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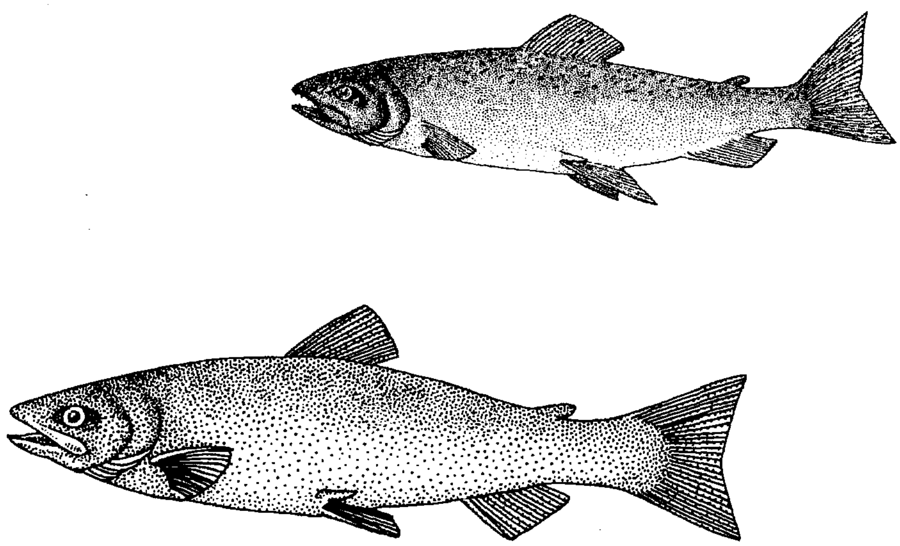
By John H. Clark, John E. Clark, David Gaudet, and John Carlile



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SUMMARY

This biological assessment describes potential incidental impacts of Southeast Alaska salmon fisheries on three groups of ESA listed salmon and evaluates whether or not these Alaskan fisheries jeopardize their continued existence. These salmon originate in the Snake River, a tributary of the Columbia River in the northwestern portion of the United States; Snake River sockeye salmon are currently ESA listed as endangered; Snake River spring/summer chinook salmon and Snake River fall chinook salmon are currently ESA listed as threatened.

The probability that a Snake River sockeye salmon would be incidentally harvested in 1995-1998 Southeast Alaska salmon fisheries is virtually zero. The 1995-1998 Southeast Alaska salmon fisheries are not expected to reduce appreciably Snake River sockeye salmon nor effect the likelihood of survival or potential for recovery of these ESA listed salmon. Southeast Alaska salmon fisheries do not jeopardize the continued existence of ESA listed Snake River sockeye salmon.

There is virtually no probability that Snake River spring/summer chinook salmon would be incidentally harvested in 1995-1998 Southeast Alaska salmon fisheries. The 1995-1998 Southeast Alaska salmon fisheries are not expected to reduce appreciably Snake River spring/summer chinook salmon nor effect the likelihood of survival or potential for recovery of these ESA listed salmon. Southeast Alaska salmon fisheries do not jeopardize the continued existence of ESA listed Snake River spring/summer chinook salmon.

Southeast Alaska is believed to represent the northern fringe of the ESA listed Snake River fall chinook salmon ocean migration pattern; and therefore, 1995-1998 Southeast Alaska salmon fisheries are likely to catch some of these ESA protected salmon. This conclusion is based on use of brood year 1988-1993 Lyons Ferry Hatchery releases of transported and non-transported sub-yearling smolt as an indicator stock for ESA listed Snake River fall chinook salmon.

Southeast Alaska salmon fishery catches and exploitation rates of Snake River fall chinook salmon during the years 1988-1993 were estimated based on recoveries of coded wire tagged Lyons Ferry Hatchery releases of transported and non-transported sub-yearling smolt. Potential statistical relationships between annual estimated Snake River fall chinook salmon mortalities (and mortality rates) and annual overall chinook salmon harvests, annual fishing effort, and annual overall chinook salmon abundances in the Southeast Alaska salmon fisheries for the years 1988-1993 were evaluated for potential use in minimizing mortality of ESA listed Snake River fall chinook salmon; no useful relationships were identified.

Through a second analysis, Southeast Alaska salmon fishery catches and exploitation rates of Snake River fall chinook salmon during the years 1979-

1994 were estimated through use of the Pacific Salmon Commission chinook model. Both analytic procedures (CWT analysis and PSC chinook model analysis) were used to estimate concentration rates of Snake River fall chinook salmon in 1988-1993 Southeast Alaska salmon fisheries. Both analytic procedures were used to estimate potential accrual rates of Snake River fall chinook salmon over Lower Granite Dam for fish not caught in Southeast Alaska salmon fisheries in the years 1988-1993. Although no useful relationships were identified for potential use in minimizing mortality of ESA listed Snake River fall chinook salmon in Southeast Alaska, it was determined that 1995-1998 salmon fisheries would likely cause similar levels of mortality to ESA listed Snake River fall chinook salmon as estimated by the 1988-1993 CWT analysis and the 1979-1994 PSC chinook model analysis.

Therefore, these potential rates of mortality to ESA listed Snake River fall chinook salmon by the 1995-1998 Southeast Alaska salmon fisheries were evaluated with population viability analyses in a manner reasonably similar to the analysis recently completed by NMFS for operations of the Federal Columbia River Power System. Recently released NMFS documents were carefully reviewed and used for guidance concerning various assumptions to use in the population viability analysis. The population viability analysis is considered robust because high-end values were used for various sources of human-induced, non-Alaskan fishing mortality; and because, Southeast Alaska salmon fishery mortality rates were varied in the population viability analysis between absolute zero and the 1979-1982 average annual rate, the highest average annual rate estimated through the 1979-1994 PSC chinook model analysis.

Results of the population viability analysis indicate that threshold escapements of Snake River fall chinook salmon will be met with probabilities in excess of 70%, the jeopardy standard used in the most recent NMFS biological opinion for FCRPS operations. Therefore, so long as 1995-1998 Southeast Alaska salmon fisheries are managed so as to incur harvest rates on ESA listed Snake River fall chinook salmon within the observed range of rates incurred since 1979, Southeast Alaska salmon fisheries will not jeopardize ESA listed Snake River fall chinook salmon. Because the ADF&G intends to manage the Southeast Alaska salmon fishery in 1995-1998 based on abundance with the goal being to maintain harvests at 1991-1993 average rates on major contributing stocks, the federal action involved with respect to these fisheries in 1995-1998 is not expected, directly or indirectly, to reduce appreciably the likelihood of survival or potential for recovery of these ESA listed salmon. Thus, 1995-1998 Southeast Alaska salmon fisheries do not jeopardize the continued existence of ESA listed Snake River fall chinook salmon. Accordingly, recommendations are made for issuance of an incidental take statement for ESA protected Snake River fall chinook salmon in 1995-1998 Southeast Alaska salmon fisheries.

BIOLOGICAL ASSESSMENT OF POTENTIAL INCIDENTAL IMPACTS
OF 1995-1998 SOUTHEAST ALASKA SALMON FISHERIES
ON ESA LISTED SNAKE RIVER SALMON

INTRODUCTION

This biological assessment describes potential incidental impacts of 1995-1998 Southeast Alaska salmon fisheries on three groups of salmon currently listed under the federal Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS) under the "distinct population segment" criteria and evaluates whether or not these fisheries jeopardize the continued existence of these salmon. These salmon originate in the Snake River, a tributary of the Columbia River in the northwestern United States. Snake River sockeye salmon were listed as "endangered" under the ESA in November of 1991 (56 FR 58619). Snake River spring/summer chinook salmon and Snake River fall chinook salmon were listed under the ESA as "threatened" in April 1992 (57 FR 14653). Both groups of chinook salmon were "reclassified" to "endangered" on August 18, 1994, based on a NMFS emergency rule (59 FR 42529). A NMFS technical amendment effective April 17, 1995, reverted both groups of Snake River chinook salmon to "threatened" status.

PROPOSED ACTION

Under its framework fishery management plan for salmon, the North Pacific Fishery Management Council (NPFMC) defers management of salmon fisheries in Southeast Alaska to the State of Alaska. The NPFMC reviews Southeast Alaska salmon fishery management regimes prepared by the State of Alaska for consistency with provisions of the Magnuson Fishery Conservation and Management Act and the Pacific Salmon Treaty (PST). Because of this federal review and action, the NMFS conducts an ESA Section 7 consultation. This biological assessment of the potential impacts of the 1995-1998 Southeast Alaska salmon fishery on ESA listed salmon is submitted for purposes of the ESA Section 7 consultation conducted by the NMFS. This biological assessment considers potential incidental impacts on ESA listed Snake River salmon by the 1995-1998 Southeast Alaska salmon fisheries conducted in federal and state waters from the international boundary in Dixon Entrance to the longitude of Cape Suckling (143^{0}53'36''W). The 1995-1998 Southeast Alaska fishery management regime is described in ADF&G (1995).

ESA LISTED SNAKE RIVER SOCKEYE SALMON IN SOUTHEAST ALASKA

ESA listed Snake River sockeye salmon are not known to be present or incidentally harvested in Southeast Alaska salmon fisheries. There is no direct information available on presence of Snake River sockeye salmon in marine fisheries either from stock identification studies or from coded wire tagging of natural or indicator stocks (PFMC 1993). Coincident timing of sockeye salmon harvests in Southeast Alaska and in-river migration of Snake River sockeye salmon in the Columbia River, approximately 1,000 miles to the south, indicates that the incidental harvest of any Snake River sockeye salmon by Southeast Alaska fisheries is extremely unlikely. Southeast Alaska fisheries harvest mature sockeye salmon. Southeast Alaska fisheries that harvest sockeye salmon do not begin until late June or early July (ADF&G 1993a). Snake River sockeye salmon migrate into the Columbia River during June and July with peak passage at Bonneville Dam about July 1st (PFMC 1993). Given an average daily migration rate of about 25 miles per day, a sockeye salmon would require about 40 days to migrate from Southeast Alaska to the Columbia River. Thus, if Snake River sockeye salmon did transit Southeast Alaska waters, the peak of that migration would pass through these waters more than a month before the fisheries start. The probability that a Snake River sockeye salmon would be incidentally harvested in Southeast Alaska salmon fisheries is virtually zero. The 1995-1998 Southeast Alaska salmon fisheries are not expected, directly or indirectly, to reduce appreciably Snake River sockeye salmon nor effect the likelihood of survival or potential for recovery of these ESA listed salmon. Thus, Southeast Alaska salmon fisheries do not jeopardize the continued existence of ESA listed Snake River sockeye salmon.

ESA LISTED SNAKE RIVER SPRING/SUMMER CHINOOK SALMON IN SOUTHEAST ALASKA

ESA listed Snake River spring/summer chinook salmon are not known to be present or incidentally harvested in Southeast Alaska fisheries. Review of available coded wire tag (CWT) data from hatchery indicator stocks reveals that these fish are not far-north migrating stocks. No CWT recoveries of Snake River spring/summer chinook salmon have ever been made in Southeast Alaska salmon fisheries. Results of CWT experiments on Snake River spring/summer hatchery chinook salmon stocks were reviewed by the Pacific Fishery Management Council (PFMC 1993). Experiments included CWT releases of spring chinook salmon of the 1976-1987 brood years at Rapid River and Sawtooth Hatcheries, and tagged releases of summer chinook salmon of the 1976-1986 brood years at the McCall Hatchery. The PFMC review found no tag recoveries from any of these experiments in Southeast Alaska fisheries. These results were verified by an examination of the CWT data base at the Alaska Department of Fish and Game (ADF&G) Tag Laboratory in Juneau, Alaska (ADF&G 1993b). Based on review of available CWT data for hatchery indicator stocks, there is virtually no probability that Snake River spring/summer chinook salmon would be incidentally harvested in Southeast Alaska salmon fisheries. The 1995-1998 Southeast Alaska salmon fisheries are not expected, directly or indirectly, to reduce appreciably Snake River spring/summer chinook salmon nor effect the likelihood of survival or potential for recovery of these ESA listed salmon. Thus, the Southeast Alaska salmon fisheries do not jeopardize the continued existence of ESA listed Snake River spring/summer chinook salmon.

ESA LISTED SNAKE RIVER FALL CHINOOK SALMON IN SOUTHEAST ALASKA

Historically, the Snake River supported the largest run of fall chinook salmon in the Columbia Basin. Fall chinook salmon were widely distributed throughout the Snake River and many of its tributaries. Fall chinook salmon spawned and reared from the confluence of the Snake and Columbia Rivers upstream some 615 miles to Shoshone Falls, Idaho. The most important spawning grounds were from river mile 328 (near Huntington, Idaho) to river mile 607 (near Auger Falls, Idaho). Fall chinook salmon were prevented from migrating above river mile 456 in 1901 when Swan Falls Dam was constructed. Construction of Brownlee Dam at river mile 273 in 1961 and Hells Canyon Dam at river mile 247 in 1967 blocked upstream passage of Snake River fall chinook salmon and thus prevented spawning fish from reaching what had before been the major spawning and rearing areas. Construction of Ice Harbor Dam at river mile 10 in 1961, Lower Monumental Dam at river mile 42 in 1969, Little Goose Dam at river mile 70 in 1970, and Lower Granite Dam at river mile 108 in 1975 further reduced spawning and rearing habitat for fall chinook salmon in the Snake River even though passage devices were installed at these four dams.

As a result of hydro-development, spawning and river rearing habitat available to Snake River fall chinook salmon today is but a small fraction of what was available historically (about 100 miles of the original 615 miles; none of the riverine habitat that was believed to be the most historically important). The remnant population of Snake River fall chinook salmon remaining today is believed to spawn in the 100 miles of the Snake River between Hells Canyon Dam and the pool above Lower Granite Dam (Figure 1); although deep water spawning in the tail-races of the four lower Snake River dams is believed to occur.

There is no direct information on ocean distribution and fishery impacts on ESA listed Snake River fall chinook salmon as none of these fish have been coded wire tagged and no applicable stock identification methods are available to separate these fish from other chinook salmon stocks. Indirect information is provided by coded wire tagged fall chinook salmon produced at the State of Washington Lyons Ferry Hatchery located on the lower Snake River between Lower Monumental and Little Goose Dams (Figure 1).

Fall chinook salmon with coded wire tags from Lyons Ferry Hatchery have been used to represent the Snake River fall chinook salmon "distinct population segment" in various west coast fisheries because the ESA listed stock itself has not been marked with tags and the fish themselves, if caught, cannot be readily identified from other non-ESA listed chinook salmon stocks. Fall chinook salmon from Lyons Ferry Hatchery have been released each year with coded wire tags since the 1984 brood year. Lyons Ferry Hatchery produces and subsequently releases both sub-yearling and yearling smolts. ESA protected Snake River fall chinook salmon only smolt as sub-yearlings (age 0 smolt). **Therefore, only the Lyons Ferry Hatchery releases of sub-yearling smolt are appropriately used to represent the ESA listed stock.** Lyons Ferry Hatchery releases of sub-yearlings are both transported and non-transported. The Chinook Technical Committee (CTC) of the Pacific Salmon Commission found no statistical differences in the ocean distributions of transported and non-transported sub-yearling chinook salmon released from Lyons Ferry Hatchery (CTC 1994). In-river distributions of transported and non-transported sub-yearling Lyons Ferry Hatchery fish differed statistically (CTC 1994). **Therefore, both transported and non-transported sub-yearling Lyons Ferry Hatchery fall chinook salmon CWT releases are appropriately used to represent the ESA listed stock in ocean fisheries but only the non-transported sub-yearling releases are appropriately used to represent the ESA listed stock in in-river fisheries.**

Recoveries of coded wire tagged Lyons Ferry Hatchery releases of sub-yearling smolt imply that the ESA listed stock of Snake River fall chinook salmon is widely distributed in ocean fisheries from California to Alaska. Although widely distributed, Snake River fall chinook salmon are relatively less abundant in northern areas and more abundant in southern areas than other Columbia River far-north migrating chinook salmon stocks such as up-river bright chinook salmon. The available coded wire tag recovery distribution data imply that Southeast Alaska represents the northerly edge of the migration pattern of Snake River fall chinook salmon. In the NMFS Proposed Recovery Plan for Snake River Salmon (NMFS 1995a), NMFS provides a summary of the distribution of adult coded wire tag recoveries of Lyons Ferry Hatchery sub-yearling releases as follows:

Alaska - 6%;
Canada - 42%;
Washington Coast - 9%;
Columbia River below Bonneville Dam - 9%;
Columbia River above Bonneville Dam - 25%;
Oregon Coast - 7%; and,
California - 2%.

Distribution of yearling smolt released from Lyons Ferry Hatchery is also provided in the NMFS Proposed Recovery Plan (NMFS 1995a):

Alaska - 1%;
Canada - 29%;
Washington Coast - 16%;
Columbia River below Bonneville Dam - 14%;
Columbia River above Bonneville Dam - 18%;
Oregon Coast - 18%; and,
California - 3%.

Clearly, ocean distribution of yearlings is more southerly. As stated earlier, releases of Lyons Ferry Hatchery yearling smolt should not be used to represent the ESA listed stock of Snake River fall chinook salmon. Although the overall analysis included in NMFS (1995a) was based upon 19,795 CWT recoveries; only about 20% of the recoveries included in the analysis were from sub-yearling smolt releases considered indicative of ESA listed Snake River fall chinook salmon. Additionally, CWT recoveries from recent years are not included as the data were taken from the Pacific States Marine Fisheries Commission in June of 1993; and therefore, the analysis is considerably "dated".

Very small numbers of Lyons Ferry Hatchery sub-yearling CWT fall chinook salmon have been recovered in Southeast Alaska fisheries. A total of more than 1.5 million non-transported sub-yearling smolt with coded wire tags from brood years 1984-1989 have been released from Lyons Ferry Hatchery. A total of 69 non-transported, sub-yearling, Lyons Ferry Hatchery chinook salmon with coded wire tags have been recovered in Southeast Alaska fisheries during the eight year period of 1987 through 1994 (Table 1); recovery rate of these fish in Southeast Alaska fisheries has averaged only 1 in about 25,000. A total of 46 transported, sub-yearling, Lyons Ferry Hatchery chinook salmon with coded wire tags have been recovered in Southeast Alaska fisheries during the years 1987 through 1994 (Table 2).

The ADF&G annually conducts an extensive sampling program to recover CWT chinook salmon from Southeast Alaska fisheries. In the process of recovering the 115 (69 non-transported + 46 transported) coded wire tagged chinook salmon released from Lyons Ferry Hatchery as sub-yearling smolt, ADF&G staff (in the years 1987-1994) examined over 750,000 chinook salmon harvested in Southeast Alaska waters for missing adipose fins and recovered almost 50,000 coded wire tags from chinook salmon heads forwarded to the ADF&G Tag Laboratory in Juneau, Alaska

Although all 115 Southeast Alaska recoveries of CWT chinook salmon from sub-yearling smolt releases of Lyons Ferry Hatchery fish during the years 1987-1994 can be used to document presence, only those recoveries from the random sampling program can be used to estimate harvest contributions. As a result, only 95 recoveries during this eight year period (1987-1994) or an average of 12 CWT recoveries per year (range 3 to 29 CWT recoveries per year) are available for estimation of harvests and harvest rates of Lyons Ferry Hatchery fall chinook salmon in the Southeast Alaska salmon fishery. Available random CWT recoveries of Lyons Ferry Hatchery fall chinook salmon from Southeast Alaska salmon fisheries are summarized below:

	Southeast Alaska Fishery				
Year	Troll	Purse Seine	Gill Net	Sport	Total
1987	5	0	0	0	5
1988	7	2	0	0	9
1989	18	0	0	0	18
1990	29	0	0	0	29
1991	4	0	0	0	4
1992	1	2	0	0	3
1993	9	0	0	0	9
1994	16	1	0	1	18
Totals	89	5	0	1	95

Readers of this biological assessment need to be cautioned that estimates of the incidental harvests and harvest rates exerted by the Southeast Alaska salmon fishery on the ESA listed stock of Snake River fall chinook salmon are based on the assumption that Lyons Ferry Hatchery fish can be used as an indicator stock. Readers of this biological assessment also need to be cautioned that all estimates of the annual Southeast Alaska harvests and harvest rates on these ESA listed fish are dependent upon this very limited data base. In many cases, harvest and harvest estimates are based upon only a limited portion of these sparse data depending upon when the estimates were calculated and what portion of the CWT data base were included in the estimation procedure. Additionally, readers of this biological assessment need to be cautioned that the very low sample sizes of available CWT's result in estimates with very low precision. In many cases, one more or one less CWT recovery in the Southeast Alaska salmon fishery would double or halve the harvest rate estimated for an entire age class or brood year. Lastly, readers of this biological assessment need to be cautioned that these very limited

data represent the only quantitative **information available to estimate past harvests and harvest rates for ESA listed Snake River fall chinook salmon in Southeast Alaska salmon fisheries.**

Non-transported Lyons Ferry Hatchery sub-yearling smolt releases of fall chinook salmon have generally been assumed to have similar ocean migration patterns, maturity schedules, and survival rates as ESA listed Snake River fall chinook salmon. These hatchery releases have been used to represent ESA listed Snake River fall chinook salmon by both the Pacific Fishery Management Council (PFMC 1993) and the Pacific Salmon Commission (PSC 1994). In 1994, coded wire tag information for both non-transported and transported Lyons Ferry Hatchery sub-yearlings was used for cohort analysis and incorporated into the PSC and PFMC chinook salmon models based upon recommendations of the CTC of the Pacific Salmon Commission as discussed earlier. The combination of both types of releases provides a larger number of tag recoveries and improved information on fishery recoveries. Although inclusion of transported sub-yearling releases improves the data base, the net increase in available CWT's for evaluation of the Southeast Alaska salmon fishery is only about 67% above the number of CWT's available from non-transported sub-yearling releases. To simulate ESA listed Snake River fall chinook salmon, fishery exploitation rates have been assumed to be the same for hatchery and natural stocks, and hatchery cohort populations have been scaled to the ESA listed population based on relative escapement levels.

Analysis of Lyons Ferry Hatchery Coded Wire Tagged Brood Year 1984-1989 Fall Chinook Salmon

Recoveries of CWT's from releases of sub-yearling smolt from Lyons Ferry Hatchery by age for brood years (BY) 1984-1989 were analyzed to estimate harvests and exploitation rates in Alaskan, Canadian, Lower 48 ocean, and in-river fisheries (Tables 3-8 and summarized in Tables 9 and 10). These estimates of the harvest of CWT Lyons Ferry Hatchery fish were scaled to ESA listed Snake River fall chinook salmon based upon relative levels of the Lyons Ferry Hatchery CWT rack returns to estimated escapements of ESA listed Snake River fall chinook salmon past Lower Granite Dam by age and brood year. For example, the 1 random CWT recovery in the Southeast Alaska troll fishery in 1989 (7/10/89) of an age 5 BY 84 Lyons Ferry Hatchery fish and the 1 random CWT recovery in the Southeast Alaska troll fishery in the winter of 1988 (caught on 10/5/88 and counted as contributing to the 1989 troll season for purposes of the troll fishery accounting year) of an age 5 (almost) BY 84 Lyons Ferry Hatchery fish (Table 1) when expanded for sampling coverage in their respective strata and expanded for other strata (the 1989 sport fishery, for instance) resulted in an estimated landed harvest of 7.99 CWT Lyons Ferry Hatchery fall chinook salmon for this specific age and brood year in the total Southeast Alaska salmon fishery (Table 3). This estimated landed harvest when coupled with estimated incidental mortality during chinook non-retention periods (0.70 fish) resulted in an estimated total mortality of 8.69 for this age and brood year of CWT Lyons Ferry Hatchery fall chinook salmon in the Southeast Alaska salmon fishery (Table 3). Maturity rate and adult equivalent rate for age 5 fish was assumed 100%. After scaling for relative escapement rates of age 5 BY 1984 fish between hatchery rack returns (9.03 CWT fish) and escapement over Lower Granite Dam in 1989 (34 fish), it is estimated that the mortality of age 5 ESA listed Snake River fall chinook salmon in Southeast Alaska in 1989 was 32.71 fish in adult equivalent terms (AEQ) (Table 3).

