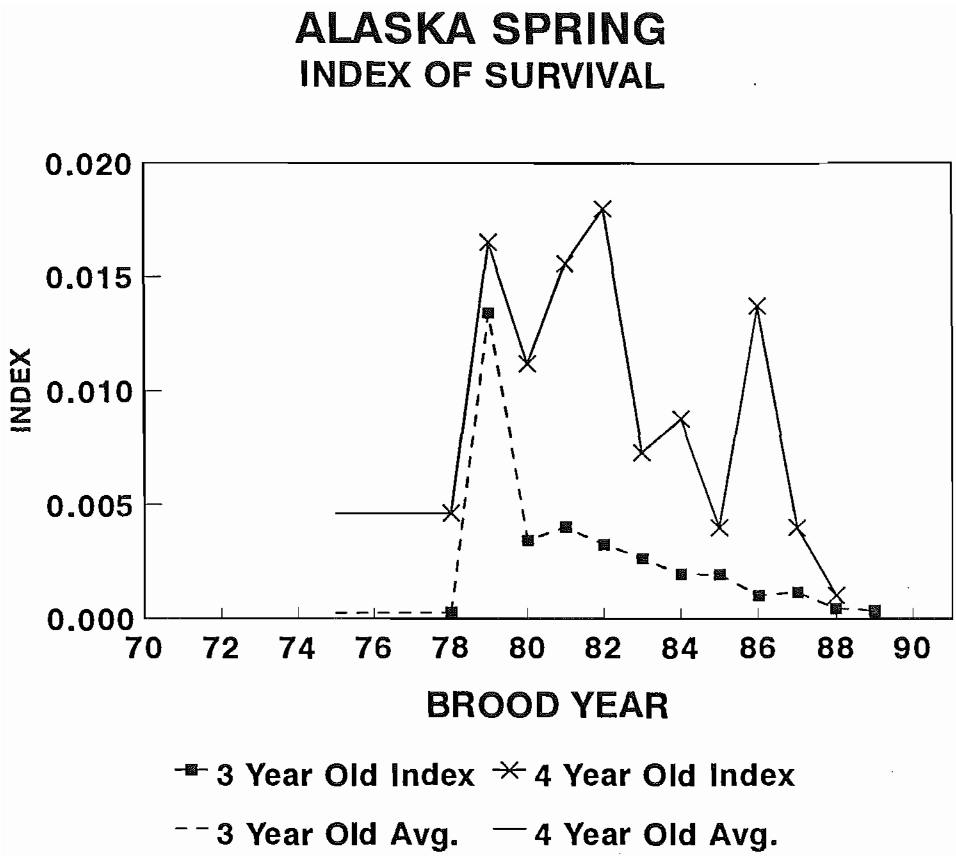
## SALMON RIVER
### BROOD YEAR OCEAN EXPLOITATION RATE

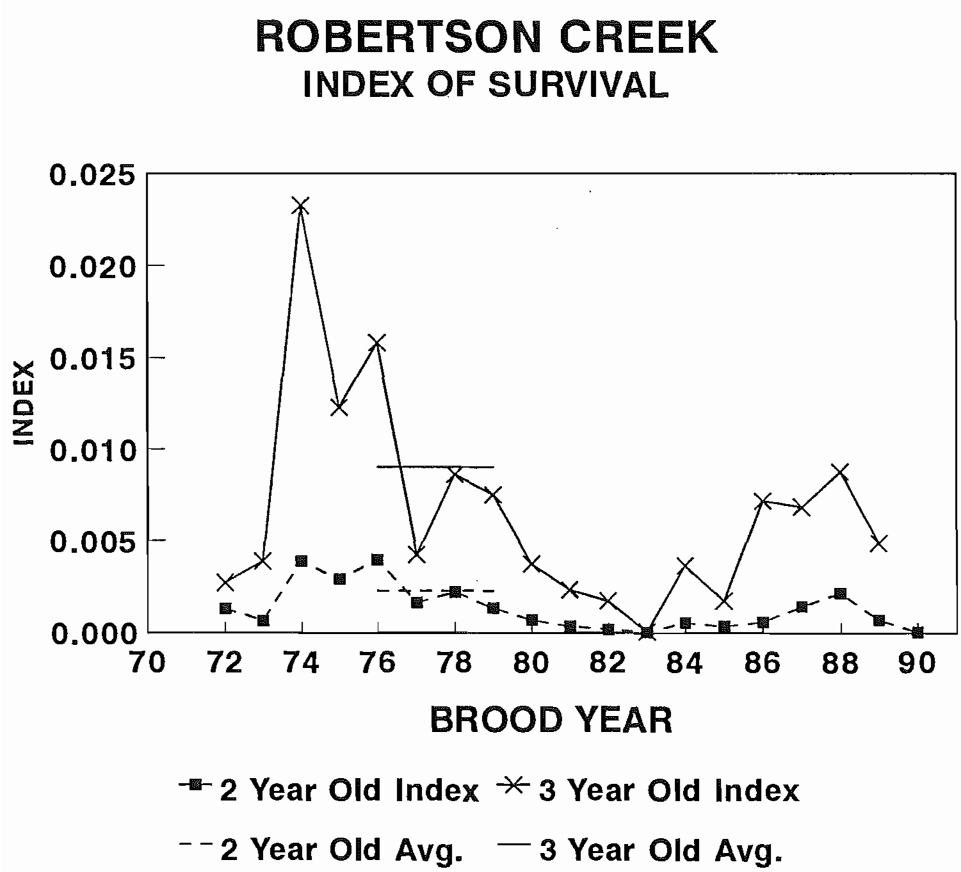



*1988 Brood Year is incomplete

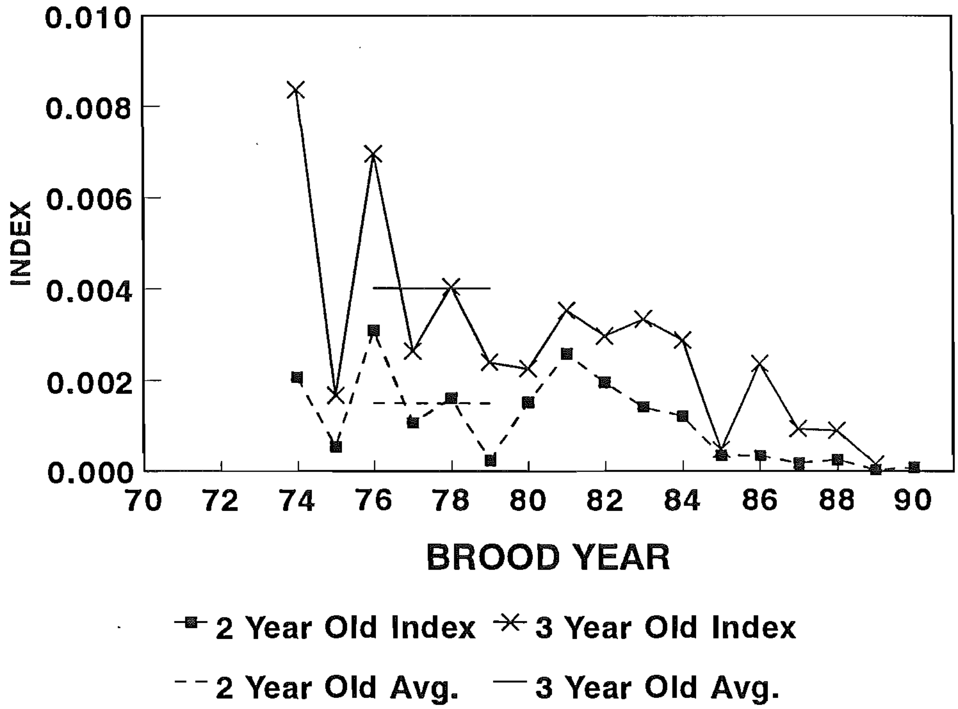
## APPENDIX G

### Survival Rate Figures

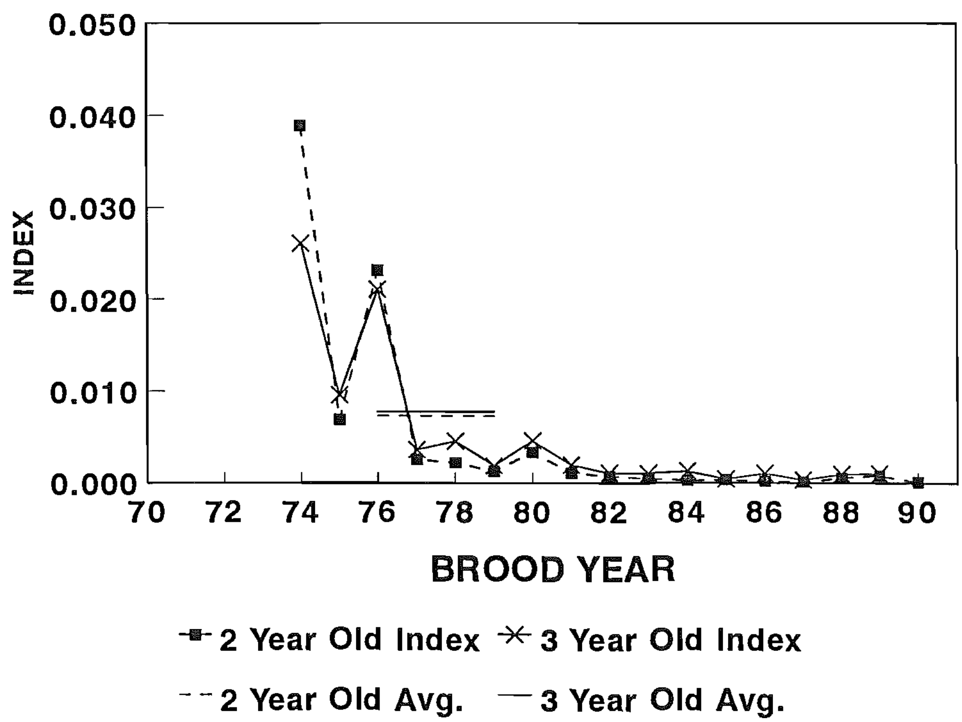

ALASKA SPRING
INDEX OF SURVIVAL
INDEX
0.020
0.015
0.010
0.005
0.000
70 72 74 76 78 80 82 84 86 88 90
BROOD YEAR
3 Year Old Index
4 Year Old Index
3 Year Old Avg.
4 Year Old Avg.

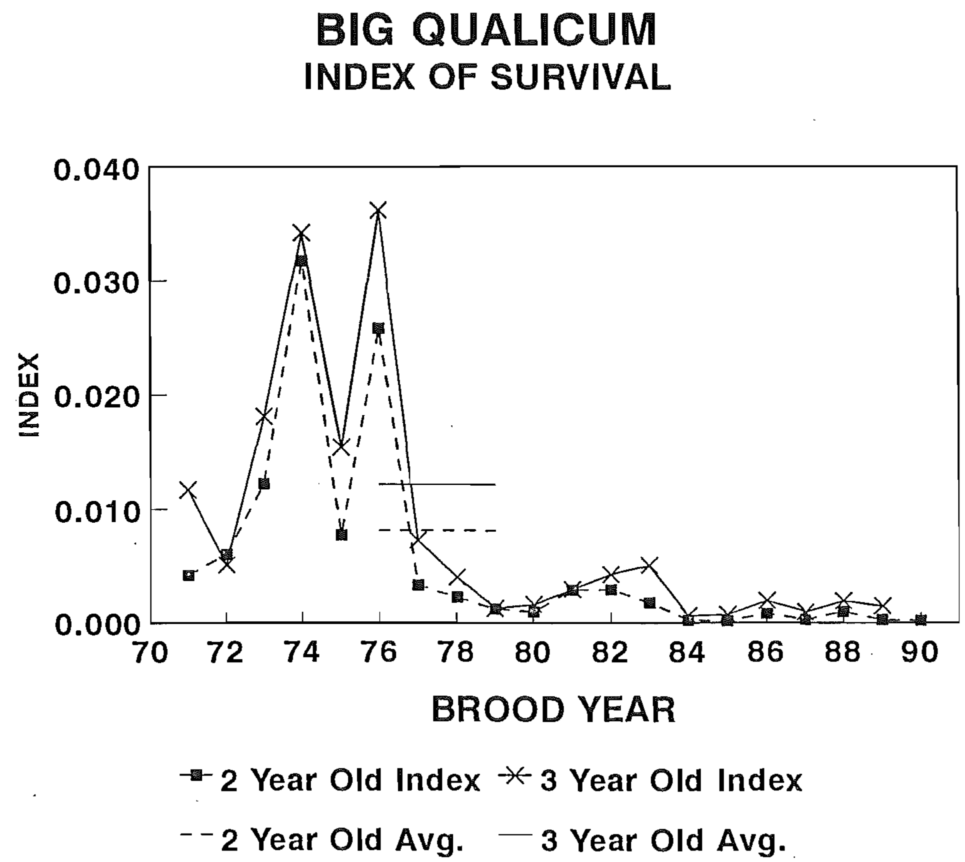

ROBERTSON CREEK
INDEX OF SURVIVAL
INDEX
0.025
0.020
0.015
0.010
0.005
0.000
70 72 74 76 78 80 82 84 86 88 90
BROOD YEAR
2 Year Old Index
3 Year Old Index
2 Year Old Avg.
3 Year Old Avg.

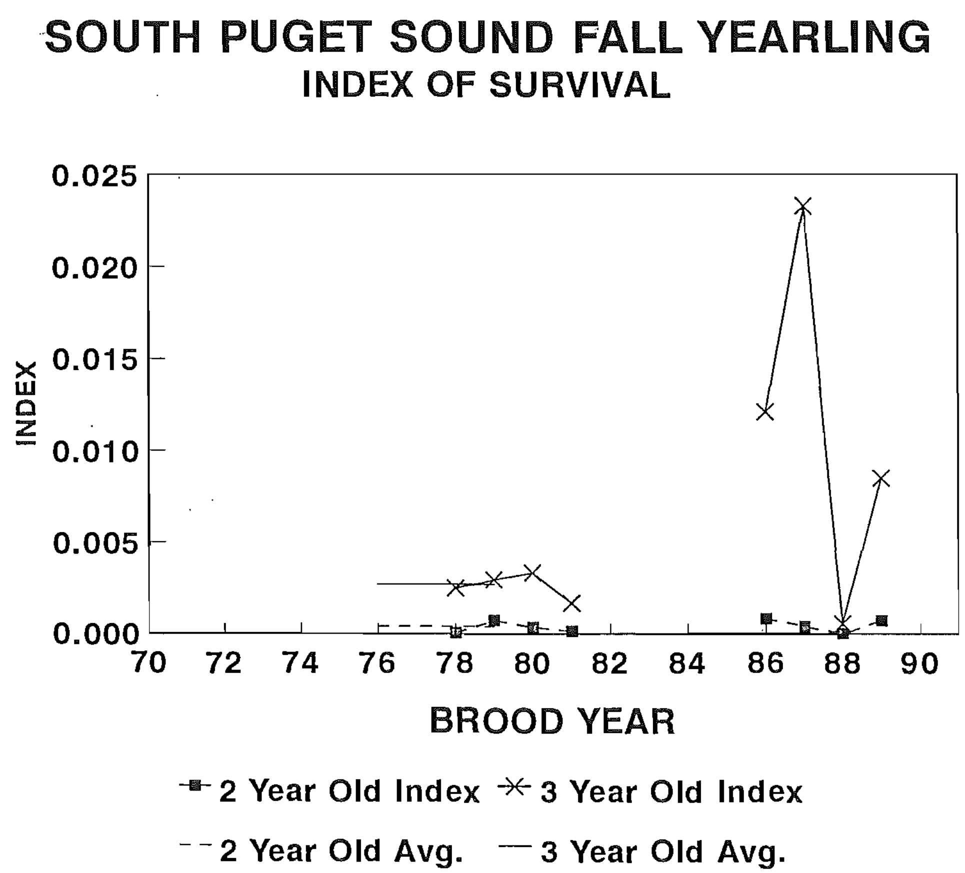
## QUINSAM
### INDEX OF SURVIVAL

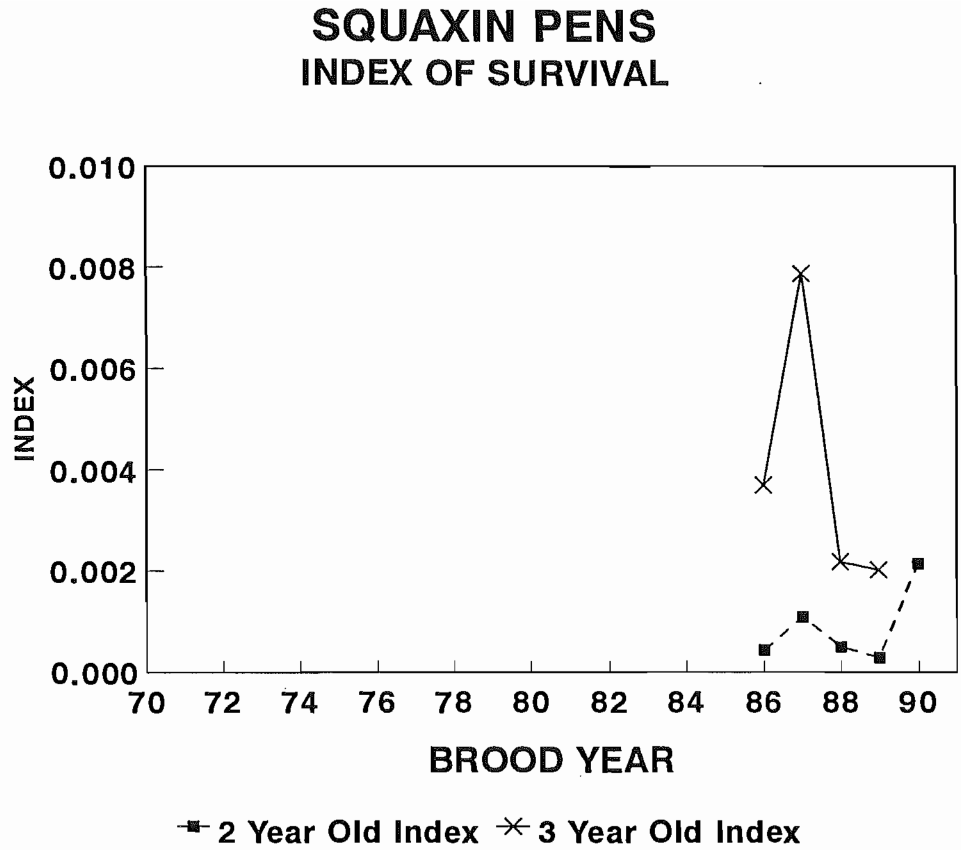


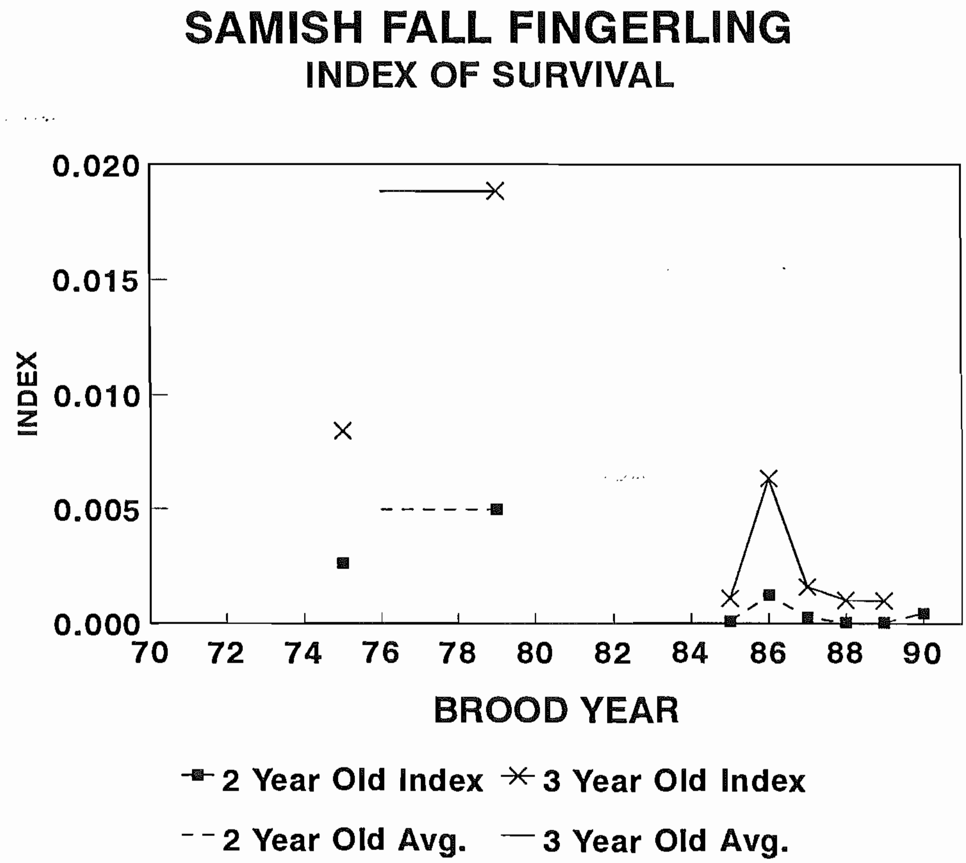

## PUNTLEDGE
### INDEX OF SURVIVAL



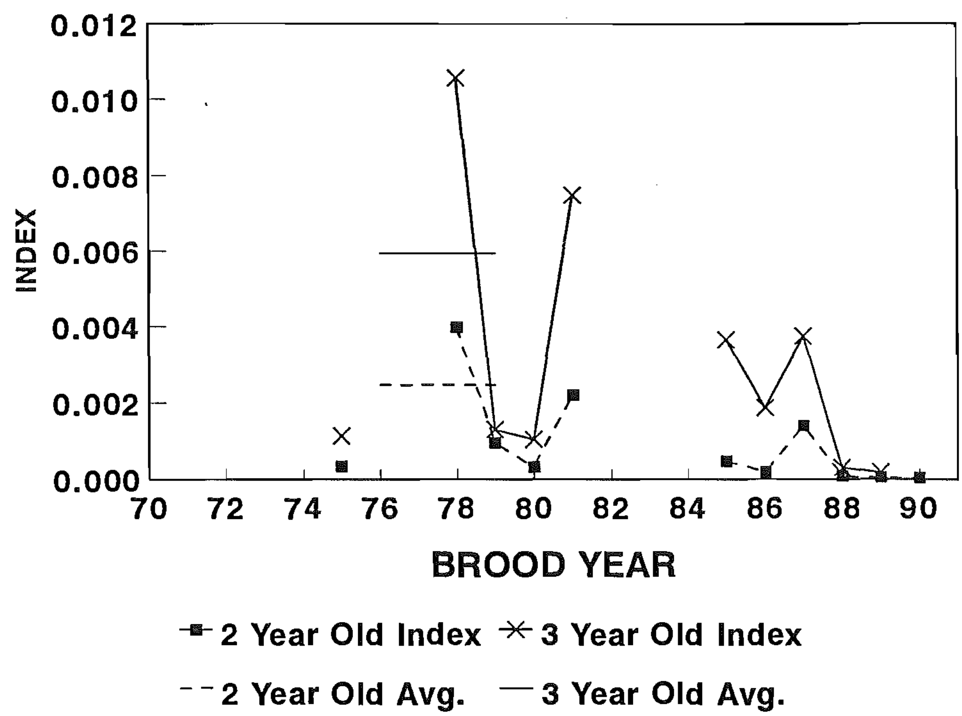

BIG QUALICUM
INDEX OF SURVIVAL
0.040
0.030
0.020
0.010
0.000
INDEX
70
72
74
76
78
80
82
84
86
88
90
BROOD YEAR
2 Year Old Index
3 Year Old Index
2 Year Old Avg.
3 Year Old Avg.


SOUTH PUGET SOUND FALL YEARLING
INDEX OF SURVIVAL
0.025
0.020
0.015
0.010
0.005
0.000
INDEX
70
72
74
76
78
80
82
84
86
88
90
BROOD YEAR
2 Year Old Index
3 Year Old Index
2 Year Old Avg.
3 Year Old Avg.

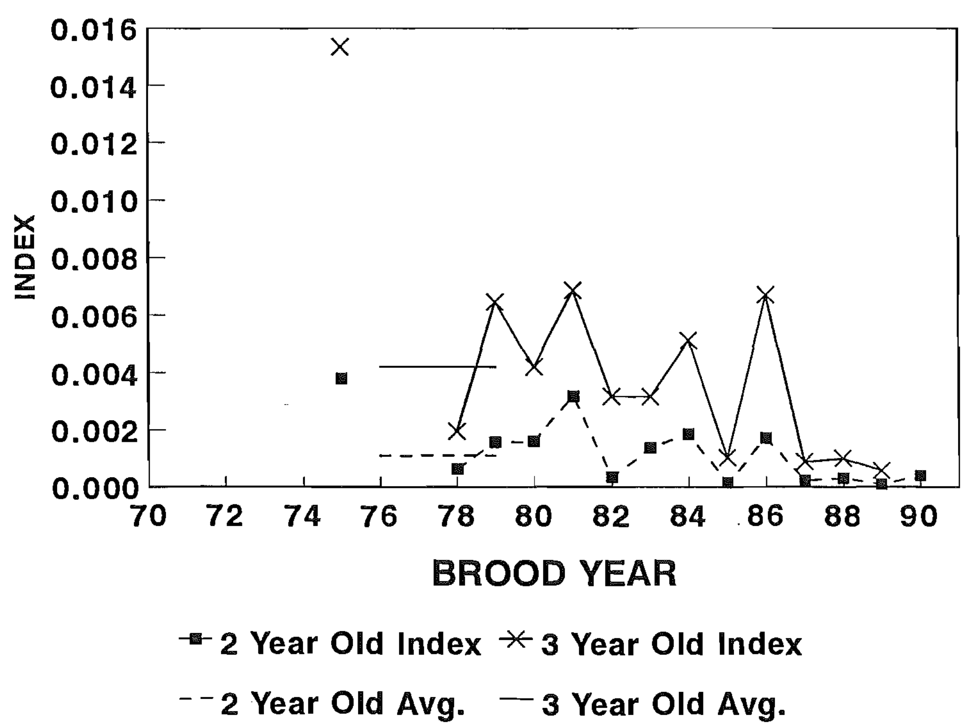

SQUAXIN PENS
INDEX OF SURVIVAL
INDEX
0.010
0.008
0.006
0.004
0.002
0.000
70
72
74
76
78
80
82
84
86
88
90
BROOD YEAR
2 Year Old Index
3 Year Old Index

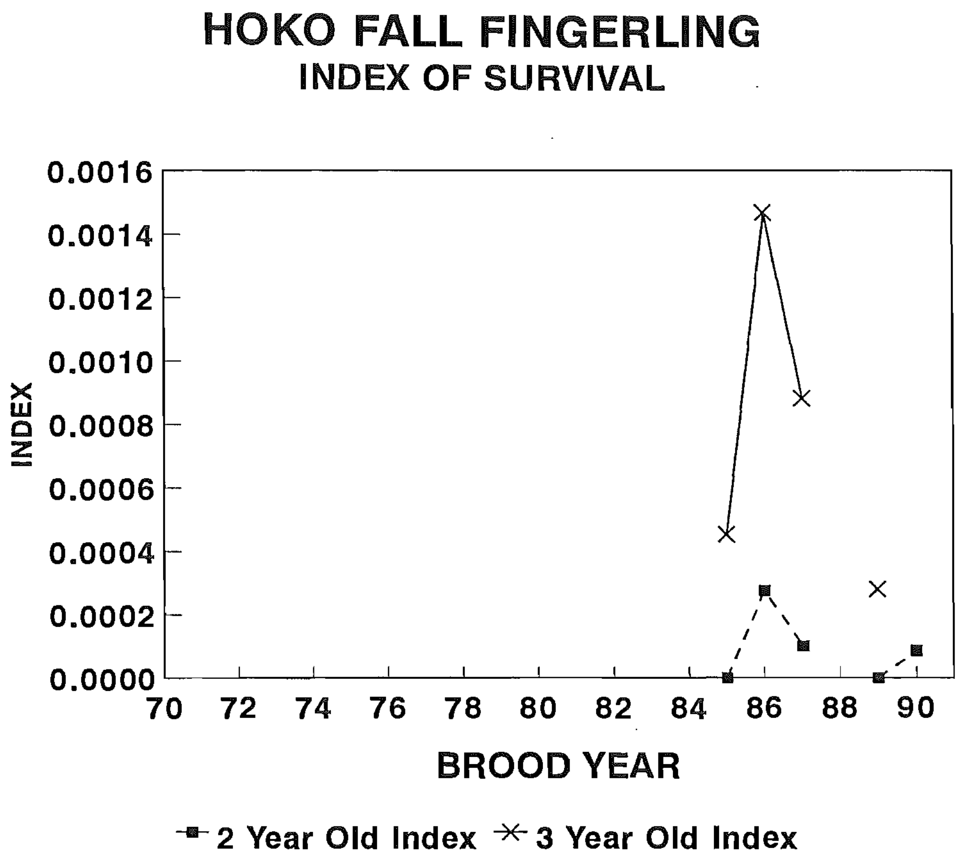

SAMISH FALL FINGERLING
INDEX OF SURVIVAL
INDEX
0.020
0.015
0.010
0.005
0.000
70
72
74
76
78
80
82
84
86
88
90
BROOD YEAR
2 Year Old Index
3 Year Old Index
2 Year Old Avg.
3 Year Old Avg.

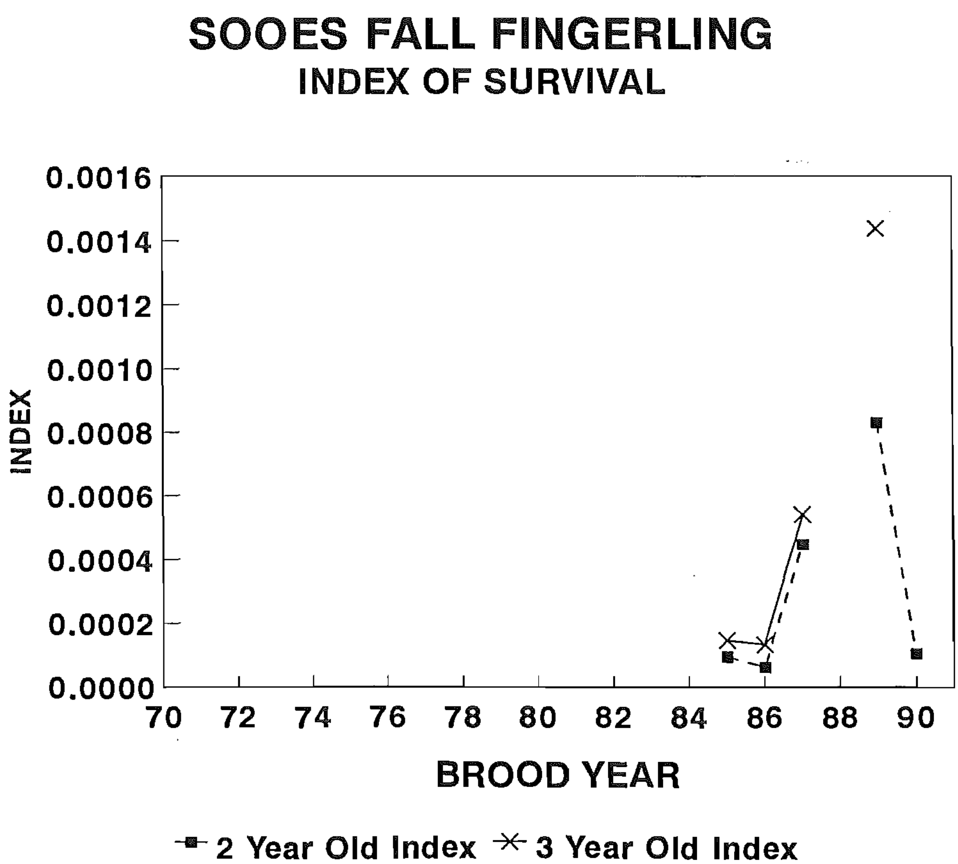
# GEORGE ADAMS FALL FINGERLING
## INDEX OF SURVIVAL



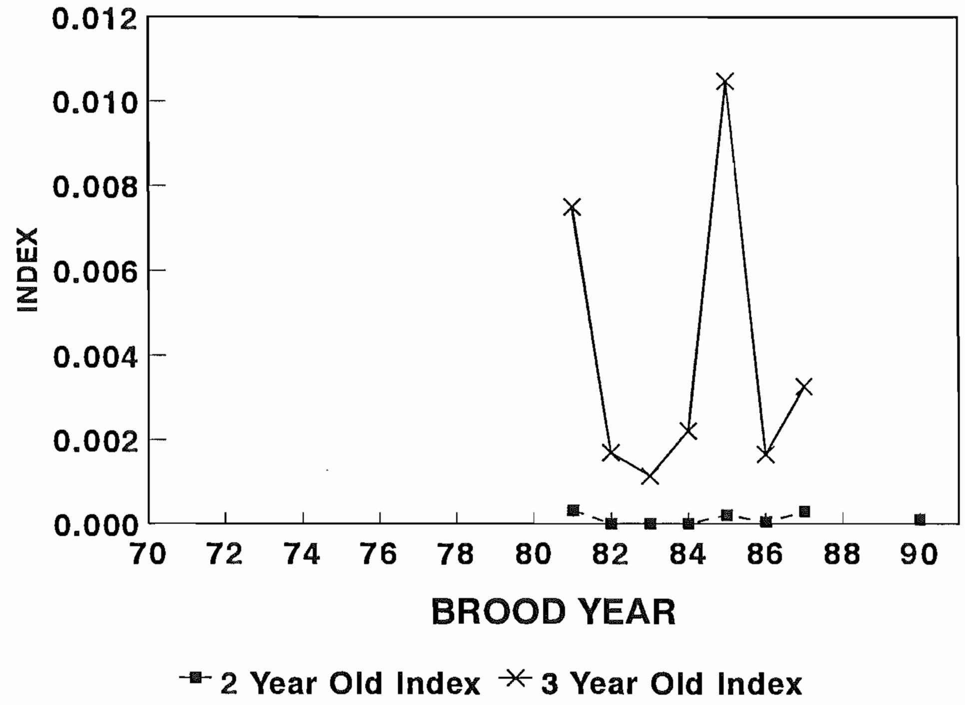

# SOUTH PUGET SOUND FALL FINGERLING
## INDEX OF SURVIVAL



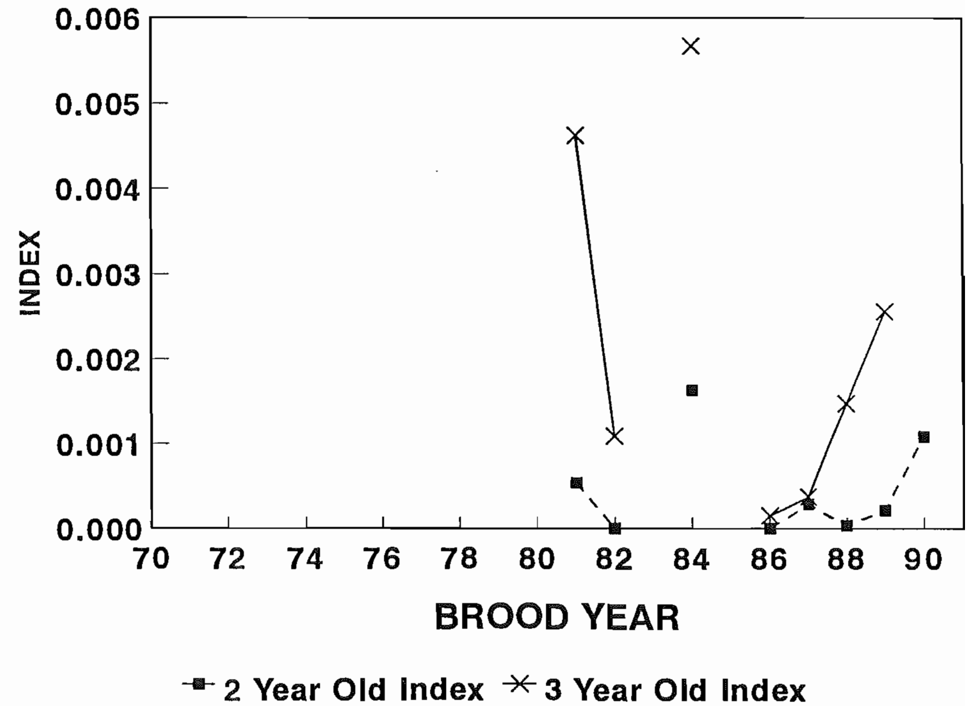

HOKO FALL FINGERLING
INDEX OF SURVIVAL
INDEX
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
70 72 74 76 78 80 82 84 86 88 90
BROOD YEAR
2 Year Old Index
3 Year Old Index


SOOES FALL FINGERLING
INDEX OF SURVIVAL
INDEX
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
70 72 74 76 78 80 82 84 86 88 90
BROOD YEAR
2 Year Old Index
3 Year Old Index

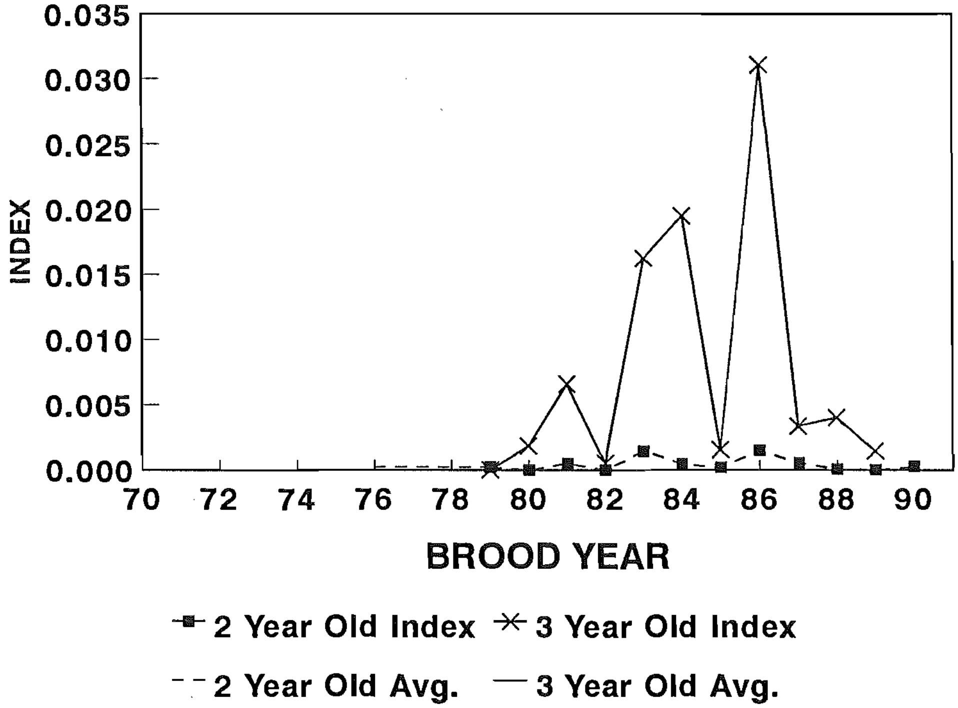
## SKAGIT SPRING YEARLING
### INDEX OF SURVIVAL



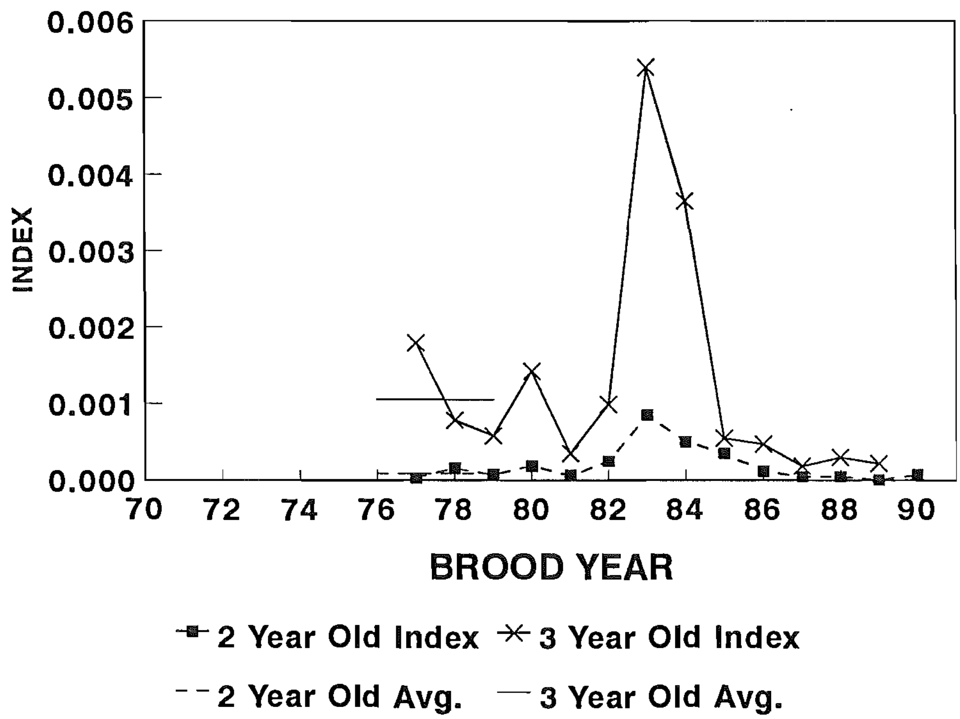

## NOOKSACK SPRING YEARLING
### INDEX OF SURVIVAL

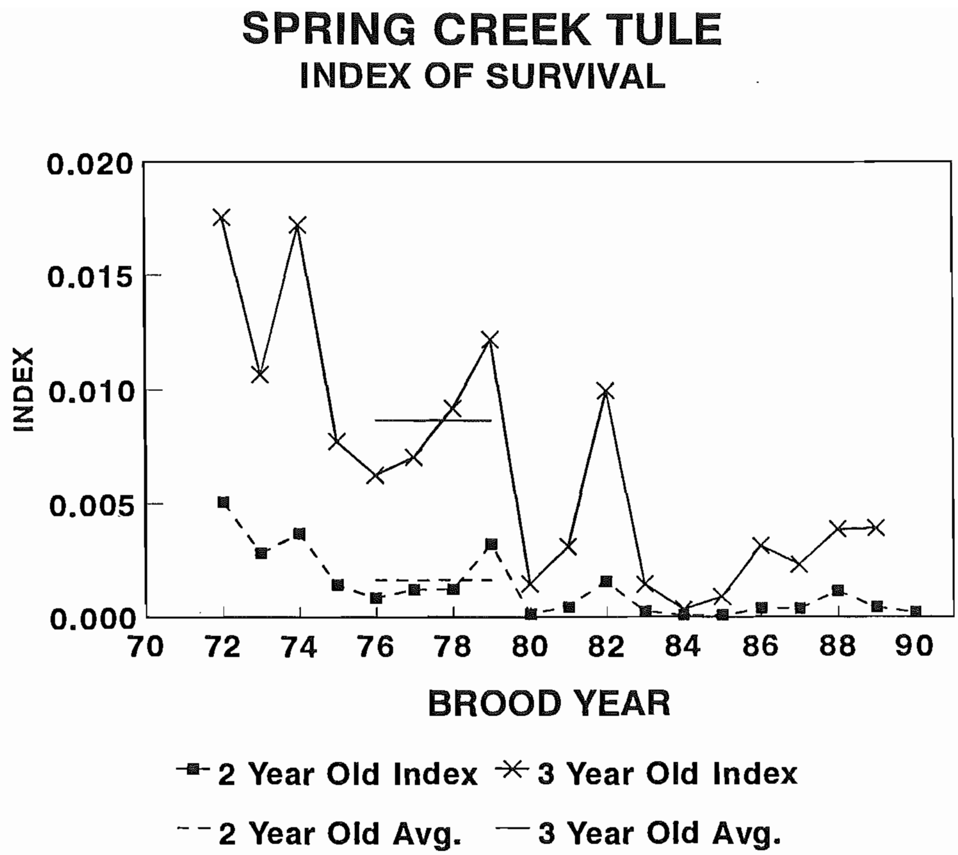


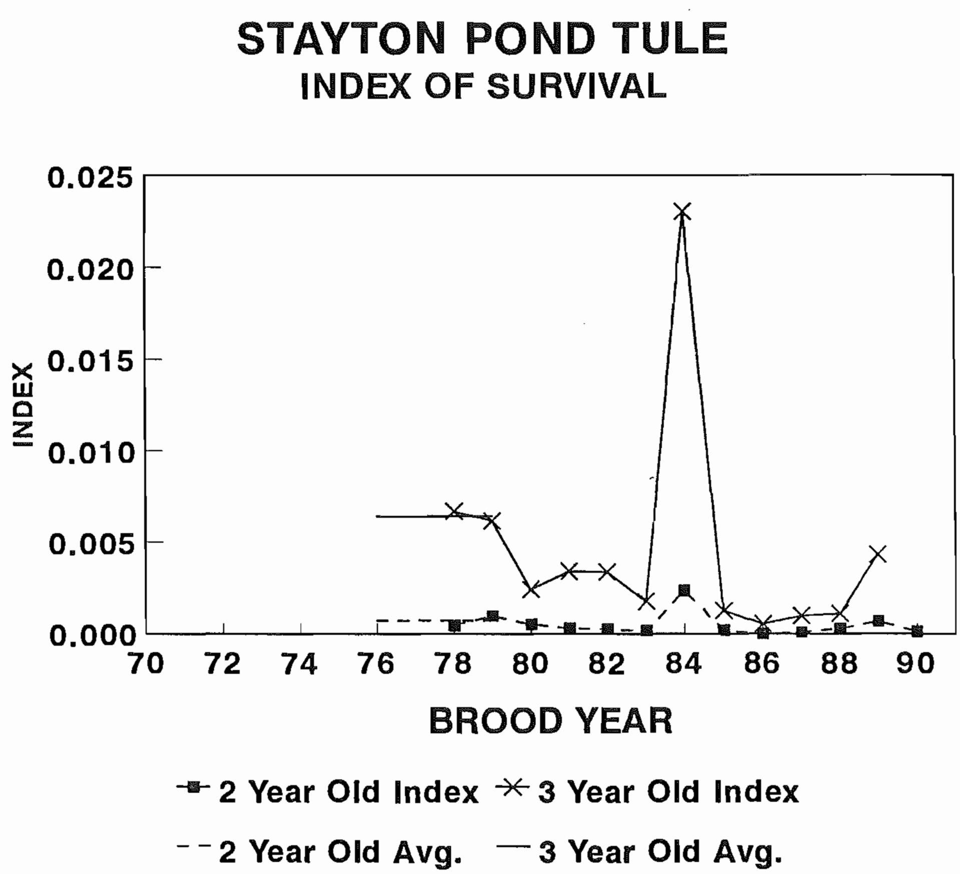
## WHITE RIVER SPRING YEARLING
### INDEX OF SURVIVAL



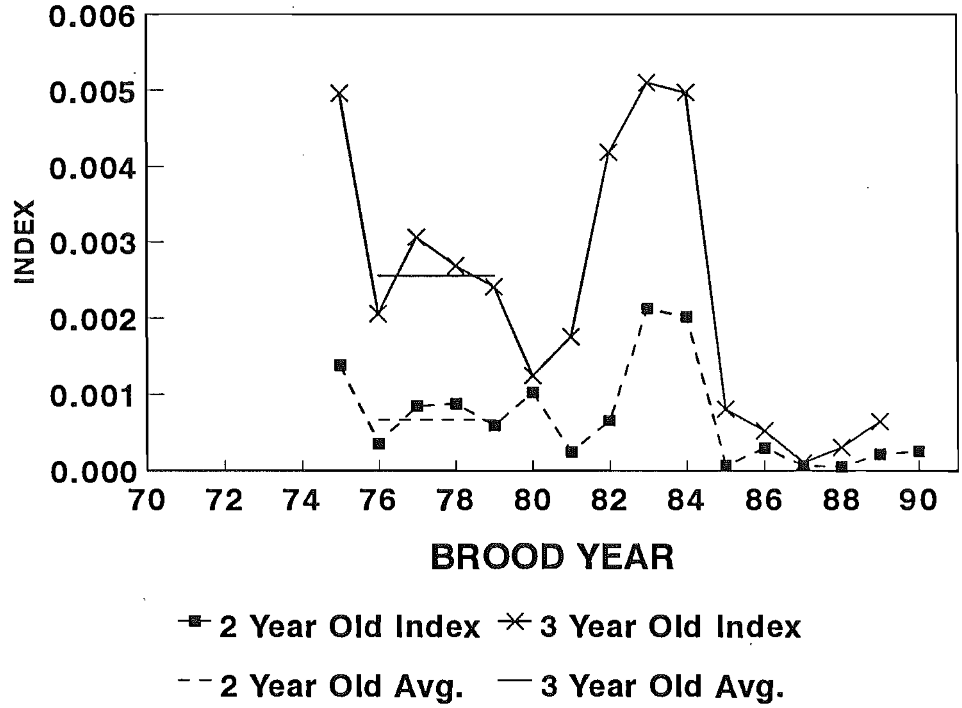

## COWLITZ FALL TULE
### INDEX OF SURVIVAL



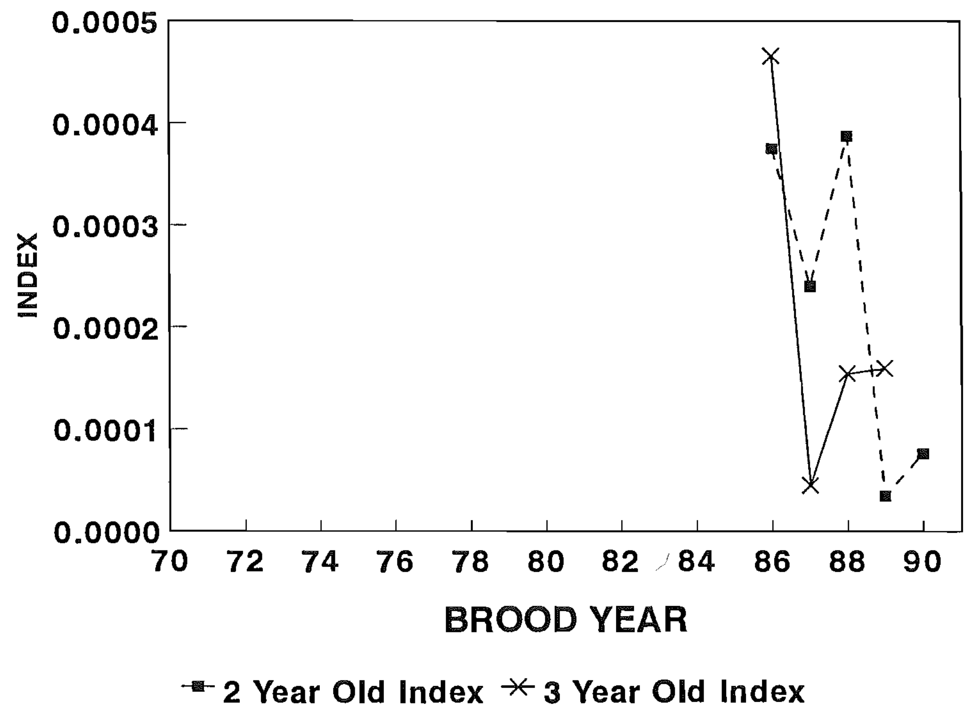

SPRING CREEK TULE
INDEX OF SURVIVAL
0.020
0.015
0.010
0.005
0.000
INDEX
70
72
74
76
78
80
82
84
86
88
90
BROOD YEAR
2 Year Old Index
3 Year Old Index
2 Year Old Avg.
3 Year Old Avg.


STAYTON POND TULE
INDEX OF SURVIVAL
0.025
0.020
0.015
0.010
0.005
0.000
INDEX
70
72
74
76
78
80
82
84
86
88
90
BROOD YEAR
2 Year Old Index
3 Year Old Index
2 Year Old Avg.
3 Year Old Avg.

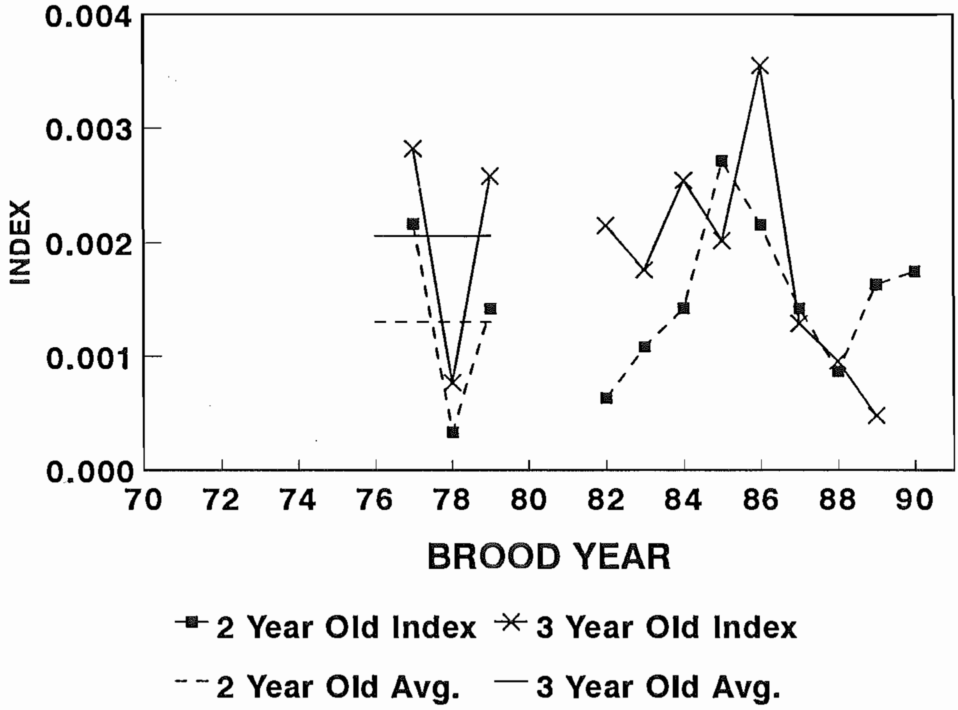
## COLUMBIA RIVER UPRIVER BRIGHT
### INDEX OF SURVIVAL



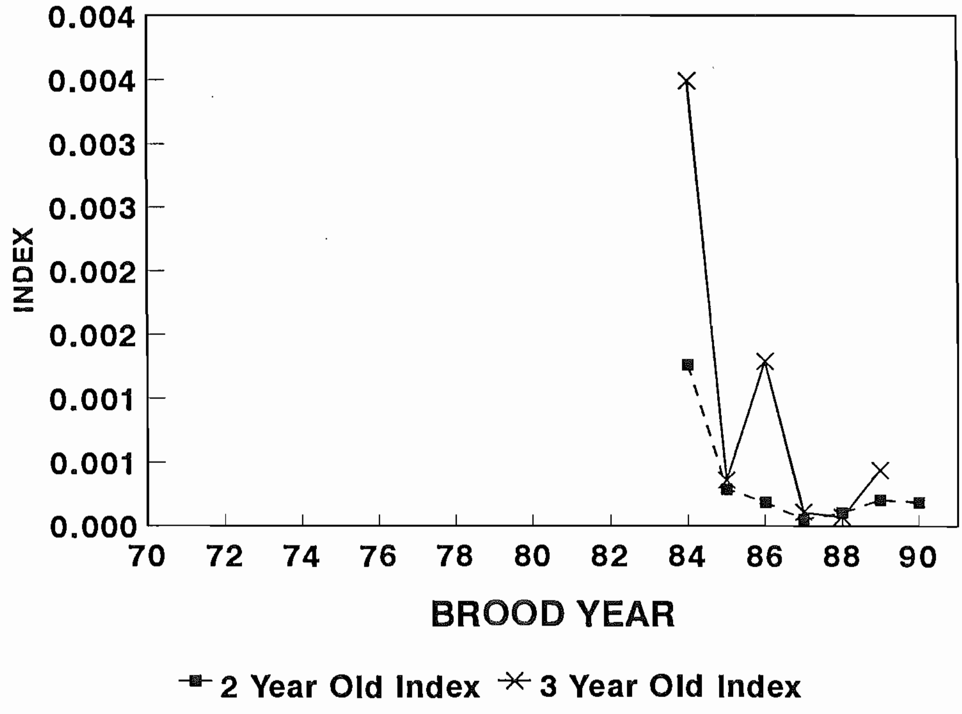

## HANFORD WILD BRIGHTS
### INDEX OF SURVIVAL



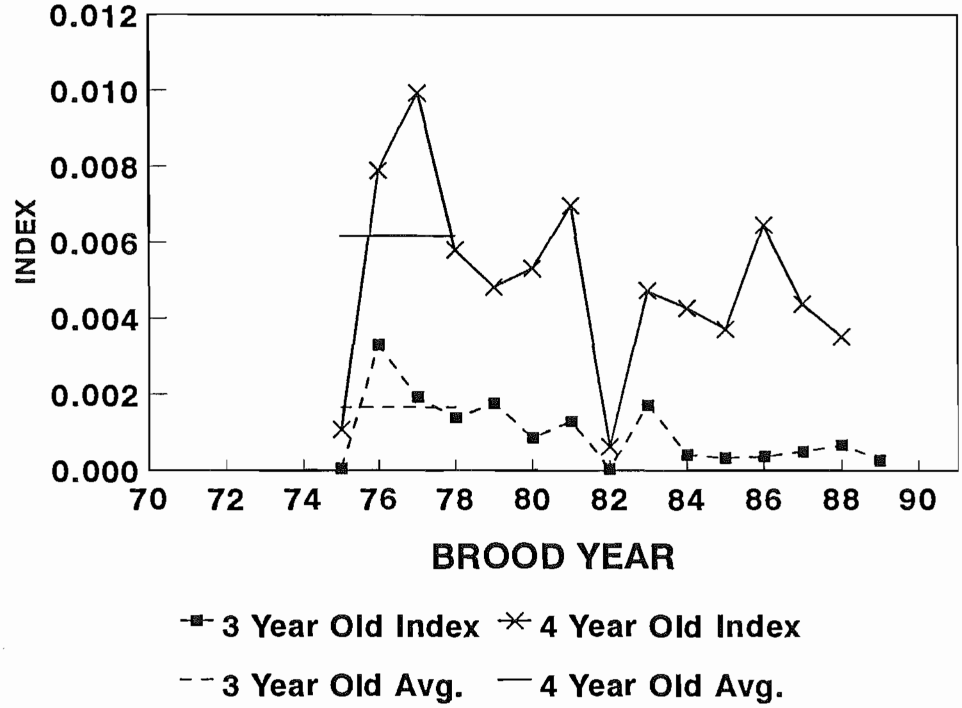
# LEWIS RIVER WILD
## INDEX OF SURVIVAL



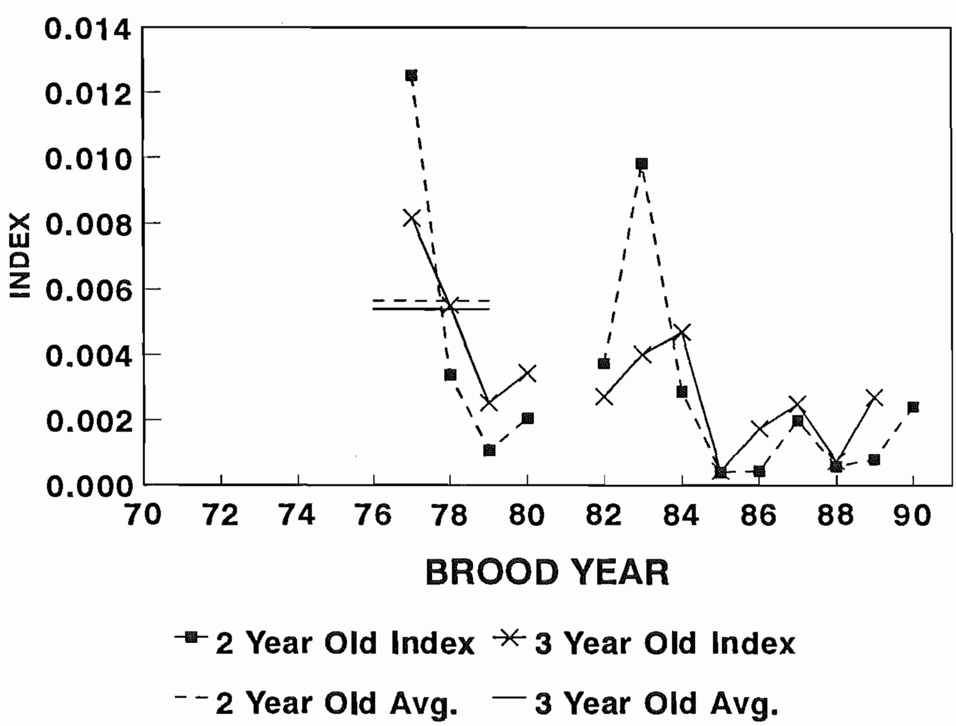

# LYONS FERRY
## INDEX OF SURVIVAL



# WILLAMETTE SPRING
## INDEX OF SURVIVAL




# SALMON RIVER
## INDEX OF SURVIVAL



## APPENDIX H

### Annual Distribution of Reported Catch and Total Fishing Mortality by Stock

# Stock: Alaska Spring

Reported Catch Only

| | Fisheries with ceilings | | | | Other fisheries | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Catch Year | All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
| 83 | 93.9% | 6.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 95.5% | 4.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% |
| 85 | 96.4% | 3.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 97.6% | 2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 97.7% | 2.3% | 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% | 1.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 96.7% | 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% |
| (83-92) | 97.0% | 3.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 97.6% | 2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