The harvest and exploitation rate estimates included in Tables 3-10 provide an accounting (estimated) of all human-induced mortality for age 2 and older ESA listed Snake River fall chinook salmon in AEQ terms for catch years 1988-1993. Table 9 provides a summary of estimated human-induced mortality for age 2 and older listed fish across ages by brood year. Table 10 provides a summary of these estimates across ages by calender year for the years 1988-1993. Tables 3-10 include estimates of age specific escapements over Lower Granite Dam (taken from Clark et al. 1995) and estimates of inter-dam loss (taken from U.S. v. Oregon Technical Advisory Committee 1994). Estimated human-induced mortality to listed Snake River fall chinook salmon through the Southeast Alaska fishery, the Canadian fishery, the lower 48 ocean fishery, the Columbia in-river fishery, and inter-dam losses coupled with escapements of these ESA listed fish over Lower Granite Dam for the years 1988-1993 is graphically displayed in Figure 2.

There is a high level of variability associated with annual estimates of removals and removal rates of Snake River fall chinook salmon in fisheries during the years 1988-1993; the only years for which direct calculations can be made based upon use of Lyons Ferry Hatchery releases of sub-yearling smolts as an indicator stock (Table 10). Estimates of the removal rates by the Southeast Alaska salmon fishery vary between 4.3% in 1988 and 13.7% in 1991, removal rates by the Canadian fishery vary between 5.3% in 1991 to 25.4% in 1988, removal rates by the lower 48 ocean fisheries vary from 2.5% in 1992 to 15.2% in 1990, and removal rates by the Columbia in-river fishery vary from 8.4% in 1992 to 33.8% in 1988.

Brood year 1987 and catch year 1991 appear different from other years. The estimated removal rate of natural Snake River fall chinook salmon for BY 1987 in the Southeast Alaska salmon fishery is 17.4%, over twice the subsequent 7.4% average removal rate for BY 1988 and 1989 and more than 3.5-fold over the average for BY 1984-1986 (Table 9). The removal rate for BY 1987 for Canadian fisheries was estimated to be only 3.0%, only about 1/8th of the other 5 brood years. This brood year inconsistency is primarily reflected in removal rates estimated for catch year 1991 (Table 10). The reason for this inconsistency is the very poor survival of BY 1987 CWT Lyons Ferry Hatchery sub-yearling smolt releases and subsequent very small numbers of CWTs recovered in all ocean fisheries and in hatchery rack returns. Only 2 CWTs were recovered in the Southeast Alaska salmon fishery from the 1987 brood year. No tags were recovered from Canadian fisheries. No CWTs from age 5 BY 1987 fish were recovered in any fishery nor from the rack returns at Lyons Ferry Hatchery, even though age 5 fish were documented in the Snake River fall chinook salmon escapement. Estimates of the relative distribution of removal rates for BY 1987 (and catch year 1991) would have been substantially different if only one more or one less CWT from BY 1987 would have been recovered in the Southeast Alaska salmon fishery or if one or more BY 1987 CWTs would have been recovered in the Canadian fishery. This is a good example of the very poor precision associated with these estimates and how the nature of "rare event sampling" can drastically sway harvest and harvest rate estimates that are based upon few tags. Although estimated harvests and exploitation rates included in Tables 3-10 have very poor precision, these estimates require fewer assumptions and fewer data manipulations than is the case for estimates of harvests and exploitation rates provided by the PSC and PFMC chinook models.

Based on the 1988-1993 CWT analysis, the Southeast Alaska fishery which is the fishery situated the farthest from the Snake River, causes the least human-induced mortality. On average, during the 1988-1993 period, it is estimated that 7.5% of the age 2 and older ESA listed Snake River fall chinook salmon were taken in Southeast Alaska fisheries, 19.9% were taken in Canadian fisheries, 8.4% were taken in lower 48 ocean fisheries, and 23.8% were taken in Columbia in-river fisheries; while 22.5% were lost while negotiating the hydro-system and 18.0% escaped over Lower Granite Dam to continue their spawning migration (Figure 2).

Based on the analysis of Lyons Ferry Hatchery CWTs, it is estimated that the Southeast Alaska fishery took an estimated 194 Snake River fall chinook salmon in adult equivalent terms from the 1984 brood year (Table 9). Estimates for later brood years were as follows: 203 from BY 1985; 38 from BY 1986; 227 from BY 1987; 126 from BY 1988; and, 195 from BY 1989 (Table 9).

The CWT analysis indicates that the Southeast Alaska fishery took an estimated 209 Snake River fall chinook salmon in adult equivalent terms in calender year 1988 (Table 10). Estimates for later years were as follows: 224 in 1989; 39 in 1990; 222 in 1991; 144 in 1992; and, 175 in 1993 (Table 10). The take of Snake River fall chinook salmon by the Southeast Alaska salmon fishery during the years 1988-1993 is estimated to have averaged 169 fish.

A substantial portion of the estimated take of ESA listed Snake River fall chinook salmon in the Southeast Alaska salmon fishery is estimated to be due to shaker mortalities of sub-legal sized fish during chinook retention fishing periods and incidental mortality of both sub-legal and legal sized fish during chinook non-retention fishing periods. The estimated proportions of the take associated with landed catches versus incidental mortalities for brood years 1984-1989 are summarized below:

Brood Year	Landed Mortality (%)	Incidental Mortality (%)
1984	64%	36%
1985	65%	35%
1986	58%	42%
1987	43%	57%
1988	43%	57%
1989	53%	47%
Averages	55%	45%

Incidental mortality was estimated based upon the rate assumed by the Pacific Salmon Commission; an assumed 30% mortality rate for incidentally hooked and released chinook salmon in commercial troll and recreational hook and line fisheries. This rate, applied to all PSC fisheries, represents the upper end of the probable range of mortality rates (20-30%) as determined during a 1987 PSC review of available information on incidental mortalities. More recent studies indicate that mortality rates in some fisheries may be substantially less than the 30% rate used by the PSC. For example, studies conducted by NMFS concluded that the most likely rate for incidental hook and release in the Southeast Alaska troll fishery was 24.5% and 20.5% for sub-legal sized (less than 28") and legal sized (more than 28") chinook salmon, respectively (Wertheimer 1988). Recent studies in Canada and the Pacific Northwest have shown that recreational fishery hook and release rates are likely to be under 20%. Thus, the PSC incidental mortality rates used in this analysis likely overestimate impacts by Southeast Alaska salmon fisheries on Snake River fall chinook salmon.

Relationships Between Estimated Mortalities of Snake River Fall Chinook Salmon and Various Aspects of the Southeast Alaska Salmon Fishery, 1988-1993

Estimated annual take and landed take of Snake River fall chinook salmon during the period 1988-1993 is not significantly related to the overall annual harvests of chinook salmon in the Southeast Alaska salmon fishery in a statistical sense. Annual take of Snake River fall chinook salmon in the years 1988-1993 is estimated to have ranged from 39 fish in 1990 to 224 fish in 1989, a 5.7 fold difference; while annual total landed harvest of chinook salmon in the Southeast Alaska salmon fishery during the same six years ranged from about 260,000 fish in 1992 (178,200 PSC "base" chinook) to about 367,000 fish in 1990 (266,800 PSC "base" chinook), a 41% difference (Figure 3). The R^2 value for these six paired data points is only 15% indicating that little variation in the annual take of Snake River fall chinook salmon can be explained by total chinook salmon harvests in Southeast Alaska. The parametric correlation coefficient is -0.39, indicating that as Southeast Alaska salmon harvests decrease, take of Snake River fall chinook salmon increases, a non-sensible result. **Clearly, incidental catch (total mortality) of Snake River fall chinook salmon in the Southeast Alaska salmon fishery is not related to overall level of harvest.** When the annual estimated landed catches of Snake River fall chinook salmon are substituted for estimates of total take of Snake River fall chinook salmon, the R^2 value is only 22% and the parametric correlation coefficient is -0.47, reaffirming that overall chinook salmon harvest levels in Southeast Alaska are not related to the level of incidental catch of ESA listed Snake River fall chinook salmon.

These relationships imply that management of the Southeast Alaska salmon fishery via quota to achieve a specified minimum take of Snake River fall chinook salmon during the years 1988-1993 would have been as likely as not to have failed to achieve the desired outcome (unless the quota was set at zero). There is no reason to expect that management to achieve a specified take for ESA listed Snake River fall chinook salmon in the Southeast Alaska salmon fishery in future years would better meet such a fishery management goal. It is reasonable to expect that take in the range of historical estimates (1988-1993) for Snake River fall chinook salmon will occur so long as some level of harvest of chinook salmon in Southeast Alaska takes place.

In further efforts to develop a predictor for Snake River fall chinook salmon take in Southeast Alaska salmon fisheries, estimated exploitation rates of Snake River fall chinook salmon by the Southeast Alaska salmon fishery for the years 1988-1993 were statistically compared through correlation analysis to:

(1) annual landed catches of chinook salmon in the Southeast Alaska salmon fishery minus hatchery add-ons; (2) annual troll fishing effort expended in Southeast Alaska; and, (3) annual overall chinook salmon exploitation rates in Southeast Alaska as estimated by the PSC chinook model index. Graphic representations of these three possible relationships are provided in Figure 4. The statistical comparisons included parametric correlation analysis and non-parametric Spearman rank coefficients. Results were as follows:

Southeast Alaska Salmon Fishery Variable	Parametric Correlation Coefficient	Spearman Non-Parametric Correlation Coefficient
Landed Catches	0.228	0.200
Fishing Effort	-0.413	-0.314
Overall Exploitation Rate	0.440	0.314

None of these correlations were statistically significant, indicating that annual Snake River fall chinook salmon exploitation rates in the Southeast Alaska salmon fishery during the years 1988-1993 were not related to any of these three variables that might be used as a basis for fishery management. This implies that management of the Southeast Alaska salmon fishery to achieve a tightly defined and specified exploitation rate during the years 1988-1993 would have been as likely as not to have failed to achieve the desired outcome.

Exploitation rate of Snake River fall chinook salmon in Southeast Alaska salmon fisheries should be a function of fishing effort; the fact that the relationship during the years 1988-1993 is not significant and trends in the wrong direction is probably due to a combination of at least two factors. First, the level of precision associated with estimated Snake River fall chinook salmon exploitation rates in Southeast Alaska salmon fisheries is low; and although, the data base likely provides estimates that are within an order of magnitude, the statistical reliability of individual annual estimates is low. Thus, due to random errors associated with rare event sampling, estimated exploitation rates of Snake River fall chinook salmon do not track well with Southeast Alaska fishing effort. Second, Snake River fall chinook salmon are only rarely detected in Southeast Alaska; Southeast Alaska is generally assumed to represent the northern edge of their ocean distribution pattern. It may be reasonable to assume that distributions of these fish vary on an annual basis and the varying annual exploitation rates may be more a function of whether or not the stock migrates significantly into Southeast Alaska waters in a given year than a function of fishing effort in this peripheral portion of their range.

In any event, there is no reason to expect that management to achieve a tightly defined exploitation rate for ESA listed Snake River fall chinook salmon in Southeast Alaska salmon fisheries in the years 1995-1998 would better meet such fishery management specification goals than would have been the case for the years 1988-1993. It is likely and reasonable to expect that exploitation rates in the range of historical estimates for Snake River fall chinook salmon will occur so long as some level of significant harvest of chinook salmon in Southeast Alaska takes place.

Concentration of Snake River Fall Chinook Salmon in the Southeast Alaska Fishery, CWT Analysis - 1988-1993

The concentrations of Snake River fall chinook salmon in the Southeast Alaska salmon fisheries for the years 1988-1993 were estimated. Estimated annual landed mortality of natural Snake River fall chinook salmon in Southeast Alaska was divided by annual total landed mortality of chinook salmon in Southeast Alaska for the years 1988-1993. Results were as follows:

Year	Estimated Landed Catch of SRFC in SEAK	Total Landings of Chinook Salmon in SEAK	Ratio	Expansion
1988	191	278,891	0.00068	1,462
1989	190	291,078	0.00065	1,528
1990	31	366,827	0.00008	11,840
1991	178	356,963	0.00050	2,007
1992	114	259,981	0.00044	2,276
1993	140	304,082	0.00046	2,171
Averages	141	309,637	0.00047	3,547

Concentration, or relative abundance of natural Snake River fall chinook salmon in the Southeast Alaska salmon fishery is estimated to have varied by a factor of over 8-fold during the six year period, 1988-1993. Annual variability in relative concentration of ESA listed Snake River fall chinook salmon is the primary factor that results in varying levels of annual take of this ESA listed distinct population segment. Accurate and precise pre-season estimates of the up-coming concentration of natural Snake River fall chinook salmon would be required to successfully manage the Southeast Alaska salmon fishery for a pre-determined take. And, these estimates would require accurate and precise pre-season estimates of: (1) the up-coming overall chinook salmon abundance in Southeast Alaska; and, (2) the up-coming abundance of natural Snake River fall chinook salmon in Southeast Alaska. This makes management of the Southeast Alaska salmon fishery a largely ineffective conservation tool for ESA protected Snake River fall chinook salmon until such time as improved pre-season estimates of abundance of all chinook salmon and ESA listed Snake River fall chinook salmon in Southeast Alaska are available to managers to use as fishery management tools.

Spawner Equivalents, CWT Analysis - 1988-1993

Because ESA listed Snake River fall chinook salmon not caught in Southeast Alaska and **potentially** available to bolster spawning escapements are likely to be taken in intervening fisheries or lost as they migrate upstream and negotiate the hydro-power system, this CWT data set was directly used to estimate the numbers of natural Snake River fall chinook salmon that would have been passed through intervening fisheries and the dams to accrue to the Lower Granite Dam counts in the years 1988-1993. Accrual rate to the spawning grounds, or spawner equivalent rate, for natural Snake River fall chinook salmon not caught in Southeast Alaska in 1988 was estimated to have been 8%. Thus, if the 1988 Southeast Alaska salmon fishery had not taken place, of the estimated 209 Snake River fall chinook salmon taken in this fishery, only 17 of these fish or 8% of them would have passed Lower Granite Dam and continued on their spawning migration. An estimated 53 of these 209 fish would have been taken in Canadian fisheries (25%), an estimated 16 of these 209 fish would have been taken in lower 48 ocean fisheries (8%), an estimated 79 of these 209 fish would have been taken in Columbia in-river fisheries (38%), and an estimated 44 of these 209 fish would have been lost going through the hydro-system (21%) (Figure 5). Similarly estimated accrual rates to Lower Granite Dam for later years follow: 9% in 1989 (Figure 6); 13% in 1990 (Figure 7); 23% in 1991 (Figure 8); 31% in 1992 (Figure 9); and, 38% in 1993 (Figure 10).

Accrual rate to the spawning grounds during the period 1988-1993 is estimated to have averaged 20%. Escapement of natural Snake River fall chinook salmon over Lower Granite Dam from 1988-1993 averaged 383 fish. Were the 1988-1993 Southeast Alaska salmon fishery take to have been reduced by 30%, it is estimated that Lower Granite Dam escapements would have averaged 396 fish, 13 fish more, or a 3% higher escapement level than actually occurred (Figure 11). Were the 1988-1993 Southeast Alaska salmon fishery take to have been reduced by 50%, it is estimated that Lower Granite Dam escapements would have averaged 404 fish, 21 fish more, or a 6% higher escapement level than actually occurred (Figure 11). If the Southeast Alaska salmon fishery had not occurred during 1988-1993, it is estimated that Lower Granite Dam escapements of natural Snake River fall chinook salmon would have averaged 426 fish, 43 fish more, or only 11% higher (Figure 11). Any reasonable manipulation of the Southeast Alaska salmon fisheries to increase escapement over Lower Granite Dam is an ineffective fishery management action if the intent is to significantly increase the number of ESA listed Snake River fall chinook salmon on the spawning grounds.

PSC Chinook Model Estimates of Snake River Fall Chinook Salmon in Southeast Alaska Fisheries, 1979-1994

The current calibration of the PSC chinook model was used to obtain estimates of harvests and exploitation rates for the Southeast Alaska, Canadian, lower 48 ocean, and Columbia in-river fisheries for the years 1979-1994 for age 2-5 natural Snake River fall chinook salmon. Estimates were obtained for landed catches as well as for incidental mortalities (Table 11). These estimates were adjusted to estimate total adult equivalent mortalities (Table 12). Exploitation rates on natural Snake River fall chinook salmon by these four fisheries were estimated (Table 13); and subsequently, adjusted to estimates of total adult equivalent mortalities (Table 14).

Estimated AEQ catches of natural Snake River fall chinook salmon in the Southeast Alaska salmon fishery developed through the PSC chinook model tended to be smaller than the estimates developed through the Lyons Ferry Hatchery CWT analysis, particularly for age 4 fish (Figure 12). In general, the PSC chinook model provided estimates on the order of one half the estimates developed through the Lyons Ferry Hatchery CWT analysis. Development of catch and exploitation rate estimates through the PSC chinook model requires many more assumptions and data manipulations than were used in the Lyons Ferry Hatchery CWT analysis. For example, the PSC chinook model projects escapements by age class and uses these projections rather than actual inputted age specific escapements (Figure 13).

On the other hand, the PSC chinook model provides estimates back to 1979, allowing a longer-term examination of trends (Figure 14). A comparison of PSC chinook model estimates of the take of Snake River fall chinook salmon in the Southeast Alaska salmon fishery in conjunction with estimates of the natural escapement of Snake River fall chinook salmon past Lower Granite Dam reveals an interesting trend (Figure 15). The ratios of Snake River fall chinook salmon counted over Lower Granite Dam to estimated Snake River fall chinook salmon mortality in Southeast Alaska have decreased substantially since 1979. This indicates that the Southeast Alaska salmon fishery has had a diminishing effect on this stock of salmon since 1979 (Figure 15).

This analysis implies that the Southeast Alaska salmon fishery managed in 1995-1998 for overall exploitation rates as occurred, on average, in the period 1991-1993, would tend to have lesser effects on Snake River fall chinook salmon than would be the case if the fishery was managed similar to the years 1979-1982, 1986-1990, or 1988-1993.

Concentration of Snake River Fall Chinook Salmon in the Southeast Alaska Salmon Fishery

The relative concentrations of natural Snake River fall chinook salmon in the Southeast Alaska salmon fishery during the years 1988-1993 were estimated. Total chinook salmon mortalities for all stocks, expressed in AEQ's, for the Southeast Alaska salmon fishery were estimated using total AEQ catches as estimated by the PSC chinook model and scaling these total catches by the ratios of actual observed catches in the fishery to catches as estimated by the model. Concentrations of Snake River fall chinook salmon were calculated by dividing the total estimated AEQ mortalities of natural Snake River fall chinook salmon in the Southeast Alaska salmon fishery by the total estimated AEQ mortalities for all stocks. Estimated concentrations of Snake River fall chinook salmon in the Southeast Alaska salmon fishery during the years 1988-1992 are summarized below:

Year	Estimated Concentrations	Estimated Expansion Ratios	Estimated Take
1988	0.00060	1: 1,667	209
1989	0.00055	1: 1,818	224
1990	0.00009	1:11,111	39
1991	0.00054	1: 1,818	222
1992	0.00040	1: 2,500	144
1993	0.00046	1: 2,174	175
Averages	0.00044	1: 3,520	168
Average in 88-89 & 91-93	0.00051	1: 1,960	228

As can be seen, concentration, or relative abundance of natural Snake River fall chinook salmon in the Southeast Alaska salmon fishery is estimated to have varied by a factor of over 6-fold during the six year period, 1988-1993. Estimated concentration of Snake River fall chinook salmon in Southeast Alaska salmon fisheries during five of the six years (1988-1989 & 1991-1993) averaged 0.00051 and only ranged from 0.00040 to 0.00060, a 1.5-fold level of variation. The other year, 1990, is the year when the escapement of Snake River fall chinook salmon only totaled 78 natural adults over Lower Granite Dam. Estimated concentration of natural Snake River fall chinook salmon in the Southeast Alaska salmon fishery during 1990 was only 0.00009; or, in other words, only an estimated 1 out of 11,112 chinook salmon in the Southeast Alaska salmon fishery in 1990 was a natural Snake River fall chinook salmon.

Implementation of conservation measures in Southeast Alaska to bolster escapements of Snake River fall chinook salmon are likely ineffective because when abundance of ESA fish is very low, the number of ESA fish that potentially could be saved is extremely small; and, only a small proportion of ESA fish potentially "saved" can be passed through intervening fisheries and through the Federal Columbia River Power System (FCRPS) and thus on to the spawning grounds. When abundance of the ESA protected fish is substantially larger than the levels of abundance that occurred during the period 1988-1993 only very modest savings in Southeast Alaska could be accrued to the spawning grounds and those are likely the years when marginal conservation actions are unneeded. It is this variability in relative concentration of ESA listed Snake River fall chinook salmon that results in varying levels of take, not variability in overall chinook salmon harvests. This fact makes management of the Southeast Alaska salmon fishery an ineffective conservation tool for ESA protected Snake River fall chinook salmon if the intent is to substantially increase the number of spawners.

Estimated concentrations of natural Snake River fall chinook salmon in the Canadian fishery, in the lower 48 ocean fishery, and in the Columbia in-river fishery were also calculated for the years 1988-1992 (Figure 16). As can be seen, concentrations of Snake River fall chinook in the Columbia in-river fishery is estimated to be about four-fold the levels estimated for ocean fisheries. These increased concentrations of Snake River fall chinook salmon after they exit the Pacific Ocean coupled with the increased probability of pass-through to the spawning grounds makes harvest management of Columbia River in-river fisheries coupled with better control of inter-dam loss of adults much more effective management tools for achievement of desired escapements of ESA listed Snake River fall chinook salmon past Lower Granite Dam; if, management of ESA listed fish is focused on age 2 and older fish.

If, on the other hand, management focuses on measures that could be implemented throughout the life history of ESA listed Snake River chinook salmon, escapements over Lower Granite Dam can best be increased by <u>improving juvenile passage survival</u> of these ESA listed fish as they migrate through the Columbia/Snake hydro-system. The most recent FCRPS biological opinion (NMFS 1995b) states that ESA listed Snake River fall chinook salmon juveniles are

likely to suffer between 62 and 100% mortality over the coming four years due to FCRPS operations.