Total Mortalities

| | Fisheries with ceilings | | | | Other fisheries | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Catch Year | All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
| 83 | 95.2% | 4.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 96.6% | 3.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% |
| 85 | 97.4% | 2.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 98.3% | 1.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 98.4% | 1.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 97.8% | 2.2% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 98.4% | 1.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 97.0% | 3.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 98.6% | 1.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 98.9% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (83-92) | 97.7% | 2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 98.1% | 1.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

## Stock: Kitsumkalum

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 83 | 41.0% | 59.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 54.2% | 45.8% | 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 | 27.8% | 72.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 25.3% | 74.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 39.8% | 60.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 41.9% | 58.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 37.4% | 62.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 33.3% | 66.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 48.2% | 50.9% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (83-92) | 40.3% | 59.6% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 38.5% | 61.4% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 83 | 47.5% | 52.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 60.5% | 39.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 59.5% | 40.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 32.6% | 67.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 34.5% | 65.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 48.0% | 52.0% | 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 | 45.6% | 54.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 44.8% | 55.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 58.4% | 40.8% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (83-92) | 48.0% | 52.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 46.5% | 53.5% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

## Stock: Kitsumkalum

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 83 | 41.0% | 59.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 54.2% | 45.8% | 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 | 27.8% | 72.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 25.3% | 74.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 39.8% | 60.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 41.9% | 58.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 37.4% | 62.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 33.3% | 66.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 48.2% | 50.9% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (83-92) | 40.3% | 59.6% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 38.5% | 61.4% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 83 | 47.5% | 52.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 60.5% | 39.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 59.5% | 40.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 32.6% | 67.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 34.5% | 65.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 48.0% | 52.0% | 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 | 45.6% | 54.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 44.8% | 55.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 58.4% | 40.8% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (83-92) | 48.0% | 52.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 46.5% | 53.5% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

# Stock: Kitimat

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 38.3% | 58.8% | 0.0% | 2.5% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 34.7% | 65.1% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 43.1% | 56.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 58.1% | 41.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 73.0% | 27.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 47.6% | 52.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 50.0% | 49.3% | 0.0% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 58.7% | 41.2% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 27.6% | 72.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 42.7% | 56.8% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 34.6% | 65.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 48.0% | 50.5% | 0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% |
| (81-92) | 46.4% | 53.1% | 0.0% | 0.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.1% |
| (85-92) | 47.8% | 51.9% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 41.6% | 55.9% | 0.0% | 2.2% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 38.4% | 61.5% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 47.7% | 52.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 62.9% | 37.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 81.2% | 18.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 57.3% | 42.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 63.0% | 36.5% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 65.8% | 34.1% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 36.4% | 63.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 52.4% | 47.1% | 0.0% | 0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 48.1% | 51.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 64.4% | 34.5% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.6% |
| (81-92) | 54.9% | 44.7% | 0.0% | 0.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.1% |
| (85-92) | 58.6% | 41.1% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |

## Stock: Snootli Creek

Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 54.7% | 27.7% | 0.0% | 7.8% | 9.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 24.7% | 72.0% | 0.0% | 3.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 32.3% | 54.0% | 0.0% | 4.7% | 9.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 31.6% | 63.5% | 4.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 47.5% | 52.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 27.0% | 73.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 35.3% | 63.0% | 0.0% | 0.0% | 1.7% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 19.9% | 80.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 24.5% | 75.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 26.2% | 73.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 15.5% | 82.1% | 2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 28.1% | 72.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 20.4% | 78.5% | 1.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 24.6% | 74.2% | 0.8% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% |
| (79-92) | 29.4% | 67.3% | 0.7% | 1.1% | 1.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 24.3% | 74.9% | 0.5% | 0.0% | 0.2% | 0.0% | 0.1% | 0.0% | 0.0% |

Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 53.5% | 31.2% | 0.0% | 6.7% | 8.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 31.5% | 65.5% | 0.6% | 2.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 39.2% | 49.2% | 0.2% | 3.9% | 7.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 36.3% | 59.1% | 4.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 48.5% | 51.4% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 33.8% | 66.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 44.7% | 53.9% | 0.0% | 0.0% | 1.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 26.4% | 73.2% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 35.3% | 64.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 88 | 30.4% | 69.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 20.6% | 77.1% | 2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 33.9% | 66.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 28.2% | 70.6% | 1.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 33.2% | 65.6% | 0.7% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% |
| (79-92) | 35.4% | 61.7% | 0.7% | 0.9% | 1.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| (85-92) | 31.6% | 67.6% | 0.6% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% |

## Stock: Robertson Creek

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 29.3% | 45.0% | 11.8% | 2.5% | 3.4% | 7.8% | 0.0% | 0.2% | 0.0% |
| 80 | 43.3% | 25.7% | 9.2% | 0.2% | 14.1% | 7.3% | 0.0% | 0.2% | 0.0% |
| 81 | 38.1% | 29.4% | 6.1% | 0.8% | 15.8% | 9.2% | 0.0% | 0.5% | 0.0% |
| 82 | 35.1% | 30.6% | 6.7% | 1.1% | 17.4% | 8.2% | 0.1% | 0.7% | 0.2% |
| 83 | 45.0% | 23.2% | 5.8% | 0.4% | 20.0% | 5.3% | 0.0% | 0.3% | 0.0% |
| 84 | 39.6% | 24.5% | 8.0% | 0.9% | 21.4% | 5.3% | 0.0% | 0.3% | 0.0% |
| 85 | 37.7% | 40.0% | 3.4% | 1.5% | 6.4% | 7.6% | 0.0% | 3.5% | 0.0% |
| 86 | 37.9% | 26.0% | 8.7% | 0.0% | 2.8% | 22.6% | 0.0% | 0.0% | 2.0% |
| 87 | 24.6% | 37.0% | 7.0% | 1.7% | 3.0% | 25.5% | 0.0% | 0.9% | 0.4% |
| 88 | 30.9% | 23.8% | 9.1% | 1.5% | 18.0% | 15.6% | 0.0% | 0.7% | 0.3% |
| 89 | 20.8% | 18.0% | 2.7% | 1.3% | 34.6% | 22.3% | 0.0% | 0.1% | 0.1% |
| 90 | 35.7% | 20.9% | 11.2% | 0.9% | 18.5% | 12.6% | 0.0% | 0.0% | 0.1% |
| 91 | 31.8% | 20.2% | 6.6% | 0.6% | 22.8% | 17.8% | 0.1% | 0.0% | 0.2% |
| 92 | 34.6% | 21.1% | 32.3% | 0.2% | 1.2% | 10.4% | 0.0% | 0.1% | 0.1% |
| (79-92) | 34.6% | 27.5% | 9.2% | 1.0% | 14.2% | 12.7% | 0.0% | 0.5% | 0.2% |
| (85-92) | 31.8% | 25.9% | 10.1% | 1.0% | 13.4% | 16.8% | 0.0% | 0.7% | 0.4% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 33.8% | 42.7% | 11.5% | 2.1% | 2.9% | 6.8% | 0.0% | 0.2% | 0.0% |
| 80 | 44.4% | 25.9% | 9.4% | 0.1% | 13.1% | 6.8% | 0.1% | 0.3% | 0.0% |
| 81 | 42.6% | 28.5% | 6.0% | 0.6% | 13.6% | 8.0% | 0.0% | 0.6% | 0.0% |
| 82 | 40.6% | 29.0% | 6.5% | 1.0% | 14.9% | 7.0% | 0.1% | 0.7% | 0.2% |
| 83 | 49.2% | 22.0% | 5.6% | 0.4% | 17.8% | 4.7% | 0.0% | 0.3% | 0.0% |
| 84 | 43.5% | 23.4% | 7.9% | 0.9% | 19.4% | 4.8% | 0.0% | 0.3% | 0.0% |
| 85 | 53.0% | 30.5% | 2.6% | 1.0% | 4.6% | 5.3% | 0.0% | 2.9% | 0.0% |
| 86 | 50.8% | 23.7% | 7.1% | 0.0% | 1.9% | 15.1% | 0.0% | 0.0% | 1.4% |
| 87 | 34.8% | 35.2% | 6.9% | 1.4% | 2.2% | 18.4% | 0.0% | 0.8% | 0.3% |
| 88 | 37.3% | 23.5% | 9.3% | 1.5% | 14.6% | 12.8% | 0.0% | 0.8% | 0.3% |
| 89 | 31.8% | 19.1% | 2.9% | 1.8% | 26.7% | 17.5% | 0.0% | 0.1% | 0.1% |
| 90 | 47.7% | 19.6% | 9.7% | 1.1% | 13.0% | 8.9% | 0.0% | 0.0% | 0.1% |
| 91 | 39.7% | 19.6% | 6.5% | 0.6% | 18.8% | 14.7% | 0.1% | 0.0% | 0.1% |
| 92 | 47.1% | 17.6% | 26.8% | 0.1% | 0.8% | 7.4% | 0.0% | 0.1% | 0.1% |
| (79-92) | 42.6% | 25.7% | 8.5% | 0.9% | 11.7% | 9.9% | 0.0% | 0.5% | 0.2% |
| (85-92) | 42.8% | 23.6% | 9.0% | 0.9% | 10.3% | 12.5% | 0.0% | 0.6% | 0.3% |

# Stock: Quinsam

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 20.7% | 61.3% | 0.0% | 11.1% | 6.9% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 29.7% | 49.7% | 0.0% | 11.3% | 9.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 22.8% | 50.4% | 0.7% | 18.4% | 7.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 40.2% | 41.6% | 0.4% | 9.1% | 8.7% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 32.7% | 49.9% | 0.7% | 7.8% | 8.9% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 39.4% | 40.1% | 1.1% | 10.6% | 8.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 55.6% | 27.5% | 0.1% | 5.9% | 10.9% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 36.1% | 47.7% | 0.0% | 8.3% | 7.9% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 31.2% | 52.1% | 0.5% | 5.8% | 10.2% | 0.2% | 0.0% | 0.0% | 0.0% |
| 88 | 53.1% | 30.7% | 1.4% | 6.7% | 7.2% | 0.7% | 0.0% | 0.0% | 0.3% |
| 89 | 41.1% | 23.7% | 0.5% | 12.5% | 22.1% | 0.0% | 0.0% | 0.2% | 0.0% |
| 90 | 41.8% | 43.9% | 2.0% | 5.7% | 6.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 31.7% | 54.9% | 0.8% | 6.8% | 5.2% | 0.6% | 0.0% | 0.0% | 0.0% |
| 92 | 32.3% | 56.8% | 0.6% | 6.1% | 4.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| (79-92) | 36.3% | 45.0% | 0.6% | 9.0% | 8.9% | 0.1% | 0.0% | 0.0% | 0.0% |
| (85-92) | 40.4% | 42.2% | 0.7% | 7.2% | 9.3% | 0.2% | 0.0% | 0.0% | 0.0% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 24.3% | 59.4% | 0.1% | 9.6% | 6.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 30.8% | 50.0% | 0.0% | 10.3% | 9.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 24.1% | 50.8% | 0.7% | 17.0% | 7.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 43.4% | 39.8% | 0.4% | 8.7% | 7.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 36.0% | 47.7% | 0.7% | 7.8% | 7.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 42.7% | 38.3% | 1.1% | 9.8% | 8.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 64.9% | 22.0% | 0.1% | 4.6% | 8.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 49.8% | 37.4% | 0.0% | 7.0% | 5.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 50.7% | 38.2% | 0.5% | 3.9% | 6.7% | 0.1% | 0.0% | 0.0% | 0.0% |
| 88 | 60.6% | 26.2% | 1.2% | 5.6% | 5.7% | 0.5% | 0.0% | 0.0% | 0.3% |
| 89 | 53.7% | 18.7% | 0.4% | 10.9% | 16.1% | 0.0% | 0.0% | 0.1% | 0.0% |
| 90 | 53.5% | 35.1% | 1.7% | 4.9% | 4.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 47.2% | 42.3% | 0.6% | 5.7% | 3.7% | 0.4% | 0.0% | 0.0% | 0.0% |
| 92 | 39.2% | 49.9% | 0.5% | 7.3% | 3.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| (79-92) | 44.3% | 39.7% | 0.6% | 8.1% | 7.2% | 0.1% | 0.0% | 0.0% | 0.0% |
| (85-92) | 52.4% | 33.7% | 0.6% | 6.2% | 6.8% | 0.1% | 0.0% | 0.0% | 0.0% |

# Stock: Puntledge

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 3.5% | 26.9% | 1.4% | 58.5% | 9.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 6.0% | 20.1% | 7.3% | 58.1% | 8.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 1.1% | 22.8% | 0.0% | 70.0% | 6.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 2.4% | 35.3% | 2.5% | 36.9% | 22.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 1.6% | 45.8% | 3.5% | 45.3% | 3.8% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 2.3% | 27.7% | 4.7% | 59.3% | 6.0% | 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 | 11.4% | 23.3% | 3.8% | 59.1% | 2.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 18.4% | 48.6% | 0.0% | 26.8% | 0.0% | 6.2% | 0.0% | 0.0% | 0.0% |
| 88 | 27.7% | 35.5% | 0.0% | 35.6% | 1.2% | 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 | 31.0% | 39.3% | 0.0% | 19.3% | 10.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 23.7% | 23.0% | 0.0% | 42.7% | 10.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 0.0% | 17.8% | 0.0% | 59.2% | 22.9% | 0.0% | 0.0% | 0.0% | 0.0% |
| (79-92) | 11.0% | 28.3% | 1.7% | 50.6% | 8.0% | 0.4% | 0.0% | 0.0% | 0.0% |
| (85-92) | 17.2% | 27.2% | 0.5% | 47.6% | 6.8% | 0.8% | 0.0% | 0.0% | 0.0% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 4.4% | 28.9% | 1.6% | 55.8% | 9.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 6.7% | 21.7% | 7.9% | 55.2% | 8.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 1.5% | 24.9% | 0.0% | 67.5% | 6.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 2.5% | 35.3% | 2.6% | 39.1% | 20.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 2.0% | 47.1% | 3.7% | 43.5% | 3.7% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 2.2% | 27.8% | 4.8% | 59.6% | 5.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 28.5% | 26.3% | 0.0% | 39.6% | 5.6% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 14.4% | 21.6% | 3.6% | 58.3% | 2.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 28.9% | 44.8% | 0.0% | 21.4% | 0.0% | 4.9% | 0.0% | 0.0% | 0.0% |
| 88 | 29.0% | 34.9% | 0.0% | 35.1% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 89 | 5.8% | 0.0% | 0.0% | 94.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 90 | 39.5% | 32.7% | 0.0% | 19.8% | 8.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 91 | 32.0% | 16.1% | 0.0% | 45.5% | 6.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| 92 | 0.0% | 14.6% | 0.0% | 66.9% | 18.4% | 0.0% | 0.0% | 0.0% | 0.0% |
| (79-92) | 14.1% | 26.9% | 1.7% | 50.1% | 6.8% | 0.3% | 0.0% | 0.0% | 0.0% |
| (85-92) | 22.3% | 23.9% | 0.4% | 47.6% | 5.2% | 0.6% | 0.0% | 0.0% | 0.0% |

# Stock: Big Qualicum

Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 11.5% | 24.4% | 3.5% | 47.6% | 12.5% | 0.1% | 0.0% | 0.5% | 0.1% |
| 80 | 5.5% | 22.1% | 6.0% | 52.2% | 13.3% | 0.0% | 0.2% | 0.4% | 0.4% |
| 81 | 3.6% | 21.2% | 1.8% | 61.0% | 11.3% | 0.1% | 0.0% | 0.2% | 0.8% |
| 82 | 10.3% | 27.2% | 6.2% | 36.5% | 17.0% | 0.0% | 0.0% | 1.5% | 1.1% |
| 83 | 9.5% | 22.5% | 1.4% | 46.9% | 19.0% | 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 | 8.7% | 19.9% | 2.1% | 48.5% | 17.5% | 0.0% | 0.0% | 3.4% | 0.0% |
| 86 | 4.3% | 29.9% | 1.7% | 55.1% | 9.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 20.1% | 17.1% | 6.4% | 47.3% | 6.9% | 0.0% | 1.2% | 1.0% | 0.0% |
| 88 | 8.9% | 23.2% | 4.5% | 51.2% | 7.6% | 2.9% | 0.0% | 1.8% | 0.0% |
| 89 | 15.7% | 9.6% | 6.8% | 54.3% | 11.8% | 0.0% | 0.4% | 0.0% | 1.4% |
| 90 | 21.7% | 23.2% | 4.4% | 33.1% | 14.5% | 0.0% | 0.2% | 0.0% | 2.8% |
| 91 | 6.9% | 12.0% | 2.9% | 68.5% | 8.0% | 0.0% | 0.0% | 0.6% | 1.0% |
| 92 | 4.6% | 28.9% | 4.8% | 56.4% | 5.0% | 0.0% | 0.0% | 0.3% | 0.0% |
| (79-92) | 9.7% | 21.6% | 3.9% | 51.7% | 11.5% | 0.2% | 0.1% | 0.7% | 0.6% |
| (85-92) | 11.4% | 20.5% | 4.2% | 51.8% | 10.0% | 0.4% | 0.2% | 0.9% | 0.7% |

Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 13.5% | 25.6% | 3.8% | 44.6% | 11.8% | 0.1% | 0.0% | 0.5% | 0.1% |
| 80 | 6.1% | 23.3% | 6.5% | 49.9% | 13.2% | 0.0% | 0.2% | 0.4% | 0.4% |
| 81 | 4.4% | 22.8% | 2.0% | 58.3% | 11.3% | 0.1% | 0.0% | 0.2% | 0.8% |
| 82 | 11.9% | 27.0% | 6.3% | 35.7% | 16.4% | 0.0% | 0.0% | 1.6% | 1.1% |
| 83 | 10.4% | 22.1% | 1.4% | 47.8% | 17.1% | 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 | 14.1% | 18.3% | 1.9% | 48.1% | 13.8% | 0.0% | 0.0% | 3.7% | 0.0% |
| 86 | 8.7% | 29.1% | 1.7% | 52.5% | 8.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 87 | 28.3% | 15.8% | 6.3% | 41.6% | 5.9% | 0.0% | 1.1% | 1.0% | 0.0% |
| 88 | 12.9% | 20.6% | 4.7% | 51.0% | 6.1% | 2.5% | 0.0% | 2.2% | 0.0% |
| 89 | 25.4% | 7.7% | 5.6% | 52.1% | 7.8% | 0.0% | 0.3% | 0.0% | 1.0% |
| 90 | 32.7% | 18.2% | 3.5% | 33.8% | 9.7% | 0.0% | 0.2% | 0.0% | 2.0% |
| 91 | 11.4% | 9.5% | 2.4% | 70.0% | 5.4% | 0.0% | 0.0% | 0.5% | 0.8% |
| 92 | 5.1% | 24.9% | 4.2% | 61.9% | 3.7% | 0.0% | 0.0% | 0.3% | 0.0% |
| (79-92) | 13.5% | 20.4% | 3.7% | 51.0% | 9.8% | 0.2% | 0.1% | 0.8% | 0.5% |
| (85-92) | 17.3% | 18.0% | 3.8% | 51.4% | 7.6% | 0.3% | 0.2% | 1.0% | 0.5% |

## Stock: Chehalis

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 85 | 0.3% | 5.8% | 32.5% | 44.9% | 4.6% | 1.1% | 1.5% | 4.1% | 5.1% |
| 86 | 2.1% | 6.8% | 21.2% | 50.5% | 12.4% | 0.6% | 0.0% | 1.4% | 5.1% |
| 87 | 0.9% | 3.5% | 12.8% | 56.6% | 5.9% | 0.0% | 5.0% | 12.4% | 3.1% |
| 88 | 3.8% | 6.2% | 6.2% | 43.9% | 8.7% | 2.0% | 7.2% | 17.4% | 4.6% |
| 89 | 0.3% | 1.8% | 31.0% | 35.1% | 8.3% | 0.9% | 9.0% | 7.3% | 6.4% |
| 90 | 0.8% | 3.6% | 36.0% | 28.9% | 4.2% | 1.0% | 11.0% | 5.7% | 8.9% |
| 91 | 0.3% | 3.1% | 42.1% | 27.1% | 6.8% | 0.0% | 10.9% | 3.5% | 6.2% |
| 92 | 0.0% | 1.0% | 28.1% | 37.3% | 2.5% | 0.0% | 18.6% | 1.6% | 10.9% |
| (85-92) | 1.0% | 4.0% | 26.2% | 40.5% | 6.7% | 0.7% | 7.9% | 6.7% | 6.3% |
| (85-92) | 1.0% | 4.0% | 26.2% | 40.5% | 6.7% | 0.7% | 7.9% | 6.7% | 6.3% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 85 | 0.6% | 5.8% | 32.2% | 45.1% | 4.5% | 0.9% | 1.5% | 4.4% | 4.9% |
| 86 | 2.5% | 6.5% | 20.9% | 51.9% | 11.1% | 0.5% | 0.0% | 1.5% | 4.9% |
| 87 | 1.2% | 3.2% | 13.2% | 55.4% | 4.8% | 0.0% | 4.8% | 14.6% | 2.8% |
| 88 | 8.1% | 5.4% | 5.4% | 39.8% | 6.0% | 1.7% | 5.8% | 19.0% | 8.8% |
| 89 | 0.3% | 1.7% | 30.6% | 39.8% | 6.5% | 0.7% | 8.4% | 6.6% | 5.3% |
| 90 | 1.0% | 3.3% | 32.2% | 31.9% | 3.7% | 0.9% | 10.2% | 7.8% | 9.0% |
| 91 | 0.7% | 2.5% | 40.3% | 32.7% | 5.2% | 0.0% | 9.8% | 3.4% | 5.5% |
| 92 | 0.0% | 1.1% | 29.0% | 40.1% | 2.0% | 0.0% | 17.6% | 1.4% | 8.8% |
| (85-92) | 1.8% | 3.7% | 25.5% | 42.1% | 5.5% | 0.6% | 7.3% | 7.3% | 6.3% |
| (85-92) | 1.8% | 3.7% | 25.5% | 42.1% | 5.5% | 0.6% | 7.3% | 7.3% | 6.3% |

## Stock: Chilliwack

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 85 | 0.7% | 4.3% | 40.2% | 33.9% | 7.0% | 0.0% | 4.8% | 4.2% | 5.1% |
| 86 | 0.0% | 6.1% | 24.2% | 35.5% | 15.6% | 0.0% | 3.4% | 7.0% | 8.2% |
| 87 | 0.1% | 2.6% | 24.2% | 54.6% | 3.2% | 0.5% | 5.7% | 5.4% | 3.8% |
| 88 | 1.2% | 0.6% | 36.1% | 39.6% | 4.4% | 0.0% | 8.7% | 6.1% | 3.3% |
| 89 | 0.6% | 1.0% | 37.5% | 33.2% | 7.1% | 0.0% | 10.6% | 7.5% | 2.6% |
| 90 | 2.0% | 3.3% | 16.1% | 27.3% | 7.5% | 0.4% | 11.2% | 22.1% | 9.9% |
| 91 | 0.7% | 2.7% | 27.8% | 33.6% | 6.2% | 0.9% | 11.3% | 9.5% | 7.3% |
| 92 | 1.0% | 2.4% | 37.0% | 33.3% | 2.0% | 0.2% | 15.3% | 2.0% | 6.9% |
| (85-92) | 0.8% | 2.9% | 30.4% | 36.4% | 6.6% | 0.3% | 8.9% | 8.0% | 5.9% |
| (85-92) | 0.8% | 2.9% | 30.4% | 36.4% | 6.6% | 0.3% | 8.9% | 8.0% | 5.9% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 85 | 0.7% | 4.1% | 38.1% | 34.9% | 6.4% | 0.0% | 4.6% | 5.5% | 5.7% |
| 86 | 0.0% | 5.8% | 23.5% | 36.8% | 13.2% | 0.0% | 3.4% | 8.1% | 9.1% |
| 87 | 0.1% | 2.8% | 27.6% | 52.0% | 2.8% | 0.4% | 5.8% | 5.2% | 3.4% |
| 88 | 1.3% | 0.6% | 34.5% | 38.2% | 4.1% | 0.0% | 8.1% | 7.9% | 5.3% |
| 89 | 0.4% | 0.7% | 35.4% | 42.0% | 4.6% | 0.0% | 9.3% | 5.5% | 2.0% |
| 90 | 2.2% | 2.2% | 14.0% | 37.8% | 4.6% | 0.3% | 8.5% | 21.7% | 8.8% |
| 91 | 1.2% | 2.3% | 25.6% | 39.9% | 4.7% | 0.7% | 9.9% | 9.4% | 6.4% |
| 92 | 1.9% | 2.3% | 37.7% | 34.6% | 1.6% | 0.2% | 14.5% | 1.7% | 5.6% |
| (85-92) | 1.0% | 2.6% | 29.6% | 39.5% | 5.2% | 0.2% | 8.0% | 8.1% | 5.8% |
| (85-92) | 1.0% | 2.6% | 29.6% | 39.5% | 5.2% | 0.2% | 8.0% | 8.1% | 5.8% |

## Stock: South Puget Sound Fall Yearling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.0% | 2.6% | 3.0% | 3.8% | 0.0% | 0.0% | 1.1% | 17.7% | 71.7% |
| 83 | 0.0% | 1.9% | 6.2% | 0.5% | 0.0% | 0.0% | 0.0% | 10.6% | 80.5% |
| 84 | 0.0% | 0.0% | 8.8% | 2.0% | 0.0% | 0.0% | 0.0% | 39.7% | 49.5% |
| 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% | 4.0% | 16.4% | 71.5% |
| 92 | 0.0% | 0.0% | 5.1% | 1.0% | 0.0% | 1.0% | 4.1% | 28.7% | 60.1% |
| (82-92) | 0.0% | 0.8% | 5.1% | 1.4% | 0.1% | 0.2% | 1.8% | 24.9% | 65.7% |
| (85-92) | 0.0% | 0.1% | 4.2% | 0.7% | 0.2% | 0.3% | 3.2% | 27.1% | 64.2% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.0% | 2.4% | 3.9% | 3.0% | 0.0% | 0.0% | 0.9% | 16.1% | 73.6% |
| 83 | 0.0% | 2.1% | 6.4% | 0.5% | 0.0% | 0.0% | 0.0% | 10.3% | 80.7% |
| 84 | 0.0% | 0.0% | 9.0% | 1.9% | 0.0% | 0.0% | 0.0% | 40.0% | 48.6% |
| 90 | 0.0% | 0.2% | 1.0% | 0.2% | 0.5% | 0.0% | 1.9% | 36.6% | 59.6% |
| 91 | 0.0% | 0.0% | 6.8% | 1.1% | 0.0% | 0.0% | 3.8% | 14.3% | 73.9% |
| 92 | 0.0% | 0.0% | 5.0% | 1.0% | 0.0% | 1.0% | 4.0% | 29.3% | 59.5% |
| (82-92) | 0.0% | 0.8% | 5.4% | 1.3% | 0.1% | 0.2% | 1.8% | 24.4% | 66.0% |
| (85-92) | 0.0% | 0.1% | 4.3% | 0.7% | 0.2% | 0.3% | 3.2% | 26.7% | 64.3% |

## Stock: Squaxin Pens Fall Yearling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 90 | 0.0% | 0.1% | 3.4% | 0.8% | 1.3% | 0.4% | 4.1% | 33.5% | 56.4% |
| 91 | 0.0% | 0.0% | 4.4% | 1.6% | 0.6% | 0.0% | 7.2% | 33.9% | 52.2% |
| 92 | 0.0% | 0.9% | 2.6% | 4.1% | 1.4% | 0.6% | 7.4% | 21.4% | 61.9% |
| (90-92) | 0.0% | 0.3% | 3.5% | 2.2% | 1.1% | 0.3% | 6.2% | 29.6% | 56.8% |
| (90-92) | 0.0% | 0.3% | 3.5% | 2.2% | 1.1% | 0.3% | 6.2% | 29.6% | 56.8% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 90 | 0.0% | 0.1% | 3.6% | 1.5% | 1.1% | 0.4% | 4.3% | 33.0% | 56.0% |
| 91 | 0.0% | 0.0% | 4.9% | 1.9% | 0.6% | 0.0% | 7.6% | 33.5% | 51.5% |
| 92 | 0.0% | 0.7% | 1.9% | 5.1% | 0.9% | 0.4% | 5.3% | 18.8% | 66.7% |
| (90-92) | 0.0% | 0.3% | 3.4% | 2.8% | 0.9% | 0.3% | 5.8% | 28.5% | 58.1% |
| (90-92) | 0.0% | 0.3% | 3.4% | 2.8% | 0.9% | 0.3% | 5.8% | 28.5% | 58.1% |

## Stock: University of Washington Accelerated

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.0% | 0.4% | 18.8% | 7.9% | 5.2% | 0.1% | 2.0% | 7.2% | 58.3% |
| 80 | 0.0% | 0.5% | 10.8% | 8.8% | 2.3% | 0.1% | 2.0% | 18.5% | 57.0% |
| 81 | 0.0% | 0.6% | 10.8% | 5.8% | 4.3% | 0.0% | 2.4% | 12.4% | 63.8% |
| 82 | 0.2% | 0.5% | 23.2% | 5.8% | 1.2% | 0.3% | 3.2% | 20.9% | 44.8% |
| 83 | 0.0% | 1.6% | 13.4% | 6.6% | 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% | 17.6% | 6.9% | 3.7% | 0.6% | 2.6% | 25.8% | 42.2% |
| (85-92) | 0.1% | 0.5% | 18.8% | 6.6% | 5.5% | 1.4% | 3.2% | 36.6% | 27.3% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.0% | 0.4% | 19.2% | 7.2% | 5.0% | 0.1% | 2.3% | 7.4% | 58.4% |
| 80 | 0.0% | 0.5% | 11.8% | 6.6% | 2.0% | 0.1% | 2.3% | 18.2% | 58.5% |
| 81 | 0.0% | 0.6% | 10.7% | 4.7% | 3.8% | 0.0% | 2.4% | 11.8% | 65.9% |
| 82 | 0.1% | 0.4% | 24.3% | 5.6% | 1.1% | 0.3% | 3.6% | 21.2% | 43.4% |
| 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% | 3.2% | 0.5% | 2.7% | 24.9% | 44.3% |
| (85-92) | 0.2% | 0.6% | 18.8% | 6.4% | 4.8% | 1.3% | 3.3% | 34.8% | 29.8% |

## Stock: Samish Fall Fingerling

### Reported Catch Only

| Catch Year | All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| | Fisheries with ceilings | | | | Other fisheries | | | | |
| 89 | 0.0% | 1.1% | 8.3% | 21.1% | 4.0% | 0.7% | 9.1% | 43.9% | 11.9% |
| 90 | 0.2% | 0.9% | 22.6% | 17.0% | 1.6% | 0.9% | 10.9% | 37.0% | 8.9% |
| 91 | 0.0% | 0.6% | 19.3% | 16.4% | 3.6% | 3.3% | 9.4% | 33.7% | 13.5% |
| 92 | 0.0% | 1.0% | 16.0% | 22.3% | 2.9% | 0.7% | 12.1% | 21.3% | 24.0% |
| (89-92) | 0.0% | 0.9% | 16.5% | 19.2% | 3.0% | 1.4% | 10.4% | 34.0% | 14.6% |
| (89-92) | 0.0% | 0.9% | 16.5% | 19.2% | 3.0% | 1.4% | 10.4% | 34.0% | 14.6% |

### Total Mortalities

| Catch Year | All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| | Fisheries with ceilings | | | | Other fisheries | | | | |
| 89 | 0.0% | 1.1% | 10.9% | 23.3% | 3.5% | 0.6% | 9.6% | 39.0% | 11.8% |
| 90 | 0.2% | 1.0% | 24.1% | 17.8% | 1.5% | 0.8% | 11.2% | 34.7% | 8.6% |
| 91 | 0.0% | 0.7% | 20.3% | 18.7% | 3.4% | 3.2% | 9.7% | 30.8% | 13.3% |
| 92 | 0.0% | 0.9% | 11.8% | 34.8% | 1.9% | 0.6% | 8.7% | 14.0% | 27.4% |
| (89-92) | 0.0% | 0.9% | 16.8% | 23.6% | 2.6% | 1.3% | 9.8% | 29.6% | 15.3% |
| (89-92) | 0.0% | 0.9% | 16.8% | 23.6% | 2.6% | 1.3% | 9.8% | 29.6% | 15.3% |

## Stock: Stillaguamish Fall Fingerling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 84 | 0.0% | 27.7% | 7.2% | 16.9% | 22.9% | 0.0% | 0.0% | 4.8% | 19.3% |
| 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% | 17.6% | 26.2% | 12.2% | 5.7% | 2.9% | 6.5% | 11.5% | 16.5% |
| 91 | 0.8% | 1.2% | 16.3% | 12.5% | 2.7% | 5.4% | 10.9% | 27.6% | 22.6% |
| 92 | 0.0% | 3.9% | 23.8% | 7.9% | 3.4% | 4.3% | 6.4% | 15.0% | 35.1% |
| (84-92) | 3.1% | 10.4% | 22.2% | 13.4% | 7.6% | 3.6% | 4.0% | 14.1% | 21.6% |
| (85-92) | 3.8% | 7.0% | 25.2% | 12.7% | 4.5% | 4.3% | 4.8% | 16.0% | 22.0% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 84 | 1.8% | 22.5% | 9.9% | 17.1% | 18.9% | 0.9% | 0.0% | 3.6% | 23.4% |
| 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% | 16.0% | 24.7% | 15.2% | 4.5% | 2.8% | 7.3% | 10.7% | 17.4% |
| 91 | 0.9% | 1.2% | 15.5% | 16.5% | 2.7% | 4.9% | 10.4% | 23.5% | 24.4% |
| 92 | 0.0% | 3.1% | 22.0% | 13.3% | 2.5% | 3.6% | 5.6% | 11.4% | 38.6% |
| (84-92) | 4.4% | 9.0% | 21.9% | 15.2% | 6.2% | 3.4% | 3.9% | 12.0% | 23.5% |
| (85-92) | 4.9% | 6.3% | 24.4% | 14.8% | 3.7% | 3.8% | 4.7% | 13.7% | 23.5% |

# Stock: George Adams Fall Fingerling

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.0% | 1.0% | 26.6% | 5.6% | 0.5% | 0.0% | 3.9% | 51.5% | 11.1% |
| 83 | 0.0% | 3.8% | 18.8% | 5.9% | 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% | 4.5% | 5.4% | 0.6% | 14.9% | 44.5% | 20.0% |
| 90 | 0.2% | 1.6% | 21.6% | 5.9% | 0.8% | 1.0% | 16.8% | 31.5% | 20.7% |
| 91 | 0.4% | 0.0% | 21.4% | 2.8% | 0.5% | 3.7% | 9.5% | 38.2% | 23.5% |
| 92 | 0.0% | 0.6% | 18.7% | 2.4% | 5.4% | 0.0% | 19.9% | 10.8% | 42.8% |
| (82-92) | 0.1% | 1.8% | 19.8% | 4.9% | 2.7% | 0.8% | 9.7% | 35.5% | 24.8% |
| (85-92) | 0.2% | 0.6% | 17.9% | 3.9% | 3.0% | 1.3% | 15.3% | 31.3% | 26.7% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.0% | 1.2% | 26.2% | 6.0% | 0.6% | 0.0% | 3.7% | 49.9% | 12.6% |
| 83 | 0.0% | 2.6% | 13.8% | 5.1% | 3.3% | 0.5% | 0.1% | 27.9% | 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% | 11.8% | 5.6% | 4.6% | 0.7% | 14.9% | 40.3% | 21.2% |
| 90 | 0.3% | 1.7% | 24.2% | 6.5% | 0.7% | 0.9% | 17.7% | 29.2% | 18.8% |
| 91 | 0.5% | 0.0% | 22.8% | 2.8% | 0.5% | 3.5% | 9.8% | 37.1% | 22.8% |
| 92 | 0.0% | 0.6% | 19.8% | 2.3% | 5.1% | 0.0% | 20.3% | 10.2% | 41.2% |
| (82-92) | 0.2% | 1.7% | 20.1% | 5.1% | 2.3% | 0.8% | 9.9% | 33.1% | 26.7% |
| (85-92) | 0.3% | 0.7% | 19.7% | 4.3% | 2.7% | 1.3% | 15.7% | 29.2% | 26.0% |

# Stock: South Puget Sound Fall Fingerling

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.3% | 1.6% | 24.8% | 15.4% | 1.7% | 0.1% | 3.4% | 27.8% | 24.9% |
| 83 | 0.2% | 3.6% | 19.9% | 6.6% | 3.0% | 0.3% | 1.9% | 31.6% | 33.0% |
| 84 | 0.4% | 3.0% | 25.0% | 10.8% | 1.2% | 0.3% | 1.8% | 30.1% | 27.4% |
| 85 | 1.1% | 1.0% | 22.8% | 7.6% | 2.0% | 0.9% | 2.3% | 35.7% | 26.4% |
| 86 | 0.0% | 1.8% | 26.6% | 11.2% | 2.4% | 0.0% | 5.7% | 15.4% | 36.9% |
| 87 | 0.0% | 0.0% | 20.9% | 20.9% | 6.5% | 0.0% | 11.8% | 22.4% | 17.5% |
| 88 | 0.2% | 2.8% | 8.0% | 11.1% | 5.6% | 2.2% | 10.7% | 38.5% | 20.7% |
| 89 | 0.1% | 1.0% | 11.2% | 6.9% | 6.1% | 1.0% | 16.8% | 32.5% | 24.6% |
| 90 | 0.1% | 1.1% | 30.8% | 5.3% | 1.1% | 1.1% | 12.1% | 31.7% | 16.6% |
| 91 | 0.6% | 0.2% | 22.0% | 2.4% | 1.2% | 2.3% | 13.1% | 41.1% | 17.1% |
| 92 | 1.4% | 2.2% | 20.9% | 5.0% | 3.4% | 2.2% | 9.3% | 28.6% | 27.2% |
| (82-92) | 0.4% | 1.7% | 21.2% | 9.4% | 3.1% | 1.0% | 8.1% | 30.5% | 24.7% |
| (85-92) | 0.4% | 1.3% | 20.4% | 8.8% | 3.5% | 1.2% | 10.2% | 30.7% | 23.4% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.3% | 1.7% | 25.3% | 14.7% | 1.6% | 0.1% | 3.3% | 26.5% | 26.3% |
| 83 | 0.2% | 3.4% | 19.2% | 6.5% | 2.6% | 0.3% | 1.9% | 28.7% | 37.4% |
| 84 | 0.4% | 3.1% | 25.9% | 10.4% | 1.2% | 0.3% | 1.9% | 30.0% | 26.9% |
| 85 | 1.2% | 1.0% | 22.9% | 7.5% | 2.0% | 1.0% | 2.3% | 35.4% | 26.7% |
| 86 | 0.0% | 1.7% | 25.2% | 11.2% | 2.2% | 0.0% | 5.5% | 13.5% | 40.6% |
| 87 | 0.0% | 0.0% | 28.8% | 20.1% | 4.4% | 0.0% | 12.9% | 14.8% | 18.8% |
| 88 | 0.4% | 2.9% | 13.2% | 15.1% | 3.6% | 1.6% | 10.1% | 26.8% | 26.2% |
| 89 | 0.2% | 1.2% | 13.1% | 8.4% | 5.4% | 0.9% | 18.2% | 29.9% | 22.7% |
| 90 | 0.2% | 1.2% | 32.2% | 5.5% | 1.1% | 1.1% | 12.3% | 30.1% | 16.4% |
| 91 | 0.8% | 0.2% | 23.5% | 2.8% | 1.2% | 2.2% | 13.5% | 38.9% | 16.8% |
| 92 | 2.1% | 2.0% | 20.5% | 6.6% | 2.9% | 2.0% | 8.8% | 24.2% | 30.5% |
| (82-92) | 0.5% | 1.7% | 22.7% | 9.9% | 2.6% | 0.9% | 8.3% | 27.2% | 26.3% |
| (85-92) | 0.6% | 1.3% | 22.4% | 9.7% | 2.9% | 1.1% | 10.5% | 26.7% | 24.8% |

## Stock: Kalama Fall Fingerling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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% | 17.5% | 15.5% | 2.1% | 0.0% | 1.0% | 43.3% | 21.6% |
| 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% | 1.8% | 15.3% | 48.7% | 21.0% |
| 90 | 0.0% | 0.3% | 25.6% | 4.0% | 0.2% | 1.2% | 11.6% | 43.2% | 13.9% |
| 91 | 0.0% | 2.6% | 10.6% | 4.8% | 3.2% | 1.6% | 14.3% | 31.2% | 31.2% |
| 92 | 0.0% | 1.4% | 13.7% | 4.7% | 4.2% | 5.2% | 11.3% | 30.7% | 28.8% |
| (83-92) | 0.0% | 1.9% | 17.3% | 8.9% | 3.7% | 1.3% | 8.0% | 34.8% | 24.5% |
| (85-92) | 0.0% | 2.1% | 15.7% | 9.2% | 3.5% | 1.6% | 9.3% | 37.1% | 22.0% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | 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% | 17.9% | 16.1% | 1.8% | 0.0% | 0.9% | 38.4% | 24.1% |
| 87 | 0.0% | 4.1% | 15.9% | 15.9% | 0.6% | 0.0% | 6.5% | 32.4% | 24.1% |
| 88 | 0.0% | 8.0% | 7.0% | 27.1% | 4.5% | 0.0% | 10.2% | 19.4% | 23.9% |
| 89 | 0.0% | 1.3% | 6.2% | 3.8% | 3.8% | 1.6% | 17.3% | 46.6% | 19.6% |
| 90 | 0.0% | 0.2% | 27.0% | 4.1% | 0.2% | 1.2% | 11.9% | 41.5% | 14.0% |
| 91 | 0.0% | 2.8% | 11.8% | 5.7% | 2.8% | 1.9% | 15.2% | 29.4% | 30.8% |
| 92 | 0.0% | 1.5% | 7.7% | 13.1% | 2.1% | 3.2% | 6.4% | 18.0% | 47.9% |
| (83-92) | 0.0% | 2.0% | 17.2% | 9.8% | 2.9% | 1.2% | 7.5% | 30.6% | 28.9% |
| (85-92) | 0.0% | 2.2% | 15.7% | 10.7% | 2.6% | 1.5% | 8.7% | 32.3% | 26.3% |

## Stock: Elwha Fall Fingerling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 86 | 32.3% | 9.1% | 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 | 13.2% | 13.6% | 25.1% | 0.0% | 0.9% | 3.8% | 8.1% | 22.6% | 13.2% |
| 89 | 17.9% | 18.6% | 11.0% | 0.0% | 0.0% | 0.0% | 4.8% | 22.1% | 26.2% |
| 90 | 0.0% | 26.3% | 31.6% | 0.0% | 0.0% | 0.0% | 0.0% | 21.1% | 21.1% |
| 91 | 0.0% | 6.3% | 12.5% | 0.0% | 0.0% | 0.0% | 0.0% | 75.0% | 0.0% |
| 92 | 3.6% | 5.5% | 45.5% | 0.0% | 3.6% | 3.6% | 14.5% | 0.0% | 23.6% |
| (86-92) | 12.5% | 13.6% | 23.1% | 3.0% | 0.9% | 1.5% | 4.6% | 23.1% | 17.0% |
| (86-92) | 12.5% | 13.6% | 23.1% | 3.0% | 0.9% | 1.5% | 4.6% | 23.1% | 17.0% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 86 | 35.8% | 9.5% | 18.2% | 7.6% | 1.3% | 1.0% | 1.3% | 11.8% | 13.5% |
| 87 | 26.2% | 15.0% | 17.5% | 11.2% | 0.5% | 2.1% | 3.3% | 6.3% | 18.0% |
| 88 | 15.3% | 13.8% | 26.9% | 0.0% | 0.7% | 3.4% | 7.8% | 20.1% | 11.9% |
| 89 | 26.1% | 17.0% | 10.3% | 0.0% | 0.0% | 0.0% | 4.2% | 19.4% | 23.0% |
| 90 | 0.0% | 23.8% | 33.3% | 0.0% | 0.0% | 0.0% | 0.0% | 19.0% | 19.0% |
| 91 | 0.0% | 4.2% | 25.0% | 0.0% | 0.0% | 0.0% | 4.2% | 50.0% | 12.5% |
| 92 | 4.8% | 6.5% | 45.2% | 0.0% | 3.2% | 6.5% | 14.5% | 0.0% | 21.0% |
| (86-92) | 15.5% | 12.8% | 25.2% | 2.7% | 0.8% | 1.8% | 5.0% | 18.1% | 17.0% |
| (86-92) | 15.5% | 12.8% | 25.2% | 2.7% | 0.8% | 1.8% | 5.0% | 18.1% | 17.0% |

## Stock: Hoko Fall Fingerling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 89 | 7.3% | 19.1% | 15.2% | 2.2% | 21.9% | 0.0% | 1.1% | 1.1% | 30.9% |
| 90 | 29.7% | 16.8% | 25.6% | 1.8% | 2.8% | 0.0% | 0.8% | 1.3% | 21.4% |
| 91 | 39.3% | 17.1% | 17.1% | 1.0% | 1.7% | 0.8% | 0.6% | 2.3% | 20.0% |
| 92 | 32.2% | 23.7% | 31.1% | 1.7% | 0.0% | 4.5% | 0.0% | 0.0% | 7.9% |
| (89-92) | 27.1% | 19.2% | 22.2% | 1.7% | 6.6% | 1.3% | 0.6% | 1.2% | 20.1% |
| (89-92) | 27.1% | 19.2% | 22.2% | 1.7% | 6.6% | 1.3% | 0.6% | 1.2% | 20.1% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 89 | 18.9% | 18.5% | 17.5% | 2.2% | 14.9% | 0.4% | 0.7% | 0.7% | 25.5% |
| 90 | 36.9% | 16.1% | 23.7% | 1.5% | 2.3% | 0.0% | 0.8% | 1.0% | 17.4% |
| 91 | 47.6% | 14.8% | 15.2% | 0.9% | 1.4% | 0.7% | 0.5% | 1.9% | 16.9% |
| 92 | 42.3% | 20.2% | 26.3% | 1.4% | 0.0% | 3.8% | 0.0% | 0.0% | 6.6% |
| (89-92) | 36.4% | 17.4% | 20.6% | 1.5% | 4.7% | 1.2% | 0.5% | 0.9% | 16.6% |
| (89-92) | 36.4% | 17.4% | 20.6% | 1.5% | 4.7% | 1.2% | 0.5% | 0.9% | 16.6% |

# Stock: Skagit Spring Yearling

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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% | 20.0% | 10.3% | 3.1% | 2.3% | 36.2% | 17.4% |
| 89 | 0.0% | 1.3% | 5.2% | 25.4% | 4.8% | 0.8% | 6.5% | 44.2% | 12.0% |
| 90 | 0.0% | 4.9% | 6.8% | 21.8% | 5.6% | 2.9% | 4.5% | 21.4% | 32.1% |
| (85-90) | 0.4% | 7.1% | 5.7% | 27.8% | 10.1% | 2.3% | 2.6% | 24.4% | 19.9% |
| (85-92) | 0.4% | 7.1% | 5.7% | 27.8% | 10.1% | 2.3% | 2.6% | 24.4% | 19.9% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | 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% | 7.9% | 3.2% | 19.7% | 9.7% | 3.0% | 2.8% | 35.3% | 18.3% |
| 89 | 0.0% | 1.4% | 5.6% | 31.0% | 4.4% | 0.8% | 6.7% | 37.8% | 12.7% |
| 90 | 0.0% | 4.7% | 7.2% | 23.3% | 5.4% | 2.7% | 5.0% | 20.8% | 30.7% |
| (85-90) | 0.6% | 6.4% | 5.7% | 29.0% | 9.1% | 2.1% | 2.6% | 21.2% | 23.2% |
| (85-92) | 0.6% | 6.4% | 5.7% | 29.0% | 9.1% | 2.1% | 2.6% | 21.2% | 23.2% |

## Stock: Nooksack Spring Yearling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | 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% | 24.1% | 0.0% | 0.0% | 0.0% | 51.7% | 24.1% |
| 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% | 51.1% | 9.0% | 7.3% | 0.6% | 19.7% | 8.4% |
| 92 | 1.1% | 4.1% | 38.9% | 29.1% | 2.4% | 3.5% | 2.4% | 1.1% | 17.7% |
| (86-92) | 0.2% | 2.3% | 8.4% | 37.2% | 10.2% | 2.2% | 1.2% | 16.4% | 22.0% |
| (86-92) | 0.2% | 2.3% | 8.4% | 37.2% | 10.2% | 2.2% | 1.2% | 16.4% | 22.0% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 86 | 0.0% | 0.7% | 3.9% | 67.3% | 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% | 4.5% | 8.0% | 53.4% | 6.8% | 1.1% | 1.1% | 3.4% | 21.6% |
| 91 | 0.0% | 0.6% | 2.1% | 65.5% | 5.4% | 5.1% | 0.3% | 14.3% | 6.8% |
| 92 | 1.6% | 3.2% | 33.6% | 37.1% | 1.6% | 2.8% | 1.9% | 0.7% | 17.1% |
| (86-92) | 0.3% | 1.8% | 9.5% | 52.1% | 4.2% | 2.1% | 0.8% | 13.6% | 15.3% |
| (86-92) | 0.3% | 1.8% | 9.5% | 52.1% | 4.2% | 2.1% | 0.8% | 13.6% | 15.3% |

## Stock: White River Spring Yearling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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% | 72.1% |
| 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% | 6.1% | 18.8% | 70.0% |
| 92 | 0.0% | 0.6% | 4.0% | 3.6% | 3.6% | 0.8% | 3.8% | 10.7% | 72.6% |
| (83-92) | 0.0% | 1.4% | 2.5% | 2.9% | 1.2% | 0.5% | 4.2% | 19.9% | 67.4% |
| (85-92) | 0.0% | 0.1% | 1.4% | 2.4% | 1.6% | 0.7% | 4.4% | 20.9% | 68.7% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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% | 71.6% |
| 89 | 0.0% | 0.0% | 2.1% | 2.3% | 1.5% | 0.0% | 9.3% | 18.1% | 66.5% |
| 90 | 0.0% | 0.0% | 2.9% | 1.6% | 0.8% | 0.0% | 8.2% | 19.7% | 66.8% |
| 91 | 0.0% | 0.0% | 1.3% | 3.3% | 0.0% | 1.7% | 5.3% | 14.7% | 74.0% |
| 92 | 0.0% | 0.8% | 4.8% | 4.4% | 3.4% | 0.8% | 4.4% | 10.8% | 70.9% |
| (83-92) | 0.0% | 1.1% | 2.3% | 2.7% | 1.1% | 0.5% | 3.8% | 16.9% | 71.6% |
| (85-92) | 0.0% | 0.2% | 1.5% | 2.5% | 1.4% | 0.6% | 4.2% | 18.1% | 71.5% |

# Stock: Sooes Fall Fingerling

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 89 | 41.4% | 24.1% | 10.3% | 0.0% | 10.3% | 13.8% | 0.0% | 0.0% | 0.0% |
| 90 | 23.1% | 26.4% | 27.5% | 11.0% | 3.3% | 0.0% | 2.2% | 0.0% | 5.5% |
| 91 | 33.3% | 33.3% | 14.2% | 0.0% | 5.8% | 0.0% | 0.0% | 0.0% | 13.3% |
| 92 | 19.1% | 22.7% | 40.4% | 2.1% | 7.1% | 2.1% | 0.7% | 0.0% | 5.0% |
| (89-92) | 29.2% | 26.6% | 23.1% | 3.3% | 6.6% | 4.0% | 0.7% | 0.0% | 5.9% |
| (89-92) | 29.2% | 26.6% | 23.1% | 3.3% | 6.6% | 4.0% | 0.7% | 0.0% | 5.9% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 89 | 42.2% | 23.4% | 14.1% | 1.6% | 7.8% | 6.3% | 0.0% | 0.0% | 4.7% |
| 90 | 31.1% | 26.2% | 24.6% | 9.0% | 2.5% | 0.0% | 2.5% | 0.0% | 4.1% |
| 91 | 36.4% | 29.4% | 16.8% | 0.7% | 4.9% | 0.0% | 0.0% | 0.0% | 11.2% |
| 92 | 23.9% | 22.0% | 39.0% | 2.5% | 6.3% | 1.9% | 0.6% | 0.0% | 4.4% |
| (89-92) | 33.4% | 25.3% | 23.6% | 3.4% | 5.4% | 2.0% | 0.8% | 0.0% | 6.1% |
| (89-92) | 33.4% | 25.3% | 23.6% | 3.4% | 5.4% | 2.0% | 0.8% | 0.0% | 6.1% |

## Stock: Queets Fall Fingerling

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 15.1% | 23.3% | 15.1% | 0.0% | 1.4% | 0.0% | 1.4% | 39.7% | 5.5% |
| 82 | 17.7% | 33.1% | 14.4% | 0.0% | 0.0% | 0.0% | 0.0% | 34.3% | 0.0% |
| 83 | 43.1% | 9.8% | 9.8% | 0.0% | 2.9% | 0.0% | 1.0% | 33.3% | 0.0% |
| 84 | 21.5% | 28.0% | 10.3% | 0.0% | 0.0% | 0.0% | 2.8% | 38.3% | 0.0% |
| 85 | 24.4% | 47.6% | 3.0% | 0.0% | 2.4% | 0.0% | 0.0% | 22.0% | 1.2% |
| 86 | 39.0% | 25.5% | 13.5% | 0.0% | 2.1% | 0.0% | 0.0% | 19.1% | 0.0% |
| 87 | 38.6% | 21.9% | 1.2% | 0.0% | 0.0% | 0.0% | 0.9% | 37.1% | 0.9% |
| 88 | 32.0% | 22.3% | 7.8% | 0.0% | 0.0% | 1.9% | 0.0% | 29.3% | 6.7% |
| 89 | 17.2% | 15.3% | 11.7% | 0.0% | 0.0% | 0.0% | 0.0% | 53.3% | 2.5% |
| 90 | 29.1% | 14.9% | 14.9% | 0.0% | 0.0% | 0.0% | 0.0% | 40.9% | 0.2% |
| 91 | 54.3% | 26.9% | 11.9% | 0.0% | 0.0% | 0.0% | 0.0% | 6.3% | 1.1% |
| 92 | 18.4% | 13.9% | 25.9% | 0.0% | 0.0% | 0.0% | 0.5% | 40.3% | 1.2% |
| (81-92) | 29.2% | 23.6% | 11.6% | 0.0% | 0.7% | 0.2% | 0.5% | 32.8% | 1.6% |
| (85-92) | 31.6% | 23.5% | 11.2% | 0.0% | 0.6% | 0.2% | 0.2% | 31.0% | 1.7% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 20.9% | 24.2% | 14.3% | 0.0% | 1.1% | 0.0% | 2.2% | 34.1% | 4.4% |
| 82 | 21.9% | 32.8% | 13.4% | 0.0% | 0.0% | 0.0% | 0.0% | 31.8% | 0.0% |
| 83 | 55.5% | 8.8% | 7.3% | 0.0% | 2.9% | 0.0% | 0.7% | 26.3% | 0.0% |
| 84 | 23.6% | 29.3% | 9.8% | 0.0% | 0.0% | 0.0% | 3.3% | 34.1% | 0.0% |
| 85 | 29.8% | 46.5% | 3.3% | 0.0% | 1.9% | 0.0% | 0.0% | 17.2% | 1.9% |
| 86 | 48.9% | 22.6% | 11.8% | 0.0% | 1.6% | 0.0% | 0.0% | 15.1% | 0.0% |
| 87 | 45.4% | 20.0% | 2.4% | 0.0% | 0.0% | 0.0% | 0.7% | 30.6% | 1.0% |
| 88 | 37.5% | 22.8% | 9.7% | 0.0% | 0.0% | 1.4% | 0.0% | 23.2% | 5.4% |
| 89 | 26.0% | 16.8% | 12.7% | 0.0% | 0.0% | 0.0% | 0.0% | 42.8% | 2.2% |
| 90 | 32.9% | 15.3% | 14.8% | 0.0% | 0.0% | 0.0% | 0.0% | 36.8% | 0.2% |
| 91 | 59.6% | 24.1% | 10.5% | 0.0% | 0.0% | 0.0% | 0.0% | 4.8% | 1.0% |
| 92 | 25.7% | 14.3% | 25.3% | 0.0% | 0.0% | 0.0% | 0.4% | 33.5% | 1.0% |
| (81-92) | 35.6% | 23.1% | 11.3% | 0.0% | 0.6% | 0.1% | 0.6% | 27.5% | 1.4% |
| (85-92) | 38.2% | 22.8% | 11.3% | 0.0% | 0.4% | 0.2% | 0.1% | 25.5% | 1.6% |