Spawner Equivalents, PSC Chinook Model Estimates

The PSC chinook model was also used to estimate the numbers of natural Snake River fall chinook salmon that would have been passed through to the Canadian fishery and so forth as well as accruing to the escapement for the years 1979-1994 were these fish not caught in Southeast Alaska salmon fisheries. Estimated potential accrual rates to the spawning escapement from Snake River fall chinook salmon "saved" in Southeast Alaska (spawner equivalents) ranged from 8.3% for 1988 to 55.2% for 1994 during the 16 year period of 1979-1994 (Table 15). A comparison of the annual accrual rates to the spawning grounds from the PSC chinook model estimation procedures and the Lyons Ferry Hatchery CWT estimation procedures for the years 1988-1993 is summarized below:

	Estimated Accrual Rate to the Spawning Escapement for Snake River Fall Chinook Salmon "Saved" in Alaska	
Year	Lyons Ferry Hatchery CWT Analysis	PSC Chinook Model Analysis
1988	8%	8%
1989	9%	14%
1990	13%	16%
1991	23%	11%
1992	31%	27%
1993	38%	27%
Average	20%	17%

Although estimated accrual rates to the spawning escapements differ in absolute value by as much as 12% for individual years between the two analytic procedures, average values are similar (20% versus 17%); and, the increasing trend through time is apparent with both data sets. On average, only about 1 in 5 of the Snake River fall chinook salmon "saved" in Southeast Alaska would have returned to the spawning grounds during the years 1988-1993.

SPAWNER TO SPAWNER REPLACEMENT RATES FOR NATURAL SNAKE RIVER FALL CHINOOK SALMON BASED ON A BROOD YEAR APPROACH

Because NMFS reinitiated ESA Section 7 consultations concerning Southeast Alaska salmon fisheries and potential impacts of these fisheries on ESA listed Snake River fall chinook salmon in August of 1994 based upon new information largely consisting of estimated spawner to spawner replacement rates, an analysis of spawner to spawner replacement rates is included in this 1995-1998 biological assessment of Southeast Alaska salmon fisheries. The spawner-spawner replacement rate analysis that was used in 1994 consisted of dividing a given year's escapement level as measured at Lower Granite Dam in terms of adult natural spawners by the weighted average of escapements three, four, and five years earlier. While this approach has the advantage of examining the very most recent escapements, it has the disadvantage of having to make a determination as to exactly what numbers of fish to include in the denominator as well as having to use a weighted average for this portion of the fraction. The first problem is complicated because of NMFS definition of ESA listed Snake River fall chinook salmon only including progeny of natural spawners. The second problem is one of including weighted averages to represent initial escapements rather than using actual realized escapements.

Both of these problems can be easily overcome by conducting a brood year analysis (a commonly accepted approach in fishery science); wherein: (1) the denominator is entirely composed of a given brood year escapement which is counted (such as the 720 natural spawners that escaped over Lower Granite Dam in 1982); and, (2) the numerator of the fraction is composed of the sum of the age 3 natural escapement 3 years later added to the age 4 natural escapement 4 years later added to the age 5 natural escapement 5 years later (such as 40+162+4 = 206, in the case of the 1982 brood year). This approach to the analysis avoids the technical issue of using weighted average escapements rather than actual counted escapements and has the advantage that all the fish involved in the equation are by definition, progeny of natural spawners; and thus, the analysis is compatible with the NMFS definition of ESA listed Snake River fall chinook salmon.

Available data were reviewed for purposes of conducting such an analysis and because of limited year specific age estimates available for the escapement of Snake River fall chinook salmon, the analysis was confined to brood year 1982 forward. Brood year 1990 was included because only the 5 year old fish have yet to return and hence the numerator for the fraction is largely fixed.

Once the brood year spawner-spawner fractions were calculated, various known sources of mortality to Snake River fall chinook salmon were examined to determine which, if any, of these sources of known human-induced mortality explained a significant portion of the variability in the brood year-based spawner to spawner ratios. Sources of human-induced mortality examined included: (1) rate of inter-dam loss (U.S. v. Oregon Technical Advisory Committee 1994); (2) rate of natural stock exploitation for Lyons Ferry Hatchery development (Clark et al. 1995); (3) Columbia in-river fishery harvest rate (PSC chinook model); and, (4) ocean harvest rate (PSC chinook model). Estimated annual values for these sources of human-induced mortality were regressed against the spawner to spawner ratios with multiple regression techniques and those human-induced sources of mortality which were least correlated with the spawner to spawner ratios were removed one at a time until a significant relationship was developed. Human-induced mortality rates associated with the Lyons Ferry Hatchery brood stock development, the Columbia in-river fisheries, and overall ocean fisheries were not statistically significant variables. Only annual rate of inter-dam loss (Figure 17) was significantly related to the brood year-based spawner to spawner ratios (R^2 = 0.832).

Estimated brood year based spawner to spawner replacement rates varied from a low of 0.283 for the 1985 escapement of 449 spawners to a high of 5.577 for the 1990 escapement of 78 spawners, almost a 20-fold level of variation. Spawner to spawner replacement rates averaged 1.57 for the 1982-1990 brood years. Four of the nine brood year escapements replaced themselves, five did not. Average inter-dam losses associated with the five brood years that failed to replace themselves was 64.1%; average inter-dam losses associated with the four brood years that replaced themselves was 46.6%. None of the escapements larger than 430 natural Snake River fall chinook counted over Lower Granite Dam replaced themselves. All three of the most recent brood years replaced themselves (1987-1990); and the 1986 brood year escapement was only 1 fish short of replacing itself. A summary of the analysis is provided below:

Brood Year	Natural SRFC Spawning Escapement	Returning Escapements[1] of Natural SRFC by Age: Age 3	Age 4	Age 5	Total	Estimated Spawner to Spawner Fraction	Estimated Inter-Dam Loss[2] of SRFC %
1982	720	40	162	4	206	0.286	64.0%
1983	428	251	227	98	576	1.346	67.6%
1983	324	22	250	34	306	0.944	69.7%
1984	438	20	238	9	267	0.610	64.6%
1985	449	23	59	45	127	0.283	63.0%
1986	253	10	178	64	252	0.996	58.9%
1987	368	95	393	61	549	1.492	52.2%
1989	295	92	631	41	764	2.590	40.0%
1990	78	50	331	54	435	5.577	26.6%

[1] Age 4 and 5 escapements for the 1994 return were estimated base on average age compositions because the 1994 age compositions were unavailable. The age 5 escapement resulting from brood year 1990 has yet to return and the number 54 was estimated using the average 1982-1989 ratio of total return to the age 3 and age 4 return adjusted to age 3 and 4 brood year 1990 escapement returns.

[2] Data Source: U.S. v. Oregon Technical Advisory Committee (1994); inter-dam loss on a given brood year was a weighted average for age 3, 4, and 5 returns.

The recently completed FCRPS biological opinion and ESA Section 7 incidental take permit (NMFS 1995b) limits the FCRPS inter-dam losses for the next few years to a level of 39%. If all other sources of human-induced mortality remain at levels similar to the levels encountered by the 1982-1990 brood years, and if, the FCRPS maintains inter-dam losses under the 39% ESA permitted limit, it can reasonably be expected that brood years of Snake River fall chinook salmon now in the ocean will achieve spawner to spawner replacement rates well in excess of 1.0:1.0 (spawners returning : parental spawners); the relationship depicted in Figure 17 implies that these ratios will be more on the order of 3.5:1.0. Nothing in this analysis indicates that catches of ESA listed Snake River fall chinook salmon in the Southeast Alaska salmon fishery will significantly change the spawner to spawner ratio over the time period covered by this biological assessment (1995-1998).

JEOPARDY ANALYSIS OF IMPACTS OF SOUTHEAST ALASKA SALMON FISHERIES ON ESA LISTED SNAKE RIVER FALL CHINOOK SALMON

On remand following the Court's decision in Idaho Department of Fish and Game, et al. v. National Marine Fisheries service et al., Civ. No. 92-973-MA (Lead Case), 93-1420-MA, 93-1603-MA, (D. Or.) (hereafter "IDFG v NMFS"), NMFS and the federal action agencies for the Federal Columbia River Power System operations engaged in extensive discussions with states (including Alaska), tribes, and other parties. Those discussions addressed among other things, the application of the statutory standards of ESA Section 7(a)(2). The participants established a Biological Requirements Work Group (BRWG) comprised of scientists and fishery managers representing federal, state, and tribal agencies. The BRWG examined the biological requirements of listed Snake River salmon and the use of these requirements in ESA Section 7(a)(2) determinations. NMFS subsequently received an independent scientific review of the BRWG work product from a team of nationally recognized experts in fish population dynamics. In response to the court's order, NMFS revised the analysis it applies to determine whether a proposed action is likely to jeopardize the continued existence of ESA listed Snake River salmon. The revised analysis was applied to the 1994-1998 FCRPS Biological Opinion (NMFS 1995b). The NMFS (1995b) has stated its intent that this approach be applied to all federal actions affecting ESA listed Snake River salmon.

Because the revised analysis was intended to be applied to all federal actions affecting listed Snake River salmon (NMFS 1995b) and because ADF&G was informed in a February 13, 1995, letter from William Stelle, Jr., Regional Director, Northwest Region, National Marine Fisheries Service, that NMFS intends to apply the ESA's jeopardy standard to the Southeast Alaska salmon fishery in accordance with guidelines developed in the IDFG v. NMFS remand proceedings, **ADF&G staff worked with members of BRWG to model the Southeast Alaska salmon fishery through the BRWG's population viability analysis to analyze potential jeopardy to listed Snake River fall chinook salmon from the Southeast Alaska salmon fishery.**

A cursory review of the revised jeopardy standard approach is provided as an aid to the readers of this biological assessment along with definitions of terms such as "survival" and "recovery" as used in the revised jeopardy analysis. An overview of the revised ESA Section 7(a)(2) approach follows:

1. Define the biological requirements of the listed species.

2. Evaluate the relevance of the environmental baseline to the species current status.

3. Determine the effects of the proposed or continuing action on listed species.

4. Determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages.

5. Identify reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of the listed species.

NMFS (1995b) stated its intent that this analysis which addresses special characteristics of Pacific salmon be a supplement and be consistent with the general consultation guidance currently undergoing public review in the Services "Draft Section 7 Endangered Species Consultation Handbook -- Procedures for Conducting Section 7 Consultations and Conferences", 59 Federal Register 65781 (December 21, 1994) (hereafter referred to as the "Draft Handbook"). NMFS must evaluate the effects of proposed federal actions on listed Snake River salmon in Section 7(a)(2) consultations by applying the standards of the ESA, 16 U.S.C. Section 1536(a)(2), as interpreted by the NMFS and U.S. Fish and Wildlife Service (USFWS) joint consultation regulations (50 CFR Part 402). Using the best scientific and commercial data available, NMFS must determine whether a proposed federal action is likely to: (1) jeopardize the continued existence of a listed species; or, (2) destroy or adversely modify the designated critical habitat of a listed species. The consultation regulations define "jeopardize the continued existence of" to mean:

> *... to engage in an action that reasonably would be expected directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 C.F.R. Section 402.02).*

The regulatory terms "survival" and "recovery" are defined by the "Draft Handbook" for use in jeopardy/critical habitat analysis as follows:

> <u>*Survival*</u>*: the species' persistence, beyond conditions leading to its endangerment, with sufficient resilience to allow recovery. Said another way, survival is the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a species with a sufficiently large population, represented by all age classes, genetic heterogeneity, and a number of sexually mature individuals producing viable offspring, that exists in an environment providing all requirements for completion of the species entire life cycle, including reproduction, sustenance, and shelter.*

> <u>*Recovery*</u>*: improvement in the status of a species and the ecosystems upon which they depend. Said another way, recovery is the process by which species' ecosystems are restored so they can support self-sustaining and self-regulating populations of listed species as persistent members of native biotic communities.*

The BRWG used the "Draft Handbook" definition of "survival" and "recovery" in the context of Pacific salmon and defined "survival" and "recovery" as follows:

> <u>*Survival*</u>*: Persistence of a listed salmon population into the future under conditions that will retain the potential for recovery. Survival is*

characterized by sufficiently large populations, represented by all age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, that exist in an environment providing all of the requirements for completing the species' entire life cycle, including reproduction, growth, migration, and cover.

<u>*Recovery*</u>*: The process by which the quality and quantity of the Columbia River/Snake River ecosystem is restored so that it can support self-sustaining and self-regulating populations of listed salmon species as persistent members of the native biotic community. At the end of this process, when the population conditions described above are achieved, delisting of the population is warranted.*

The BRWG developed a population viability analysis and constructed models to provide a quantitative approach to determining if survival and recovery criteria would be met for ESA listed Snake River chinook salmon distinct population segments. In the process of developing this approach, the BRWG defined threshold levels for ESA listed Snake River chinook salmon distinct population segments as a criteria for survival and used delisting values recommended by the Snake River Recovery Team as recovery criteria. After review and after submitting the BRWG approach to an independent peer review group, NMFS (1995b) concluded in general, the following concerning the BRWG recommended threshold population levels:

The BRWG's threshold population levels for survival correspond to the Draft Handbook's definition of survival as used by the BRWG, which requires "sufficiently large populations" to ensure persistence into the future under conditions that will retain the potential for recovery. In an independent peer review of the BRWG report, Barnthouse et al. (1994) concluded that the BRWG's method of developing threshold levels was credible.

Further, NMFS (1995b) concluded specifically for Snake River fall chinook salmon that:

The NMFS finds that the threshold level of 300 spawners annually recommended by the BRWG is reasonable and adopts that threshold for purposes of the jeopardy analysis applicable to Snake River fall chinook salmon.

NMFS (1995b) reached the following conclusions relative to recovery criteria for Snake River fall chinook salmon:

For escapement levels representing recovery, the BRWG report made provisional recommendations; however, these are now superseded by delisting criteria in NMFS' draft Recovery Plan. The following numerical escapement delisting criteria are specified in the draft Recovery Plan as eight-year geometric means: ... (2) at least 2500 naturally-produced fall chinook salmon in the lower Snake River and tributaries, excluding the lower Clearwater River ...

The draft Recovery Plan (NMFS 1995a) is currently undergoing public review. Section 4 (f) (4) and (5) of the ESA states:

> *(4) The Secretary shall, prior to final approval of a new or revised recovery plan, provide public notice and an opportunity for public review and comment on such plan. The Secretary shall consider all information presented during the public comment period prior to approval of the plan.*
>
> *(5) Each Federal agency shall, prior to implementation of a new or revised recovery plan, consider all information presented during the public comment period under paragraph (4).*

The comment period for the draft Recovery Plan will likely last through much of the summer of 1995. Following this on-going public review period, NMFS will consider public comments and prepare a final recovery plan which will not be in place until fall 1995 or winter 1995-96. Consequently, ADF&G assumes the current applicable standard for jeopardy analysis is the survival standard or threshold value of 300 spawners as recommended by the BRWG and as adopted by NMFS.

The BRWG report recommended that life cycle models be used to evaluate the ESA listed Snake River chinook salmon likelihoods of survival and recovery, taking into account measures to meet the biological requirements in all life stages. NMFS (1995b) determined it appropriate to take a conservative approach in using results of life cycle models to determine whether the combination of the proposed action and other reasonable and prudent actions meet the biological requirements of listed species. NMFS (1995b) determined that biological requirements for survival, with an adequate potential for recovery, will be met using life cycle models (population viability analysis) when there is a **high likelihood** that ESA listed Snake River fall chinook salmon will remain above critical escapement thresholds (300 spawners) over **a sufficiently long period of time**. However, because of potential fall-back at Lower Granite Dam and because of potential pre-spawning mortality of Snake River fall chinook salmon counted over Lower Granite Dam, the standard of 300 spawners is being interpreted in various NMFS documents as a value over 300 and as many as 500 as measured in counts of adult natural Snake River fall chinook salmon migrating past Lower Granite Dam. Therefore, when ADF&G staff conducted population viability analysis and evaluated the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon, threshold criteria values ranging from 300 to 500 were used.

In the biological opinion recently released for FCRPS operations, NMFS (1995b), provides further guidance concerning specifics associated with use of life cycle models (in terms of alternate assumptions that could be used in models; what NMFS intends to give greater deference to; and, in terms of specific criteria used to define "high likelihood"). The following is a discussion concerning how ADF&G staff attempted to use this **guidance** when the Southeast Alaska salmon fishery was evaluated through the BRWG population viability analysis:

High Likelihood: The specific criterion associated with the term "high likelihood" used in the FCRPS Biological Opinion (NMFS 1995b) is consistently 70%. Therefore, ADF&G staff interprets "high likelihood" as meaning a probability level of 70%.

Sufficiently Long Period of Time: Page 74 of the FCRPS Biological Opinion (NMFS 1995b) states that life-cycle model analyses are presented as 24-year and 100-year probabilities of being above threshold levels and where conclusions differ, greater weight may be given to the 24-year assessments. Therefore, ADF&G staff worked to develop both 24-year and 100-year probabilities.

Depensation: Page 74 of the FCRPS Biological Opinion (NMFS 1995b) states that NMFS will give greater weight to model results that are based on an assumption of depensation at low population levels. Page 75 of the FCRPS Biological Opinion (NMFS 1995b) goes on to state that NMFS acknowledges technical disagreements among modelling teams about the method of implementing depensation; and on page 75, NMFS (1995b) states that NMFS will view model runs using depensation with some caution until this technical issue is resolved. When ADF&G staff met with other members of the BRWG, they requested that depensation models be used. However, the other State and Tribal members of the BRWG stated they were unable to meet this request due to the on-going technical disagreement. As a result, population viability analysis conducted to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon did not use depensation models.

Predators: Page 73 of the FCRPS Biological Opinion (NMFS 1995b) states that NMFS will give greater weight to higher predator removal effectiveness assumptions used in population viability analysis. Therefore, life-cycle analysis conducted to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon consistently used the 25% predator effectiveness assumption and option.

Population viability analyses conducted to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon were based upon: (1) the Fish Leaving Under Several Hypothesis Model (**FLUSH**) developed and used by Idaho, Oregon, Washington, and Tribal fishery agencies to model the hydro-power system and its' effects on anadromous salmon survival in the Columbia River basin; and, (2) the Empirical Life-Cycle Model (**ELCM**) developed and used by Idaho, Oregon, Washington, and Tribal fishery agencies to model dynamics of Columbia basin salmon stocks. Model runs were completed on April 6, 1995. Scientists that conducted the analysis and made the model runs included: John E. Clark and Dave Gaudet of the Alaska Department of Fish and Game, Paul Wilson of the Columbia Basin Fish and Wildlife Authority, Earl Weber of the Columbia River Inter-Tribal Fish Commission, Charles Petrosky of the Idaho Department of Fish and Game, Howard Schaller of the Oregon Department of Fish and Wildlife, and Olaf Langness of the Washington Department of Fish and Wildlife.

Other specifics associated with the population viability analysis conducted to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon are summarized below:

Operation of FCRPS: Because the BRWG has not yet completed the modeling of the reasonable and prudent alternative associated with operation of the FCRPS, the FCRPS operation alternative closest to the operation as specified in the recent (3/2/95) FCRPS Biological Opinion (NMFS 1995b) which has been modeled by the BRWG was used consistently as the background hydro-power operation condition to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon.

Hatchery and Habitat Improvements: All population viability analyses conducted assumed moderate improvements from baseline conditions. This was the only hatchery and habitat improvement option available.

Supplementation: Options available within population viability models relative to supplementation included: (1) none, (2) low level, (3) moderate level, and (4) high level of supplementation. After careful review, ADF&G staff decided to use the low supplementation option to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon. The low level supplementation option assumes 75 spawners are added in the years 1998-2000, 150 spawners are added to the spawning population in the years 2001-2005, and 250 spawners are added in the years after 2005. The average annual number of Lyons Ferry Hatchery strays estimated to have crossed Lower Granite Dam as they migrated to the spawning grounds in the years 1986-1990 (before listing petition) was 242 fish. Since the listing petition was received, NMFS has engaged in an effort to limit the number of Lyons Ferry Hatchery strays that successfully navigate Lower Granite Dam and enter the spawning grounds. The average annual number of Lyons Ferry Hatchery strays estimated to have crossed Lower Granite Dam as they migrated to the spawning grounds in the years 1991-1993 was 115 fish. Of the options available for model runs relative to the question of supplementation, the low supplementation option most closely resembles recent past history of achieved (but unintended) supplementation and therefore, this option was selected because it comes closest to present day reality.

Transport Benefit Ratios: Two different levels of transport benefit ratios were assumed in population viability analyses conducted to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed Snake River fall chinook salmon. Model runs were made assuming transport to benefit ratios of 1:1 and 2:1. The range of transport benefit ratios used in this population viability analysis are believed to encompass both pessimistic and optimistic views concerning the potential benefits of transporting Snake River fall chinook salmon. Studies of transport benefit ratios for Snake River fall chinook salmon have not been conducted to date; various transport benefit ratios are simply assumed in prior analyses and prior biological opinions including the recent FCRPS Biological Opinion (NMFS 1995b).

Non-Alaska Harvests: All population viability analyses conducted to evaluate the effect of the Southeast Alaska salmon fishery on survival and potential for recovery of ESA listed salmon consistently used the 1988-1993 average Snake River fall chinook salmon exploitation rates for non-Alaskan fisheries. These rates were estimated from the PSC chinook model based on a calibration conducted about two years ago. The BRWG intends to update the harvest portion of the population viability model over the coming few months with current calibrations of the PSC chinook model output. Age specific exploitation rates **used** in the population viability analysis and **current** PSC chinook model estimates (current calibration) of the 1988-1993 average exploitation rates for non-Alaska ocean and Columbia in-river fisheries are summarized below:

	Average 1988-1993 Exploitation Rates			
SRFC	Non-Alaska Ocean Fisheries		Columbia In-River Fisheries	
Age	Est. Used in PVA	Current Est.	Est. Used in PVA	Current Est.
2	1.02	0.45	42.93	6.90
3	22.97	11.75	22.32	17.10
4	43.26	33.25	46.74	45.26
5	32.05	28.83	51.54	31.79

Note that all current PSC model estimates of the average 1988-1993 exploitation rates for non-Alaskan fisheries are lower than the rates used in the population viability analysis that set background harvests from which to evaluate the added effect of exploitation by the Southeast Alaska salmon fishery. In some cases these differences are significant; about 1/2 for age 3 fish in the non-Alaskan ocean fishery, for instance.

Southeast Alaska Harvests: Three exploitation rates for natural Snake River fall chinook salmon by the Southeast Alaska salmon fishery were used in population viability analyses. Option one was an absolute zero impact analyses; wherein, the exploitation rate on Snake River fall chinook salmon by the Southeast Alaska salmon fishery was set at zero for all age classes over the next 100 years. Option two was a low potential impact level defined as the average 1991-1993 exploitation rate on Snake River fall chinook salmon by the Southeast Alaska salmon fishery over the next 100 years. Option two, based upon average exploitation rates in 1991-1993, is the option Alaska intends to implement in 1995-1998. Option three was a high potential impact level defined as the 1979-1982 average exploitation rate on Snake River fall chinook salmon by the Southeast Alaska salmon fishery over the next 100 years. Option three represents high potential impacts because the years 1979-1982 are the years prior to implementation of the Pacific Salmon Treaty and these years represent the years of highest PSC model estimated exploitation rates on natural Snake River fall chinook salmon. Age specific exploitation rates **used** under option two (low potential impact) and under option three (high potential impact) in the population viability analyses (taken from PSC chinook model output calibrated about two years ago) versus **current** PSC chinook model estimates (current calibration) for the Southeast Alaska salmon fishery are summarized below:

SRFC	Option Two (Low Poten. Impact) 1991-1993 Average Exp. Rate		Option Three (High Poten. Impact) 1979-1982 Average Exp. Rate	
Age	Est. Used in PVA	Current Est.	Est. Used in PVA	Current Est.
2	0.00	0.02	0.00	0.05
3	0.17	0.22	0.39	0.33
4	2.20	3.09	5.16	6.80
5	3.88	5.89	9.06	11.33

Although the current estimates of the 1979-1982 average exploitation rates by the Southeast Alaska salmon fishery are higher than the exploitation rates used in the population viability analysis for three of the four ages, the differences are at most 2%.

The specific options used for the six population viability analysis (PVA) runs implemented to evaluate impacts of the Southeast Alaska salmon fishery on survival of ESA listed Snake River fall chinook salmon are summarized below:

Potential	Population Viability Model Run Number					
Variable	PVA # 1	PVA # 2	PVA # 3	PVA # 4	PVA # 5	PVA # 6
Depensation	None	None	None	None	None	None
Predator Control	25% Reduction	25% Reduction	25% Reduction	25% Reduction	25% Reduction	25% Reduction
FCRPS	All runs assumed the closest look-a-like to recent Biol. Opinion					
Hatchery & Habitat	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Supplemen-tation	Low	Low	Low	Low	Low	Low
Transport Benefit	None	None	None	High	High	High
Ratio	1:1	1:1	1:1	2:1	2:1	2:1
Non-Alaskan Harvests	88-93 avg	88-93 avg	88-93 avg	88-93 avg	88-93 avg	88-93 avg
SE Alaska Harvests	None Zero	91-93 avg Low	79-82 avg High	None Zero	91-93 avg Low	79-82 avg High

Results of population viability analyses conducted by ADF&G to determine if the Southeast Alaska salmon fishery jeopardizes survival of ESA listed Snake

River fall chinook salmon are provided in Figures 18-24 and are summarized below:

Run No.	SEAK Fishery Option	& Harvest	T/B Ratio	Probabilities of Escapements Being At Or Above Threshold = 300: 24 years	Threshold = 300: 100 years	Threshold = 500: 24 years	Threshold = 500: 100 years
1	One	zero	1:1	87.0%	91.7%	68.2%	76.6%
2	Two	1991-93	1:1	85.9%	90.7%	65.1%	74.8%
3	Three	1979-82	1:1	84.1%	89.3%	62.3%	71.9%
4	One	zero	2:1	96.8%	98.8%	89.1%	95.3%
5	Two	1991-93	2:1	96.9%	98.7%	89.1%	94.9%
6	Three	1979-82	2:1	96.4%	98.5%	86.8%	94.0%

The jeopardy standard survival threshold value of 300 Snake River fall chinook salmon was exceeded at probability levels in excess of 70% under both short-term projections (24-year) and long term projections (100-years) for all six population viability analysis runs. As discussed earlier, because of concern over potential fall-back of Snake River fall chinook salmon counted over Lower Granite Dam and because of potential pre-spawning mortality to fall chinook salmon counted over Lower Granite Dam, NMFS has stated that the 300 spawning fish threshold value needs to be adjusted upward.

Therefore, it is appropriate to evaluate probabilities of achieving threshold values larger than 300 and as high as 500. If the jeopardy standard survival threshold value was 400 Snake River fall chinook salmon, this standard would be exceeded at probability levels in excess of 70% under both short-term projections (24-year) and long term projections (100-years) for all six population viability analysis runs. If the jeopardy standard survival threshold value was 500 Snake River fall chinook salmon, this standard would be exceeded at probability levels in excess of 70% under both short-term projections (24-year) and long term projections (100-years) for all three population viability analysis runs where transport benefit ratios were assumed to be 2:1; and, for long term projections (100-years) for all three population viability analysis runs where transport benefit ratios were assumed to be 1:1. Short-term probability levels for population viability analysis runs where transport benefit ratios were assumed to be 1:1 and the jeopardy standard survival threshold value was defined as 500 Snake River fall chinook salmon ranged from 68.2% for the zero Southeast Alaska salmon fishery option to 62.3% for the average 1979-82 Southeast Alaska salmon fishery exploitation rate option. It is important to note that under the 24-year probabilities with transport benefit ratios of 1:1 and a jeopardy standard survival threshold of 500, the zero Southeast Alaska salmon fishery (PVA #1) has a probability level of 68.2% and the high potential harvest option for Southeast Alaska salmon fisheries (PVA #3) is only 5.9 percentage points lower (62.3%).

The net effect of the Southeast Alaska salmon fishery conducted within a range of from zero exploitation rate to the highest levels of estimated prior exploitation rates is almost nil in terms of the probabilities of the ESA listed distinct population segment achieving threshold survival values. The differences between the probabilities for option one (least potential jeopardy option; no Southeast Alaska salmon fishery) and option 3 (highest potential jeopardy option; 1979-1982 average exploitation rates) ranges from a low of 0.3 percentage points for the 2:1 transport benefit ratio with a threshold of 300 and a 100-year evaluation to a high of 8.4 percentage points for the 1:1 transport benefit ratio with a threshold of 300 and a 24-year evaluation. In summary **there are only very small differences in the probabilities of Snake River fall chinook salmon achieving threshold escapement levels within the full range of exploitation rates modeled for the Southeast Alaska salmon fishery** (range of Southeast Alaska salmon fishery exploitation rates that were modeled varied from no exploitation rate for the next 100 years to the highest exploitation rates estimated to date being applied continuously over the next 100 years).

The population viability analyses and model runs used to evaluate the potential impacts of the Southeast Alaska salmon fishery on ESA listed Snake River fall chinook salmon is believed to be a rigorous and conservative test of the jeopardy standard because:

1. The assumption associated with supplementation was low. Although this option of the four available supplementation options best reflected current trends and escapements of Lyons Ferry Hatchery fish over Lower Granite Dam, the low supplementation option does not start accruing these fish to the spawning grounds until the year 1998 and then only accrues 75 fish for the period 1998-2000. Actual documented Lyons Ferry Hatchery strays over Lower Granite Dam during the eight-year period of 1986-1993 averaged 194 fish per year. Supplementation reflective of the recent past is not reflected in the low supplementation option until the year 2001. Thus the 24-year probabilities are biased low.

2. Transport benefits modeled included 1:1 (no benefits) and 2:1. Although there are no direct and specific studies to base assumptions on for transport benefits for Snake River fall chinook salmon, **CRISP** modelers used a ratio of 9:1 for the recent FCRPS analysis (NMFS 1995b). NMFS has been critical of modelers using a range of assumptions from 1:1 to 2:1 as being too low (NMFS 1995b). If higher transport benefit ratios were assumed (as NMFS appears to believe) and were used in this population viability analysis, the potential impact of the Southeast Alaska salmon fishery would have been further reduced from levels indicated in this population viability analysis. If NMFS beliefs concerning the benefits of transportation are correct, the probabilities estimated by this population viability analysis are biased low.

3. Non-Alaskan ocean fisheries and Columbia in-river fisheries were modeled at 1988-1993 average exploitation rates. According to recent decisions made by the PFMC, lower 48 ocean fisheries and Canadian fisheries are expected to impose a substantially lower exploitation rate on ESA listed Snake River fall chinook salmon over the next few years than the rates assumed in this population viability analysis. Similarly, this analysis assumed 1988-1993 average exploitation rates would be exerted on ESA listed Snake River fall chinook salmon by Columbia in-river fisheries. Recent reports from the Pacific Northwest indicate that these fisheries will be managed for lower exploitation rates than were used in this modeling. Additionally, the exploitation rates used in the population

viability analysis for non-Alaskan ocean and Columbia in-river fisheries are higher than current PSC chinook model estimates. Age 4 fish support the highest exploitation rates in non-Alaskan ocean fisheries; the PVA used a value of 43.26%, whereas, the current PSC chinook model estimate is 33.25%, about 10% less. Differences between exploitation rates used in the population viability analysis versus current estimates for the Columbia in-river fishery are as much as 20% less (age 5). All of this information indicates that it is likely that the exploitation rate values used for southern harvests as well as for total harvests in the population viability analysis were substantially too high. If lower exploitation rates in southern fisheries; and, hence total fisheries were assumed and used in the population viability analysis, the threshold survival probabilities would have been higher and the potential impact of the Southeast Alaska salmon fishery would have been further reduced from indicated levels.

4. The harvest portions of the population viability analyses used to evaluate potential effects of the Southeast Alaska salmon fishery on listed Snake River fall chinook salmon do not reflect the full level of reallocations and inter-dam losses of fish potentially "saved" in Southeast Alaska as discussed earlier in this biological assessment. Therefore the potential differences in threshold escapement probabilities between the three fishery options modeled for Southeast Alaska are smaller than the population viability analyses indicates.

So long as 1995-1998 Southeast Alaska salmon fisheries are managed so as to incur harvest rates on ESA listed Snake River chinook salmon within the observed range of rates since 1979 (Figure 25 and Table 16), these fisheries do not jeopardize ESA listed Snake River fall chinook salmon. Because the ADF&G intends to manage Southeast Alaska salmon fisheries in 1995-1998 based on abundance with the goal being to maintain harvest at 1991-1993 average rates on major contributing stocks, the federal action involved with respect to these 1995-1998 fisheries is not expected, directly or indirectly, to reduce appreciably the likelihood of survival or potential for recovery of this ESA listed salmon stock. **Thus, Southeast Alaska salmon fisheries do not jeopardize the continued existence of ESA listed Snake River fall chinook salmon.**

ESA SECTION 7 INCIDENTAL TAKE STATEMENT FOR 1995-1998 SOUTHEAST ALASKA SALMON FISHERIES

Because of the no-jeopardy decisions outlined in this document, ADF&G is making recommendations to NMFS relative to NMFS issuance of an ESA Section 7 incidental take statement for 1995-1998 Southeast Alaska salmon fisheries and their impact on ESA protected Snake River salmon.

Section 9 and regulations implementing Section 4 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. When a proposed federal action is found to be consistent with Section 7(a)(2) of the ESA (i.e., the action is found not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat) and that action may incidentally take individuals of listed species, NMFS will issue an incidental take statement specifying the impact of any incidental taking of endangered or threatened species.

The incidental take statement also provides reasonable and prudent measures that are necessary to minimize impacts, and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures. Incidental takings resulting from agency action, including incidental takings caused by activities authorized by the agency, are exempted from the taking prohibition by Section 7(c) of the ESA, but only if those takings are in compliance with the specified terms and conditions.

A. Snake River Sockeye Salmon

No Snake River sockeye salmon are expected to be taken as a result of the 1995-1998 Southeast Alaska salmon fisheries.

B. Snake River Spring/Summer Chinook Salmon

No Snake River spring/summer chinook salmon are expected to be taken as a result of the 1995-1998 Southeast Alaska salmon fisheries.

C. Snake River Fall Chinook Salmon

Information on the distribution of transported and non-transported coded wire tagged sub-yearling fall chinook salmon smolt released from Lyons Ferry Hatchery implies that ESA listed Snake River fall chinook salmon are caught in Southeast Alaska salmon fisheries. The number of ESA listed Snake River fall chinook salmon caught incidentally in Southeast Alaska salmon fisheries cannot be estimated with any certainty. The estimates of the total annual mortality rates during the 1979-1994 seasons is estimated to have ranged from 2.36% to 7.22% (PSC chinook model analysis); the estimated total annual mortality during the 1995-1998 seasons is estimated to average less than 5.47% (PSC chinook model analysis). The number provided here should not be taken out of context or be compared without appropriate qualification to mortality estimates for harvest or other actions using different assumptions or models.

It is not possible to identify ESA listed Snake River fall chinook salmon that may be taken in Southeast Alaska salmon fisheries. Further, limiting Southeast Alaska salmon fisheries in terms of total catch is an ineffective approach to minimize impacts to ESA listed Snake River fall chinook salmon. Provided that the Southeast Alaska salmon fisheries are conducted within the range of exploitation rates observed since 1979, the 1995-1998 fisheries will be consistent with Section 7(a)(2) of the ESA.

The proposed fishery regime calls for the 1995-1998 Southeast Alaska salmon fisheries to be abundance based managed with the target harvests being set at 1991-1993 average rates. Under the proposed fisheries regime, exploitation rates of ESA listed fall chinook salmon are expected to be well within the range of exploitation rates estimated since 1979. The proposed fisheries regime, by its terms, therefore incorporates reasonable and prudent measures to minimize impacts. No further measures are necessary for purposes of Section 7(a)(2) of the ESA.

To the extent NMFS deems terms and conditions necessary to implement reasonable and prudent measures to minimize the impact of the Southeast Alaska salmon fisheries through the period from April 16, 1995, through April 15, 1998, ADF&G recommends the following:

1. The ADF&G in consultation with the Alaska Regional Director of NMFS and NPFMC chair shall ensure that in-season and between season management actions taken during the course of the fisheries are consistent with the proposed fisheries regime, and that the average exploitation rate does not exceed 5.5% of the age 2-5 ESA listed Snake River fall chinook salmon over the entire 1995-1998 period.

2. The ADF&G in cooperation with the Alaska Regional Director of NMFS and NPFMC chair shall monitor the catch and implementation of other management measures at levels that are at least comparable to those used in recent years to ensure that specified management actions used to control the fisheries are fully implemented.

3. The ADF&G in cooperation with the Alaska Regional Director of NMFS and NPFMC chair shall sample the fisheries for stock composition including the collection of CWTs in all fisheries and biological information to allow for a thorough post-season analysis of fishery impacts on ESA listed Snake River fall chinook salmon.

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Table 1. Non-transported Lyon's Ferry Hatchery sub-yearling recoveries in S.E. Alaska.

OBS	YEAR	BROOD	CODE	SOURCE	GEAR	AREA	DATE	SAMPLE TYPE	EXPANDED CWT	CWT CONTRIBUTION
1	1987	84	633226	COMMERCIAL	TROLL	1INWI113-41	10/22/87	RANDOM	2.447	5.62
2	1987	84	633227	COMMERCIAL	TROLL	1ISEI101-	07/06/87	RANDOM	2.827	6.49
3	1987	84	633228	COMMERCIAL	TROLL	1INEI -	10/29/87	RANDOM	2.063	4.73
4	1987	84	633228	COMMERCIAL	TROLL	1INEI -	10/29/87	RANDOM	2.063	4.73
5	1987	84	633228	COMMERCIAL	TROLL	1ISEI105-	07/09/87	RANDOM	2.827	6.49
6	1987	84	633228	SPORT		1INWI113-62	06/13/87	SELECT	.	.
7	1988	84	633227	COMMERCIAL	TROLL	1INEI110-	10/05/88	RANDOM	1.878	4.31
8	1988	84	633227	COMMERCIAL	TROLL	1INWI113-41	07/02/88	RANDOM	2.732	6.27
9	1988	84	633227	COMMERCIAL	TROLL	1ISWI -	07/07/88	RANDOM	2.712	6.23
10	1988	84	633227	COMMERCIAL	TROLL	1ISWI103-90	07/12/88	RANDOM	2.712	6.23
11	1988	84	633228	COMMERCIAL	TROLL	1INWI113-	07/14/88	RANDOM	2.732	6.27
12	1988	84	633228	COMMERCIAL	TROLL	1ISWI104-	07/03/88	RANDOM	2.712	6.22
13	1988	84	633228	COMMERCIAL	TROLL	1ISWI104-40	07/13/88	RANDOM	2.712	6.22
14	1989	84	633226	COMMERCIAL	TROLL	1I I -	07/08/89	SELECT	.	.
15	1989	84	633228	COMMERCIAL	TROLL	1ISEI105-10	07/10/89	RANDOM	2.348	5.39
16	1989	84	633228	SPORT		1INWI113-31	06/26/89	SELECT	.	.
17	1989	85	633638	COMMERCIAL	TROLL	1INWI189-50	07/12/89	RANDOM	3.278	3.31
18	1989	85	633639	COMMERCIAL	TROLL	1INEI109-	07/04/89	RANDOM	1.996	2.01
19	1989	85	633639	COMMERCIAL	TROLL	1INWI -	07/08/89	RANDOM	3.278	3.31
20	1989	85	633639	COMMERCIAL	TROLL	1INWI189-50	07/15/89	RANDOM	3.278	3.31
21	1989	85	633641	COMMERCIAL	TROLL	1INWI181-60	07/10/89	RANDOM	3.278	3.31
22	1989	85	633642	COMMERCIAL	TROLL	1ISEI101-	06/24/89	RANDOM	1.849	1.87
23	1989	86	634259	COMMERCIAL	TROLL	1INEI -	10/10/89	RANDOM	1.214	1.24
24	1990	85	633638	COMMERCIAL	TROLL	1ISWI -	07/03/90	RANDOM	2.712	2.74
25	1990	85	633640	COMMERCIAL	TROLL	1INWI113-61	07/07/90	RANDOM	4.695	4.74
26	1990	85	633641	COMMERCIAL	TROLL	1I I -	04/16/90	RANDOM	.	.
27	1990	85	633642	COMMERCIAL	TROLL	1ISWI103-	04/05/90	RANDOM	9.72	9.81
28	1990	86	634259	COMMERCIAL		1I I -	07/15/90	SELECT	.	.
29	1990	86	634259	COMMERCIAL	TROLL	1INEI110-16	06/12/90	RANDOM	0.983	1.01
30	1990	86	634259	COMMERCIAL	TROLL	1INWI -	07/07/90	SELECT	.	.
31	1990	86	634259	COMMERCIAL	TROLL	1ISEI101-21	07/23/90	RANDOM	2.202	2.25

Table 1. Non-transported Lyon's Ferry Hatchery sub-yearling recoveries in S.E. Alaska (Continued).

OBS	YEAR	BROOD	CODE	SOURCE	GEAR	AREA	DATE	SAMPLE TYPE	EXPANDED CWT	CWT CONTRIBUTION
32	1990	86	634259	COMMERCIAL	TROLL	1|SE|101-21	07/12/90	RANDOM	2.202	2.25
33	1990	86	634261	COMMERCIAL	TROLL	1|NE|109-45	07/07/90	RANDOM	1.989	2.03
34	1990	86	634261	COMMERCIAL	TROLL	1|NE|109-61	07/19/90	RANDOM	1.989	2.03
35	1990	86	634261	COMMERCIAL	TROLL	1|SE|101-	06/26/90	RANDOM	1.619	1.66
36	1990	86	634261	COMMERCIAL	TROLL	1|SE|101-21	07/04/90	RANDOM	2.202	2.25
37	1990	86	634261	COMMERCIAL	TROLL	1|SW| -	07/08/90	RANDOM	2.712	2.77
38	1991	86	634261	SPORT		1|NW|113-41	06/23/91	VOLUNT	.	.
39	1991	87	635214	COMMERCIAL	TROLL	1|NW| -	07/08/91	RANDOM	3.219	24.97
40	1991	87	635216	COMMERCIAL	TROLL	1|NW|113-	07/06/91	RANDOM	3.219	24.97
41	1992	88	630228	COMMERCIAL	TROLL	1|NW|113-21	07/06/92	RANDOM	2.474	2.92
42	1992	90	634143	COMMERCIAL	SEINE	1|NE|112-	07/20/92	RANDOM	1.039	1.04
43	1993	89	635544	COMMERCIAL	TROLL	1|NW|113-41	09/13/93	RANDOM	2.514	2.59
44	1993	89	635544	COMMERCIAL	TROLL	1|SW| -	07/03/93	RANDOM	2.936	3.02
45	1993	89	635547	COMMERCIAL	TROLL	1|NW|113-41	11/27/93	RANDOM	3.042	3.13
46	1993	89	635547	COMMERCIAL	TROLL	1|NW|113-41	11/29/93	RANDOM	3.042	3.13
47	1993	89	635547	COMMERCIAL	TROLL	1|NW|113-41	10/24/93	RANDOM	3.042	3.13
48	1993	89	635547	COMMERCIAL	TROLL	1|SW|103-70	07/07/93	RANDOM	2.936	3.02
49	1993	90	634143	COMMERCIAL	TROLL	1| | -	09/19/93	SELECT	.	.
50	1993	90	634143	COMMERCIAL	TROLL	1| | -	09/14/93	SELECT	.	.
51	1993	90	634143	COMMERCIAL	TROLL	1|NW|113-41	11/29/93	RANDOM	3.042	3.06
52	1994	89	635544	COMMERCIAL	TROLL	1|NW|116-	07/09/94	RANDOM	2.46	2.53
53	1994	90	634143	COMMERCIAL	TROLL	1| | -	07/08/94	RANDOM	.	.
54	1994	90	634143	COMMERCIAL	TROLL	1| | -	07/08/94	RANDOM	.	.
55	1994	90	634143	COMMERCIAL	TROLL	1|NE|109-	07/06/94	RANDOM	2.165	2.18
56	1994	90	634143	COMMERCIAL	TROLL	1|NW|113-41	04/09/94	RANDOM	2.67	2.68
57	1994	90	634143	COMMERCIAL	TROLL	1|NW|113-41	07/01/94	RANDOM	2.46	2.47
58	1994	90	634143	COMMERCIAL	TROLL	1|NW|113-41	11/08/94	RANDOM	2.292	2.3
59	1994	90	634143	COMMERCIAL	TROLL	1|NW|113-41	11/15/94	RANDOM	2.292	2.3
60	1994	90	634143	COMMERCIAL	TROLL	1|NW|116-	07/09/94	RANDOM	2.46	2.47
61	1994	90	634143	COMMERCIAL	TROLL	1|NW|156-	07/05/94	RANDOM	2.46	2.47
62	1994	90	634143	COMMERCIAL	TROLL	1|SW| -	07/06/94	RANDOM	1.689	1.7
63	1994	90	634143	COMMERCIAL	TROLL	1|SW|103-70	07/08/94	RANDOM	1.689	1.7

Table 1. Non-transported Lyon's Ferry Hatchery sub-yearling recoveries in S.E. Alaska (Continued).

OBS	YEAR	BROOD	CODE	SOURCE	GEAR	AREA	DATE	SAMPLE TYPE	EXPANDED CWT	CWT CONTRIBUTION
64	1994	90	634143	COMMERCIAL	TROLL	1ISWI104-40	07/06/94	RANDOM	1.689	1.7
65	1994	90	634143	SPORT		1INWI113-41	07/26/94	RANDOM	12.781	12.85
66	1994	90	634160	COMMERCIAL	SEINE	1ISWI104-	08/06/94	RANDOM	3.275	3.31
67	1994	90	634160	COMMERCIAL	TROLL	1I I -	07/09/94	SELECT	.	.
68	1994	90	634160	COMMERCIAL	TROLL	1INWI -	07/09/94	RANDOM	2.46	2.49
69	1994	90	634160	COMMERCIAL	TROLL	1INWI116-	07/09/94	RANDOM	2.46	2.49

Table 2. Transported Lyon's Ferry Hatchery sub-yearling recoveries in S.E. Alaska.