## Stock: Cowlitz Fall Tule

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 8.9% | 12.1% | 22.8% | 0.0% | 3.3% | 0.0% | 13.7% | 20.9% | 18.2% |
| 82 | 5.9% | 5.9% | 22.1% | 0.0% | 1.9% | 1.4% | 29.0% | 14.8% | 19.0% |
| 83 | 6.1% | 17.3% | 28.2% | 0.9% | 0.9% | 0.0% | 9.3% | 7.7% | 29.6% |
| 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 | 5.5% | 6.2% | 11.8% | 0.0% | 1.0% | 0.6% | 14.3% | 32.5% | 28.3% |
| 88 | 2.9% | 2.9% | 21.9% | 0.0% | 0.9% | 0.0% | 21.2% | 33.2% | 17.1% |
| 89 | 7.6% | 9.1% | 12.7% | 0.0% | 1.9% | 0.0% | 34.1% | 13.7% | 20.8% |
| 90 | 8.9% | 15.3% | 29.8% | 0.0% | 1.8% | 0.0% | 19.6% | 0.0% | 24.6% |
| 91 | 20.9% | 9.4% | 12.1% | 0.0% | 0.0% | 5.4% | 21.1% | 23.1% | 8.1% |
| 92 | 5.8% | 9.3% | 48.8% | 0.0% | 0.0% | 0.0% | 7.9% | 14.6% | 13.6% |
| (81-92) | 7.4% | 10.2% | 24.0% | 0.2% | 1.5% | 0.6% | 16.9% | 20.0% | 19.1% |
| (85-92) | 7.6% | 8.9% | 22.2% | 0.2% | 1.2% | 0.7% | 18.0% | 21.6% | 19.6% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 9.6% | 11.1% | 23.6% | 0.0% | 3.1% | 0.0% | 16.1% | 19.3% | 17.2% |
| 82 | 7.7% | 5.6% | 22.6% | 0.0% | 1.7% | 1.5% | 29.7% | 13.6% | 17.5% |
| 83 | 7.9% | 17.5% | 28.3% | 0.9% | 0.8% | 0.0% | 9.9% | 7.2% | 27.5% |
| 84 | 8.8% | 15.8% | 38.1% | 0.0% | 2.6% | 0.0% | 7.2% | 22.1% | 5.4% |
| 85 | 11.6% | 16.0% | 22.9% | 0.9% | 2.0% | 0.0% | 9.2% | 11.5% | 25.9% |
| 86 | 1.2% | 2.3% | 18.3% | 0.5% | 1.3% | 0.0% | 18.6% | 39.0% | 18.7% |
| 87 | 8.0% | 7.0% | 13.1% | 0.0% | 0.8% | 0.5% | 14.5% | 29.0% | 27.0% |
| 88 | 3.8% | 3.1% | 24.1% | 0.0% | 0.8% | 0.0% | 21.4% | 30.8% | 16.0% |
| 89 | 9.7% | 9.4% | 13.1% | 0.0% | 1.8% | 0.0% | 34.0% | 12.5% | 19.5% |
| 90 | 10.3% | 15.4% | 30.0% | 0.0% | 1.7% | 0.0% | 19.3% | 0.0% | 23.3% |
| 91 | 26.7% | 10.0% | 12.4% | 0.0% | 0.0% | 4.6% | 20.4% | 19.1% | 6.9% |
| 92 | 7.7% | 9.6% | 48.8% | 0.0% | 0.0% | 0.0% | 7.8% | 13.7% | 12.4% |
| (81-92) | 9.4% | 10.2% | 24.6% | 0.2% | 1.4% | 0.6% | 17.3% | 18.1% | 18.1% |
| (85-92) | 9.9% | 9.1% | 22.9% | 0.2% | 1.1% | 0.6% | 18.1% | 19.4% | 18.7% |

## Stock: Spring Creek Tule

Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | 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% | 29.2% | 3.2% | 1.1% | 0.1% | 27.1% | 27.0% | 11.4% |
| 81 | 0.0% | 0.5% | 25.7% | 1.8% | 2.3% | 0.2% | 28.5% | 24.4% | 16.7% |
| 82 | 0.0% | 0.6% | 25.1% | 1.3% | 0.2% | 0.0% | 22.4% | 40.8% | 9.6% |
| 83 | 0.0% | 0.6% | 44.1% | 2.3% | 0.0% | 0.8% | 7.9% | 29.8% | 14.9% |
| 84 | 0.0% | 3.4% | 38.9% | 0.0% | 1.8% | 0.6% | 8.5% | 36.7% | 10.4% |
| 85 | 0.0% | 0.3% | 23.5% | 0.0% | 0.3% | 1.1% | 22.5% | 45.6% | 6.7% |
| 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% | 27.2% | 1.1% | 2.2% | 0.7% | 19.7% | 36.1% | 12.0% |
| 89 | 0.0% | 0.2% | 17.2% | 0.5% | 0.5% | 0.6% | 29.5% | 41.5% | 10.0% |
| 90 | 0.0% | 1.0% | 23.9% | 0.9% | 0.8% | 1.9% | 19.4% | 34.2% | 17.9% |
| 91 | 0.0% | 0.5% | 17.6% | 0.3% | 0.5% | 1.3% | 20.6% | 44.4% | 14.7% |
| 92 | 0.0% | 0.4% | 17.8% | 1.1% | 0.7% | 2.4% | 37.4% | 22.4% | 17.7% |
| (79-92) | 0.0% | 1.0% | 25.4% | 1.2% | 1.1% | 0.9% | 20.3% | 36.2% | 13.8% |
| (85-92) | 0.0% | 0.9% | 20.5% | 0.8% | 0.9% | 1.4% | 21.3% | 39.9% | 14.3% |

Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | 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% | 30.0% | 2.7% | 1.0% | 0.1% | 28.7% | 25.0% | 11.5% |
| 81 | 0.0% | 0.5% | 25.9% | 1.6% | 2.2% | 0.2% | 29.9% | 23.2% | 16.6% |
| 82 | 0.0% | 0.6% | 25.4% | 1.2% | 0.2% | 0.0% | 25.3% | 38.5% | 8.9% |
| 83 | 0.0% | 0.6% | 44.4% | 2.6% | 0.0% | 0.6% | 8.1% | 26.7% | 16.9% |
| 84 | 0.0% | 3.2% | 36.1% | 0.0% | 1.6% | 0.5% | 8.1% | 32.9% | 17.7% |
| 85 | 0.0% | 0.3% | 24.0% | 0.0% | 0.3% | 1.0% | 25.3% | 42.8% | 6.5% |
| 86 | 0.0% | 3.8% | 27.8% | 2.3% | 2.3% | 3.4% | 4.6% | 45.6% | 10.6% |
| 87 | 0.0% | 0.0% | 11.9% | 0.0% | 0.0% | 0.0% | 18.7% | 45.5% | 24.6% |
| 88 | 0.0% | 1.2% | 30.4% | 1.2% | 1.6% | 0.8% | 19.9% | 30.3% | 14.7% |
| 89 | 0.0% | 0.3% | 19.2% | 0.8% | 0.5% | 0.6% | 31.3% | 36.7% | 10.6% |
| 90 | 0.0% | 1.1% | 25.9% | 1.2% | 0.7% | 1.9% | 20.5% | 29.9% | 18.7% |
| 91 | 0.0% | 0.5% | 19.9% | 0.5% | 0.5% | 1.3% | 22.2% | 39.8% | 15.3% |
| 92 | 0.0% | 0.5% | 19.5% | 1.4% | 0.7% | 2.2% | 38.6% | 19.8% | 17.5% |
| (79-92) | 0.0% | 1.0% | 26.5% | 1.2% | 1.0% | 0.9% | 21.6% | 33.1% | 14.7% |
| (85-92) | 0.0% | 1.0% | 22.3% | 0.9% | 0.8% | 1.4% | 22.6% | 36.3% | 14.8% |

## Stock: Bonneville Tule

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 1.3% | 2.0% | 27.0% | 1.1% | 2.6% | 1.1% | 30.0% | 10.3% | 24.6% |
| 81 | 0.0% | 1.1% | 35.7% | 5.5% | 4.2% | 0.0% | 36.1% | 3.3% | 14.1% |
| 82 | 0.0% | 1.7% | 45.4% | 0.0% | 0.8% | 0.9% | 11.7% | 31.4% | 8.2% |
| 83 | 0.0% | 4.6% | 56.9% | 3.9% | 0.9% | 0.6% | 11.3% | 10.4% | 11.5% |
| 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% | 2.6% | 39.0% | 1.9% | 3.6% | 1.4% | 18.3% | 19.6% | 13.4% |
| (85-92) | 0.0% | 1.2% | 31.9% | 1.7% | 5.8% | 2.9% | 16.3% | 25.9% | 14.2% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 0.9% | 1.9% | 31.7% | 0.7% | 2.4% | 0.9% | 32.0% | 7.8% | 21.6% |
| 81 | 0.0% | 1.1% | 35.3% | 4.8% | 3.7% | 0.0% | 39.0% | 3.1% | 13.0% |
| 82 | 0.0% | 1.6% | 46.9% | 0.0% | 0.7% | 0.9% | 13.2% | 28.3% | 8.3% |
| 83 | 0.0% | 4.8% | 57.0% | 3.7% | 0.8% | 0.6% | 12.0% | 9.6% | 11.5% |
| 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% | 6.8% | 3.9% | 2.0% | 21.3% | 57.6% |
| 87 | 0.0% | 2.8% | 35.8% | 0.6% | 0.3% | 1.0% | 21.1% | 26.8% | 11.7% |
| (80-87) | 0.1% | 2.6% | 39.5% | 1.7% | 2.5% | 1.1% | 19.2% | 16.1% | 17.1% |
| (85-92) | 0.0% | 1.3% | 31.3% | 1.5% | 3.1% | 2.2% | 16.4% | 19.0% | 25.3% |

# Stock: Stayton Pond Tule

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.0% | 3.0% | 33.3% | 1.3% | 0.4% | 0.6% | 28.0% | 20.1% | 13.2% |
| 83 | 0.0% | 4.1% | 51.4% | 2.1% | 0.8% | 0.7% | 16.3% | 10.6% | 13.8% |
| 84 | 0.0% | 2.8% | 71.0% | 2.5% | 1.5% | 0.5% | 7.1% | 10.3% | 4.3% |
| 85 | 0.0% | 2.7% | 45.8% | 2.7% | 1.8% | 0.9% | 29.0% | 5.5% | 11.6% |
| 86 | 0.0% | 2.7% | 23.3% | 5.6% | 13.1% | 4.4% | 20.1% | 12.7% | 18.1% |
| 87 | 0.0% | 1.9% | 35.5% | 0.8% | 0.3% | 2.2% | 21.2% | 24.7% | 13.5% |
| 88 | 0.6% | 0.5% | 42.3% | 0.0% | 0.0% | 1.4% | 19.3% | 31.1% | 4.9% |
| 89 | 0.0% | 0.0% | 27.5% | 0.0% | 3.9% | 0.0% | 47.4% | 10.8% | 10.4% |
| 90 | 0.0% | 0.4% | 40.7% | 0.0% | 3.1% | 0.0% | 32.8% | 0.7% | 22.3% |
| 91 | 0.0% | 0.6% | 27.1% | 2.0% | 6.3% | 4.1% | 13.5% | 6.4% | 40.0% |
| 92 | 0.0% | 0.8% | 28.7% | 0.0% | 1.7% | 2.2% | 45.8% | 1.4% | 19.3% |
| (82-92) | 0.1% | 1.8% | 38.8% | 1.5% | 3.0% | 1.5% | 25.5% | 12.2% | 15.6% |
| (85-92) | 0.1% | 1.2% | 33.9% | 1.4% | 3.8% | 1.9% | 28.6% | 11.7% | 17.5% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.0% | 3.0% | 33.8% | 1.5% | 0.3% | 0.5% | 28.6% | 19.5% | 12.8% |
| 83 | 0.0% | 4.0% | 50.9% | 2.3% | 0.8% | 0.8% | 16.8% | 9.9% | 14.6% |
| 84 | 0.0% | 2.8% | 70.9% | 2.4% | 1.4% | 0.4% | 7.4% | 9.7% | 4.9% |
| 85 | 0.0% | 2.5% | 45.7% | 2.5% | 1.6% | 0.8% | 30.8% | 5.4% | 10.8% |
| 86 | 0.0% | 2.5% | 17.7% | 6.5% | 8.7% | 4.0% | 15.4% | 9.2% | 36.0% |
| 87 | 0.0% | 2.2% | 41.2% | 0.6% | 0.2% | 1.7% | 20.8% | 20.2% | 13.1% |
| 88 | 0.7% | 0.5% | 45.4% | 0.0% | 0.0% | 1.3% | 19.0% | 28.6% | 4.5% |
| 89 | 0.0% | 0.0% | 28.8% | 0.0% | 3.5% | 0.0% | 48.4% | 9.2% | 10.2% |
| 90 | 0.0% | 0.4% | 42.3% | 0.0% | 2.8% | 0.0% | 33.0% | 0.6% | 21.0% |
| 91 | 0.0% | 0.6% | 26.7% | 6.9% | 5.1% | 4.1% | 13.1% | 5.3% | 38.3% |
| 92 | 0.0% | 0.9% | 30.1% | 0.0% | 1.4% | 2.0% | 45.4% | 1.2% | 19.0% |
| (82-92) | 0.1% | 1.8% | 39.4% | 2.1% | 2.3% | 1.4% | 25.3% | 10.8% | 16.8% |
| (85-92) | 0.1% | 1.2% | 34.7% | 2.1% | 2.9% | 1.7% | 28.2% | 10.0% | 19.1% |

## Stock: Columbia River Upriver Bright

### Reported Catch Only

| | Fisheries with ceilings | | | | Other fisheries | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Catch Year | All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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% | 14.8% | 2.1% | 0.4% | 0.0% | 2.3% | 12.9% | 3.4% |
| 81 | 47.2% | 23.1% | 11.0% | 1.0% | 1.4% | 0.5% | 1.5% | 10.6% | 3.6% |
| 82 | 34.2% | 23.7% | 21.9% | 0.0% | 2.1% | 0.0% | 2.8% | 12.5% | 2.9% |
| 83 | 36.8% | 36.1% | 7.9% | 0.6% | 0.2% | 0.0% | 0.4% | 18.0% | 0.0% |
| 84 | 31.6% | 22.2% | 13.1% | 0.3% | 1.3% | 0.4% | 0.3% | 27.8% | 3.0% |
| 85 | 16.4% | 15.8% | 11.4% | 0.1% | 1.7% | 0.1% | 0.8% | 47.3% | 6.5% |
| 86 | 19.4% | 15.2% | 9.4% | 0.2% | 0.2% | 0.1% | 1.1% | 51.2% | 3.2% |
| 87 | 20.0% | 18.8% | 9.9% | 0.0% | 0.2% | 0.3% | 1.7% | 44.5% | 4.7% |
| 88 | 14.2% | 10.2% | 13.3% | 0.0% | 0.1% | 0.0% | 2.6% | 56.4% | 3.2% |
| 89 | 14.8% | 19.4% | 9.3% | 0.0% | 0.9% | 0.0% | 1.5% | 51.7% | 2.5% |
| 90 | 20.0% | 15.7% | 11.5% | 0.0% | 0.0% | 0.0% | 1.8% | 47.2% | 3.9% |
| 91 | 16.1% | 12.5% | 19.7% | 0.0% | 0.0% | 0.0% | 1.9% | 38.5% | 11.2% |
| 92 | 10.4% | 10.6% | 23.2% | 0.0% | 1.1% | 1.5% | 0.0% | 38.4% | 14.7% |
| (79-92) | 25.2% | 18.9% | 13.7% | 0.3% | 0.7% | 0.2% | 1.4% | 34.8% | 4.7% |
| (85-92) | 16.4% | 14.8% | 13.4% | 0.0% | 0.5% | 0.2% | 1.4% | 46.9% | 6.2% |

### Total Mortalities

| | Fisheries with ceilings | | | | Other fisheries | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Catch Year | All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Canada Net | Canada Sport | 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 | 45.3% | 19.8% | 14.7% | 1.9% | 0.4% | 0.0% | 2.3% | 12.4% | 3.3% |
| 81 | 48.6% | 22.6% | 10.9% | 0.9% | 1.4% | 0.5% | 1.5% | 10.0% | 3.5% |
| 82 | 42.6% | 21.6% | 19.3% | 0.0% | 1.7% | 0.0% | 2.8% | 9.6% | 2.4% |
| 83 | 45.2% | 32.8% | 7.2% | 0.5% | 0.1% | 0.0% | 0.4% | 13.8% | 0.0% |
| 84 | 38.9% | 21.2% | 12.6% | 0.3% | 1.1% | 0.4% | 0.3% | 22.0% | 3.1% |
| 85 | 22.3% | 15.2% | 11.1% | 0.1% | 1.5% | 0.1% | 0.8% | 42.3% | 6.7% |
| 86 | 22.9% | 15.0% | 9.6% | 0.2% | 0.2% | 0.1% | 1.2% | 47.5% | 3.3% |
| 87 | 26.1% | 19.1% | 10.4% | 0.0% | 0.1% | 0.2% | 1.7% | 38.2% | 4.2% |
| 88 | 17.3% | 10.8% | 14.5% | 0.0% | 0.1% | 0.0% | 2.6% | 51.8% | 2.9% |
| 89 | 18.7% | 19.4% | 9.4% | 0.0% | 0.8% | 0.0% | 1.4% | 47.9% | 2.3% |
| 90 | 23.2% | 16.1% | 11.7% | 0.0% | 0.0% | 0.0% | 1.8% | 43.6% | 3.7% |
| 91 | 22.2% | 13.0% | 20.0% | 0.0% | 0.0% | 0.0% | 2.0% | 32.6% | 10.2% |
| 92 | 15.7% | 10.9% | 23.8% | 0.0% | 1.0% | 1.4% | 0.0% | 32.8% | 14.4% |
| (79-92) | 29.8% | 18.4% | 13.6% | 0.3% | 0.7% | 0.2% | 1.5% | 31.0% | 4.5% |
| (85-92) | 21.0% | 14.9% | 13.8% | 0.0% | 0.5% | 0.2% | 1.4% | 42.1% | 6.0% |

## Stock: Hanford Wild Brights

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 90 | 15.9% | 9.7% | 16.1% | 0.0% | 0.5% | 1.6% | 0.8% | 47.3% | 8.1% |
| 91 | 17.4% | 18.1% | 8.4% | 1.5% | 0.0% | 0.0% | 1.6% | 44.3% | 8.7% |
| 92 | 29.7% | 7.3% | 24.6% | 0.0% | 0.0% | 0.0% | 1.6% | 31.8% | 4.9% |
| (90-92) | 21.0% | 11.7% | 16.4% | 0.5% | 0.2% | 0.5% | 1.3% | 41.1% | 7.2% |
| (90-92) | 21.0% | 11.7% | 16.4% | 0.5% | 0.2% | 0.5% | 1.3% | 41.1% | 7.2% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 90 | 19.8% | 10.3% | 16.3% | 0.0% | 0.5% | 1.4% | 0.9% | 43.3% | 7.5% |
| 91 | 22.0% | 18.3% | 8.4% | 1.6% | 0.0% | 0.0% | 1.6% | 40.0% | 8.0% |
| 92 | 37.2% | 7.3% | 23.1% | 0.0% | 0.0% | 0.0% | 1.5% | 26.7% | 4.2% |
| (90-92) | 26.4% | 12.0% | 15.9% | 0.5% | 0.2% | 0.5% | 1.3% | 36.7% | 6.6% |
| (90-92) | 26.4% | 12.0% | 15.9% | 0.5% | 0.2% | 0.5% | 1.3% | 36.7% | 6.6% |

# Stock: Lewis River Wild

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 16.5% | 15.9% | 14.7% | 0.0% | 1.8% | 0.0% | 5.0% | 8.0% | 38.1% |
| 82 | 13.5% | 9.3% | 18.8% | 0.8% | 1.3% | 0.0% | 8.0% | 10.9% | 37.4% |
| 86 | 9.3% | 8.1% | 11.1% | 0.0% | 0.0% | 4.2% | 4.8% | 42.8% | 19.8% |
| 87 | 6.7% | 10.5% | 14.6% | 0.0% | 0.0% | 0.7% | 4.7% | 44.7% | 18.1% |
| 88 | 6.8% | 5.6% | 14.6% | 0.0% | 0.2% | 0.0% | 7.6% | 37.9% | 27.2% |
| 89 | 5.4% | 16.1% | 14.5% | 0.0% | 2.3% | 0.7% | 13.1% | 26.9% | 21.0% |
| 90 | 14.9% | 9.6% | 36.5% | 0.0% | 0.0% | 1.5% | 11.6% | 9.8% | 16.3% |
| 91 | 14.4% | 12.0% | 13.7% | 0.0% | 1.6% | 0.0% | 5.1% | 37.1% | 16.1% |
| 92 | 3.9% | 11.5% | 10.3% | 0.0% | 0.0% | 0.0% | 4.7% | 7.9% | 61.7% |
| (81-92) | 10.2% | 10.9% | 16.5% | 0.1% | 0.8% | 0.8% | 7.2% | 25.1% | 28.4% |
| (85-92) | 8.8% | 10.5% | 16.5% | 0.0% | 0.6% | 1.0% | 7.4% | 29.6% | 25.8% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 81 | 18.4% | 15.4% | 15.6% | 0.0% | 1.6% | 0.0% | 5.5% | 7.5% | 36.1% |
| 82 | 16.5% | 9.3% | 18.4% | 0.7% | 1.2% | 0.0% | 8.0% | 10.1% | 35.8% |
| 86 | 11.3% | 8.7% | 12.8% | 0.0% | 0.0% | 3.8% | 5.3% | 39.2% | 18.9% |
| 87 | 8.9% | 11.1% | 15.7% | 0.0% | 0.0% | 0.7% | 4.7% | 41.0% | 17.9% |
| 88 | 7.8% | 6.3% | 16.8% | 0.0% | 0.2% | 0.0% | 7.9% | 34.3% | 26.6% |
| 89 | 7.6% | 16.9% | 15.3% | 0.0% | 2.1% | 0.6% | 13.3% | 24.3% | 19.9% |
| 90 | 17.3% | 9.6% | 36.9% | 0.0% | 0.0% | 1.4% | 11.3% | 8.6% | 14.9% |
| 91 | 18.4% | 11.8% | 13.7% | 0.0% | 1.4% | 0.0% | 5.0% | 34.1% | 15.6% |
| 92 | 5.3% | 12.7% | 10.7% | 0.0% | 0.0% | 0.0% | 4.8% | 7.2% | 59.4% |
| (81-92) | 12.4% | 11.3% | 17.3% | 0.1% | 0.7% | 0.7% | 7.3% | 22.9% | 27.2% |
| (85-92) | 10.9% | 11.0% | 17.4% | 0.0% | 0.5% | 0.9% | 7.5% | 27.0% | 24.7% |

# Stock: Lyons Ferry

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 88 | 4.3% | 6.4% | 26.2% | 0.0% | 0.3% | 0.0% | 14.9% | 42.3% | 5.5% |
| 89 | 4.8% | 9.0% | 21.5% | 0.0% | 1.6% | 0.6% | 16.5% | 36.6% | 9.3% |
| 90 | 8.0% | 5.6% | 23.3% | 0.0% | 0.0% | 0.0% | 13.5% | 41.2% | 8.4% |
| 91 | 11.9% | 14.5% | 23.8% | 0.0% | 2.2% | 0.0% | 10.7% | 33.3% | 3.6% |
| 92 | 0.0% | 16.7% | 36.3% | 0.0% | 3.7% | 6.7% | 18.5% | 18.1% | 0.0% |
| (88-92) | 5.8% | 10.5% | 26.2% | 0.0% | 1.6% | 1.5% | 14.8% | 34.3% | 5.4% |
| (88-92) | 5.8% | 10.5% | 26.2% | 0.0% | 1.6% | 1.5% | 14.8% | 34.3% | 5.4% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 88 | 5.3% | 7.3% | 28.9% | 0.0% | 0.3% | 0.1% | 15.4% | 37.2% | 5.4% |
| 89 | 6.3% | 9.8% | 23.3% | 0.0% | 1.4% | 0.6% | 16.9% | 33.0% | 8.7% |
| 90 | 9.3% | 5.8% | 24.0% | 0.0% | 0.0% | 0.0% | 13.6% | 39.2% | 8.0% |
| 91 | 16.0% | 14.8% | 24.0% | 0.0% | 2.1% | 0.0% | 10.6% | 29.1% | 3.3% |
| 92 | 0.0% | 18.1% | 38.9% | 0.0% | 3.2% | 6.0% | 18.5% | 15.3% | 0.0% |
| (88-92) | 7.4% | 11.2% | 27.8% | 0.0% | 1.4% | 1.3% | 15.0% | 30.8% | 5.1% |
| (88-92) | 7.4% | 11.2% | 27.8% | 0.0% | 1.4% | 1.3% | 15.0% | 30.8% | 5.1% |

# Stock: Willamette Spring

## Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 26.8% | 29.6% | 11.9% | 0.8% | 0.0% | 0.0% | 3.0% | 0.2% | 27.8% |
| 81 | 12.5% | 20.3% | 4.0% | 0.4% | 0.0% | 0.0% | 1.7% | 21.3% | 39.7% |
| 82 | 12.4% | 16.0% | 11.3% | 0.0% | 0.1% | 0.0% | 2.6% | 10.2% | 47.4% |
| 83 | 21.1% | 17.8% | 6.2% | 1.3% | 0.0% | 0.0% | 2.8% | 11.5% | 39.3% |
| 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 | 5.5% | 18.0% | 6.0% | 0.0% | 0.0% | 1.3% | 0.5% | 32.1% | 36.6% |
| 87 | 22.2% | 14.8% | 3.5% | 0.0% | 0.0% | 0.4% | 4.3% | 8.9% | 45.5% |
| 88 | 16.3% | 10.1% | 4.7% | 0.0% | 0.0% | 0.0% | 3.2% | 17.3% | 48.4% |
| 89 | 10.5% | 3.8% | 3.5% | 1.0% | 0.2% | 0.2% | 3.4% | 30.2% | 47.2% |
| 90 | 13.0% | 3.7% | 3.3% | 0.0% | 0.1% | 0.2% | 1.9% | 31.6% | 46.3% |
| 91 | 9.3% | 3.5% | 0.5% | 0.3% | 0.2% | 0.2% | 1.3% | 13.4% | 71.4% |
| 92 | 13.6% | 2.5% | 5.8% | 0.0% | 0.1% | 0.2% | 4.3% | 14.2% | 59.4% |
| (80-92) | 14.7% | 11.6% | 5.2% | 0.3% | 0.1% | 0.2% | 2.5% | 18.8% | 46.4% |
| (85-92) | 13.4% | 7.4% | 3.6% | 0.2% | 0.1% | 0.3% | 2.5% | 23.0% | 49.5% |

## Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | U.S. Sport |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 26.6% | 27.9% | 11.1% | 0.7% | 0.0% | 0.0% | 2.8% | 0.6% | 30.2% |
| 81 | 15.4% | 20.9% | 4.2% | 0.4% | 0.0% | 0.0% | 1.8% | 18.3% | 39.1% |
| 82 | 15.5% | 15.8% | 11.5% | 0.0% | 0.1% | 0.0% | 2.8% | 8.8% | 45.6% |
| 83 | 25.0% | 17.3% | 5.9% | 1.2% | 0.0% | 0.0% | 2.8% | 9.7% | 38.1% |
| 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% | 31.3% | 40.1% |
| 86 | 7.3% | 20.4% | 6.9% | 0.0% | 0.0% | 1.6% | 0.7% | 29.1% | 33.8% |
| 87 | 32.3% | 14.1% | 3.7% | 0.0% | 0.0% | 0.4% | 4.1% | 6.0% | 39.7% |
| 88 | 20.3% | 11.2% | 5.0% | 0.0% | 0.0% | 0.0% | 3.1% | 14.3% | 46.1% |
| 89 | 13.5% | 4.4% | 3.7% | 1.4% | 0.2% | 0.2% | 3.4% | 26.8% | 46.3% |
| 90 | 19.0% | 4.5% | 3.9% | 0.0% | 0.1% | 0.2% | 2.1% | 27.0% | 43.0% |
| 91 | 12.9% | 3.8% | 0.5% | 0.5% | 0.2% | 0.2% | 1.4% | 11.9% | 68.7% |
| 92 | 23.2% | 2.7% | 6.1% | 0.0% | 0.1% | 0.2% | 4.6% | 11.3% | 51.8% |
| (80-92) | 19.1% | 11.9% | 5.4% | 0.3% | 0.1% | 0.2% | 2.5% | 16.2% | 44.4% |
| (85-92) | 19.0% | 8.0% | 3.9% | 0.3% | 0.1% | 0.3% | 2.5% | 19.7% | 46.2% |

## Stock: Salmon River

### Reported Catch Only

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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 | 42.7% | 32.7% | 5.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 19.3% |
| 87 | 19.4% | 27.5% | 3.7% | 0.0% | 0.0% | 0.0% | 3.7% | 0.0% | 45.8% |
| 88 | 24.2% | 21.0% | 9.6% | 0.0% | 0.0% | 0.0% | 2.1% | 0.0% | 43.2% |
| 89 | 15.7% | 20.8% | 6.5% | 0.0% | 1.4% | 0.0% | 5.3% | 0.0% | 50.4% |
| 90 | 19.8% | 19.5% | 11.4% | 0.0% | 0.4% | 0.0% | 4.6% | 0.0% | 44.4% |
| 91 | 26.9% | 25.1% | 9.8% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 37.8% |
| 92 | 6.9% | 18.7% | 33.1% | 0.0% | 0.0% | 0.0% | 3.6% | 0.0% | 37.6% |
| (81-92) | 23.8% | 28.2% | 9.8% | 0.0% | 0.3% | 0.1% | 2.0% | 0.1% | 35.7% |
| (85-92) | 23.7% | 24.6% | 10.2% | 0.0% | 0.2% | 0.0% | 2.5% | 0.0% | 38.8% |