OBS	YEAR	BROOD	CODE	SOURCE	GEAR	AREA	DATE	SAMPLE TYPE	EXPANDED CWT	CWT CONTRIBUTION
1	1988	86	634262	COMMERCIAL	SEINE	1ISWI104-40	08/19/88	RANDOM	8.902	8.97
2	1988	86	634401	COMMERCIAL	SEINE	1INWI114-27	07/24/88	RANDOM	0.294	0.3
3	1989	85	633633	COMMERCIAL	TROLL	1INWI113-41	06/23/89	RANDOM	3.379	3.4
4	1989	85	633633	COMMERCIAL	TROLL	1INWI157-	07/10/89	RANDOM	3.278	3.3
5	1989	85	633634	COMMERCIAL	TROLL	1INWI157-	07/13/89	RANDOM	3.278	3.3
6	1989	85	633635	COMMERCIAL	TROLL	1ISEI102-10	07/07/89	RANDOM	2.348	2.37
7	1989	85	633636	COMMERCIAL	TROLL	1INWI157-	07/13/89	RANDOM	3.278	3.3
8	1989	85	633637	COMMERCIAL	TROLL	1I I -	06/09/89	RANDOM	.	.
9	1989	85	633637	COMMERCIAL	TROLL	1INWI113-62	07/05/89	RANDOM	3.278	3.3
10	1989	85	633637	COMMERCIAL	TROLL	1ISEI102-10	06/07/89	RANDOM	2.037	2.05
11	1989	85	633637	COMMERCIAL	TROLL	1ISEI102-10	07/07/89	RANDOM	2.348	2.37
12	1989	86	634262	SPORT		1ISEI102-50	08/17/89	SELECT	.	.
13	1989	86	634401	COMMERCIAL	TROLL	1INEI -	10/27/89	SELECT	.	.
14	1989	86	634401	COMMERCIAL	TROLL	1INWI114-	10/13/89	SELECT	.	.
15	1989	86	634401	COMMERCIAL	TROLL	1ISEI101-	07/13/89	RANDOM	2.348	2.37
16	1990	85	633633	COMMERCIAL		1I I -	07/15/90	SELECT	.	.
17	1990	85	633634	COMMERCIAL	TROLL	1I I -	07/14/90	SELECT	.	.
18	1990	85	633634	COMMERCIAL	TROLL	1I I -	06/24/90	RANDOM	.	.
19	1990	85	633636	COMMERCIAL	TROLL	1INWI -	07/10/90	RANDOM	4.695	4.73
20	1990	85	633637	COMMERCIAL	TROLL	1INWI113-62	07/07/90	RANDOM	4.695	4.73
21	1990	86	634262	COMMERCIAL	TROLL	1I I -	07/30/90	SELECT	.	.
22	1990	86	634262	COMMERCIAL	TROLL	1INEI109-	07/14/90	RANDOM	1.989	2.01
23	1990	86	634262	COMMERCIAL	TROLL	1INWI -	07/20/90	RANDOM	4.695	4.73
24	1990	86	634262	COMMERCIAL	TROLL	1INWI -	07/12/90	RANDOM	4.695	4.73
25	1990	86	634262	COMMERCIAL	TROLL	1INWI113-	07/23/90	RANDOM	4.695	4.73
26	1990	86	634262	COMMERCIAL	TROLL	1INWI116-13	07/24/90	RANDOM	4.695	4.73
27	1990	86	634262	COMMERCIAL	TROLL	1ISEI101-	06/20/90	RANDOM	1.619	1.63
28	1990	86	634262	COMMERCIAL	TROLL	1ISWI -	07/12/90	RANDOM	2.712	2.73
29	1990	86	634401	COMMERCIAL		1I I -	07/15/90	SELECT	.	.
30	1990	86	634401	COMMERCIAL	TROLL	1I I -	07/20/90	SELECT	.	.
31	1990	86	634401	COMMERCIAL	TROLL	1INWI -	07/05/90	RANDOM	4.695	4.73

Table 2. Transported Lyon's Ferry Hatchery sub-yearling recoveries in S.E. Alaska (Continued).

OBS	YEAR	BROOD	CODE	SOURCE	GEAR	AREA	DATE	SAMPLE TYPE	EXPANDED CWT	CWT CONTRIBUTION
32	1990	86	634401	COMMERCIAL	TROLL	1|NW|116-13	07/24/90	RANDOM	4.695	4.73
33	1990	86	634401	COMMERCIAL	TROLL	1|NW|157-	07/09/90	RANDOM	4.695	4.73
34	1990	86	634401	COMMERCIAL	TROLL	1|NW|157-	07/21/90	RANDOM	4.695	4.73
35	1990	86	634401	COMMERCIAL	TROLL	1|SE|101-	07/05/90	RANDOM	2.202	2.22
36	1990	86	634401	COMMERCIAL	TROLL	1|SE|101-21	06/24/90	RANDOM	1.619	1.63
37	1990	86	634401	COMMERCIAL	TROLL	1|SE|101-21	07/19/90	RANDOM	2.202	2.22
38	1991	86	634262	COMMERCIAL	TROLL	1|NW|113-	07/03/91	RANDOM	3.219	3.24
39	1991	86	634262	COMMERCIAL	TROLL	1|SW|103-	07/06/91	RANDOM	2.358	2.38
40	1991	86	634401	COMMERCIAL	TROLL	1| | -	07/12/91	SELECT	.	.
41	1991	86	634401	COMMERCIAL	TROLL	1| | -	07/28/91	SELECT	.	.
42	1991	86	634401	COMMERCIAL	TROLL	1|NW| -	07/06/91	SELECT	.	.
43	1992	89	635550	COMMERCIAL	SEINE	1|SE|101-	07/10/92	RANDOM	0.93	0.97
44	1993	89	635549	COMMERCIAL	TROLL	1|SE|101-21	07/07/93	RANDOM	1.499	1.56
45	1993	89	635549	COMMERCIAL	TROLL	1|SW| -	07/07/93	RANDOM	2.936	3.05
46	1994	89	635550	COMMERCIAL	TROLL	1|SW|104-30	07/08/94	RANDOM	1.689	1.76

Table 3. Summary of the exploitation rate analysis for Lyons Ferry Hatchery 1984 brood year.

Total Catches and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	PreDam Esc.
5	1989	7.99	18.09	0.00	43.00	25.14
4	1988	24.91	173.89	77.08	238.98	142.17
3	1987	8.22	191.04	122.90	148.98	394.77
2	1986	0.00	54.05	0.00	37.13	228.41

Total Incidental Mortalities

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Natural Survival
5	1989	0.70	0.23	0.00	0.00	90%
4	1988	2.11	12.45	1.88	2.11	80%
3	1987	8.93	55.69	17.39	21.38	70%
2	1986	11.28	83.65	35.95	12.22	60%

Total Fishery Mortality and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Total Tags	Cohort Size
5	1989	8.69	18.32	0.00	43.00	95.15	95.15
4	1988	27.02	186.34	78.96	241.09	675.58	781.30
3	1987	17.15	246.73	140.29	170.36	969.30	1,945.93
2	1986	11.28	137.70	35.95	49.35	462.69	3,242.59

Exploitation Rates

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Esc. Tags	Esc. Natural	Dam Survival
5	1989	9.13%	19.25%	0.00%	63.11%	9.03	34	35.9%
4	1988	3.46%	23.85%	10.11%	62.91%	41.63	250	29.3%
3	1987	0.88%	12.68%	7.21%	30.15%	133.00	22	33.7%
2	1986	0.35%	4.25%	1.11%	17.77%	74.07	NA	32.4%

Estimated catch of Wild Snake River Fall Chinook Salmon

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	River Return	Maturity Rate	Adult Equvlt.
5	1989	32.71	68.96	0.00	161.85	256.48	100.0%	100.0%
4	1988	162.27	1,119.10	474.21	1,447.91	2,301.73	78.4%	97.8%
3	1987	2.84	40.81	23.21	28.18	93.48	36.7%	86.2%

Table 4. Summary of the exploitation rate analysis for Lyons Ferry Hatchery 1985 brood year.

Total Catches and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	PreDam Esc.
5	1990	18.00	17.76	8.88	35.02	57.46
4	1989	17.02	80.89	38.97	127.01	70.29
3	1988	0.00	17.76	17.02	17.02	61.41
2	1987	0.00	12.82	0.00	3.95	78.43

Total Incidental Mortalities

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Natural Survival
5	1990	2.47	0.49	0.00	0.25	90%
4	1989	3.95	2.47	0.74	0.99	80%
3	1988	6.17	15.78	3.95	2.96	70%
2	1987	6.41	22.94	10.60	3.95	60%

Total Fishery Mortality and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Total Tags	Cohort Size
5	1990	20.47	18.25	8.88	35.27	140.33	140.33
4	1989	20.97	83.36	39.71	128.00	342.33	498.25
3	1988	6.17	33.54	20.97	19.98	142.07	764.89
2	1987	6.41	35.76	10.60	7.90	139.10	1,231.79

Exploitation Rates

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Esc. Tags	Esc. Natural	Dam Survival
5	1990	14.59%	13.01%	6.33%	38.04%	20.60	9	35.9%
4	1989	4.21%	16.73%	7.97%	64.55%	25.26	238	35.9%
3	1988	0.81%	4.38%	2.74%	24.55%	17.98	20	29.3%
2	1987	0.52%	2.90%	0.86%	9.15%	26.42	NA	33.7%

Estimated catch of Wild Snake River Fall Chinook Salmon

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	River Return	Maturity Rate	Adult Equvlt.
5	1990	8.94	7.97	3.88	15.41	40.51	100.0%	100.0%
4	1989	197.62	785.57	374.22	1,206.25	1,868.65	56.0%	95.6%
3	1988	6.86	37.31	23.32	22.22	90.53	11.6%	79.2%

Table 5. Summary of the exploitation rate analysis for Lyons Ferry Hatchery 1986 brood year

Total Catches and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	PreDam Esc.
5	1991	4.03	30.95	7.05	18.12	49.83
4	1990	17.11	109.21	79.02	141.93	121.80
3	1989	0.00	88.08	85.81	33.97	127.84
2	1988	0.00	3.02	0.00	7.05	41.02

Total Incidental Mortalities

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Natural Survival
5	1991	0.00	0.25	0.25	0.00	90%
4	1990	2.52	4.53	1.76	1.26	80%
3	1989	6.29	25.42	12.08	5.28	70%
2	1988	6.54	51.34	25.67	2.01	60%

Total Fishery Mortality and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Total Tags	Cohort Size
5	1991	4.03	31.20	7.30	18.12	110.48	110.48
4	1990	19.63	113.74	80.78	143.19	479.14	601.90
3	1989	6.29	113.50	97.89	39.25	384.77	1,137.14
2	1988	6.54	54.36	25.67	9.06	136.65	1,761.13

Exploitation Rates

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Esc. Tags	Esc. Natural	Dam Survival
5	1991	3.65%	28.24%	6.61%	26.67%	19.43	45	39.0%
4	1990	3.26%	18.90%	13.42%	54.04%	43.67	59	35.9%
3	1989	0.55%	9.98%	8.61%	23.49%	45.93	23	35.9%
2	1988	0.37%	3.09%	1.46%	18.09%	12.01	NA	29.3%

Estimated catch of wild Snake River Fall Chinook Salmon

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	River Return	Maturity Rate	Adult Equvlt.
5	1991	9.33	72.26	16.91	41.97	157.38	100.0%	100.0%
4	1990	26.52	153.68	109.15	193.48	358.05	68.3%	96.8%
3	1989	3.15	56.83	49.02	19.65	83.67	18.2%	81.6%

Table 6. Summary of the exploitation rate analysis for Lyons Ferry Hatchery 1987 brood year

Total Catches and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	PreDam Esc.
5	1992	0.00	0.00	0.00	0.00	0.00
4	1991	5.97	0.00	1.99	9.95	16.17
3	1990	0.00	0.00	2.98	5.97	19.15
2	1989	0.00	0.00	0.00	3.98	9.95

Total Incidental Mortalities

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Natural Survival
5	1992	0.00	0.00	0.00	0.00	90%
4	1991	1.49	0.00	0.00	0.00	80%
3	1990	3.48	0.00	0.25	1.49	70%
2	1989	2.74	0.00	0.50	0.75	60%

Total Fishery Mortality and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Total Tags	Cohort Size
5	1992	0.00	0.00	0.00	0.00	0.00	0.00
4	1991	7.46	0.00	1.99	9.95	35.57	35.57
3	1990	3.48	0.00	3.23	7.46	33.32	77.78
2	1989	2.74	0.00	0.50	4.73	17.92	129.04

Exploitation Rates

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Esc. Tags	Esc. Natural	Dam Survival
5	1992	6.84%	15.12%	3.23%	31.95%	0.00	64	47.9% /1
4	1991	20.97%	0.00%	5.59%	38.09%	6.30	178	39.0%
3	1990	4.47%	0.00%	4.15%	28.03%	6.87	10	35.9%
2	1989	2.12%	0.00%	0.39%	32.22%	3.58	NA	35.9%

Estimated catch of wild Snake River Fall Chinook Salmon

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	River Return	Maturity Rate	Adult Equvlt.
5	1992	17.98	39.74	8.50	62.79	196.51	100.00%	100.00%
4	1991	210.62	0.00	56.18	280.92	737.45	100.0%	97.2%
3	1990	5.07	0.00	4.70	10.87	38.76	37.4%	86.1%

/1 Note: Age 5 Catches are estimated using the 1984 - 1986 and 1988 brood year average exploitation rate and the 1984 - 1988 average interdam survival. The estimated age 5 escapements (64 chinook salmon) were divided by the average interdam survival to estimate the predam escapement (134 chinook salmon). The predam escapement was divided by 1 minus average Inriver exploitation rate to estimate total inriver return (197 chinook salmon). Total ocean abundance was estimated by dividing the inriver return by 1 minus the total ocean exploitation rate (263 chinook salmon). Estimated Catches, escapement, and interdam mortalities were estimated by multiplying the average exploitation rate or mortality rate by the appropriate abundance. Estimated catches of Snake River Fall chinook salmon by fishery, dam mortalities, and escapement are as follows:

Alaska Fisheries: 18.0 fish; Canadian Fisheries: 39.7 fish; Non-Terminal U.S. Fisheries: 8.5 fish; Terminal net and sport fisheries: 62.8 fish; Dam mortalities: 70.0 fish; and escapement: 64 fish.

Table 7. Summary of the exploitation rate analysis for Lyons Ferry Hatchery 1988 brood year

Total Catches and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	PreDam Esc.
5	1993	0.00	0.00	0.00	0.00	1.36
4	1992	2.94	9.97	0.00	2.04	24.69
3	1991	0.00	0.00	4.08	4.08	17.67
2	1990	0.00	0.91	0.00	2.04	24.69

Total Incidental Mortalities

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Natural Survival
5	1993	0.00	0.00	0.00	0.00	90%
4	1992	0.68	0.23	0.00	0.00	80%
3	1991	0.68	1.13	0.00	0.23	70%
2	1990	2.49	2.72	0.45	0.23	60%

Total Fishery Mortality and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Total Tags	Cohort Size
5	1993	0.00	0.00	0.00	0.00	1.36	1.36
4	1992	3.62	10.20	0.00	2.04	40.55	42.06
3	1991	0.68	1.13	4.08	4.31	27.87	80.45
2	1990	2.49	3.63	0.45	2.27	33.53	148.45

Exploitation Rates

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Esc. Tags	Esc. Natural	Dam Survival
5	1993	0.00%	0.00%	0.00%	0.00%	0.83	61	60.8%
4	1992	8.61%	24.25%	0.00%	7.63%	11.82	393	47.9%
3	1991	0.85%	1.40%	5.07%	19.61%	6.89	95	39.0%
2	1990	1.68%	2.45%	0.30%	8.42%	8.85	NA	35.9%

Estimated catch of wild Snake River Fall Chinook Salmon

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	River Return	Maturity Rate	Adult Equvlt.
5	1993	0.00	0.00	0.00	0.00	100.36	100.0%	100.0%
4	1992	120.39	339.23	0.00	67.85	888.99	94.6%	98.4%
3	1991	9.38	15.58	56.26	59.43	303.08	29.5%	85.0%

Table 8. Summary of the exploitation rate analysis for Lyons Ferry Hatchery 1989 brood year

Total Catches and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	PreDam Esc.
5	1994	ND	ND	ND	ND	ND
4	1993	8.89	29.13	4.94	12.10	65.92
3	1992	0.00	18.02	12.1	8.89	54.07
2	1991	0.00	4.94	0.00	0.00	49.87

Total Incidental Mortalities

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Natural Survival
5	1994	ND	ND	ND	ND	90%
4	1993	2.47	0.74	0.25	0.00	80%
3	1992	2.47	5.43	1.48	0.49	70%
2	1991	2.96	9.38	2.96	0.49	60%

Total Fishery Mortality and Escapement

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Total Tags	Cohort Size
5	1994	ND	ND	ND	ND	ND	ND
4	1993	11.36	29.87	5.19	12.10	124.44	144.60
3	1992	2.47	23.45	13.58	9.38	102.95	283.69
2	1991	2.96	14.32	2.96	0.49	70.60	475.88

Exploitation Rates

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Esc. Tags	Esc. Natural	Dam Survival
5	1994	6.84%	15.12%	3.23%	31.95%	NA	41	39.4%
4	1993	7.86%	20.66%	3.59%	15.51%	40.07	631	60.8%
3	1992	0.87%	8.27%	4.79%	14.78%	25.88	92	47.9%
2	1991	0.62%	3.01%	0.62%	0.97%	19.44	NA	39.0%

Estimated catch of wild Snake River Fall Chinook Salmon

Age	Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	River Return	Maturity Rate	Adult Equvlt.
5	1994	14.01	30.97	6.62	48.94	153.16	100.0%	100.0%
4	1993	178.91	470.42	81.74	190.56	1,228.73	79.5%	97.2%
3	1992	8.78	83.37	48.28	33.35	225.57	26.7%	83.6%

Table 9. Summary of Removal and Escapement Rates by Brood Year. Numbers are in adult equivalents.

Brood Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Dam Mortality	Escape.	Total
Numbers							
1984	194	1,199	484	1,638	708	306	4,529
1985	203	789	380	1,244	489	267	3,372
1986	38	267	163	255	217	127	1,067
1987	227	40	67	355	366	252	1,307/1
1988	126	347	48	127	616	549	1,814
1989	195	558	126	273	571	764	2,487/2
Percent							
1984	4.3%	26.5%	10.7%	36.2%	15.6%	6.8%	
1985	6.0%	23.4%	11.3%	36.9%	14.5%	7.9%	
1986	3.5%	25.1%	15.2%	23.9%	20.3%	11.9%	
1987	17.4%	3.0%	5.1%	27.0%	27.9%	19.3%	
1988	7.0%	19.1%	2.6%	7.0%	34.0%	30.3%	
1989	7.8%	22.4%	5.1%	11.0%	22.9%	30.7%	
Average	7.7%	19.9%	8.3%	23.9%	22.5%	17.8%	

/1 Note: Age 5 Catches are estimated using the 1984 - 1986 and 1988 brood year average exploitation rate and the 1984 - 1988 average interdam survival. The estimated age 5 escapements (64 chinook salmon) were divided by the average interdam survival to estimate the predam escapement (134 chinook salmon). The predam escapement was divided by 1 minus average Inriver exploitation rate to estimate total inriver return (197 chinook salmon). Total ocean abundance was estimated by dividing the inriver return by 1 minus the total ocean exploitation rate (263 chinook salmon). Estimated Catches, escapement, and interdam mortalities were estimated by multiplying the average exploitation rate or mortality rate by the appropriate abundance. Estimated catches of Snake River Fall chinook salmon by fishery, dam mortalities, and escapement are as follows:
Alaska Fisheries: 18.0 fish; Canadian Fisheries: 39.7 fish; Non-Terminal U.S. Fisheries: 8.5 fish; Terminal net and sport fisheries: 62.8 fish; Dam mortalities: 70.0 fish; and escapement: 64 fish.

/2 Note: Age 5 catches for the 1989 brood year are estimated using the 1984 - 1986 and 1988 brood year average exploitation rate for age 5 fish and the 1984 - 1988 average interdam survival. The estimated age 5 escapements (41 chinook salmon) were divided by the average interdam survival to estimate the predam escapement (104 chinook salmon). The predam escapement was divided by 1 minus average Inriver exploitation rate to estimate total inriver return (153 chinook salmon). Total ocean abundance was estimated by dividing the inriver return by 1 minus the total ocean exploitation rate (205 chinook salmon). Estimated Catches, escapement, and interdam mortalities were estimated by multiplying the average exploitation rate or mortality rate by the appropriate abundance. Estimated catches of Snake River Fall chinook salmon by fishery, dam mortalities, and escapement are as follows: Alaska Fisheries: 14.0 fish; Canadian Fisheries: 31.0 fish; Non-Terminal U.S. Fisheries: 6.6 fish; Terminal net and sport fisheries: 48.9 fish; Dam mortalities: 63.2 fish; and escapement: 41 fish.

Table 10. Summary of Removal and Escapement Rates by Catch Year. Numbers are in adult equivalents.

Catch Year	Alaska Fisheries	Canadian Fisheries	Lower 48 Ocean	Terminal Net&Spt	Dam Mortality	Escape.	Total
Numbers							
1988	209	1,224	504	1,627	889	368	4,821[/1]
1989	224	866	398	1,388	526	295	3,697
1990	39	157	114	220	140	78	747
1991	222	86	119	382	498	318	1,625
1992	144	443	49	164	598	549	1,947[/2]
1993	175	463	85	216	479	742	2,160[/3]
Percent							
1988	4.3%	25.4%	10.4%	33.8%	18.4%	7.6%	
1989	6.1%	23.4%	10.8%	37.5%	14.2%	8.0%	
1990	5.2%	21.0%	15.2%	29.4%	18.7%	10.4%	
1991	13.7%	5.3%	7.3%	23.5%	30.6%	19.6%	
1992	7.4%	22.8%	2.5%	8.4%	30.7%	28.2%	
1993	8.1%	21.5%	3.9%	10.0%	22.2%	34.3%	
Average	7.5%	19.9%	8.4%	23.8%	22.5%	18.0%	

/1 Note: Age 5 catches for the 1983 brood year are estimated using the 1984 - 1986 and 1988 brood year average exploitation rate for age 5 fish and the 1984 - 1988 average interdam survival. The estimated age 5 escapements (98 chinook salmon) were divided by the average interdam survival to estimate the predam escapement (335 chinook salmon). The predam escapement was divided by 1 minus average Inriver exploitation rate to estimate total inriver return (492 chinook salmon). Total ocean abundance was estimated by dividing the inriver return by 1 minus the total ocean exploitation rate (658 chinook salmon). Estimated Catches, escapement, and interdam mortalities were estimated by multiplying the average exploitation rate or mortality rate by the appropriate abundance. Estimated catches of Snake River Fall chinook salmon by fishery, dam mortalities, and escapement are as follows: Alaska Fisheries: 45.0 fish; Canadian Fisheries: 99.5 fish; Non-Terminal U.S. Fisheries: 21.3 fish; Terminal net and sport fisheries: 157.2 fish; Dam mortalities: 236.7 fish; and escapement: 98 fish.

/2 Note: Age 5 Catches are estimated using the 1984 - 1986 and 1988 brood year average exploitation rate and the 1984 - 1988 average interdam survival. The estimated age 5 escapements (64 chinook salmon) were divided by the average interdam survival to estimate the predam escapement (134 chinook salmon). The predam escapement was divided by 1 minus average Inriver exploitation rate to estimate total inriver return (197 chinook salmon). Total ocean abundance was estimated by dividing the inriver return by 1 minus the total ocean exploitation rate (263 chinook salmon). Estimated Catches, escapement, and interdam mortalities were estimated by multiplying the average exploitation rate or mortality rate by the appropriate abundance. Estimated catches of Snake River Fall chinook salmon by fishery, dam mortalities, and escapement are as follows:
Alaska Fisheries: 18.0 fish; Canadian Fisheries: 39.7 fish; Non-Terminal U.S. Fisheries: 8.5 fish; Terminal net and sport fisheries: 62.8 fish; Dam mortalities: 70.0 fish; and escapement: 64 fish.