### Total Mortalities

| Catch Year | Fisheries with ceilings: All Alaska | All Nth/Cent | WCVI Troll | All Geo St | Other fisheries: Canada Net | Canada Sport | U.S. Troll | U.S. Net | 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 | 22.3% | 38.3% | 5.7% | 0.0% | 1.3% | 0.0% | 0.2% | 0.6% | 31.8% |
| 85 | 41.5% | 26.8% | 2.1% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 29.6% |
| 86 | 43.3% | 29.5% | 5.9% | 0.0% | 0.0% | 0.0% | 0.8% | 0.0% | 20.5% |
| 87 | 26.3% | 27.7% | 3.8% | 0.0% | 0.0% | 0.0% | 3.2% | 0.0% | 39.0% |
| 88 | 29.9% | 23.9% | 10.6% | 0.0% | 0.0% | 0.0% | 2.0% | 0.0% | 33.8% |
| 89 | 24.6% | 23.6% | 6.7% | 0.0% | 1.1% | 0.0% | 4.6% | 0.0% | 39.6% |
| 90 | 24.7% | 21.2% | 11.1% | 0.0% | 0.3% | 0.0% | 4.1% | 0.0% | 38.6% |
| 91 | 32.9% | 24.1% | 9.5% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 33.2% |
| 92 | 10.3% | 19.4% | 33.0% | 0.0% | 0.0% | 0.0% | 3.4% | 0.0% | 34.0% |
| (81-92) | 28.5% | 27.8% | 9.9% | 0.0% | 0.2% | 0.1% | 2.0% | 0.1% | 31.6% |
| (85-92) | 29.2% | 24.5% | 10.3% | 0.0% | 0.2% | 0.0% | 2.3% | 0.0% | 33.5% |

## APPENDIX I

### Chinook Model Estimates of
### Year Rebuilt,
### 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 1985-1992. See Section 4.3.4 for additional description of tables.**

FISHERY: SE ALASKA ALL GEAR

| Model Stock | Yr Rebuilt or % in 1998 | Percent Fishery | Percent Stock | Escapement Indicator Stock Name | Status |
|---|---|---|---|---|---|
| WCVI Hatchery | 1996 | 25.62% | 38.84% | NA | |
| Columbia Upriver Bright | 1983 | 24.82% | 26.37% | Columbia Upriver Bright | Above Goal |
| Oregon Coastal North Migrating | 1979 | 12.04% | 27.23% | Oregon Coastal | Not Classified |
| North/Central BC | 1992 | 11.13% | 48.16% | Yakoun | Above Goal |
| | | | | Nass | Indeterminate |
| | | | | Skeena | Above Goal |
| | | | | Area 6 Index | Not Rebuilding |
| | | | | Area 8 Index | Prob. Not Rebuilding |
| | | | | Rivers Inlet | Rebuilding |
| | | | | Smith Inlet | Prob. Not Rebuilding |
| Fraser Early | 1985 | 7.43% | 33.67% | Upper Fraser | Above Goal |
| | | | | Middle Fraser | Above Goal |
| | | | | Thompson | Indeterminate |
| WCVI Wild | 3% | 4.97% | 36.23% | WCVI | Prob. Not Rebuilding |
| Upper Georgia Strait | 97% | 2.66% | 29.24% | Upper Georgia Strait | Indeterminate |
| Washington Coastal Wild | 1993 | 2.40% | 15.82% | Grays Harbor Fall | Above Goal |
| | | | | Quillayute Fall | Not Classified |
| | | | | Hoh Fall | Not Classified |
| | | | | Queets Fall | Not Classified |
| WA Coastal Hatchery | 1983 | 2.09% | 15.50% | NA | |
| Willamette River Hatchery | 1982 | 2.07% | 8.67% | NA | |
| Columbia Upriver Summer | 35% | 1.52% | 27.81% | Columbia Upriver Summer | Prob. Not Rebuilding |
| Alaska South SE | 1996 | 0.90% | 95.03% | King Salmon | Prob. Not Rebuilding |
| | | | | Andrew Creek | Above Goal |
| | | | | Blossom | Prob. Not Rebuilding |
| | | | | Keta | Prob. Not Rebuilding |
| | | | | Unuk | Prob. Not Rebuilding |
| | | | | Chickamin | Prob. Not Rebuilding |
| Lewis River Wild | 1979 | 0.77% | 12.00% | Lewis River | Above Goal |
| Spring Cowlitz Hatchery | 1979 | 0.43% | 1.93% | NA | |
| Fall Cowlitz Hatchery | 76% | 0.31% | 6.65% | NA | |
| Fraser Late | 1998 | 0.19% | 0.22% | Harrison | Prob. Not Rebuilding |
| Lower GS Hatchery | 1983 | 0.17% | 2.55% | NA | |
| Lower Georgia Strait | 1998 | 0.13% | 2.43% | Lower Georgia Strait | Prob. Not Rebuilding |
| Skagit Summer/Fall | 86% | 0.08% | 2.66% | Skagit Summer/Fall | Prob. Not Rebuilding |
| PS Hatchery Fingerling | 1992 | 0.06% | 0.31% | NA | |
| Puget Sound Natural | 1993 | 0.05% | 0.28% | Green | Above Goal |
| Nooksack Fall | 1998 | 0.05% | 0.12% | NA | |
| PS Yearling | 1986 | 0.04% | 0.26% | NA | |
| Snohomish Summer/Fall | 84% | 0.04% | 1.75% | Snohomish | Not Rebuilding |
| Stillaguamish Summer/Fall | 1998 | 0.02% | 7.00% | Stillaguamish | Prob. Not Rebuilding |
| Snake River Fall | 8% | 0.02% | 4.54% | Not Represented | |
| Nooksack Spring | 72% | 0.00% | 0.00% | Not Represented | |
| Spring Creek Hatchery | 1998 | 0.00% | 0.00% | NA | |
| Lower Bonneville Hatchery | 1979 | 0.00% | 0.00% | NA | |

FISHERY: NCBC ALL GEAR

| Model Stock | Yr Rebuilt or % in 1998 | Percent Fishery | Percent Stock | Escapement Indicator Stock Name | Status |
|---|---|---|---|---|---|
| Columbia Upriver Bright | 1983 | 17.98% | 17.89% | Columbia Upriver Bright | Above Goal |
| WCVI Hatchery | 1996 | 17.20% | 25.10% | NA | |
| Oregon Coastal North Migrating | 1979 | 13.88% | 30.28% | Oregon Coastal | Not Classified |
| North/Central BC | 1992 | 11.37% | 46.26% | Yakoun | Above Goal |
| | | | | Nass | Indeterminate |
| | | | | Skeena | Above Goal |
| | | | | Area 6 Index | Not Rebuilding |
| | | | | Area 8 Index | Prob. Not Rebuilding |
| | | | | Rivers Inlet | Rebuilding |
| | | | | Smith Inlet | Prob. Not Rebuilding |
| Fraser Early | 1985 | 7.29% | 31.37% | Upper Fraser | Above Goal |
| | | | | Middle Fraser | Above Goal |
| | | | | Thompson | Indeterminate |
| Upper Georgia Strait | 97% | 4.76% | 49.30% | Upper Georgia Strait | Indeterminate |
| Fraser Late | 1998 | 4.75% | 5.72% | Harrison | Prob. Not Rebuilding |
| Willamette River Hatchery | 1982 | 3.74% | 15.02% | NA | |
| WCVI Wild | 3% | 3.53% | 24.62% | WCVI | Prob. Not Rebuilding |
| Washington Coastal Wild | 1993 | 3.22% | 19.66% | Grays Harbor Fall | Above Goal |
| | | | | Quillayute Fall | Not Classified |
| | | | | Hoh Fall | Not Classified |
| | | | | Queets Fall | Not Classified |
| WA Coastal Hatchery | 1983 | 2.89% | 19.93% | NA | |
| Columbia Upriver Summer | 35% | 1.55% | 27.10% | Columbia Upriver Summer | Prob. Not Rebuilding |
| Lower Bonneville Hatchery | 1979 | 1.34% | 2.15% | NA | |
| Lower GS Hatchery | 1983 | 1.02% | 14.68% | NA | |
| Spring Cowlitz Hatchery | 1979 | 0.93% | 3.97% | NA | |
| Lower Georgia Strait | 1998 | 0.82% | 14.77% | Lower Georgia Strait | Prob. Not Rebuilding |
| Nooksack Fall | 1998 | 0.79% | 2.07% | NA | |
| PS Yearling | 1986 | 0.63% | 3.51% | NA | |
| Skagit Summer/Fall | 86% | 0.54% | 17.24% | Skagit Summer/Fall | Prob. Not Rebuilding |
| Lewis River Wild | 1979 | 0.49% | 7.42% | Lewis River | Above Goal |
| PS Hatchery Fingerling | 1992 | 0.30% | 1.38% | NA | |
| Puget Sound Natural | 1993 | 0.26% | 1.25% | Green | Above Goal |
| Snohomish Summer/Fall | 84% | 0.25% | 11.66% | Snohomish | Not Rebuilding |
| Fall Cowlitz Hatchery | 76% | 0.24% | 5.21% | NA | |
| Spring Creek Hatchery | 1998 | 0.05% | 0.51% | NA | |
| Stillaguamish Summer/Fall | 1998 | 0.05% | 12.26% | Stillaguamish | Prob. Not Rebuilding |
| Alaska South SE | 1996 | 0.05% | 4.97% | King Salmon | Prob. Not Rebuilding |
| | | | | Andrew Creek | Above Goal |
| | | | | Blossom | Prob. Not Rebuilding |
| | | | | Keta | Prob. Not Rebuilding |
| | | | | Unuk | Prob. Not Rebuilding |
| | | | | Chickamin | Prob. Not Rebuilding |
| Snake River Fall | 8% | 0.04% | 9.63% | Not Represented | |
| Nooksack Spring | 72% | 0.01% | 3.17% | Not Represented | |

FISHERY: WCVI TROLL

| Model Stock | Yr Rebuilt or % in 1998 | Percent Fishery | Percent Stock | Escapement Indicator Stock Name | Status |
|---|---|---|---|---|---|
| Fraser Late | 1998 | 21.01% | 26.31% | Harrison | Prob. Not Rebuilding |
| Lower Bonneville Hatchery | 1979 | 17.83% | 43.28% | NA | |
| Columbia Upriver Bright | 1983 | 14.42% | 17.15% | Columbia Upriver Bright | Above Goal |
| WCVI Hatchery | 1996 | 8.39% | 12.77% | NA | |
| Nooksack Fall | 1998 | 5.75% | 17.09% | NA | |
| Oregon Coastal North Migrating | 1979 | 4.65% | 11.75% | Oregon Coastal | Not Classified |
| PS Hatchery Fingerling | 1992 | 4.15% | 22.03% | NA | |
| Puget Sound Natural | 1993 | 3.86% | 21.09% | Green | Above Goal |
| Spring Creek Hatchery | 1998 | 2.83% | 26.95% | NA | |
| PS Yearling | 1986 | 2.23% | 14.23% | NA | |
| Spring Cowlitz Hatchery | 1979 | 2.08% | 10.31% | NA | |
| Columbia Upriver Summer | 35% | 1.60% | 32.83% | Columbia Upriver Summer | Prob. Not Rebuilding |
| WCVI Wild | 3% | 1.58% | 12.12% | WCVI | Prob. Not Rebuilding |
| Willamette River Hatchery | 1982 | 1.58% | 7.46% | NA | |
| Fall Cowlitz Hatchery | 76% | 1.44% | 35.70% | NA | |
| Fraser Early | 1985 | 1.42% | 7.41% | Upper Fraser | Above Goal |
| | | | | Middle Fraser | Above Goal |
| | | | | Thompson | Indeterminate |
| Washington Coastal Wild | 1993 | 1.31% | 9.25% | Grays Harbor Fall | Above Goal |
| | | | | Quillayute Fall | Not Classified |
| | | | | Hoh Fall | Not Classified |
| | | | | Queets Fall | Not Classified |
| WA Coastal Hatchery | 1983 | 1.26% | 9.59% | NA | |
| Lewis River Wild | 1979 | 0.79% | 14.11% | Lewis River | Above Goal |
| Skagit Summer/Fall | 86% | 0.66% | 25.60% | Skagit Summer/Fall | Prob. Not Rebuilding |
| Snohomish Summer/Fall | 84% | 0.30% | 16.91% | Snohomish | Not Rebuilding |
| Lower GS Hatchery | 1983 | 0.21% | 3.50% | NA | |
| Lower Georgia Strait | 1998 | 0.18% | 3.43% | Lower Georgia Strait | Prob. Not Rebuilding |
| Snake River Fall | 8% | 0.16% | 34.39% | Not Represented | |
| North/Central BC | 1992 | 0.12% | 0.57% | Yakoun | Above Goal |
| | | | | Nass | Indeterminate |
| | | | | Skeena | Above Goal |
| | | | | Area 6 Index | Not Rebuilding |
| | | | | Area 8 Index | Prob. Not Rebuilding |
| | | | | Rivers Inlet | Rebuilding |
| | | | | Smith Inlet | Prob. Not Rebuilding |
| Upper Georgia Strait | 97% | 0.08% | 0.94% | Upper Georgia Strait | Indeterminate |
| Stillaguamish Summer/Fall | 1998 | 0.06% | 17.23% | Stillaguamish | Prob. Not Rebuilding |
| Nooksack Spring | 72% | 0.04% | 11.81% | Not Represented | |
| Alaska South SE | 1996 | 0.00% | 0.00% | King Salmon | Prob. Not Rebuilding |
| | | | | Andrew Creek | Above Goal |
| | | | | Blossom | Prob. Not Rebuilding |
| | | | | Keta | Prob. Not Rebuilding |
| | | | | Unuk | Prob. Not Rebuilding |
| | | | | Chickamin | Prob. Not Rebuilding |

FISHERY: GS SPORT AND TROLL

| Model Stock | Yr Rebuilt or % in 1998 | Percent Fishery | Percent Stock | Escapement Indicator Stock Name | Status |
|---|---|---|---|---|---|
| Fraser Late | 1998 | 53.17% | 45.55% | Harrison | Prob. Not Rebuilding |
| Nooksack Fall | 1998 | 11.16% | 20.26% | NA | |
| Lower GS Hatchery | 1983 | 6.65% | 68.27% | NA | |
| PS Yearling | 1986 | 5.58% | 20.11% | NA | |
| Lower Georgia Strait | 1998 | 5.54% | 68.27% | Lower Georgia Strait | Prob. Not Rebuilding |
| PS Hatchery Fingerling | 1992 | 2.58% | 7.96% | NA | |
| Lower Bonneville Hatchery | 1979 | 2.36% | 2.95% | NA | |
| Puget Sound Natural | 1993 | 2.32% | 7.03% | Green | Above Goal |
| Columbia Upriver Bright | 1983 | 2.26% | 1.27% | Columbia Upriver Bright | Above Goal |
| Upper Georgia Strait | 97% | 1.71% | 12.12% | Upper Georgia Strait | Indeterminate |
| Fraser Early | 1985 | 1.58% | 4.79% | Upper Fraser<br>Middle Fraser<br>Thompson | Above Goal<br>Above Goal<br>Indeterminate |
| WCVI Hatchery | 1996 | 1.09% | 1.07% | NA | |
| WA Coastal Hatchery | 1983 | 0.86% | 3.76% | NA | |
| Washington Coastal Wild | 1993 | 0.80% | 3.17% | Grays Harbor Fall<br>Quillayute Fall<br>Hoh Fall<br>Queets Fall | Above Goal<br>Not Classified<br>Not Classified<br>Not Classified |
| Skagit Summer/Fall | 86% | 0.77% | 15.90% | Skagit Summer/Fall | Prob. Not Rebuilding |
| Snohomish Summer/Fall | 84% | 0.35% | 11.12% | Snohomish | Not Rebuilding |
| Nooksack Spring | 72% | 0.26% | 52.63% | Not Represented | |
| Columbia Upriver Summer | 35% | 0.24% | 2.61% | Columbia Upriver Summer | Prob. Not Rebuilding |
| Spring Creek Hatchery | 1998 | 0.22% | 1.42% | NA | |
| WCVI Wild | 3% | 0.18% | 0.92% | WCVI | Prob. Not Rebuilding |
| Stillaguamish Summer/Fall | 1998 | 0.10% | 17.51% | Stillaguamish | Prob. Not Rebuilding |
| North/Central BC | 1992 | 0.08% | 0.25% | Yakoun<br>Nass<br>Skeena<br>Area 6 Index<br>Area 8 Index<br>Rivers Inlet<br>Smith Inlet | Above Goal<br>Indeterminate<br>Above Goal<br>Not Rebuilding<br>Prob. Not Rebuilding<br>Rebuilding<br>Prob. Not Rebuilding |
| Spring Cowlitz Hatchery | 1979 | 0.06% | 0.19% | NA | |
| Willamette River Hatchery | 1982 | 0.06% | 0.15% | NA | |
| Lewis River Wild | 1979 | 0.03% | 0.27% | Lewis River | Above Goal |
| Fall Cowlitz Hatchery | 76% | 0.01% | 0.08% | NA | |
| Oregon Coastal North Migrating | 1979 | 0.00% | 0.00% | Oregon Coastal | Not Classified |
| Snake River Fall | 8% | 0.00% | 0.00% | Not Represented | |
| Alaska South SE | 1996 | 0.00% | 0.00% | King Salmon<br>Andrew Creek<br>Blossom<br>Keta<br>Unuk<br>Chickamin | Prob. Not Rebuilding<br>Above Goal<br>Prob. Not Rebuilding<br>Prob. Not Rebuilding<br>Prob. Not Rebuilding<br>Prob. Not Rebuilding |

## APPENDIX J

**Catch By Fishery, Troll CNR, and Add-on, 1975-1992**
**See Table 1-1 footnotes for explanation of catch areas.**

## Southeast Alaska

| Year | S.E. Alaska | | | | | | |
|---|---|---|---|---|---|---|---|
| | Troll CNR Days | Troll | Net | Sport | Total | Add-on | 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 | 64.5 | 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 |

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.

**North/Central B.C.**

| Year | North/Central B.C. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Troll CNR Days | Troll | Net[1] | Sport | Total | Terminal Exclusion | Ceiling Catch |
| 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 |

[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 | West Coast Vancouver Island | | | | |
|---|---|---|---|---|---|
| | Troll CNR Days | Troll | Net | Sport | 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 |

Troll: Areas 21, 23-27, and 121-127
Net: Areas 21, and 23-27
Sport: Areas 23a, 23b, and 24

**Strait of Georgia/Fraser**

| Year | Strait of Georgia/Fraser | | | | |
|---|---|---|---|---|---|
| | Troll CNR Days | Troll | Net | Sport | Total |
| 1975 | 0 | 177,318 | 66,119 | 398,000 | 641,437 |
| 1976 | 0 | 197,873 | 73,018 | 490,000 | 760,891 |
| 1977 | 0 | 248,973 | 85,222 | 372,000 | 706,195 |
| 1978 | 0 | 215,531 | 50,247 | 500,000 | 765,778 |
| 1979 | 0 | 257,278 | 49,038 | 350,000 | 656,316 |
| 1980 | 0 | 273,122 | 31,161 | 371,000 | 675,283 |
| 1981 | 0 | 238,876 | 19,985 | 253,300 | 512,161 |
| 1982 | 0 | 178,498 | 22,971 | 163,793 | 365,262 |
| 1983 | 0 | 105,061 | 17,520 | 198,433 | 321,014 |
| 1984 | 0 | 88,158 | 19,851 | 369,445 | 477,454 |
| 1985 | 44[1] | 55,686 | 31,006 | 234,838 | 321,530 |
| 1986 | 76 | 43,899 | 32,359 | 181,896 | 258,154 |
| 1987 | 0 | 38,695 | 13,016 | 121,081 | 172,792 |
| 1988 | 0 | 19,611 | 8,373 | 119,117 | 147,101 |
| 1989 | 0 | 28,474 | 23,833 | 132,846 | 185,153 |
| 1990 | 0 | 34,394 | 15,298 | 111,914 | 161,606 |
| 1991 | 37 | 32,230 | 15,407 | 115,519 | 163,156 |
| 1992 | 55 | 37,249 | 9,157 | 116,579 | 162,985 |

[1] In 1985, major inside areas were closed during all CNR periods to reduce chinook shakers.

Troll: Areas 13-18, and 29
Net: Areas 14-19, 28, and 29
Sport: Areas 13-19, 19b, 28, and 29

**Johnstone Strait**

| Year | Johnstone Strait Net |
|---|---|
| 1975 | 30,295 |
| 1976 | 31,855 |
| 1977 | 49,511 |
| 1978 | 55,148 |
| 1979 | 31,291 |
| 1980 | 30,325 |
| 1981 | 28,620 |
| 1982 | 29,454 |
| 1983 | 28,364 |
| 1984 | 18,361 |
| 1985 | 38,073 |
| 1986 | 17,866 |
| 1987 | 13,863 |
| 1988 | 6,292 |
| 1989 | 29,486 |
| 1990 | 18,433 |
| 1991 | 15,071 |
| 1992 | 9,574 |

Net: Areas 11-13

**Canada - Strait of Juan de Fuca**

| Year | Strait 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 |

Net: Area 20

**Washington - Strait of Juan de Fuca**

| Year | Washington Strait of Juan de Fuca | | | | |
|---|---|---|---|---|---|
| | CNR Days | Troll | Net | Sport | Total |
| 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 | 47,195 | 5,000 | 50,903 | 103,098 |
| 1991 | 0 | 37,159 | 2,138 | 39,667 | 78,964 |
| 1992 | 0 | 31,455 | 1,073 | 38,438 | 70,966 |

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**

| Year | Washington San Juans | | | | |
|---|---|---|---|---|---|
| | CNR Days | Troll | Net | Sport | Total |
| 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 | 1,000 | 9,000 | 7,370 | 17,370 |
| 1991 | 0 | 0 | 11,745 | 5,115 | 16,860 |
| 1992 | 0 | 0 | 13,988 | 6,788 | 20,776 |

Troll: Areas 6, 6A, 7, and 7A
Net: Areas 6, 6A, 7, and 7A
Sport: Area 7

**Washington - Other Puget Sound**

| Year | Washington Other Puget Sound | | | |
|---|---|---|---|---|
| | Troll | Net | Sport | Total |
| 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 | 178,000 | 71,000 | 249,000 |
| 1991 | 0 | 89,489 | 48,859 | 138,348 |
| 1992 | 0 | 62,925 | 47,531 | 110,456 |

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

**Washington - Inside Coastal**

| Year | Washington Inside Coastal | | | |
|---|---|---|---|---|
| | Troll | Net | Sport | Total |
| 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 | 58,000 | 5,000 | 63,000 |
| 1991 | 0 | 53,044 | 6,070 | 59,114 |
| 1992 | 0 | 63,600 | NA | NA |

Net: Areas 2A - 2M; Areas 72B - 73H
Sport: All Coastal Rivers

**Columbia River**

| Year | Columbia River | | |
|---|---|---|---|
| | Net | Sport | Total |
| 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 | NA | NA |

**Washington/Oregon Ocean North of Cape Falcon**

| Year | Washington/Oregon North of Falcon | | | | |
|---|---|---|---|---|---|
| | CNR Days | Troll | Net | Sport | Total |
| 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 | 65,000 | 0 | 30,000 | 95,000 |
| 1991 | 0 | 51,296 | 0 | 16,732 | 68,028 |
| 1992 | 0 | 68,866 | 0 | 18,927 | 87,793 |

[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, and 4

**Oregon**

| Year | Oregon | | | |
|---|---|---|---|---|
| | CNR Days | Troll | Sport | Total |
| 1975 | 0 | 300 | 19,000 | 19,300 |
| 1976 | 0 | 1,000 | 21,000 | 22,000 |
| 1977 | 0 | 3,000 | 34,000 | 37,000 |
| 1978 | 0 | 1,000 | 37,000 | 38,000 |
| 1979 | 0 | 800 | 31,000 | 31,800 |
| 1980 | 0 | 300 | 22,000 | 22,300 |
| 1981 | 0 | 300 | 28,000 | 28,300 |
| 1982 | 0 | 500 | 23,000 | 23,500 |
| 1983 | 0 | 700 | 19,000 | 19,700 |
| 1984 | 0 | 1,088 | 27,000 | 28,088 |
| 1985 | 0 | 1,700 | 25,000 | 26,700 |
| 1986 | 0 | 1,900 | 33,000 | 34,900 |
| 1987 | 0 | 3,600 | 46,000 | 49,600 |
| 1988 | 0 | 4,800 | 49,000 | 53,800 |
| 1989 | 0 | 4,500 | 45,000 | 49,500 |
| 1990 | 0 | 0 | 38,000 | 38,000 |
| 1991 | 0 | 0 | 44,500 | 44,500 |
| 1992 | 0 | 400 | 38,000 | 38,400 |

Troll: late season troll off Elk River mouth
Sport: estuary and inland

## APPENDIX K

### Modeled Adult Equivalent Mortality Estimates and Indices

## Southeast Alaska Troll

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 192467 | 45823 | 0 | 0 | 238290 |
| 1980 | 188674 | 45049 | 0 | 0 | 233723 |
| 1981 | 184865 | 46651 | 4076 | 3032 | 238623 |
| 1982 | 215203 | 62168 | 23770 | 18315 | 319455 |
| 1983 | 355536 | 95335 | 29489 | 22839 | 503200 |
| 1984 | 281508 | 67260 | 31160 | 23640 | 403568 |
| 1985 | 185040 | 45979 | 30235 | 24527 | 285782 |
| 1986 | 200295 | 52744 | 20054 | 19234 | 292328 |
| 1987 | 199934 | 45988 | 47518 | 32651 | 326091 |
| 1988 | 191083 | 31225 | 15101 | 16303 | 253712 |
| 1989 | 194463 | 41111 | 37260 | 30376 | 303209 |
| 1990 | 230726 | 50179 | 29143 | 25476 | 335523 |
| 1991 | 201062 | 46995 | 42246 | 37591 | 327893 |
| 1992 | 142076 | 30121 | 53819 | 50293 | 276310 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 0.985 | 0.918 | 0.000 | 0.000 | 0.925 |
| 1980 | 0.966 | 0.902 | 0.000 | 0.000 | 0.908 |
| 1981 | 0.947 | 0.934 | 0.585 | 0.568 | 0.927 |
| 1982 | 1.102 | 1.245 | 3.415 | 3.432 | 1.240 |
| 1983 | 1.820 | 1.910 | 4.236 | 4.280 | 1.954 |
| 1984 | 1.441 | 1.347 | 4.476 | 4.430 | 1.567 |
| 1985 | 0.947 | 0.921 | 4.343 | 4.596 | 1.110 |
| 1986 | 1.026 | 1.057 | 2.881 | 3.604 | 1.135 |
| 1987 | 1.024 | 0.921 | 6.826 | 6.118 | 1.266 |
| 1988 | 0.978 | 0.625 | 2.169 | 3.055 | 0.985 |
| 1989 | 0.996 | 0.823 | 5.352 | 5.692 | 1.177 |
| 1990 | 1.181 | 1.005 | 4.186 | 4.774 | 1.303 |
| 1991 | 1.029 | 0.941 | 6.069 | 7.044 | 1.273 |
| 1992 | 0.727 | 0.603 | 7.731 | 9.424 | 1.073 |

## Southeast Alaska Net

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 13440 | 849 | 0 | 0 | 14289 |
| 1980 | 13258 | 843 | 0 | 0 | 14101 |
| 1981 | 12645 | 862 | 0 | 0 | 13507 |
| 1982 | 17040 | 1363 | 0 | 0 | 18403 |
| 1983 | 24951 | 1876 | 0 | 0 | 26827 |
| 1984 | 15331 | 1055 | 0 | 0 | 16386 |
| 1985 | 20401 | 1176 | 6300 | 28161 | 56037 |
| 1986 | 11377 | 2728 | 6410 | 12988 | 33504 |
| 1987 | 7619 | 2991 | 2002 | 6507 | 19120 |
| 1988 | 10459 | 1964 | 3927 | 13370 | 29721 |
| 1989 | 10337 | 2530 | 3881 | 13062 | 29810 |
| 1990 | 10222 | 2180 | 3864 | 13086 | 29351 |
| 1991 | 11899 | 2730 | 4498 | 15219 | 34346 |
| 1992 | 13999 | 3085 | 3064 | 2206 | 22354 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 0.953 | 0.867 | - NA - | - NA - | 0.948 |
| 1980 | 0.941 | 0.861 | - NA - | - NA - | 0.935 |
| 1981 | 0.897 | 0.880 | - NA - | - NA - | 0.896 |
| 1982 | 1.209 | 1.392 | - NA - | - NA - | 1.221 |
| 1983 | 1.770 | 1.915 | - NA - | - NA - | 1.780 |
| 1984 | 1.088 | 1.077 | - NA - | - NA - | 1.087 |
| 1985 | 1.447 | 1.200 | - NA - | - NA - | 3.717 |
| 1986 | 0.807 | 2.786 | - NA - | - NA - | 2.222 |
| 1987 | 0.541 | 3.054 | - NA - | - NA - | 1.268 |
| 1988 | 0.742 | 2.005 | - NA - | - NA - | 1.972 |
| 1989 | 0.733 | 2.583 | - NA - | - NA - | 1.977 |
| 1990 | 0.725 | 2.226 | - NA - | - NA - | 1.947 |
| 1991 | 0.844 | 2.787 | - NA - | - NA - | 2.278 |
| 1992 | 0.993 | 3.150 | - NA - | - NA - | 1.483 |

## Southeast Alaska Sport

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 9603 | 5133 | 0 | 0 | 14736 |
| 1980 | 9446 | 5082 | 0 | 0 | 14527 |
| 1981 | 9219 | 6119 | 0 | 0 | 15337 |
| 1982 | 10216 | 8035 | 0 | 0 | 18251 |
| 1983 | 13198 | 8641 | 0 | 0 | 21839 |
| 1984 | 14078 | 7910 | 0 | 0 | 21988 |
| 1985 | 11195 | 7135 | 0 | 0 | 18331 |
| 1986 | 9196 | 6207 | 0 | 0 | 15403 |
| 1987 | 9719 | 3927 | 0 | 0 | 13646 |
| 1988 | 10036 | 3317 | 0 | 0 | 13353 |
| 1989 | 13511 | 5422 | 0 | 0 | 18933 |
| 1990 | 19454 | 9180 | 0 | 0 | 28634 |
| 1991 | 22540 | 11341 | 0 | 0 | 33881 |
| 1992 | 18652 | 6748 | 0 | 0 | 25400 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 0.998 | 0.843 | - NA - | - NA - | 0.938 |
| 1980 | 0.982 | 0.834 | - NA - | - NA - | 0.925 |
| 1981 | 0.958 | 1.004 | - NA - | - NA - | 0.976 |
| 1982 | 1.062 | 1.319 | - NA - | - NA - | 1.162 |
| 1983 | 1.372 | 1.418 | - NA - | - NA - | 1.390 |
| 1984 | 1.463 | 1.298 | - NA - | - NA - | 1.399 |
| 1985 | 1.164 | 1.171 | - NA - | - NA - | 1.167 |
| 1986 | 0.956 | 1.019 | - NA - | - NA - | 0.980 |
| 1987 | 1.010 | 0.645 | - NA - | - NA - | 0.868 |
| 1988 | 1.043 | 0.544 | - NA - | - NA - | 0.850 |
| 1989 | 1.404 | 0.890 | - NA - | - NA - | 1.205 |
| 1990 | 2.022 | 1.507 | - NA - | - NA - | 1.822 |
| 1991 | 2.343 | 1.862 | - NA - | - NA - | 2.156 |
| 1992 | 1.939 | 1.108 | - NA - | - NA - | 1.616 |

# North/Central B.C. Troll

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 251640 | 43981 | 0 | 0 | 295620 |
| 1980 | 240192 | 42185 | 0 | 0 | 282376 |
| 1981 | 233661 | 45367 | 0 | 0 | 279028 |
| 1982 | 274818 | 51344 | 0 | 0 | 326162 |
| 1983 | 245160 | 44978 | 0 | 0 | 290138 |
| 1984 | 301977 | 50847 | 0 | 0 | 352824 |
| 1985 | 208555 | 37613 | 0 | 0 | 246168 |
| 1986 | 205022 | 37523 | 0 | 0 | 242545 |
| 1987 | 243921 | 59126 | 2195 | 8869 | 314112 |
| 1988 | 185420 | 33738 | 4398 | 13338 | 236895 |
| 1989 | 219716 | 50649 | 1798 | 6907 | 279070 |
| 1990 | 179827 | 41611 | 3505 | 13551 | 238493 |
| 1991 | 213384 | 54259 | 1490 | 6308 | 275441 |
| 1992 | 185656 | 42842 | 3430 | 13158 | 245086 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.006 | 0.962 | - NA - | - NA - | 0.999 |
| 1980 | 0.960 | 0.923 | - NA - | - NA - | 0.955 |
| 1981 | 0.934 | 0.992 | - NA - | - NA - | 0.943 |
| 1982 | 1.099 | 1.123 | - NA - | - NA - | 1.103 |
| 1983 | 0.980 | 0.984 | - NA - | - NA - | 0.981 |
| 1984 | 1.208 | 1.112 | - NA - | - NA - | 1.193 |
| 1985 | 0.834 | 0.823 | - NA - | - NA - | 0.832 |
| 1986 | 0.820 | 0.821 | - NA - | - NA - | 0.820 |
| 1987 | 0.975 | 1.293 | - NA - | - NA - | 1.062 |
| 1988 | 0.741 | 0.738 | - NA - | - NA - | 0.801 |
| 1989 | 0.879 | 1.108 | - NA - | - NA - | 0.943 |
| 1990 | 0.719 | 0.910 | - NA - | - NA - | 0.806 |
| 1991 | 0.853 | 1.187 | - NA - | - NA - | 0.931 |
| 1992 | 0.742 | 0.937 | - NA - | - NA - | 0.829 |

## North/Central B.C. Net

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 61555 | 5373 | 0 | 0 | 66928 |
| 1980 | 59957 | 5311 | 0 | 0 | 65267 |
| 1981 | 60200 | 5810 | 0 | 0 | 66010 |
| 1982 | 62655 | 5837 | 0 | 0 | 68493 |
| 1983 | 46305 | 3761 | 0 | 0 | 50066 |
| 1984 | 62214 | 5239 | 0 | 0 | 67453 |
| 1985 | 52082 | 3960 | 0 | 0 | 56042 |
| 1986 | 63906 | 5187 | 0 | 0 | 69093 |
| 1987 | 32749 | 1953 | 0 | 0 | 34702 |
| 1988 | 42329 | 2676 | 0 | 0 | 45005 |
| 1989 | 36718 | 1892 | 0 | 0 | 38610 |
| 1990 | 48902 | 3531 | 0 | 0 | 52433 |
| 1991 | 46653 | 2854 | 0 | 0 | 49507 |
| 1992 | 42627 | 2628 | 0 | 0 | 45255 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.008 | 0.962 | - NA - | - NA - | 1.004 |
| 1980 | 0.981 | 0.951 | - NA - | - NA - | 0.979 |
| 1981 | 0.985 | 1.041 | - NA - | - NA - | 0.990 |
| 1982 | 1.026 | 1.046 | - NA - | - NA - | 1.027 |
| 1983 | 0.758 | 0.674 | - NA - | - NA - | 0.751 |
| 1984 | 1.492 | 1.321 | - NA - | - NA - | 1.426 |
| 1985 | 1.154 | 1.181 | - NA - | - NA - | 1.165 |
| 1986 | 0.948 | 1.032 | - NA - | - NA - | 0.980 |
| 1987 | 1.002 | 0.656 | - NA - | - NA - | 0.870 |
| 1988 | 1.034 | 0.551 | - NA - | - NA - | 0.850 |
| 1989 | 1.393 | 0.883 | - NA - | - NA - | 1.198 |
| 1990 | 2.006 | 1.602 | - NA - | - NA - | 1.852 |
| 1991 | 2.318 | 1.758 | - NA - | - NA - | 2.104 |
| 1992 | 1.927 | 1.110 | - NA - | - NA - | 1.615 |

## North/Central B.C. Sport

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 10947 | 2330 | 0 | 0 | 13277 |
| 1980 | 10849 | 2352 | 0 | 0 | 13201 |
| 1981 | 10485 | 2134 | 0 | 0 | 12618 |
| 1982 | 11659 | 3580 | 0 | 0 | 15240 |
| 1983 | 13181 | 3862 | 0 | 0 | 17044 |
| 1984 | 16418 | 4636 | 0 | 0 | 21054 |
| 1985 | 8439 | 1523 | 0 | 0 | 9962 |
| 1986 | 11013 | 2268 | 0 | 0 | 13282 |
| 1987 | 11995 | 2062 | 0 | 0 | 14057 |
| 1988 | 16672 | 3255 | 0 | 0 | 19927 |
| 1989 | 31908 | 4189 | 0 | 0 | 36097 |
| 1990 | 27020 | 6854 | 0 | 0 | 33874 |
| 1991 | 27065 | 6381 | 0 | 0 | 33446 |
| 1992 | 27540 | 6464 | 0 | 0 | 34005 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 0.997 | 0.896 | - NA - | - NA - | 0.977 |
| 1980 | 0.988 | 0.905 | - NA - | - NA - | 0.972 |
| 1981 | 0.954 | 0.821 | - NA - | - NA - | 0.929 |
| 1982 | 1.061 | 1.378 | - NA - | - NA - | 1.122 |
| 1983 | 1.200 | 1.486 | - NA - | - NA - | 1.255 |
| 1984 | 1.495 | 1.784 | - NA - | - NA - | 1.550 |
| 1985 | 0.768 | 0.586 | - NA - | - NA - | 0.733 |
| 1986 | 1.003 | 0.873 | - NA - | - NA - | 0.978 |
| 1987 | 1.092 | 0.793 | - NA - | - NA - | 1.035 |
| 1988 | 1.518 | 1.252 | - NA - | - NA - | 1.467 |
| 1989 | 2.905 | 1.612 | - NA - | - NA - | 2.657 |
| 1990 | 2.460 | 2.637 | - NA - | - NA - | 2.494 |
| 1991 | 2.464 | 2.455 | - NA - | - NA - | 2.462 |
| 1992 | 2.507 | 2.487 | - NA - | - NA - | 2.503 |

# West Coast Vancouver Island Troll

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 421011 | 75918 | 0 | 0 | 496928 |
| 1980 | 401241 | 73291 | 0 | 0 | 474531 |
| 1981 | 385858 | 74696 | 0 | 0 | 459554 |
| 1982 | 453358 | 84505 | 0 | 0 | 537862 |
| 1983 | 396987 | 71006 | 0 | 0 | 467993 |
| 1984 | 374141 | 67428 | 0 | 0 | 441569 |
| 1985 | 310872 | 51704 | 1564 | 2549 | 366689 |
| 1986 | 302767 | 55527 | 0 | 0 | 358294 |
| 1987 | 335619 | 95273 | 5329 | 14831 | 451052 |
| 1988 | 374303 | 78062 | 11454 | 23420 | 487240 |
| 1989 | 178407 | 48180 | 0 | 0 | 226587 |
| 1990 | 273495 | 60899 | 0 | 0 | 334394 |
| 1991 | 177757 | 42950 | 0 | 0 | 227006 |
| 1992 | 310079 | 81516 | 0 | 0 | 391595 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.014 | 0.985 | - NA - | - NA - | 1.010 |
| 1980 | 0.967 | 0.951 | - NA - | - NA - | 0.964 |
| 1981 | 0.927 | 0.969 | - NA - | - NA - | 0.934 |
| 1982 | 1.092 | 1.096 | - NA - | - NA - | 1.093 |
| 1983 | 0.956 | 0.921 | - NA - | - NA - | 0.951 |
| 1984 | 0.901 | 0.875 | - NA - | - NA - | 0.897 |
| 1985 | 0.749 | 0.671 | - NA - | - NA - | 0.745 |
| 1986 | 0.729 | 0.720 | - NA - | - NA - | 0.728 |
| 1987 | 0.808 | 1.236 | - NA - | - NA - | 0.916 |
| 1988 | 0.902 | 1.012 | - NA - | - NA - | 0.990 |
| 1989 | 0.430 | 0.625 | - NA - | - NA - | 0.460 |
| 1990 | 0.659 | 0.790 | - NA - | - NA - | 0.679 |
| 1991 | 0.428 | 0.639 | - NA - | - NA - | 0.461 |
| 1992 | 0.747 | 1.057 | - NA - | - NA - | 0.796 |

## West Coast Vancouver Island Terminal Sport [1]

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 20876 | 1575 | 0 | 0 | 22451 |
| 1980 | 20426 | 1572 | 0 | 0 | 21999 |
| 1981 | 23067 | 2855 | 0 | 0 | 25922 |
| 1982 | 30102 | 3479 | 0 | 0 | 33581 |
| 1983 | 51195 | 3143 | 0 | 0 | 54338 |
| 1984 | 36336 | 1866 | 0 | 0 | 38202 |
| 1985 | 21120 | 1075 | 0 | 0 | 22195 |
| 1986 | 20682 | 2282 | 0 | 0 | 22964 |
| 1987 | 24812 | 1355 | 0 | 0 | 26167 |
| 1988 | 45815 | 3953 | 0 | 0 | 49769 |
| 1989 | 41902 | 2520 | 0 | 0 | 44422 |
| 1990 | 55810 | 2878 | 0 | 0 | 58689 |
| 1991 | 89069 | 3462 | 0 | 0 | 92531 |
| 1992 | 33949 | 574 | 0 | 0 | 34523 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 0.884 | 0.664 | - NA - | - NA - | 0.864 |
| 1980 | 0.865 | 0.663 | - NA - | - NA - | 0.846 |
| 1981 | 0.977 | 1.204 | - NA - | - NA - | 0.997 |
| 1982 | 1.275 | 1.468 | - NA - | - NA - | 1.292 |
| 1983 | 2.168 | 1.326 | - NA - | - NA - | 2.091 |
| 1984 | 1.539 | 0.787 | - NA - | - NA - | 1.470 |
| 1985 | 0.894 | 0.454 | - NA - | - NA - | 0.854 |
| 1986 | 0.876 | 0.963 | - NA - | - NA - | 0.884 |
| 1987 | 1.051 | 0.572 | - NA - | - NA - | 1.007 |
| 1988 | 1.940 | 1.668 | - NA - | - NA - | 1.915 |
| 1989 | 1.774 | 1.063 | - NA - | - NA - | 1.709 |
| 1990 | 2.363 | 1.214 | - NA - | - NA - | 2.258 |
| 1991 | 3.771 | 1.460 | - NA - | - NA - | 3.560 |
| 1992 | 1.437 | 0.242 | - NA - | - NA - | 1.328 |

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 | 172277 | 11670 | 0 | 0 | 183946 |
| 1980 | 155704 | 10912 | 0 | 0 | 166616 |
| 1981 | 143293 | 10817 | 0 | 0 | 154110 |
| 1982 | 132704 | 8687 | 0 | 0 | 141391 |
| 1983 | 121192 | 9376 | 0 | 0 | 130569 |
| 1984 | 127637 | 18796 | 0 | 0 | 146433 |
| 1985 | 42464 | 3556 | 3041 | 2281 | 51341 |
| 1986 | 35862 | 5220 | 1259 | 3248 | 45588 |
| 1987 | 30696 | 5823 | 0 | 0 | 36518 |
| 1988 | 14952 | 3526 | 0 | 0 | 18478 |
| 1989 | 21136 | 6627 | 0 | 0 | 27763 |
| 1990 | 28001 | 4962 | 0 | 0 | 32963 |
| 1991 | 24113 | 6812 | 1001 | 2771 | 34697 |
| 1992 | 28934 | 7328 | 1903 | 4725 | 42889 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.141 | 1.109 | - NA - | - NA - | 1.139 |
| 1980 | 1.031 | 1.037 | - NA - | - NA - | 1.032 |
| 1981 | 0.949 | 1.028 | - NA - | - NA - | 0.954 |
| 1982 | 0.879 | 0.826 | - NA - | - NA - | 0.875 |
| 1983 | 0.803 | 0.891 | - NA - | - NA - | 0.808 |
| 1984 | 0.845 | 1.786 | - NA - | - NA - | 0.907 |
| 1985 | 0.281 | 0.338 | - NA - | - NA - | 0.318 |
| 1986 | 0.238 | 0.496 | - NA - | - NA - | 0.282 |
| 1987 | 0.203 | 0.553 | - NA - | - NA - | 0.226 |
| 1988 | 0.099 | 0.335 | - NA - | - NA - | 0.114 |
| 1989 | 0.140 | 0.630 | - NA - | - NA - | 0.172 |
| 1990 | 0.185 | 0.472 | - NA - | - NA - | 0.204 |
| 1991 | 0.160 | 0.647 | - NA - | - NA - | 0.215 |
| 1992 | 0.192 | 0.696 | - NA - | - NA - | 0.266 |

## Strait of Georgia Sport

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 337755 | 108 | 0 | 0 | 337862 |
| 1980 | 309288 | 101 | 0 | 0 | 309389 |
| 1981 | 289496 | 97 | 0 | 0 | 289592 |
| 1982 | 220407 | 34540 | 0 | 0 | 254948 |
| 1983 | 202930 | 39091 | 0 | 0 | 242020 |
| 1984 | 284941 | 55838 | 0 | 0 | 340779 |
| 1985 | 239406 | 17578 | 0 | 0 | 256985 |
| 1986 | 192258 | 19503 | 0 | 0 | 211761 |
| 1987 | 124740 | 11432 | 0 | 0 | 136172 |
| 1988 | 120128 | 33883 | 0 | 0 | 154011 |
| 1989 | 136337 | 66034 | 0 | 0 | 202371 |
| 1990 | 126392 | 58036 | 0 | 0 | 184428 |
| 1991 | 120408 | 89101 | 0 | 0 | 209509 |
| 1992 | 126922 | 106587 | 0 | 0 | 233508 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.168 | 0.012 | - NA - | - NA - | 1.134 |
| 1980 | 1.069 | 0.012 | - NA - | - NA - | 1.038 |
| 1981 | 1.001 | 0.011 | - NA - | - NA - | 0.972 |
| 1982 | 0.762 | 3.965 | - NA - | - NA - | 0.856 |
| 1983 | 0.702 | 4.487 | - NA - | - NA - | 0.812 |
| 1984 | 0.985 | 6.410 | - NA - | - NA - | 1.144 |
| 1985 | 0.828 | 2.018 | - NA - | - NA - | 0.863 |
| 1986 | 0.665 | 2.239 | - NA - | - NA - | 0.711 |
| 1987 | 0.431 | 1.312 | - NA - | - NA - | 0.457 |
| 1988 | 0.415 | 3.889 | - NA - | - NA - | 0.517 |
| 1989 | 0.471 | 7.580 | - NA - | - NA - | 0.679 |
| 1990 | 0.437 | 6.662 | - NA - | - NA - | 0.619 |
| 1991 | 0.416 | 10.228 | - NA - | - NA - | 0.703 |
| 1992 | 0.439 | 12.235 | - NA - | - NA - | 0.784 |

## Other B.C. Net

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 129218 | 8575 | 0 | 0 | 137793 |
| 1980 | 122352 | 8227 | 0 | 0 | 130579 |
| 1981 | 123198 | 9183 | 0 | 0 | 132381 |
| 1982 | 118801 | 8121 | 0 | 0 | 126922 |
| 1983 | 154715 | 9820 | 0 | 0 | 164535 |
| 1984 | 110408 | 7149 | 0 | 0 | 117557 |
| 1985 | 75555 | 3494 | 0 | 0 | 79048 |
| 1986 | 78777 | 3936 | 0 | 0 | 82713 |
| 1987 | 56521 | 2290 | 0 | 0 | 58811 |
| 1988 | 98951 | 8721 | 0 | 0 | 107672 |
| 1989 | 102222 | 4281 | 0 | 0 | 106503 |
| 1990 | 61593 | 2596 | 0 | 0 | 64189 |
| 1991 | 107098 | 4403 | 0 | 0 | 111501 |
| 1992 | 124595 | 6036 | 0 | 0 | 130631 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.047 | 1.006 | - NA - | - NA - | 1.045 |
| 1980 | 0.992 | 0.965 | - NA - | - NA - | 0.990 |
| 1981 | 0.998 | 1.077 | - NA - | - NA - | 1.004 |
| 1982 | 0.963 | 0.952 | - NA - | - NA - | 0.962 |
| 1983 | 1.254 | 1.152 | - NA - | - NA - | 1.247 |
| 1984 | 0.895 | 0.839 | - NA - | - NA - | 0.891 |
| 1985 | 0.612 | 0.410 | - NA - | - NA - | 0.599 |
| 1986 | 0.638 | 0.462 | - NA - | - NA - | 0.627 |
| 1987 | 0.458 | 0.269 | - NA - | - NA - | 0.446 |
| 1988 | 0.802 | 1.023 | - NA - | - NA - | 0.816 |
| 1989 | 0.828 | 0.502 | - NA - | - NA - | 0.807 |
| 1990 | 0.499 | 0.304 | - NA - | - NA - | 0.487 |
| 1991 | 0.868 | 0.516 | - NA - | - NA - | 0.845 |
| 1992 | 1.010 | 0.708 | - NA - | - NA - | 0.990 |

## Other U.S. Troll

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 158789 | 38728 | 0 | 0 | 197516 |
| 1980 | 155293 | 38291 | 0 | 0 | 193585 |
| 1981 | 152186 | 38636 | 0 | 0 | 190823 |
| 1982 | 190099 | 48266 | 0 | 0 | 238365 |
| 1983 | 70570 | 16437 | 0 | 0 | 87007 |
| 1984 | 32450 | 7511 | 0 | 0 | 39961 |
| 1985 | 56152 | 12887 | 0 | 0 | 69039 |
| 1986 | 50946 | 12690 | 0 | 0 | 63636 |
| 1987 | 79681 | 19614 | 0 | 0 | 99295 |
| 1988 | 108689 | 19438 | 0 | 0 | 128127 |
| 1989 | 71833 | 16870 | 0 | 0 | 88703 |
| 1990 | 65515 | 12917 | 0 | 0 | 78432 |
| 1991 | 49090 | 12400 | 0 | 0 | 61490 |
| 1992 | 67040 | 15924 | 0 | 0 | 82964 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 0.968 | 0.945 | - NA - | - NA - | 0.963 |
| 1980 | 0.946 | 0.934 | - NA - | - NA - | 0.944 |
| 1981 | 0.927 | 0.943 | - NA - | - NA - | 0.931 |
| 1982 | 1.158 | 1.178 | - NA - | - NA - | 1.162 |
| 1983 | 0.430 | 0.401 | - NA - | - NA - | 0.424 |
| 1984 | 0.198 | 0.183 | - NA - | - NA - | 0.195 |
| 1985 | 0.342 | 0.314 | - NA - | - NA - | 0.337 |
| 1986 | 0.310 | 0.310 | - NA - | - NA - | 0.310 |
| 1987 | 0.486 | 0.479 | - NA - | - NA - | 0.484 |
| 1988 | 0.662 | 0.474 | - NA - | - NA - | 0.625 |
| 1989 | 0.438 | 0.412 | - NA - | - NA - | 0.433 |
| 1990 | 0.399 | 0.315 | - NA - | - NA - | 0.382 |
| 1991 | 0.299 | 0.303 | - NA - | - NA - | 0.300 |
| 1992 | 0.409 | 0.389 | - NA - | - NA - | 0.405 |

## Other U.S. Net

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 335912 | 37919 | 0 | 0 | 373831 |
| 1980 | 320595 | 37173 | 0 | 0 | 357768 |
| 1981 | 304783 | 34752 | 0 | 0 | 339534 |
| 1982 | 304793 | 30458 | 0 | 0 | 335250 |
| 1983 | 235016 | 28351 | 0 | 0 | 263367 |
| 1984 | 305490 | 29999 | 0 | 0 | 335489 |
| 1985 | 337064 | 31599 | 0 | 0 | 368662 |
| 1986 | 432633 | 47230 | 0 | 0 | 479863 |
| 1987 | 561151 | 39837 | 0 | 0 | 600988 |
| 1988 | 589776 | 43489 | 0 | 0 | 633266 |
| 1989 | 387058 | 18116 | 0 | 0 | 405174 |
| 1990 | 330610 | 31961 | 0 | 0 | 362572 |
| 1991 | 230283 | 23957 | 0 | 0 | 254239 |
| 1992 | 219638 | 29607 | 0 | 0 | 249245 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.061 | 1.081 | - NA - | - NA - | 1.063 |
| 1980 | 1.013 | 1.060 | - NA - | - NA - | 1.018 |
| 1981 | 0.963 | 0.991 | - NA - | - NA - | 0.966 |
| 1982 | 0.963 | 0.868 | - NA - | - NA - | 0.954 |
| 1983 | 0.742 | 0.808 | - NA - | - NA - | 0.749 |
| 1984 | 0.965 | 0.855 | - NA - | - NA - | 0.954 |
| 1985 | 1.065 | 0.901 | - NA - | - NA - | 1.049 |
| 1986 | 1.367 | 1.347 | - NA - | - NA - | 1.365 |
| 1987 | 1.773 | 1.136 | - NA - | - NA - | 1.709 |
| 1988 | 1.863 | 1.240 | - NA - | - NA - | 1.801 |
| 1989 | 1.223 | 0.516 | - NA - | - NA - | 1.152 |
| 1990 | 1.045 | 0.911 | - NA - | - NA - | 1.031 |
| 1991 | 0.728 | 0.683 | - NA - | - NA - | 0.723 |
| 1992 | 0.694 | 0.844 | - NA - | - NA - | 0.709 |

## Other U.S. Sport

| Adult Equivalent Mortality Estimates | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 259713 | 29146 | 0 | 0 | 288859 |
| 1980 | 253901 | 29559 | 0 | 0 | 283460 |
| 1981 | 265708 | 31968 | 0 | 0 | 297676 |
| 1982 | 255650 | 26553 | 0 | 0 | 282204 |
| 1983 | 287472 | 25225 | 0 | 0 | 312697 |
| 1984 | 237446 | 19495 | 0 | 0 | 256941 |
| 1985 | 294695 | 21398 | 0 | 0 | 316093 |
| 1986 | 320900 | 29277 | 0 | 0 | 350176 |
| 1987 | 341027 | 16842 | 0 | 0 | 357869 |
| 1988 | 316395 | 27838 | 0 | 0 | 344233 |
| 1989 | 305748 | 10060 | 0 | 0 | 315808 |
| 1990 | 302248 | 21577 | 0 | 0 | 323825 |
| 1991 | 286944 | 17878 | 0 | 0 | 304822 |
| 1992 | 260025 | 25451 | 0 | 0 | 285477 |

| Adult Equivalent Mortality Indices | | | | | |
|---|---|---|---|---|---|
| Year | Retention | | CNR | | Total |
| | Landed | Shaker | Legal | Sublegal | |
| 1979 | 1.004 | 0.995 | - NA - | - NA - | 1.003 |
| 1980 | 0.981 | 1.009 | - NA - | - NA - | 0.984 |
| 1981 | 1.027 | 1.091 | - NA - | - NA - | 1.033 |
| 1982 | 0.988 | 0.906 | - NA - | - NA - | 0.980 |
| 1983 | 1.111 | 0.861 | - NA - | - NA - | 1.086 |
| 1984 | 0.918 | 0.665 | - NA - | - NA - | 0.892 |
| 1985 | 1.139 | 0.730 | - NA - | - NA - | 1.097 |
| 1986 | 1.240 | 0.999 | - NA - | - NA - | 1.216 |
| 1987 | 1.318 | 0.575 | - NA - | - NA - | 1.242 |
| 1988 | 1.223 | 0.950 | - NA - | - NA - | 1.195 |
| 1989 | 1.182 | 0.343 | - NA - | - NA - | 1.096 |
| 1990 | 1.168 | 0.736 | - NA - | - NA - | 1.124 |
| 1991 | 1.109 | 0.610 | - NA - | - NA - | 1.058 |
| 1992 | 1.005 | 0.868 | - NA - | - NA - | 0.991 |

## APPENDIX L

### Tag Codes Used for Exploitation Rate Assessment

Tag codes for Alaska Spring

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 031703 | 031716 | 031753 | 031761 | 031807 | 031826 | 031901 | 031957 | 032027 | 032037 | 030116 | 030218 | |
| | | | | | | | 031704 | 031717 | 031754 | 031762 | 031808 | 031827 | 031902 | 031958 | 032028 | 032038 | 030119 | 030219 | |
| | | | | | | | 031706 | 041917 | 041944 | 031763 | 031809 | 031828 | 031903 | 031959 | 032029 | 032039 | 030121 | 030220 | |
| | | | | | | | 031707 | 041943 | 042121 | 031801 | 031810 | 031829 | 031904 | 031960 | 032030 | 032040 | 030122 | 030221 | |
| | | | | | | | 031708 | 041945 | 042202 | 031802 | 031811 | 031830 | 031905 | 031961 | 032031 | 032041 | 030125 | 030222 | |
| | | | | | | | 031709 | 042039 | 044005 | 031803 | 031812 | 031831 | 031906 | 031962 | 032032 | 032042 | 030216 | 030223 | |
| | | | | | | | 031710 | 042040 | | 042222 | 031813 | 031832 | 031907 | 031963 | 032033 | 032043 | 030217 | 030224 | |
| | | | | | | | 031711 | 042042 | | 042223 | 031814 | 031833 | 031908 | 032001 | 032034 | 032044 | 031947 | 030225 | |
| | | | | | | | 031712 | 042043 | | 042227 | 031815 | 031834 | 031909 | 032002 | 032113 | 032045 | 032138 | 030226 | |
| | | | | | | | 031713 | 042045 | | 042229 | 031816 | 031835 | 031910 | 032003 | 032114 | 032131 | 032141 | 032052 | |
| | | | | | | | 031714 | | | 042230 | 031817 | 031836 | 031911 | 032004 | 032116 | 032132 | 032201 | 032203 | |
| | | | | | | | 031715 | | | B40907 | 031818 | 031837 | 031912 | 032005 | 032119 | 032135 | 032202 | 032204 | |
| | | | | | | | 041932 | | | B40908 | 031819 | 031838 | 031913 | 032006 | 032121 | 036226 | 036237 | 032205 | |
| | | | | | | | 041938 | | | | 042255 | 031839 | 031914 | 032007 | 032122 | 036228 | 036238 | 032206 | |
| | | | | | | | 041939 | | | | 042354 | 031843 | 031915 | 032008 | 036213 | 036231 | 036329 | 032207 | |
| | | | | | | | 041940 | | | | 042355 | 031844 | 031916 | 032009 | 036214 | 036232 | 036330 | 032210 | |
| | | | | | | | | | | | 042356 | 031845 | 031917 | 032010 | 036216 | 036319 | 036331 | 032211 | |
| | | | | | | | | | | | 042430 | 031846 | 031918 | 032011 | 036219 | 036321 | 043247 | 032212 | |
| | | | | | | | | | | | 042431 | 031847 | 031919 | 032012 | 036221 | 036322 | 043249 | 032213 | |
| | | | | | | | | | | | | 031848 | 031920 | 032013 | 036222 | 036323 | 043250 | 032214 | |
| | | | | | | | | | | | | 031849 | 031921 | 032014 | 036225 | 036324 | 043252 | 032215 | |
| | | | | | | | | | | | | 031850 | 031922 | 032015 | 036310 | 036325 | 043255 | 043232 | |
| | | | | | | | | | | | | 031851 | 031923 | 032016 | 036311 | 036326 | 043303 | 043449 | |
| | | | | | | | | | | | | 031852 | 031924 | 032017 | 036312 | 036327 | 043304 | 043450 | |
| | | | | | | | | | | | | 031853 | 031925 | 032018 | 036313 | 036328 | 043305 | 043504 | |
| | | | | | | | | | | | | 031854 | 031926 | 032019 | 036314 | 042737 | 043306 | 043507 | |
| | | | | | | | | | | | | 031855 | 031927 | 032101 | 036315 | 042738 | 043319 | 043530 | |
| | | | | | | | | | | | | 031856 | 031928 | 032102 | 036316 | 043027 | 043320 | 043531 | |
| | | | | | | | | | | | | 031857 | 031929 | 032103 | 036317 | 043028 | 043323 | 043532 | |
| | | | | | | | | | | | | 031858 | 031930 | 032104 | 042754 | 043029 | 043324 | 043533 | |
| | | | | | | | | | | | | 031859 | 031931 | 042626 | 042908 | 043030 | 043406 | 043606 | |
| | | | | | | | | | | | | 031860 | 031932 | 042628 | 042909 | 043031 | 043407 | 043607 | |
| | | | | | | | | | | | | 031861 | 031933 | 042631 | 042960 | 043032 | | 043608 | |
| | | | | | | | | | | | | 031862 | 031934 | 042632 | 043101 | 043058 | | | |
| | | | | | | | | | | | | 031863 | 031935 | 042633 | 043102 | 043059 | | | |
| | | | | | | | | | | | | 040321 | 031936 | 042634 | 043104 | 043141 | | | |
| | | | | | | | | | | | | 042463 | 031937 | 042713 | 043107 | 043142 | | | |
| | | | | | | | | | | | | 042503 | 031938 | 042731 | 043108 | 043144 | | | |
| | | | | | | | | | | | | 042511 | 031939 | 042732 | | 043147 | | | |
| | | | | | | | | | | | | 042512 | 031940 | 042733 | | 043149 | | | |
| | | | | | | | | | | | | 042513 | 031941 | 042825 | | | | | |
| | | | | | | | | | | | | | 031942 | | | | | | |
| | | | | | | | | | | | | | 031943 | | | | | | |
| | | | | | | | | | | | | | 031944 | | | | | | |
| | | | | | | | | | | | | | 031945 | | | | | | |
| | | | | | | | | | | | | | 031946 | | | | | | |
| | | | | | | | | | | | | | 031948 | | | | | | |
| | | | | | | | | | | | | | 040329 | | | | | | |
| | | | | | | | | | | | | | 040330 | | | | | | |