/3 Note: Age 3 catches for the 1990 brood year are estimated using the 1984 - 1988 brood year average exploitation rate for age 3 fish and the 1984 - 1988 average interdam survival. The estimated age 3 escapements (50 chinook salmon) were divided by the average interdam survival to estimate the predam escapement (82 chinook salmon). The predam escapement was divided by 1 minus average Inriver exploitation rate to estimate total inriver return (107 chinook salmon). Total ocean abundance was estimated by dividing the inriver return by 1 minus the total ocean exploitation rate (123 chinook salmon). Estimated Catches, escapement, and interdam mortalities were estimated by multiplying the average exploitation rate or mortality rate by the appropriate abundance. Estimated catches of Snake River Fall chinook salmon by fishery, dam mortalities, and escapement are as follows: Alaska Fisheries: 1.7 fish Canadian Fisheries: 7.5 fish; Non-Terminal U.S. Fisheries: 6.7 fish; Terminal net and sport fisheries: 25.2 fish; Dam mortalities: 32.3 fish; and escapement: 50 fish.

Table 11. Snake River fall chinook mortality as estimated by the PSC chinook model. Calibration #9521.

			YEAR															
AREA	AGE	Data	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Alaska	2	TOTAL CATCH	1	1	1	1	1	0	2	1	0	0	0	0	0	0	0	1
		INCIDENTAL MORTALITY	4	2	1	1	1	0	2	1	1	0	0	0	0	0	0	1
		TOTAL MORTALITY	5	3	3	1	1	1	3	2	1	0	1	1	1	0	0	2
	3	TOTAL CATCH	21	13	9	12	8	7	3	13	6	4	2	5	7	7	1	3
		INCIDENTAL MORTALITY	4	2	1	1	1	1	0	1	1	0	0	0	0	1	0	0
		TOTAL MORTALITY	25	15	10	13	9	7	4	14	8	4	3	5	7	8	1	3
	4	TOTAL CATCH	373	239	149	100	175	75	52	40	156	62	50	26	38	42	68	9
		INCIDENTAL MORTALITY	0	0	3	11	15	8	9	4	37	5	10	3	5	8	11	2
		TOTAL MORTALITY	374	239	152	111	190	84	61	44	193	66	60	29	43	50	79	10
	5	TOTAL CATCH	144	102	65	41	34	37	16	18	13	39	20	21	8	12	23	31
		INCIDENTAL MORTALITY	0	0	1	4	3	4	2	2	3	3	3	2	1	2	3	5
		TOTAL MORTALITY	144	102	66	45	36	41	18	19	16	42	24	23	9	14	26	35
Canada	2	TOTAL CATCH	68	46	62	35	31	15	83	44	20	6	19	24	29	3	6	42
		INCIDENTAL MORTALITY	7	3	3	1	1	1	2	2	3	1	1	1	2	0	1	2
		TOTAL MORTALITY	75	49	65	36	32	16	85	46	23	8	20	25	30	3	7	43
	3	TOTAL CATCH	854	533	358	488	264	264	157	673	295	253	74	172	218	202	24	79
		INCIDENTAL MORTALITY	4	2	1	1	0	0	1	1	7	9	0	1	1	1	0	0
		TOTAL MORTALITY	858	535	359	489	265	265	157	674	301	261	75	173	219	203	24	79
	4	TOTAL CATCH	1706	1089	681	458	612	367	319	231	1165	722	361	211	342	343	436	69
		INCIDENTAL MORTALITY	1	0	0	0	0	0	1	0	17	20	1	1	0	1	1	0
		TOTAL MORTALITY	1706	1090	681	458	612	367	321	231	1182	743	361	212	343	344	437	69
	5	TOTAL CATCH	315	224	143	89	56	94	49	48	49	211	82	79	33	47	76	125
		INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	1	6	0	1	0	0	1	0
		TOTAL MORTALITY	315	224	143	89	56	94	49	48	50	217	82	79	33	47	76	125
Columbia River	2	TOTAL CATCH	27	18	24	14	10	16	77	37	34	14	20	29	28	1	8	21
		INCIDENTAL MORTALITY	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		TOTAL MORTALITY	27	18	25	14	10	16	77	37	34	14	20	29	28	1	8	21
	3	TOTAL CATCH	158	99	66	90	37	93	73	308	195	131	50	83	103	55	14	18
		INCIDENTAL MORTALITY	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		TOTAL MORTALITY	159	99	67	91	37	93	73	308	196	132	50	83	103	55	14	18
	4	TOTAL CATCH	697	446	278	185	191	274	334	257	1230	506	375	152	245	151	414	27
		INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		TOTAL MORTALITY	698	446	278	185	191	274	334	257	1230	506	375	152	245	151	414	27
	5	TOTAL CATCH	201	143	91	56	26	83	68	75	68	237	90	84	27	21	75	51
		INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		TOTAL MORTALITY	201	143	91	56	26	83	68	75	68	237	90	84	27	21	75	51
WA/OR Ocean	2	TOTAL CATCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		INCIDENTAL MORTALITY	3	1	1	1	0	0	1	1	1	1	0	1	1	0	0	0
		TOTAL MORTALITY	3	1	1	1	0	0	1	1	1	1	0	1	1	0	0	0
	3	TOTAL CATCH	535	334	225	306	99	38	73	244	143	183	66	158	125	246	28	9
		INCIDENTAL MORTALITY	2	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0
		TOTAL MORTALITY	537	335	225	307	99	38	73	245	143	183	66	159	126	247	28	9
	4	TOTAL CATCH	642	410	256	172	133	31	78	49	221	231	131	76	82	181	217	3
		INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		TOTAL MORTALITY	643	410	256	172	133	31	78	49	221	232	131	76	82	181	217	3
	5	TOTAL CATCH	104	74	47	29	15	17	13	18	10	54	24	25	8	20	30	20
		INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		TOTAL MORTALITY	104	74	47	29	15	17	13	18	10	54	24	25	8	20	30	20

Table 12. Snake River fall chinook adult equivalent mortality as estimated by the PSC chinook model. Calibration #9521.

			YEAR															
AREA	AGE	Data	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Alaska	2	AEQ CATCH	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1
		AEQ INCIDENTAL MORTALITY	2	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1
		AEQ TOTAL MORTALITY	3	2	2	1	1	0	2	1	1	0	0	0	1	0	0	1
	3	AEQ CATCH	17	11	7	10	6	5	3	11	5	3	2	4	6	6	1	2
		AEQ INCIDENTAL MORTALITY	3	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0
		AEQ TOTAL MORTALITY	20	12	8	11	7	6	3	12	6	4	2	4	6	7	1	3
	4	AEQ CATCH	361	230	144	97	169	73	50	39	150	59	48	25	37	40	66	8
		AEQ INCIDENTAL MORTALITY	0	0	3	11	14	8	8	4	36	5	9	3	5	8	10	2
		AEQ TOTAL MORTALITY	361	230	147	107	183	81	58	43	186	64	58	28	41	48	76	10
	5	AEQ CATCH	144	102	65	41	34	37	16	18	13	39	20	21	8	12	23	31
		AEQ INCIDENTAL MORTALITY	0	0	1	4	3	4	2	2	3	3	3	2	1	2	3	5
		AEQ TOTAL MORTALITY	144	102	66	45	36	41	18	19	16	42	24	23	9	14	26	35
Canada	2	AEQ CATCH	41	28	37	21	19	9	50	26	12	4	11	15	17	2	4	25
		AEQ INCIDENTAL MORTALITY	4	2	2	1	1	0	1	1	2	1	1	1	1	0	0	1
		AEQ TOTAL MORTALITY	45	29	39	22	19	9	51	27	14	5	12	15	18	2	4	26
	3	AEQ CATCH	700	437	294	400	217	217	128	551	241	207	61	141	179	165	20	65
		AEQ INCIDENTAL MORTALITY	3	2	1	1	0	0	1	1	5	7	0	1	1	1	0	0
		AEQ TOTAL MORTALITY	703	438	294	401	217	217	129	552	247	214	61	142	180	166	20	65
	4	AEQ CATCH	1647	1052	657	442	590	354	308	223	1125	697	348	204	330	331	421	67
		AEQ INCIDENTAL MORTALITY	1	0	0	0	0	0	1	0	17	20	1	1	0	1	1	0
		AEQ TOTAL MORTALITY	1647	1052	657	442	590	354	309	223	1141	717	349	205	331	332	422	67
	5	AEQ CATCH	315	224	143	89	56	94	49	48	49	211	82	79	33	47	76	125
		AEQ INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	1	6	0	1	0	0	1	0
		AEQ TOTAL MORTALITY	315	224	143	89	56	94	49	48	50	217	82	79	33	47	76	125
Columbia River	2	AEQ CATCH	27	18	24	14	10	16	77	37	34	14	20	29	28	1	8	21
		AEQ INCIDENTAL MORTALITY	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ TOTAL MORTALITY	27	18	25	14	10	16	77	37	34	14	20	29	28	1	8	21
	3	AEQ CATCH	158	99	66	90	37	93	73	308	195	131	50	83	103	55	14	18
		AEQ INCIDENTAL MORTALITY	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ TOTAL MORTALITY	159	99	67	91	37	93	73	308	196	132	50	83	103	55	14	18
	4	AEQ CATCH	697	446	278	185	191	274	334	257	1230	506	375	152	245	151	414	27
		AEQ INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ TOTAL MORTALITY	698	446	278	185	191	274	334	257	1230	506	375	152	245	151	414	27
	5	AEQ CATCH	201	143	91	56	26	83	68	75	68	237	90	84	27	21	75	51
		AEQ INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ TOTAL MORTALITY	201	143	91	56	26	83	68	75	68	237	90	84	27	21	75	51
WA/OR Ocean	2	AEQ CATCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ INCIDENTAL MORTALITY	2	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
		AEQ TOTAL MORTALITY	2	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
	3	AEQ CATCH	439	274	184	251	81	31	59	200	117	150	54	130	103	202	23	7
		AEQ INCIDENTAL MORTALITY	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
		AEQ TOTAL MORTALITY	440	275	184	252	81	31	59	200	117	150	54	130	103	202	23	7
	4	AEQ CATCH	620	396	247	166	129	30	76	47	213	223	126	74	79	175	209	3
		AEQ INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ TOTAL MORTALITY	620	396	247	166	129	30	76	47	213	223	126	74	79	175	209	3
	5	AEQ CATCH	104	74	47	29	15	17	13	18	10	54	24	25	8	20	30	20
		AEQ INCIDENTAL MORTALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		AEQ TOTAL MORTALITY	104	74	47	29	15	17	13	18	10	54	24	25	8	20	30	20

Table 13. Snake River fall chinook fishery exploitation rates estimated by the PSC chinook model. Calibration #9521.

			YEAR															
AREA	AGE	Data	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Alaska	2	CATCH ER	0.00021	0.00021	0.00021	0.00021	0.00019	0.00010	0.00015	0.00012	0.00009	0.00010	0.00009	0.00008	0.00007	0.00010	0.00008	0.00011
		TOTAL ER	0.00075	0.00058	0.00043	0.00037	0.00034	0.00018	0.00028	0.00028	0.00027	0.00022	0.00019	0.00015	0.00014	0.00020	0.00019	0.00024
	3	CATCH ER	0.00289	0.00289	0.00289	0.00289	0.00337	0.00280	0.00193	0.00172	0.00163	0.00129	0.00169	0.00211	0.00212	0.00176	0.00226	0.00234
		TOTAL ER	0.00349	0.00330	0.00317	0.00326	0.00372	0.00307	0.00216	0.00187	0.00197	0.00141	0.00189	0.00223	0.00224	0.00191	0.00246	0.00257
	4	CATCH ER	0.06585	0.06586	0.06585	0.06586	0.08457	0.06224	0.04004	0.04038	0.03668	0.02750	0.03057	0.03441	0.02885	0.02235	0.02900	0.03077
		TOTAL ER	0.06588	0.06588	0.06731	0.07313	0.09162	0.06915	0.04661	0.04440	0.04539	0.02968	0.03643	0.03796	0.03243	0.02678	0.03352	0.03672
	5	CATCH ER	0.10998	0.11004	0.10993	0.10995	0.13836	0.10467	0.06842	0.06697	0.06147	0.04673	0.05427	0.06294	0.05584	0.04448	0.05738	0.06044
		TOTAL ER	0.10999	0.11004	0.11211	0.12089	0.14898	0.11509	0.07830	0.07300	0.07458	0.05001	0.06311	0.06828	0.06122	0.05118	0.06418	0.06938
Canada	2	CATCH ER	0.00984	0.00984	0.00984	0.00984	0.00846	0.00539	0.00701	0.00714	0.00417	0.00300	0.00502	0.00480	0.00446	0.00349	0.00320	0.00446
		TOTAL ER	0.01080	0.01054	0.01031	0.01026	0.00879	0.00563	0.00720	0.00741	0.00486	0.00368	0.00528	0.00499	0.00470	0.00367	0.00348	0.00465
	3	CATCH ER	0.11959	0.11959	0.11959	0.11957	0.11588	0.11200	0.08693	0.08809	0.07396	0.08329	0.05504	0.07105	0.06611	0.04846	0.04832	0.06348
		TOTAL ER	0.12017	0.12000	0.11986	0.11981	0.11607	0.11214	0.08735	0.08825	0.07562	0.08609	0.05538	0.07139	0.06640	0.04882	0.04874	0.06373
	4	CATCH ER	0.30069	0.30073	0.30072	0.30073	0.29479	0.30347	0.24572	0.23282	0.27425	0.32294	0.21987	0.27763	0.25904	0.18319	0.18564	0.24601
		TOTAL ER	0.30079	0.30080	0.30077	0.30078	0.29483	0.30350	0.24671	0.23285	0.27835	0.33201	0.22029	0.27834	0.25940	0.18397	0.18624	0.24637
	5	CATCH ER	0.24154	0.24170	0.24142	0.24136	0.22913	0.26353	0.21290	0.18297	0.23405	0.25435	0.21856	0.23134	0.23871	0.17550	0.18660	0.24707
		TOTAL ER	0.24159	0.24173	0.24144	0.24138	0.22913	0.26353	0.21343	0.18297	0.23705	0.26115	0.21947	0.23301	0.23943	0.17733	0.18783	0.24794
Columbia River	2	CATCH ER	0.00384	0.00384	0.00385	0.00385	0.00274	0.00576	0.00651	0.00604	0.00732	0.00658	0.00528	0.00564	0.00436	0.00160	0.00393	0.00224
		TOTAL ER	0.00395	0.00389	0.00388	0.00387	0.00277	0.00580	0.00653	0.00606	0.00737	0.00661	0.00531	0.00566	0.00439	0.00164	0.00399	0.00225
	3	CATCH ER	0.02211	0.02212	0.02213	0.02212	0.01631	0.03940	0.04037	0.04031	0.04900	0.04329	0.03721	0.03420	0.03113	0.01315	0.02771	0.01454
		TOTAL ER	0.02232	0.02222	0.02220	0.02218	0.01637	0.03949	0.04041	0.04037	0.04912	0.04335	0.03728	0.03424	0.03121	0.01323	0.02783	0.01457
	4	CATCH ER	0.12296	0.12298	0.12265	0.12129	0.09195	0.22637	0.25707	0.25924	0.28960	0.22626	0.22875	0.19924	0.18570	0.08078	0.17655	0.09519
		TOTAL ER	0.12303	0.12302	0.12268	0.12130	0.09197	0.22640	0.25709	0.25925	0.28964	0.22628	0.22877	0.19925	0.18572	0.08081	0.17659	0.09519
	5	CATCH ER	0.15385	0.15395	0.15321	0.15087	0.10784	0.23157	0.29624	0.28468	0.32647	0.28557	0.24100	0.24579	0.19419	0.07752	0.18438	0.10036
		TOTAL ER	0.15389	0.15397	0.15323	0.15087	0.10784	0.23157	0.29624	0.28468	0.32647	0.28558	0.24100	0.24579	0.19419	0.07752	0.18441	0.10036
WA/OR Ocean	2	CATCH ER	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		TOTAL ER	0.00039	0.00027	0.00019	0.00022	0.00009	0.00003	0.00006	0.00009	0.00012	0.00025	0.00012	0.00013	0.00013	0.00025	0.00018	0.00003
	3	CATCH ER	0.07502	0.07502	0.07502	0.07501	0.04350	0.01607	0.04029	0.03196	0.03590	0.06020	0.04870	0.06541	0.03792	0.05912	0.05595	0.00683
		TOTAL ER	0.07528	0.07519	0.07514	0.07515	0.04356	0.01609	0.04032	0.03202	0.03598	0.06040	0.04878	0.06549	0.03802	0.05930	0.05610	0.00684
	4	CATCH ER	0.11323	0.11325	0.11324	0.11325	0.06425	0.02537	0.06034	0.04943	0.05199	0.10344	0.07973	0.10003	0.06192	0.09678	0.09233	0.01129
		TOTAL ER	0.11330	0.11330	0.11328	0.11329	0.06426	0.02538	0.06034	0.04945	0.05202	0.10350	0.07976	0.10005	0.06195	0.09683	0.09237	0.01129
	5	CATCH ER	0.07978	0.07983	0.07975	0.07976	0.06107	0.04649	0.05766	0.06845	0.04778	0.06522	0.06384	0.07294	0.05900	0.07643	0.07408	0.03913
		TOTAL ER	0.07981	0.07985	0.07977	0.07978	0.06107	0.04649	0.05766	0.06845	0.04778	0.06525	0.06384	0.07294	0.05900	0.07647	0.07411	0.03913

Table 14. Snake River fall chinook adult equivalent fishery exploitation rates estimated by the PSC chinook model. Calibration #9521.

			YEAR															
AREA	AGE	Data	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Alaska	2	AEQ CATCH ER	0.00013	0.00013	0.00012	0.00013	0.00012	0.00006	0.00009	0.00007	0.00006	0.00006	0.00005	0.00005	0.00004	0.00007	0.00005	0.00007
		AEQ TOTAL ER	0.00045	0.00035	0.00026	0.00022	0.00020	0.00011	0.00017	0.00017	0.00017	0.00013	0.00011	0.00009	0.00008	0.00012	0.00011	0.00014
	3	AEQ CATCH ER	0.00237	0.00237	0.00237	0.00237	0.00277	0.00229	0.00158	0.00141	0.00134	0.00106	0.00138	0.00173	0.00173	0.00144	0.00185	0.00192
		AEQ TOTAL ER	0.00286	0.00270	0.00260	0.00267	0.00305	0.00251	0.00177	0.00153	0.00162	0.00115	0.00155	0.00183	0.00183	0.00156	0.00202	0.00210
	4	AEQ CATCH ER	0.06356	0.06357	0.06356	0.06356	0.08163	0.06008	0.03865	0.03898	0.03540	0.02655	0.02951	0.03322	0.02784	0.02157	0.02799	0.02970
		AEQ TOTAL ER	0.06359	0.06358	0.06497	0.07059	0.08843	0.06674	0.04499	0.04286	0.04381	0.02864	0.03516	0.03664	0.03130	0.02585	0.03235	0.03544
	5	AEQ CATCH ER	0.10998	0.11004	0.10993	0.10995	0.13836	0.10467	0.06842	0.06697	0.06147	0.04673	0.05427	0.06294	0.05584	0.04448	0.05738	0.06044
		AEQ TOTAL ER	0.10999	0.11004	0.11211	0.12089	0.14898	0.11509	0.07830	0.07300	0.07458	0.05001	0.06311	0.06828	0.06122	0.05118	0.06418	0.06938
Canada	2	AEQ CATCH ER	0.00593	0.00593	0.00593	0.00593	0.00509	0.00325	0.00422	0.00430	0.00251	0.00181	0.00302	0.00289	0.00269	0.00210	0.00193	0.00269
		AEQ TOTAL ER	0.00651	0.00635	0.00621	0.00618	0.00529	0.00339	0.00433	0.00446	0.00293	0.00222	0.00318	0.00301	0.00283	0.00221	0.00209	0.00280
	3	AEQ CATCH ER	0.09801	0.09801	0.09801	0.09799	0.09497	0.09179	0.07124	0.07220	0.06062	0.06826	0.04511	0.05823	0.05418	0.03972	0.03959	0.05203
		AEQ TOTAL ER	0.09849	0.09835	0.09824	0.09819	0.09513	0.09191	0.07159	0.07233	0.06197	0.07056	0.04539	0.05851	0.05442	0.04001	0.03994	0.05223
	4	AEQ CATCH ER	0.29030	0.29033	0.29032	0.29033	0.28458	0.29296	0.23723	0.22476	0.26474	0.31173	0.21226	0.26800	0.25007	0.17685	0.17921	0.23750
		AEQ TOTAL ER	0.29039	0.29040	0.29037	0.29038	0.28462	0.29298	0.23819	0.22479	0.26870	0.32048	0.21267	0.26869	0.25042	0.17760	0.17979	0.23784
	5	AEQ CATCH ER	0.24154	0.24170	0.24142	0.24136	0.22913	0.26353	0.21290	0.18297	0.23405	0.25435	0.21856	0.23134	0.23871	0.17550	0.18660	0.24707
		AEQ TOTAL ER	0.24159	0.24173	0.24144	0.24138	0.22913	0.26353	0.21343	0.18297	0.23705	0.26115	0.21947	0.23301	0.23943	0.17733	0.18783	0.24794
Columbia River	2	AEQ CATCH ER	0.00384	0.00384	0.00385	0.00385	0.00274	0.00576	0.00651	0.00604	0.00732	0.00658	0.00528	0.00564	0.00436	0.00160	0.00393	0.00224
		AEQ TOTAL ER	0.00395	0.00389	0.00388	0.00387	0.00277	0.00580	0.00653	0.00606	0.00737	0.00661	0.00531	0.00566	0.00439	0.00164	0.00399	0.00225
	3	AEQ CATCH ER	0.02211	0.02212	0.02213	0.02212	0.01631	0.03940	0.04037	0.04031	0.04900	0.04329	0.03721	0.03420	0.03113	0.01315	0.02771	0.01454
		AEQ TOTAL ER	0.02232	0.02222	0.02220	0.02218	0.01637	0.03949	0.04041	0.04037	0.04912	0.04335	0.03728	0.03424	0.03121	0.01323	0.02783	0.01457
	4	AEQ CATCH ER	0.12296	0.12298	0.12265	0.12129	0.09195	0.22637	0.25707	0.25924	0.28960	0.22626	0.22875	0.19924	0.18570	0.08078	0.17655	0.09519
		AEQ TOTAL ER	0.12303	0.12302	0.12268	0.12130	0.09197	0.22640	0.25709	0.25925	0.28964	0.22628	0.22877	0.19925	0.18572	0.08081	0.17659	0.09519
	5	AEQ CATCH ER	0.15385	0.15395	0.15321	0.15087	0.10784	0.23157	0.29624	0.28468	0.32647	0.28557	0.24100	0.24579	0.19419	0.07752	0.18438	0.10036
		AEQ TOTAL ER	0.15389	0.15397	0.15323	0.15087	0.10784	0.23157	0.29624	0.28468	0.32647	0.28558	0.24100	0.24579	0.19419	0.07752	0.18441	0.10036
WA/OR Ocean	2	AEQ CATCH ER	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		AEQ TOTAL ER	0.00023	0.00016	0.00011	0.00013	0.00005	0.00002	0.00003	0.00006	0.00007	0.00015	0.00007	0.00008	0.00008	0.00015	0.00011	0.00002
	3	AEQ CATCH ER	0.06148	0.06148	0.06148	0.06148	0.03565	0.01317	0.03302	0.02619	0.02943	0.04934	0.03991	0.05360	0.03108	0.04845	0.04586	0.00560
		AEQ TOTAL ER	0.06169	0.06163	0.06158	0.06159	0.03570	0.01319	0.03305	0.02624	0.02949	0.04950	0.03998	0.05367	0.03116	0.04860	0.04598	0.00561
	4	AEQ CATCH ER	0.10929	0.10931	0.10931	0.10931	0.06201	0.02449	0.05824	0.04770	0.05019	0.09984	0.07696	0.09655	0.05977	0.09342	0.08912	0.01090
		AEQ TOTAL ER	0.10936	0.10935	0.10934	0.10935	0.06202	0.02450	0.05824	0.04772	0.05021	0.09990	0.07698	0.09657	0.05980	0.09347	0.08916	0.01090
	5	AEQ CATCH ER	0.07978	0.07983	0.07975	0.07976	0.06107	0.04649	0.05766	0.06845	0.04778	0.06522	0.06384	0.07294	0.05900	0.07643	0.07408	0.03913
		AEQ TOTAL ER	0.07981	0.07985	0.07977	0.07978	0.06107	0.04649	0.05766	0.06845	0.04778	0.06525	0.06384	0.07294	0.05900	0.07647	0.07411	0.03913

Table 15. The estimated adult equavalent (AEQ) mortality of wild Snake River Fall Chinook salmon by fishery, dam loss and escapement, the estimated AEQ mortaltity of wild SRFC by fishery, dam loss and escapement if the Southeast Alaska fishery is eliminated, and the additional number of AEQ mortalities by fishery, dam loss and escapement if the Southeast Alaska fishery is eliminated.

AEQ Mortality

Year	Alaska	Canada	WA/OR Ocean	Columbia River	Dam Loss	Escapement	Total
1979	528	2,710	1,166	1,085	1,205	2,018	8,713
1980	346	1,744	745	705	1,429	669	5,638
1981	223	1,134	480	459	1,212	346	3,854
1982	164	954	448	345	917	367	3,194
1983	228	883	225	265	765	489	2,855
1984	128	675	77	466	74	751	2,172
1985	82	538	149	551	618	635	2,573
1986	75	851	266	678	1,203	535	3,608
1987	209	1,452	341	1,529	922	456	4,909
1988	109	1,153	428	889	789	296	3,665
1989	84	504	204	535	609	308	2,244
1990	56	441	229	347	614	315	2,002
1991	56	562	191	404	1,014	268	2,495
1992	69	548	398	228	867	756	2,865
1993	103	522	262	511	411	624	2,433
1994	49	283	30	117	300	901	1,681

AEQ Mortality with No Alaska Mortality

Year	Alaska	Canada	WA/OR Ocean	Columbia River	Dam Loss	Escapement	Total
1979	0	2,885	1,242	1,155	1,283	2,148	8,713
1980	0	1,858	794	751	1,522	713	5,638
1981	0	1,203	509	488	1,287	367	3,854
1982	0	1,005	472	363	967	387	3,194
1983	0	959	245	288	832	532	2,855
1984	0	717	82	495	79	798	2,172
1985	0	556	154	570	638	656	2,573
1986	0	869	272	692	1,228	547	3,608
1987	0	1,516	356	1,597	963	477	4,909
1988	0	1,188	441	916	813	305	3,665
1989	0	523	212	556	632	320	2,244
1990	0	454	235	357	631	324	2,002
1991	0	575	195	413	1,038	274	2,495
1992	0	561	407	234	888	775	2,865
1993	0	545	274	533	429	652	2,433
1994	0	292	31	120	309	928	1,681

Table 15. The estimated adult equavalent (AEQ) mortality of wild Snake River Fall Chinook salmon by fishery, dam loss and escapement, the estimated AEQ mortaltity of wild SRFC by fishery, dam loss and escapement if the Southeast Alaska fishery is eliminated, and the additional number of AEQ mortalities by fishery, dam loss and escapement if the Southeast Alaska fishery is eliminated (continued).

Additional Mortality

Year	Alaska	Canada	WA/OR Ocean	Columbia River	Dam Loss	Escapement	Accrual Rate
1979	0	175	75	70	78	130	24.6%
1980	0	114	49	46	93	44	12.6%
1981	0	70	29	28	74	21	9.5%
1982	0	52	24	19	50	20	12.1%
1983	0	76	20	23	66	42	18.6%
1984	0	42	5	29	5	47	36.8%
1985	0	18	5	18	20	21	25.5%
1986	0	18	6	14	25	11	15.2%
1987	0	65	15	68	41	20	9.7%
1988	0	35	13	27	24	9	8.3%
1989	0	20	8	21	24	12	14.3%
1990	0	13	7	10	18	9	16.2%
1991	0	13	4	9	23	6	11.0%
1992	0	13	10	6	21	19	27.0%
1993	0	23	12	23	18	28	26.8%
1994	0	9	1	4	9	27	55.2%

Table 16. Estimated annual exploitation rates on natural Snake River fall chinook salmon (ages 2-5 combined[1]) in the Southeast Alaska salmon fishery in 1979-1994 based on the most current calibration of the PSC chinook model (calibration # 9521).

Year	Estimated Annual SRFC Exploitation Rate in SE Alaska Fishery
1979	5.32%
1980	5.31%
1981	5.40%
1982	5.84%
1983	7.22%
1984	5.54%
1985	3.76%
1986	3.53%
1987	3.61%
1988	2.40%
1989	3.00%
1990	3.21%
1991	2.83%
1992	2.36%
1993	2.96%
1994	3.22%
Averages for the Years:	
1979-1982	5.47%
1986-1990	3.15%
1988-1993	2.79%
1991-1993	2.72%

[1] Exploitation rate for age 2-5 fish is based on the age specific exploitation rates weighted by the age specific adult equivalence factors.

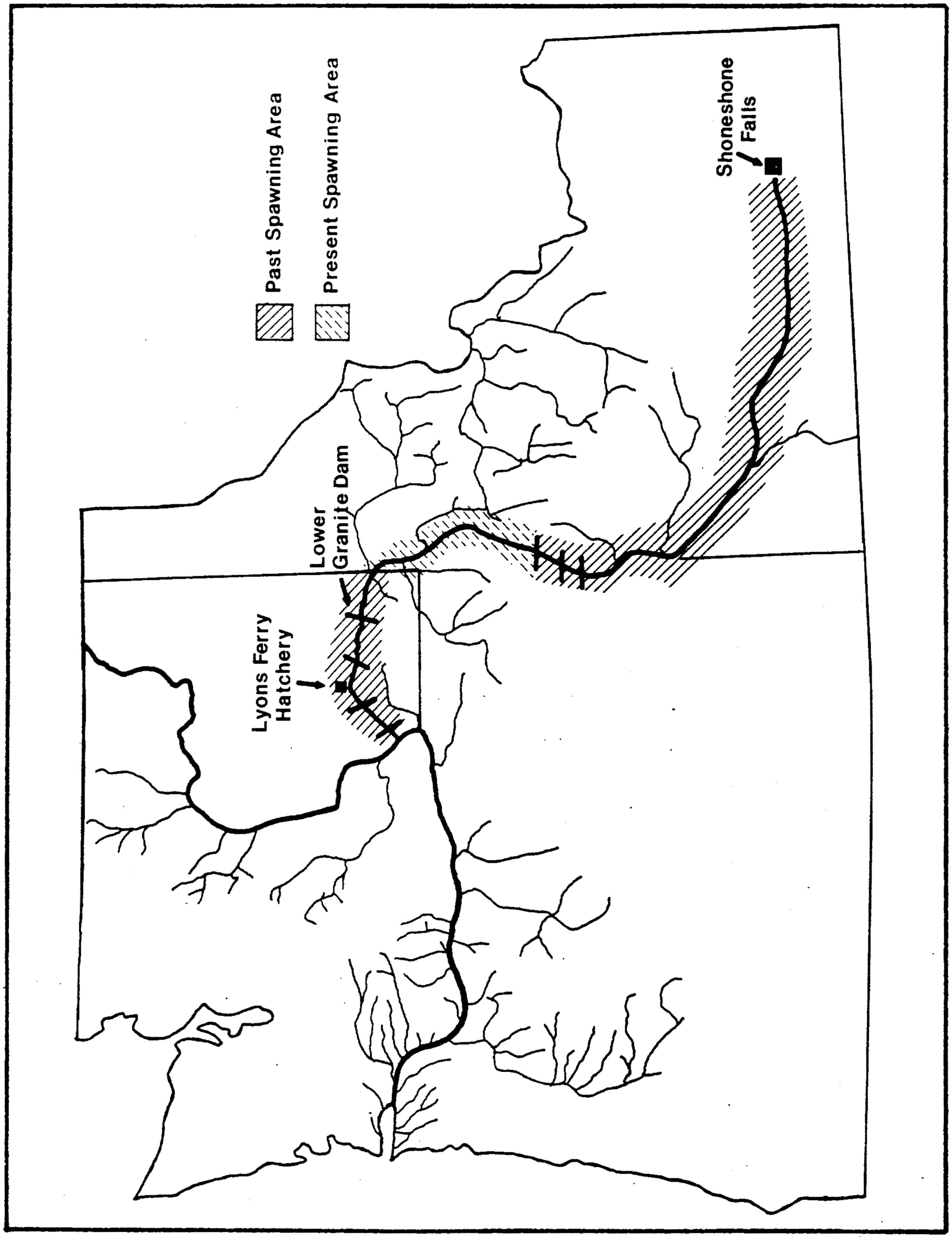


Figure 1. Location of Lyons Ferry Hatchery, Lower Granite Dam and the past and present spawning areas of the wild Snake River Fall chinook salmon.

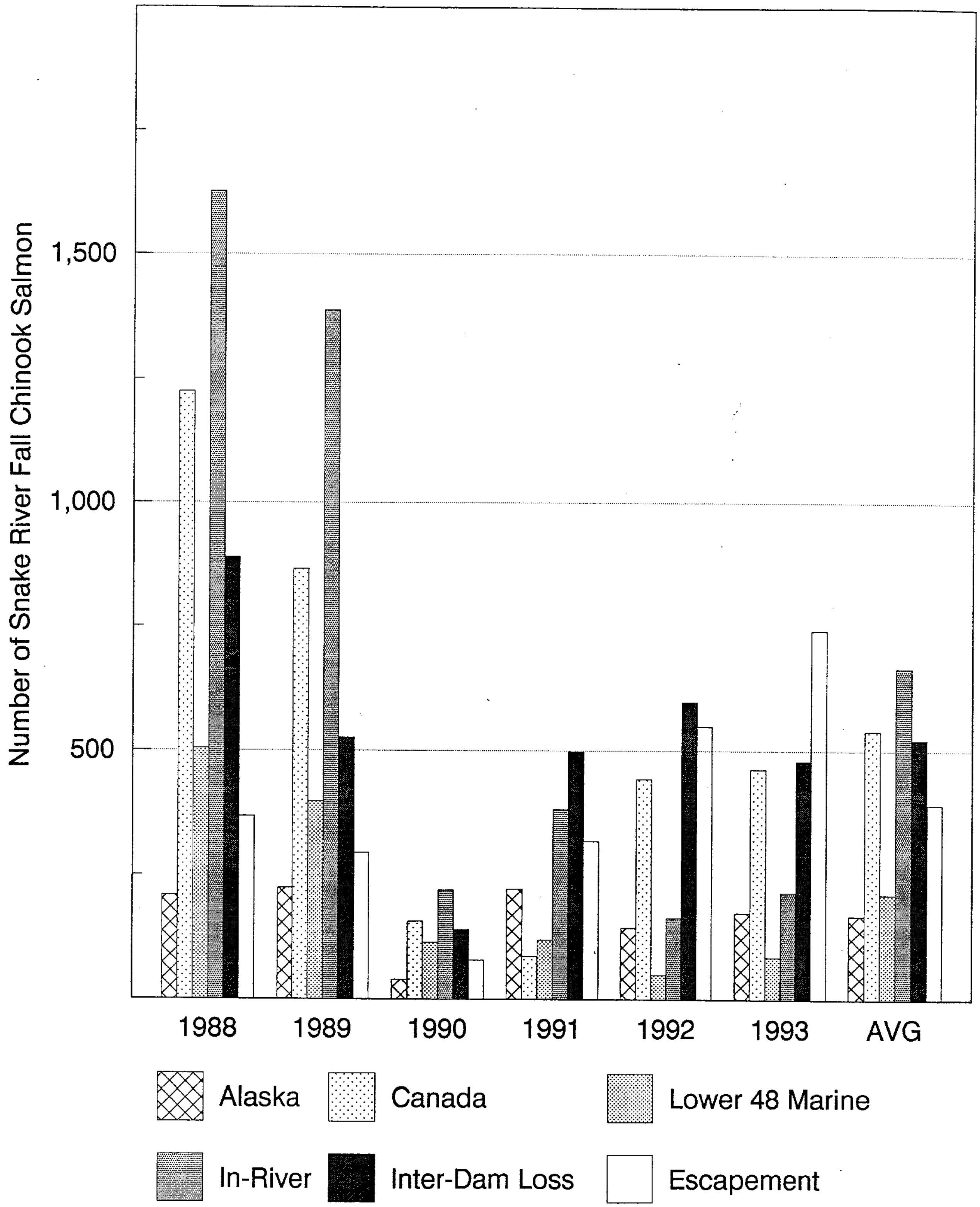
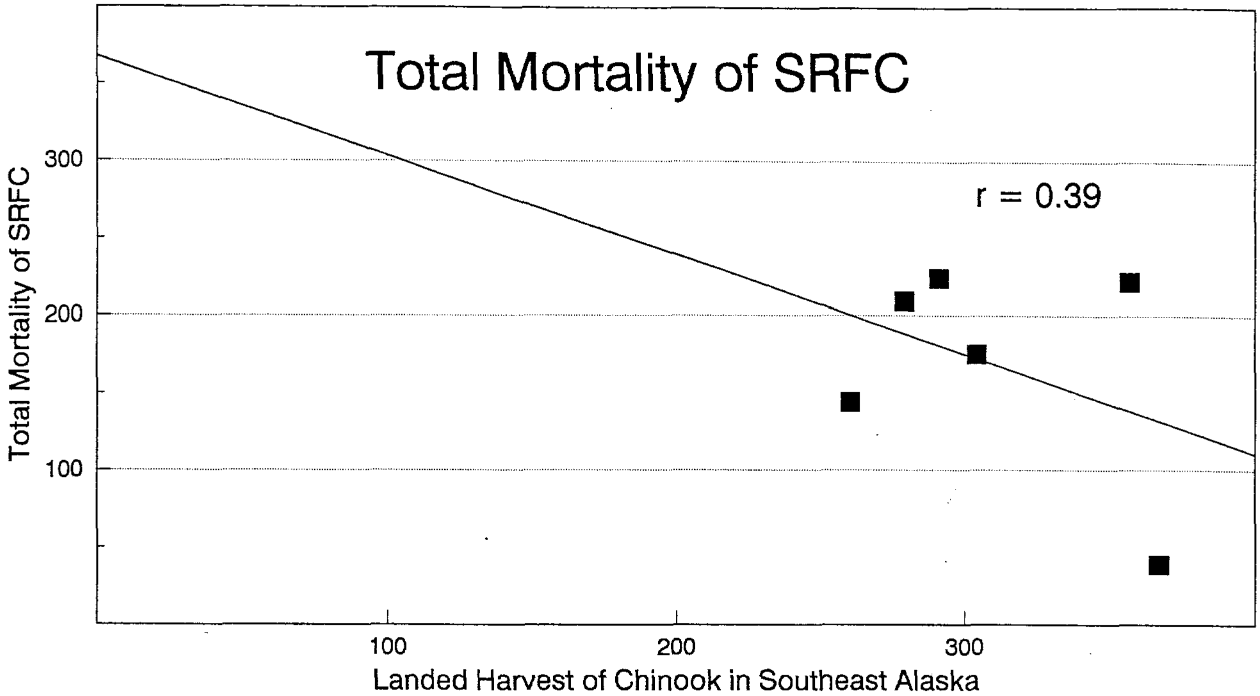


Figure 2. Estimated catches of Snake River fall chinook salmon in various fisheries, estimated inter-dam loss of adult listed fish, and actual escapement of listed fish past Lower Granite Dam.



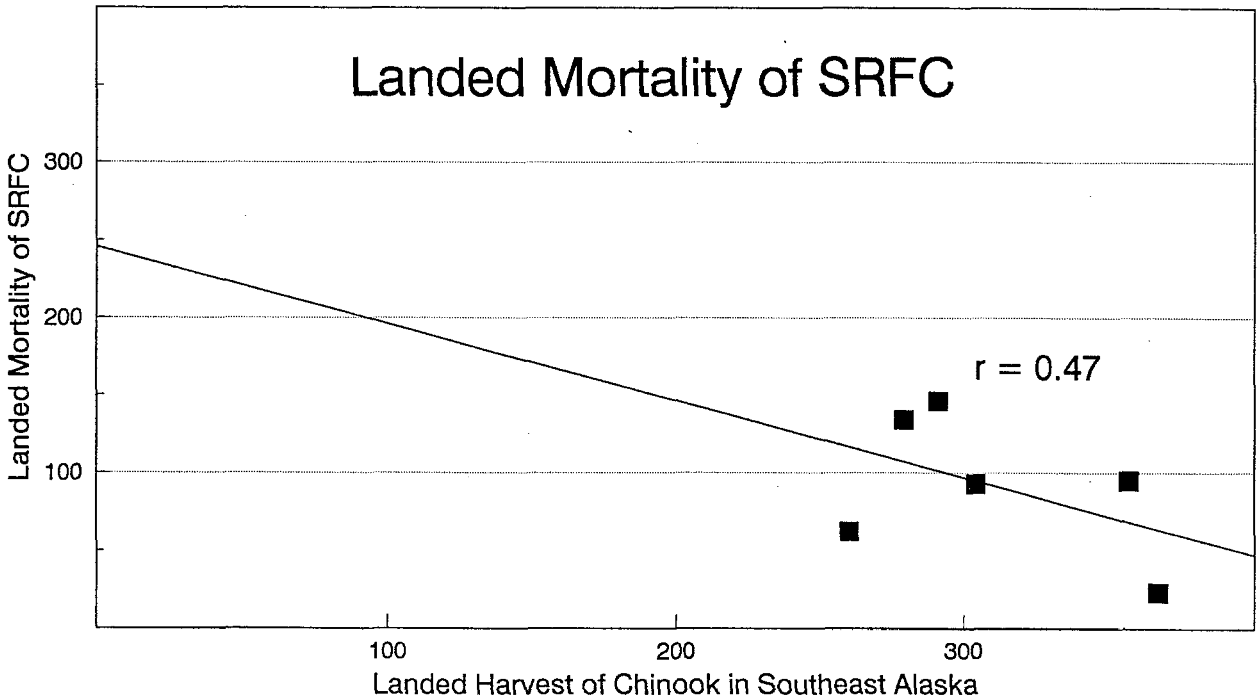


Figure 3. Relationships between total landed harvests of chinook salmon in Southeast Alaska and total mortality of SRFC (upper) and landed mortality of SRFC (lower), 1988-1993.

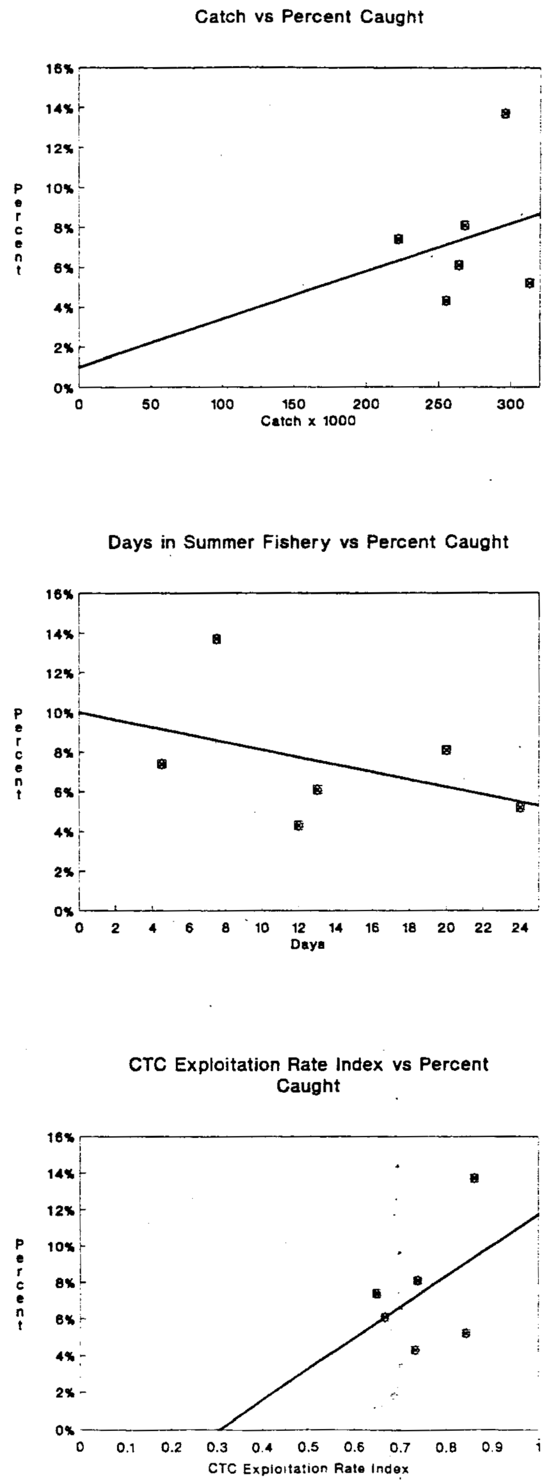


Figure 4. Comparison of the harvest rate of Snake River fall chinook in SE AK and total chinook catch in SE AK (upper); days open to chinook salmon troll harvest in summer season (middle); and, PSC Chinook Technical Committee exploitation rate index (lower).

Figure 5. Fate of Snake River fall chinook in 1988 as actually occurred versus fate of these fish were the Southeast Alaska fishery eliminated.

Fates as Occurred	Changes	Pass-Thru	Fates as Modified
SEAK Fishery: 209 SRFC Exp. Rt.=4.3%	-209 SRFC		0 SRFC Exp. Rt.=0.0%
		209 SRFC	
CAN Fishery: 1,224 SRFC Exp. Rt.=25.4%	+53 SRFC		1,277 SRFC Exp. Rt.=26.5%
		156 SRFC	
Lower 48 Ocean Fishery: 504 SRFC Exp. Rt.=10.4%	+16 SRFC		520 SRFC Exp. Rt.=10.8%
		140 SRFC	
MARINE FISHERY SUMMARY: 1,937 SRFC Exp. Rt.=40.2%	-140 SRFC		1,797 SRFC Exp. Rt.=37.3%
SRFC RETURN TO THE COLUMBIA: 2,884 SRFC Marine Escap. Rt.=59.8%	+140 SRFC		3,024 SRFC Marine Escap. Rt.=62.7%
In-River Fishery: 1,627 SRFC Exp. Rt.=56.4%	+79 SRFC		1,706 SRFC Exp. Rt.=56.4%
TOTAL FISHERY SUMMARY: 3,564 SRFC Exp. Rt.=73.9%	-61 SRFC		3,503 SRFC Exp. Rt.=72.7%
		61 SRFC	
INTER-DAM LOSS: 889 SRFC Inter-Dam Loss=70.7%	+44 SRFC		933 SRFC Inter-Dam Loss=70.7%
		17 SRFC	
ESCAPEMENT OF SRFC: 368 SRFC 7.6% of total 4,821 SRFC	+17 SRFC 8% of 209 SRFC "saved" in SEAK		385 SRFC 8.0% of total 4,821 SRFC
TOTAL SRFC: 4,821 SRFC	zero		4,821 SRFC

SUMMARY OF CHANGES:

53 SRFC "reallocated to Canadian Fisheries
16 SRFC "reallocated to Lower 48 Ocean Fisheries
79 SRFC "reallocated to Columbia River Fisheries
44 more SRFC lost during upstream passage due to hydro-power system
17 more SRFC escaping past Lower Granite Dam

209 SRFC not caught in SE Alaska

Figure 6. Fate of Snake River fall chinook in 1989 as actually occurred versus fate of these fish were the Southeast Alaska fishery eliminated.