Tag codes for Alaska Spring (continued)

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 040331 | | | | | | |
| | | | | | | | | | | | | | 040332 | | | | | | |
| | | | | | | | | | | | | | 040333 | | | | | | |
| | | | | | | | | | | | | | 040336 | | | | | | |
| | | | | | | | | | | | | | 040342 | | | | | | |
| | | | | | | | | | | | | | 040343 | | | | | | |
| | | | | | | | | | | | | | 040344 | | | | | | |
| | | | | | | | | | | | | | 040345 | | | | | | |
| | | | | | | | | | | | | | 040346 | | | | | | |
| | | | | | | | | | | | | | 040347 | | | | | | |
| | | | | | | | | | | | | | 040348 | | | | | | |
| | | | | | | | | | | | | | 040349 | | | | | | |
| | | | | | | | | | | | | | 040350 | | | | | | |
| | | | | | | | | | | | | | 042321 | | | | | | |
| | | | | | | | | | | | | | 042530 | | | | | | |
| | | | | | | | | | | | | | 042531 | | | | | | |
| | | | | | | | | | | | | | 042534 | | | | | | |
| | | | | | | | | | | | | | 042535 | | | | | | |
| | | | | | | | | | | | | | 042536 | | | | | | |
| | | | | | | | | | | | | | 042537 | | | | | | |
| | | | | | | | | | | | | | 042538 | | | | | | |
| | | | | | | | | | | | | | 042539 | | | | | | |
| | | | | | | | | | | | | | 042540 | | | | | | |

Tag codes for Kitsumkalum

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 021852 | 021951 | 022149 | 022533 | 022758 | 023346 | 023704 | 024412 | 024944 | 024908 | 020940 | 021133 |
| | | | | | | | | | | 022311 | 022534 | | 023347 | 023705 | | 024841 | 024909 | 020941 | 021134 |
| | | | | | | | | | | 022312 | | | 023348 | 023706 | | 024847 | 024910 | 020942 | 021135 |
| | | | | | | | | | | 022313 | | | 023349 | 023707 | | 024913 | 024911 | 020943 | 021136 |
| | | | | | | | | | | | | | 023350 | | | 024914 | 024912 | 020944 | 021137 |
| | | | | | | | | | | | | | 023351 | | | 024941 | 026039 | 020945 | 021138 |
| | | | | | | | | | | | | | 023352 | | | 024942 | 026040 | 020946 | 021139 |
| | | | | | | | | | | | | | 023353 | | | 024943 | 026041 | 026011 | 021140 |
| | | | | | | | | | | | | | | | | 025060 | 026042 | 026124 | 180230 |
| | | | | | | | | | | | | | | | | 025061 | 026043 | 026125 | 180231 |
| | | | | | | | | | | | | | | | | 025257 | 026044 | 026126 | 180232 |
| | | | | | | | | | | | | | | | | 025258 | 026045 | 026137 | 180233 |
| | | | | | | | | | | | | | | | | | | 026138 | |
| | | | | | | | | | | | | | | | | | | 026246 | |
| | | | | | | | | | | | | | | | | | | 026309 | |

Tag codes for Snootli Creek

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 020110 | 022016 | 022020 | 021732 | | | 022154 | 022139 | 022739 | 023257 | 023641 | 024349 | 025446 | 025956 | 020246 | 020346 |
| | | | | | 022017 | 022021 | | | | 022155 | 022501 | 022740 | 023258 | 023642 | 024350 | 025447 | 025957 | 020247 | 021428 |
| | | | | | 022018 | | | | | | 022559 | 022741 | 023259 | 023643 | 024351 | 025448 | 025958 | 020248 | 021429 |
| | | | | | | | | | | | | 022755 | 023260 | 023644 | 024352 | 025552 | 025959 | 020249 | 021430 |
| | | | | | | | | | | | | 022756 | | 023750 | 024353 | | 025960 | 020250 | 021459 |
| | | | | | | | | | | | | | | 023751 | 024354 | | 025961 | 020251 | 021521 |
| | | | | | | | | | | | | | | 023752 | 024355 | | | | 021522 |
| | | | | | | | | | | | | | | 023753 | 024356 | | | | 021523 |

Tag codes for Kitimat River

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 022034 | 021614 | 022001 | 021756 | 021961 | 022436 | 022742 | 023253 | 023628 | 024217 | 025151 | 025409 | 020432 | 021517 |
| | | | | | | 022048 | | | 021844 | 022137 | 022527 | 022743 | 023254 | 023629 | 024218 | 025152 | 025529 | 020433 | 021518 |
| | | | | | | | | | | 022222 | | 022745 | 023255 | 023630 | 024219 | 025153 | 025530 | 020434 | 021519 |
| | | | | | | | | | | | | | | 023631 | 024220 | 025154 | 025531 | 020435 | 021520 |
| | | | | | | | | | | | | | | 023632 | 024221 | 025155 | 025532 | 020436 | 021533 |
| | | | | | | | | | | | | | | 023633 | 024222 | 025156 | | 020437 | 021560 |
| | | | | | | | | | | | | | | | | | | 020438 | |
| | | | | | | | | | | | | | | | | | | 020618 | |

Tag codes for Robertson

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 020501 | 020203 | 020606 | 020408 | 021629 | 022217 | 021615 | 021827 | 021661 | 022202 | 022541 | 022662 | 023131 | 023734 | 024256 | 024311 | 025014 | 020645 | 021549 |
| | 020801 | 020406 | 020906 | 020409 | 021630 | 022218 | 021635 | 021829 | | 022405 | 082225 | 022663 | 023132 | 023735 | 024257 | 024802 | 025836 | 020646 | 021550 |
| | 021101 | 020506 | 021206 | 021305 | 021631 | | | | | | | 022708 | 023133 | 023736 | 024361 | 024809 | 025837 | 020950 | 021551 |
| | | 020602 | 021406 | | | | | | | | | 022753 | 023134 | 023737 | 024362 | 024810 | 025838 | 020949 | 021552 |
| | | | | | | | | | | | | 082247 | 023135 | 023738 | 024363 | 024951 | 025839 | 020948 | 021553 |
| | | | | | | | | | | | | 082248 | 023136 | 023739 | 024401 | 024952 | 026055 | 020648 | 021208 |
| | | | | | | | | | | | | | 023142 | 023740 | | 024958 | 026056 | 020647 | 021209 |
| | | | | | | | | | | | | | 023143 | 023741 | | 024959 | 026057 | 020153 | |
| | | | | | | | | | | | | | 023144 | | | 024960 | | 020152 | |
| | | | | | | | | | | | | | 023145 | | | 024961 | | 020151 | |
| | | | | | | | | | | | | | 023151 | | | 025326 | | | |
| | | | | | | | | | | | | | 023203 | | | 025327 | | | |
| | | | | | | | | | | | | | 023204 | | | 025328 | | | |
| | | | | | | | | | | | | | 023206 | | | 025329 | | | |
| | | | | | | | | | | | | | 023208 | | | | | | |
| | | | | | | | | | | | | | 023304 | | | | | | |

Tag codes for Quinsam

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 020403 | 020108 | 021916 | 021736 | 021759 | 021757 | 021657 | 022303 | 022518 | 022631 | 023322 | 023522 | 024152 | 024419 | 025814 | 026062 | 020956 |
| | | | | | | 021737 | | 021758 | 021943 | 022304 | 022519 | 022632 | 023323 | 023523 | 024153 | 024420 | 025815 | 026063 | 020957 |
| | | | | | | 021738 | | | 021950 | | | | 023324 | 023524 | 024154 | 024421 | 025816 | 026101 | 020958 |
| | | | | | | | | | | | | | 023325 | 023525 | 024155 | 024956 | 025817 | 026102 | 020959 |
| | | | | | | | | | | | | | 023326 | 023554 | 024156 | 025358 | 025818 | 020361 | 021448 |
| | | | | | | | | | | | | | 023327 | 023555 | 024157 | 025359 | 025819 | 020360 | 021450 |
| | | | | | | | | | | | | | 023328 | 023556 | 024158 | 025360 | 025820 | 020359 | 021451 |
| | | | | | | | | | | | | | 023329 | 023557 | 024159 | 025361 | 025821 | 020358 | 026019 |
| | | | | | | | | | | | | | 023330 | 023558 | 024160 | 025362 | 025822 | 020357 | |

Tag codes for Puntledge

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 021402 | 020308 | 021816 | 021634 | 021731 | 021854 | 021947 | 022302 | 022556 | 022710 | 023357 | 023727 | 024701 | 023701 | 026034 | 020809 | 180315 |
| | | | | | | | | | | | 022557 | 022711 | 023358 | | 024702 | | | 020810 | 180316 |
| | | | | | | | | | | | | | 023359 | | | | | | |
| | | | | | | | | | | | | | 023360 | | | | | | |

Tag codes for Big Qualicum

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 021002 | 020206 | 021716 | 021726 | 021612 | 021824 | 021810 | 022223 | 022543 | 022661 | 023217 | 023742 | 024260 | 024416 | 026010 | 020660 | 021312 |
| | | | | | | 021727 | 021613 | 021825 | 021944 | 022306 | | 022747 | 023320 | 023743 | 024261 | 024742 | 026047 | 020661 | 021313 |
| | | | | | | | 021656 | 021826 | | | | 022748 | 023321 | 023744 | 024262 | 024761 | 026048 | 020662 | 021314 |
| | | | | | | | | | | | | 022824 | 023333 | 023745 | 024263 | 024762 | 026049 | 020663 | 021315 |
| | | | | | | | | | | | | 022825 | 023334 | 024047 | 024357 | 024957 | 026050 | 020727 | 180253 |
| | | | | | | | | | | | | 022826 | 023335 | 024048 | 024358 | 024962 | 026051 | 020952 | 180254 |
| | | | | | | | | | | | | | 023336 | 024049 | 024359 | 024963 | 026052 | 020953 | 180255 |
| | | | | | | | | | | | | | 023337 | 024050 | 024360 | 025001 | 026053 | 020954 | 180256 |
| | | | | | | | | | | | | | 023338 | | | | 026054 | | |
| | | | | | | | | | | | | | 023345 | | | | 026323 | | |
| | | | | | | | | | | | | | | | | | 026324 | | |

Tag codes for Chehalis

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 022205 | 022520 | 022655 | 022819 | 023754 | 024402 | 024738 | 025761 | 020641 | 020235 |
| | | | | | | | | | | | 022521 | 022701 | 022901 | 023755 | 024403 | 024739 | 025762 | 020642 | 021547 |
| | | | | | | | | | | | 022523 | 022702 | 023041 | 023756 | 024404 | 024740 | | 020643 | 021548 |
| | | | | | | | | | | | 022525 | 022725 | 023042 | 023757 | 024405 | 024741 | | | |
| | | | | | | | | | | | | 022759 | 023043 | 023758 | 024406 | | | | |
| | | | | | | | | | | | | 022760 | | 023759 | 024407 | | | | |
| | | | | | | | | | | | | 022761 | | 024051 | 024408 | | | | |
| | | | | | | | | | | | | | | 024052 | 024409 | | | | |

Tag codes for Chilliwack

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 022163 | 022422 | 022658 | 023414 | 024101 | 024547 | 025542 | 025747 | 020242 | 020329 |
| | | | | | | | | | | | | 022659 | 023415 | | | | 025748 | 020243 | 020330 |
| | | | | | | | | | | | | 022660 | 023416 | | | | | | 020331 |
| | | | | | | | | | | | | | 023417 | | | | | | 020332 |
| | | | | | | | | | | | | | 023418 | | | | | | 180330 |
| | | | | | | | | | | | | | 023419 | | | | | | |

Tag codes for South Puget Sound Fall Yearling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 632004 | 632015 | 632248 | 632147 | | | | | 634959 | 635502 | 630138 | 633926 | |
| | | | | | | | | 632019 | 632302 | 632360 | | | | | | | | | |
| | | | | | | | | 632054 | 632308 | 632416 | | | | | | | | | |
| | | | | | | | | 632055 | | | | | | | | | | | |
| | | | | | | | | 632056 | | | | | | | | | | | |
| | | | | | | | | H10204 | | | | | | | | | | | |

Tag codes for Squaxin Pens Fall Yearling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | 634162 | 634202 | 635244 | 630455 | 633955 |
| | | | | | | | | | | | | | | | | | | | 634008 |

Tag codes for Univ of Washington Accelerated

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 110211 | 110116 | 111601 | 111603 | 111627 | 110634 | 111644 | 111655 | 633025 | 111718 | | | | | | |
| | | | | 110212 | 110117 | 111602 | 111604 | 111628 | 110635 | 111645 | 111656 | | 111719 | | | | | | |
| | | | | 110213 | 110118 | | 111605 | 111629 | 110636 | 111646 | 111657 | | 111720 | | | | | | |
| | | | | 110214 | 110119 | | 111606 | 111630 | 110637 | 111647 | 111658 | | 111721 | | | | | | |
| | | | | 110301 | | | 111618 | 111631 | 110638 | 111648 | 111659 | | 111722 | | | | | | |
| | | | | 110302 | | | 111624 | 111632 | 110639 | 111649 | 111660 | | 111723 | | | | | | |
| | | | | | | | | | 110640 | 111650 | | | | | | | | | |
| | | | | | | | | | 110641 | 111651 | | | | | | | | | |
| | | | | | | | | | 110642 | 111652 | | | | | | | | | |

Tag codes for Samish Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 130302 | | | | 632042 | | | | | | 633804 | 634122 | 634732 | 635242 | 630731 | 634025 |
| | | | | 130602 | | | | 632101 | | | | | | 633805 | | | | | |
| | | | | 130603 | | | | 632102 | | | | | | 633806 | | | | | |
| | | | | | | | | | | | | | | 633807 | | | | | |
| | | | | | | | | | | | | | | 634111 | | | | | |

Tag codes for Stillaguamish Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 050843 | 051063 | 051427 | 211618 | | | 212221 | 212555 | 213147 | 211826 | 212026 |

Tag codes for George Adams Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 130913 | | | 631752 | 632041 | 632146 | 632235 | | | | 633501 | 634119 | 635208 | 635237 | 630450 | 630862 |
| | | | | | | | 631915 | 632109 | 632262 | 632331 | | | | 633502 | | | | | |
| | | | | | | | | | 632161 | | | | | 633503 | | | | | |
| | | | | | | | | | | | | | | 633504 | | | | | |

Tag codes for South Puget Sound Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 130604 | | | 631935 | 631943 | 632233 | 051047 | 051346 | 211622 | 211657 | 211901 | 211961 | 212542 | 213137 | 211831 | 634024 |
| | | | | | | | 631936 | 631944 | 632253 | 632256 | | | | 633643 | 634116 | 635221 | 635238 | 630261 | 212014 |
| | | | | | | | 631940 | | | 632158 | | | | 633644 | 634121 | 635222 | | | |
| | | | | | | | 631945 | | | | | | | 633645 | | | | | |
| | | | | | | | | | | | | | | 633646 | | | | | |
| | | | | | | | | | | | | | | 634104 | | | | | |

Tag codes for Kalama Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 050722 | 050839 | 051048 | 051344 | 211628 | 211706 | 211759 | 211962 | 212541 | 213138 | 211836 | 211833 |
| | | | | | | | | | 050840 | 051049 | 051345 | 211629 | 211707 | 211761 | | | | | |

Tag codes for Elwha Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 051363 | 211616 | 211658 | 211919 | 212208 | | 213132 | 211827 | 212015 |
| | | | | | | | | | | | 632721 | 633038 | 633419 | 211920 | | | | 211828 | |
| | | | | | | | | | | | 632722 | 633039 | 633420 | 211921 | | | | | |
| | | | | | | | | | | | | | | 633543 | | | | | |
| | | | | | | | | | | | | | | 633544 | | | | | |
| | | | | | | | | | | | | | | 633547 | | | | | |
| | | | | | | | | | | | | | | 633548 | | | | | |

Tag codes for Hoko Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 211935 | 212216 | 211907 | | 211829 | 212018 |

Tag codes for Skagit Spring Yearling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 632606 | 632607 | 632608 | 633353 | 633323 | 633314 | 634744 | | | 633114 |
| | | | | | | | | | | | | | 633354 | | | 634902 | | | |
| | | | | | | | | | | | | | | | | 635026 | | | |

Tag codes for Nooksack Spring Yearling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 632411 | 632546 | | 633452 | | 633247 | 634962 | 634422 | 635261 | 634123 |
| | | | | | | | | | | | | | 633453 | | 633248 | 635059 | | | |
| | | | | | | | | | | | | | | | 633336 | | | | |

Tag codes for White River Spring Yearling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 631834 | 632047 | 632136 | 632341 | 632853 | 633049 | 632508 | 633131 | 633246 | 634702 | 630161 | 635542 | 635908 |
| | | | | | | | | | | 632604 | 633009 | 633050 | 633060 | 633648 | 634145 | 634704 | 630162 | | |
| | | | | | | | | | | | | | 633108 | | | | | | |

Tag codes for Sooes Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 051744 | 051907 | 051950 | | 051955 | 052353 |
| | | | | | | | | | | | | | | 051745 | | | | | 052354 |
| | | | | | | | | | | | | | | 051746 | | | | | 052355 |
| | | | | | | | | | | | | | | 051747 | | | | | 052356 |

Tag codes for Queets Fall Fingerling

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 050361 | 050520 | 050661 | 050830 | 050962 | 051425 | 211621 | | 211908 | 212101 | 212835 | 213144 | 211835 | 212010 |
| | | | | | | | 050522 | | 050833 | 051016 | | | | | | | | | |
| | | | | | | | 050525 | | | | | | | | | | | | |

Tag codes for Cowlitz Tule

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 631802 | 631942 | 632154 | 632156 | 632462 | 632503 | 633019 | 633235 | 634108 | 634126 | 635231 | 635250 | 630452 | 634056 |
| | | | | | | | | | 632255 | | | 633020 | 633236 | | | | | | |
| | | | | | | | | | | | | 633124 | 633237 | | | | | | |
| | | | | | | | | | | | | 633125 | 633238 | | | | | | |

Tag codes for Spring Creek Tule

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 050101 | 050401 | 050901 | 050202 | 054101 | 055501 | 050433 | 050639 | 050740 | 051050 | 051142 | 051151 | 051534 | B50109 | 051855 | 051445 | 052013 | 052207 | 052106 |
| | 050201 | 050501 | 051001 | 050302 | 054201 | 055601 | 050434 | 050640 | 050741 | 051051 | 051143 | 051152 | 051535 | B50110 | 051856 | 051449 | 052015 | 052208 | 052109 |
| | 050301 | 050601 | 051101 | 050402 | 054401 | 055701 | 050444 | 050641 | 050742 | 051052 | | | 051536 | B50111 | 051857 | 051450 | 052016 | 052209 | 052110 |
| | | | 051201 | 050502 | 054501 | 056001 | 050446 | | 050748 | | | | 051537 | B50112 | 051858 | 051451 | 052017 | 052210 | 052112 |
| | | | 051301 | 050602 | 054601 | 056201 | | | 050749 | | | | 051538 | B50113 | 051859 | 051659 | 052018 | 052211 | 052115 |
| | | | 051401 | 050702 | | | | | 050750 | | | | 051539 | B50114 | 051860 | 051660 | 052019 | 052212 | 052117 |
| | | | | 050802 | | | | | 050751 | | | | | B50115 | 051861 | 051661 | 052020 | 052213 | 052118 |
| | | | | | | | | | | | | | | B50208 | 051862 | 051662 | 052021 | 052214 | 052123 |
| | | | | | | | | | | | | | | B50209 | 051863 | 051910 | 052023 | 052215 | 052124 |
| | | | | | | | | | | | | | | | 051905 | 051912 | 052024 | 052216 | |
| | | | | | | | | | | | | | | | 051906 | 051913 | 052025 | 052217 | |
| | | | | | | | | | | | | | | | 051909 | 051914 | 052032 | 052218 | |
| | | | | | | | | | | | | | | | | 051923 | 052033 | 052335 | |
| | | | | | | | | | | | | | | | | 051924 | | 052336 | |
| | | | | | | | | | | | | | | | | 051925 | | | |

Tag codes for Bonneville Tule

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 091605 | 071656 | 071842 | 072157 | 072156 | 072407 | 072729 | 073120 | 073322 | | | | | | |
| | | | | | | | | 072163 | 072329 | 072408 | 072730 | 073121 | 073323 | | | | | | |
| | | | | | | | | | 072341 | 072411 | | | | | | | | | |
| | | | | | | | | | 072342 | | | | | | | | | | |

Tag codes for Stayton Pond Tule

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 071841 | 072055 | 072335 | 072662 | 072328 | 073144 | 073352 | 073818 | 074050 | 074526 | 075012 | 075218 | 075227 |
| | | | | | | | | | | | 072830 | 073145 | 073353 | 073819 | 074051 | 074527 | 075015 | 075219 | 075228 |
| | | | | | | | | | | | 072831 | 073146 | 073354 | 073820 | 074052 | 074528 | 075017 | 075220 | 075229 |
| | | | | | | | | | | | 072832 | 073147 | 073355 | 073821 | 074053 | 074529 | 075018 | 075221 | 075230 |
| | | | | | | | | | | | 072833 | 073148 | 073356 | 073822 | 074054 | 074530 | 075020 | 075222 | 075231 |
| | | | | | | | | | | | 072834 | | | | | | | | |

Tag codes for Upriver Bright

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 130713 | 631662 | 631741 | 631821 | 631948 | 632155 | 632252 | 632611 | 632859 | 633221 | 634102 | 634128 | 635226 | 635249 | 630732 | 634057 |
| | | | | 131101 | | 631745 | | | 632261 | 632456 | 632612 | 632860 | 633222 | | | | | | |
| | | | | 131202 | | | | | | | | | | | | | | | |

Tag codes for Hanford Wild

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | 634152 | 635232 | 635252 | 630755 | 634115 |

Tag codes for Lewis River Wild

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 631611 | 631813 | 632123 | | | 632737 | 633126 | 633411 | 633821 | 634151 | 635061 | 630456 | 631350 | 634217 |
| | | | | | | 631618 | 631858 | 632124 | | | 632738 | 633127 | 633412 | 633822 | 634153 | 635062 | | | |
| | | | | | | 631619 | 631859 | 632125 | | | | | | | | | | | |
| | | | | | | | 631902 | 632207 | | | | | | | | | | | |
| | | | | | | | 631920 | 632208 | | | | | | | | | | | |
| | | | | | | | 632002 | 632214 | | | | | | | | | | | |
| | | | | | | | | 632213 | | | | | | | | | | | |

Tag codes for Lyons Ferry

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 633226 | 633638 | 634259 | 635214 | 630226 | 635544 | 634143 |
| | | | | | | | | | | | | | 633227 | 633639 | 634261 | 635216 | 630228 | 635547 | 634160 |
| | | | | | | | | | | | | | 633228 | 633640 | | | | | |
| | | | | | | | | | | | | | | 633641 | | | | | |
| | | | | | | | | | | | | | | 633642 | | | | | |

Tag codes for Willamette Spring

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 090509 | 091701 | 071737 | 071925 | 072219 | 072237 | 072521 | 072863 | 073024 | 073163 | 073428 | 073707 | 074653 | 073721 | 075347 | |
| | | | | | 091703 | 071738 | 072042 | 072222 | 072418 | 072522 | 072905 | 072902 | 073201 | 073429 | 073708 | 074654 | 075158 | 075348 | |
| | | | | | 091621 | 071741 | 072047 | 072224 | 072422 | 072719 | 072930 | 073023 | 073202 | 073902 | 074962 | 075028 | 075159 | 075349 | |
| | | | | | 091622 | 071742 | 072049 | 072225 | 072517 | 072720 | | | 073203 | 073903 | 075002 | 075038 | 075160 | 075350 | |
| | | | | | 091623 | | 072053 | 072226 | 072528 | | | | 073651 | 073906 | 075004 | 075041 | 075161 | 075438 | |
| | | | | | 091624 | | | 072252 | 072529 | | | | 073652 | 073907 | 075013 | 075042 | 075162 | 075439 | |
| | | | | | 091625 | | | 072253 | 072530 | | | | 073653 | 073908 | | 075047 | 075163 | 075501 | |
| | | | | | 091626 | | | 072254 | | | | | 073654 | 073909 | | 075049 | 075202 | 075502 | |
| | | | | | 091627 | | | | | | | | 073655 | 073910 | | 075050 | 075203 | 075504 | |
| | | | | | 091628 | | | | | | | | 073656 | 073911 | | 075052 | 075205 | 075506 | |
| | | | | | 091629 | | | | | | | | 073663 | 073944 | | | 075206 | 075514 | |
| | | | | | 091630 | | | | | | | | 073701 | 073945 | | | 075207 | 075515 | |
| | | | | | 091631 | | | | | | | | 073702 | 073948 | | | 075208 | 075516 | |
| | | | | | | | | | | | | | 073729 | 073949 | | | 075210 | 075522 | |
| | | | | | | | | | | | | | 073730 | 073950 | | | 075211 | 075523 | |
| | | | | | | | | | | | | | 073731 | 073951 | | | | 075524 | |
| | | | | | | | | | | | | | 073732 | 073952 | | | | 075525 | |
| | | | | | | | | | | | | | 073733 | 073953 | | | | 075526 | |
| | | | | | | | | | | | | | 073734 | | | | | 075527 | |
| | | | | | | | | | | | | | 073735 | | | | | 075528 | |
| | | | | | | | | | | | | | 073736 | | | | | | |

Tag codes for Salmon River

| BY 71 | BY 72 | BY 73 | BY 74 | BY 75 | BY 76 | BY 77 | BY 78 | BY 79 | BY 80 | BY 81 | BY 82 | BY 83 | BY 84 | BY 85 | BY 86 | BY 87 | BY 88 | BY 89 | BY 90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 071643 | 071849 | 072239 | 072504 | | 072647 | 072726 | 073051 | 073329 | 073342 | 074629 | 075131 | 075458 | 075705 |
| | | | | | | 071644 | 071850 | 072240 | 072505 | | | | 073052 | 073330 | 074321 | 074635 | 075132 | 075459 | 075706 |
| | | | | | | | | | | | | | | | 074322 | 074636 | 075133 | 075460 | 075707 |
| | | | | | | | | | | | | | | | 074323 | 074637 | 075134 | 075461 | 075708 |
| | | | | | | | | | | | | | | | 074324 | 074638 | 075135 | 075462 | 075709 |
| | | | | | | | | | | | | | | | | | 075136 | | |

## APPENDIX M
## Model Estimates of Fishery Abundance Indices

| Catch Year | SEAK Troll | NCBC Troll | WCVI Troll | GS Sport and Troll |
|---|---|---|---|---|
| 1979 | 0.97 | 1.01 | 1.02 | 1.13 |
| 1980 | 0.95 | 0.96 | 0.97 | 1.03 |
| 1981 | 0.93 | 0.94 | 0.93 | 0.96 |
| 1982 | 1.15 | 1.09 | 1.08 | 0.88 |
| 1983 | 1.37 | 1.19 | 0.97 | 0.90 |
| 1984 | 1.53 | 1.26 | 0.96 | 1.00 |
| 1985 | 1.48 | 1.23 | 0.94 | 0.90 |
| 1986 | 1.59 | 1.16 | 0.99 | 0.69 |
| 1987 | 1.85 | 1.38 | 1.24 | 0.48 |
| 1988 | 2.27 | 1.51 | 1.05 | 0.54 |
| 1989 | 1.97 | 1.48 | 0.90 | 0.73 |
| 1990 | 1.96 | 1.40 | 0.88 | 0.71 |
| 1991 | 1.81 | 1.33 | 0.73 | 0.67 |
| 1992 | 1.76 | 1.37 | 0.82 | 0.83 |
| 1993 | 1.65 | 1.26 | 0.83 | 0.95 |
| 1994 | 1.26 | 1.09 | 0.84 | 0.96 |