Fates as Occurred	Changes	Pass-Thru	Fates as Modified
SEAK Fishery: 224 SRFC Exp. Rt.=6.1%	-224 SRFC		0 SRFC Exp. Rt.=0.0%
		224 SRFC	
CAN Fishery: 866 SRFC Exp. Rt.=23.4%	+52 SRFC		918 SRFC Exp. Rt.=24.8%
		172 SRFC	
Lower 48 Ocean Fishery: 398 SRFC Exp. Rt.=10.8%	+19 SRFC		417 SRFC Exp. Rt.=11.3%
		153 SRFC	
MARINE FISHERY SUMMARY: 1,488 SRFC Exp. Rt.=40.3%	-153 SRFC		1,335 SRFC Exp. Rt.=36.1%
SRFC RETURN TO THE COLUMBIA: 2,209 SRFC Marine Escap. Rt.=59.7%	+153 SRFC		2,362 SRFC Marine Escap. Rt.=63.9%
In-River Fishery: 1,388 SRFC Exp. Rt.=62.8%	+96 SRFC		1,484 SRFC Exp. Rt.=62.8%
TOTAL FISHERY SUMMARY: 2,876 SRFC Exp. Rt.=77.8%	-57 SRFC		2,819 SRFC Exp. Rt.=76.3%
		57 SRFC	
INTER-DAM LOSS: 526 SRFC Inter-Dam Loss=63.6%	+36 SRFC		562 SRFC Inter-Dam Loss=63.6%
		21 SRFC	
ESCAPEMENT OF SRFC: 295 SRFC 8.0% of total 3,697 SRFC	+21 SRFC 9% of 224 SRFC "saved" in SEAK		316 SRFC 8.5% of total 3,697 SRFC
TOTAL SRFC: 3,697 SRFC	zero		3,697 SRFC

SUMMARY OF CHANGES:

52 SRFC "reallocated to Canadian Fisheries
19 SRFC "reallocated to Lower 48 Ocean Fisheries
96 SRFC "reallocated to Columbia River Fisheries
36 more SRFC lost during upstream passage due to hydro-power system
21 more SRFC escaping past Lower Granite Dam

224 SRFC not caught in SE Alaska

Figure 7. Fate of Snake River fall chinook in 1990 as actually occurred versus fate of these fish were the Southeast Alaska fishery eliminated.

Fates as Occurred	Changes	Pass-Thru	Fates as Modified
SEAK Fishery: 39 SRFC Exp. Rt.=5.2%	-39 SRFC	39 SRFC	0 SRFC Exp. Rt.=0.0%
CAN Fishery: 157 SRFC Exp. Rt.=21.0%	+8 SRFC	31 SRFC	165 SRFC Exp. Rt.=22.1%
Lower 48 Ocean Fishery: 114 SRFC Exp. Rt.=15.2%	+5 SRFC	26 SRFC	119 SRFC Exp. Rt.=15.9%
MARINE FISHERY SUMMARY: 310 SRFC Exp. Rt.=41.4%	-26 SRFC		284 SRFC Exp. Rt.=38.0%
SRFC RETURN TO THE COLUMBIA: 437 SRFC Marine Escap. Rt.=58.5%	+26 SRFC		463 SRFC Marine Escap. Rt.=62.0%
In-River Fishery: 220 SRFC Exp. Rt.=50.3%	+13 SRFC		233 SRFC Exp. Rt.=50.3%
TOTAL FISHERY SUMMARY: 530 SRFC Exp. Rt.=71.0%	-13 SRFC	13 SRFC	517 SRFC Exp. Rt.=69.2%
INTER-DAM LOSS: 140 SRFC Inter-Dam Loss=64.5%	+8 SRFC	5 SRFC	148 SRFC Inter-Dam Loss=64.5%
ESCAPEMENT OF SRFC: 78 SRFC 10.4% of total 747 SRFC	+5 SRFC 13% of 39 SRFC "saved" in SEAK		83 SRFC 11.1% of total 747 SRFC
TOTAL SRFC: 747 SRFC	zero		747 SRFC

SUMMARY OF CHANGES:

8 SRFC "reallocated to Canadian Fisheries
5 SRFC "reallocated to Lower 48 Ocean Fisheries
13 SRFC "reallocated to Columbia River Fisheries
8 more SRFC lost during upstream passage due to hydro-power system
5 more SRFC escaping past Lower Granite Dam

39 SRFC not caught in SE Alaska

Figure 8. Fate of Snake River fall chinook in 1991 as actually occurred versus fate of these fish were the Southeast Alaska fishery eliminated.

Fates as Occurred	Changes	Pass-Thru	Fates as Modified
SEAK Fishery: 222 SRFC Exp. Rt.=13.5%	-222 SRFC	222 SRFC	0 SRFC Exp. Rt.=0.0%
CAN Fishery: 86 SRFC Exp. Rt.=5.3%	+13 SRFC	209 SRFC	99 SRFC Exp. Rt.=6.1%
Lower 48 Ocean Fishery: 119 SRFC Exp. Rt.=7.3%	+15 SRFC	194 SRFC	134 SRFC Exp. Rt.=8.2%
MARINE FISHERY SUMMARY: 427 SRFC Exp. Rt.=26.1%	-194 SRFC		233 SRFC Exp. Rt.=14.3%
SRFC RETURN TO THE COLUMBIA: 1,198 SRFC Marine Escap. Rt.=73.9%	+194 SRFC		1,392 SRFC Marine Escap. Rt.=87.4%
In-River Fishery: 382 SRFC Exp. Rt.=31.9%	62 SRFC		444 SRFC Exp. Rt.=31.9%
TOTAL FISHERY SUMMARY: 809 SRFC Exp. Rt.=49.8%	-132 SRFC	132 SRFC	677 SRFC Exp. Rt.=41.7%
INTER-DAM LOSS: 498 SRFC Inter-Dam Loss=61.0%	+81 SRFC	51 SRFC	579 SRFC Inter-Dam Loss=61.0%
ESCAPEMENT OF SRFC: 318 SRFC 19.6% of total 1,625 SRFC	+51 SRFC 23% of 222 SRFC "saved" in SEAK		369 SRFC 22.7% of total 1,625 SRFC
TOTAL SRFC: 1,625 SRFC	zero		1,625 SRFC

SUMMARY OF CHANGES:

13 SRFC "reallocated to Canadian Fisheries
15 SRFC "reallocated to Lower 48 Ocean Fisheries
62 SRFC "reallocated to Columbia River Fisheries
81 more SRFC lost during upstream passage due to hydro-power system
51 more SRFC escaping past Lower Granite Dam

222 SRFC not caught in SE Alaska

Figure 9. Fate of Snake River fall chinook in 1992 as actually occurred versus fate of these fish were the Southeast Alaska fishery eliminated.

Fates as Occurred	Changes	Pass-Thru	Fates as Modified
SEAK Fishery: 144 SRFC Exp. Rt.=7.4%	-144 SRFC	144 SRFC	0 SRFC Exp. Rt.=0.0%
CAN Fishery: 443 SRFC Exp. Rt.=22.8%	+33 SRFC	111 SRFC	476 SRFC Exp. Rt.=24.4%
Lower 48 Ocean Fishery: 49 SRFC Exp. Rt.=2.5%	+3 SRFC	108 SRFC	52 SRFC Exp. Rt.=2.7%
MARINE FISHERY SUMMARY: 636 SRFC Exp. Rt.=32.7%	-108 SRFC		528 SRFC Exp. Rt.=27.1%
SRFC RETURN TO THE COLUMBIA: 1,311 SRFC Marine Escap. Rt.=67.3%	+108 SRFC		1,419 SRFC Marine Escap. Rt.=72.9%
In-River Fishery: 164 SRFC Exp. Rt.=12.5%	+14 SRFC		178 SRFC Exp. Rt.=12.5%
TOTAL FISHERY SUMMARY: 800 SRFC Exp. Rt.=41.1%	-94 SRFC	94 SRFC	706 SRFC Exp. Rt.=36.3%
INTER-DAM LOSS: 598 SRFC Inter-Dam Loss=52.1%	+49 SRFC	45 SRFC	647 SRFC Inter-Dam Loss=52.1%
ESCAPEMENT OF SRFC: 549 SRFC 28% of total 1,947 SRFC	+45 SRFC 31% of 144 SRFC "saved" in SEAK		593 SRFC 30% of total 1,947 SRFC
TOTAL SRFC: 1,947 SRFC	zero		1,947 SRFC

SUMMARY OF CHANGES:

33 SRFC "reallocated to Canadian Fisheries
3 SRFC "reallocated to Lower 48 Ocean Fisheries
14 SRFC "reallocated to Columbia River Fisheries
49 more SRFC lost during upstream passage due to hydro-power system
45 more SRFC escaping past Lower Granite Dam

144 SRFC not caught in SE Alaska

Figure 10. Fate of Snake River fall chinook in 1993 as actually occurred versus fate of these fish were the Southeast Alaska fishery eliminated.

Fates as Occurred	Changes	Pass-Thru	Fates as Modified
SEAK Fishery: 175 SRFC Exp. Rt.=8.1%	-175 SRFC		0 SRFC Exp. Rt.=0.0%
		175 SRFC	
CAN Fishery: 463 SRFC Exp. Rt.=21.5%	+38 SRFC		501 SRFC Exp. Rt.=23.2%
		137 SRFC	
Lower 48 Ocean Fishery: 85 SRFC Exp. Rt.=3.9%	+5 SRFC		90 SRFC Exp. Rt.=4.2%
		132 SRFC	
MARINE FISHERY SUMMARY: 723 SRFC Exp. Rt.=33.5%	-132 SRFC		591 SRFC Exp. Rt.=27.4%
SRFC RETURN TO THE COLUMBIA: 1,437 SRFC Marine Escap. Rt.=66.5%	+132 SRFC		1,569 SRFC Marine Escap. Rt.=72.6%
In-River Fishery: 216 SRFC Exp. Rt.=15.0%	+20 SRFC		236 SRFC Exp. Rt.=15.0%
TOTAL FISHERY SUMMARY: 939 SRFC Exp. Rt.=43.5%	-112 SRFC		827 SRFC Exp. Rt.=38.3%
		112 SRFC	
INTER-DAM LOSS: 479 SRFC Inter-Dam Loss=39.2%	+44 SRFC		523 SRFC Inter-Dam Loss=39.2%
		68 SRFC	
ESCAPEMENT OF SRFC: 742 SRFC 34% of total 2,160 SRFC	+68 SRFC 38% of 175 SRFC "saved" in SEAK		810 SRFC 37% of total 2,160 SRFC
TOTAL SRFC: 2,160 SRFC	zero		2,160 SRFC

SUMMARY OF CHANGES:

38 SRFC "reallocated to Canadian Fisheries
5 SRFC "reallocated to Lower 48 Ocean Fisheries
20 SRFC "reallocated to Columbia River Fisheries
44 more SRFC lost during upstream passage due to hydro-power system
68 more SRFC escaping past Lower Granite Dam

175 SRFC not caught in SE Alaska

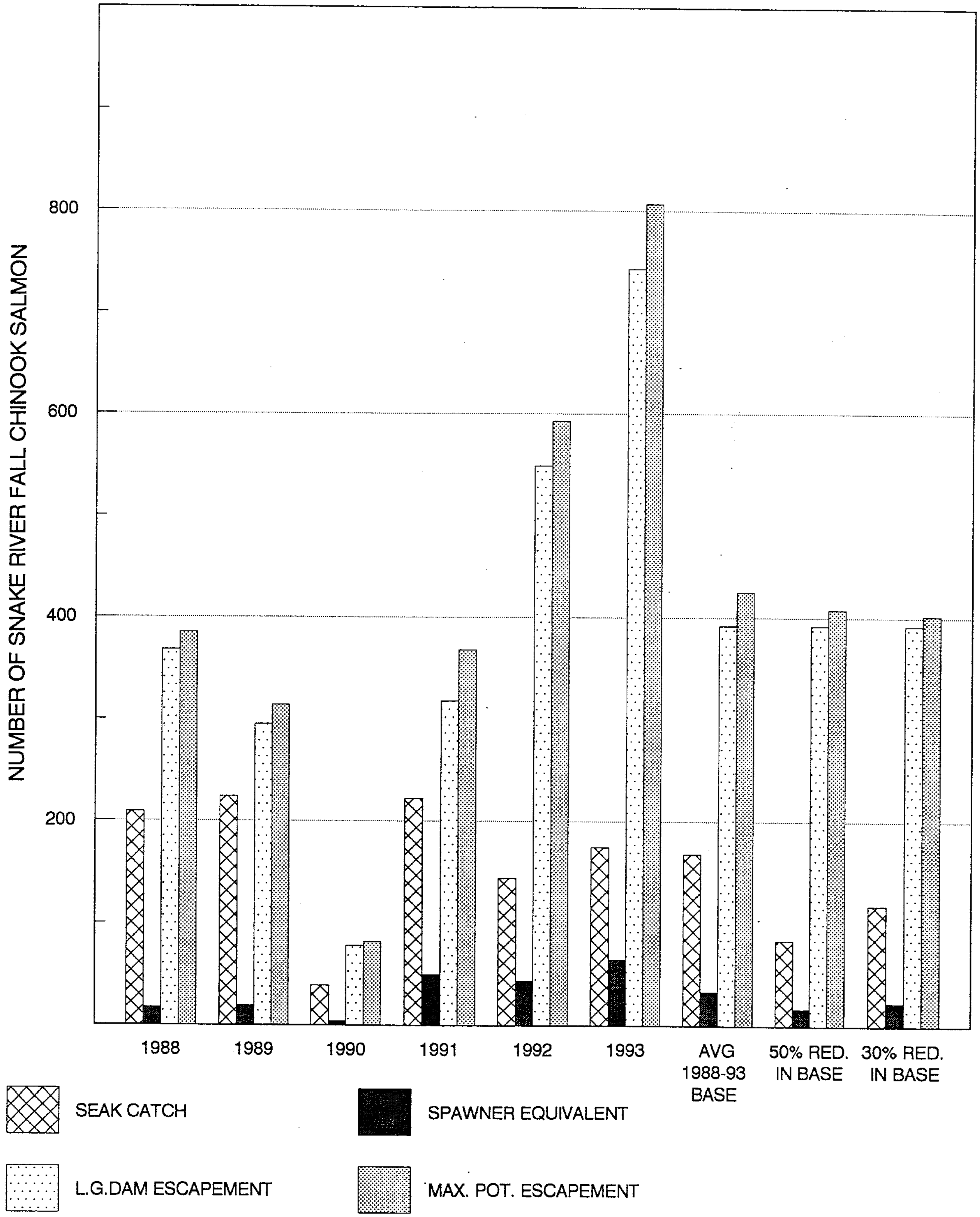


Figure 11. Estimated catch of Snake River fall chinook in SE Alaska, actual escapement of natural spawners over Lower Granite Dam, estimated SE Alaska catch in spawner equivalents, and estimated potential SRFC escapements had the SE Alaska fishery been cancelled or modified.

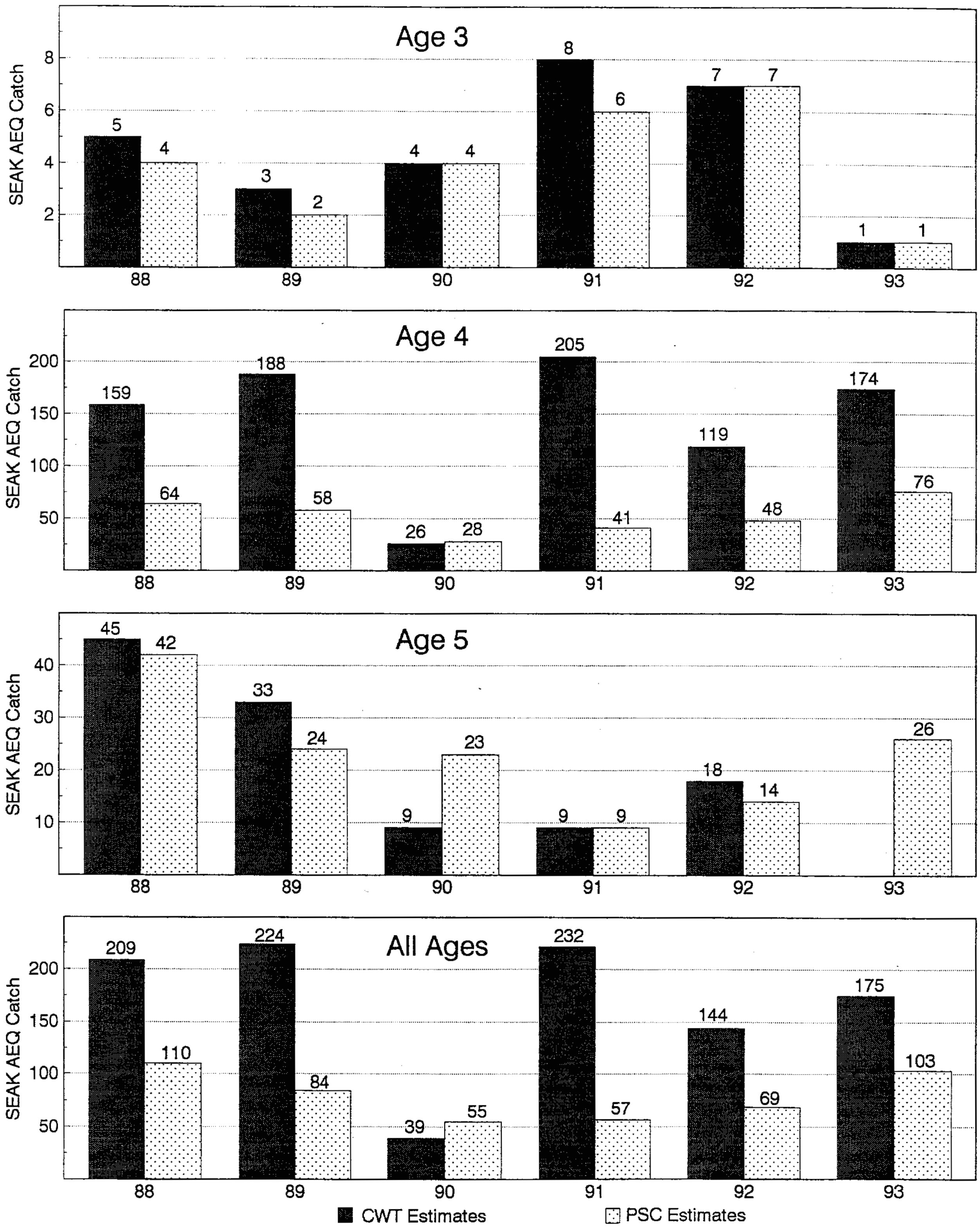


Figure 12. Comparison of estimated adult equivalent catches of SRFC in SEAK based on coded wire tag estimates versus Pacific Salmon Commission chinook model estimates.

NOTE: PSC model estimates include 1 age 2 SRFC in SEAK in 1991.

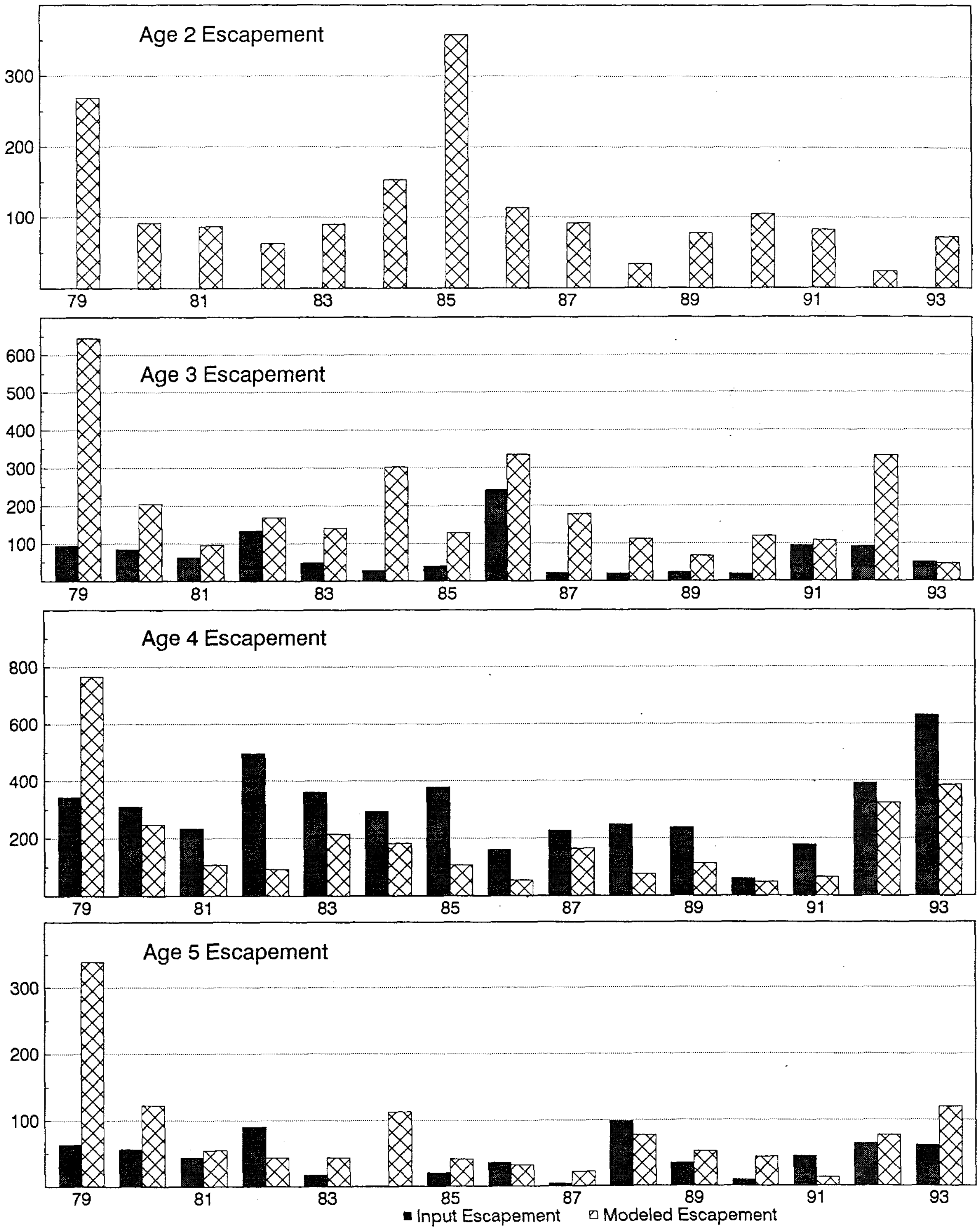


Figure 13. Snake River fall chinook salmon escapements inputted into the PSC chinook model versus modelled escapements. Jack counts (age 2) are not input; model fit for age 3, 4, and 5 is poor.

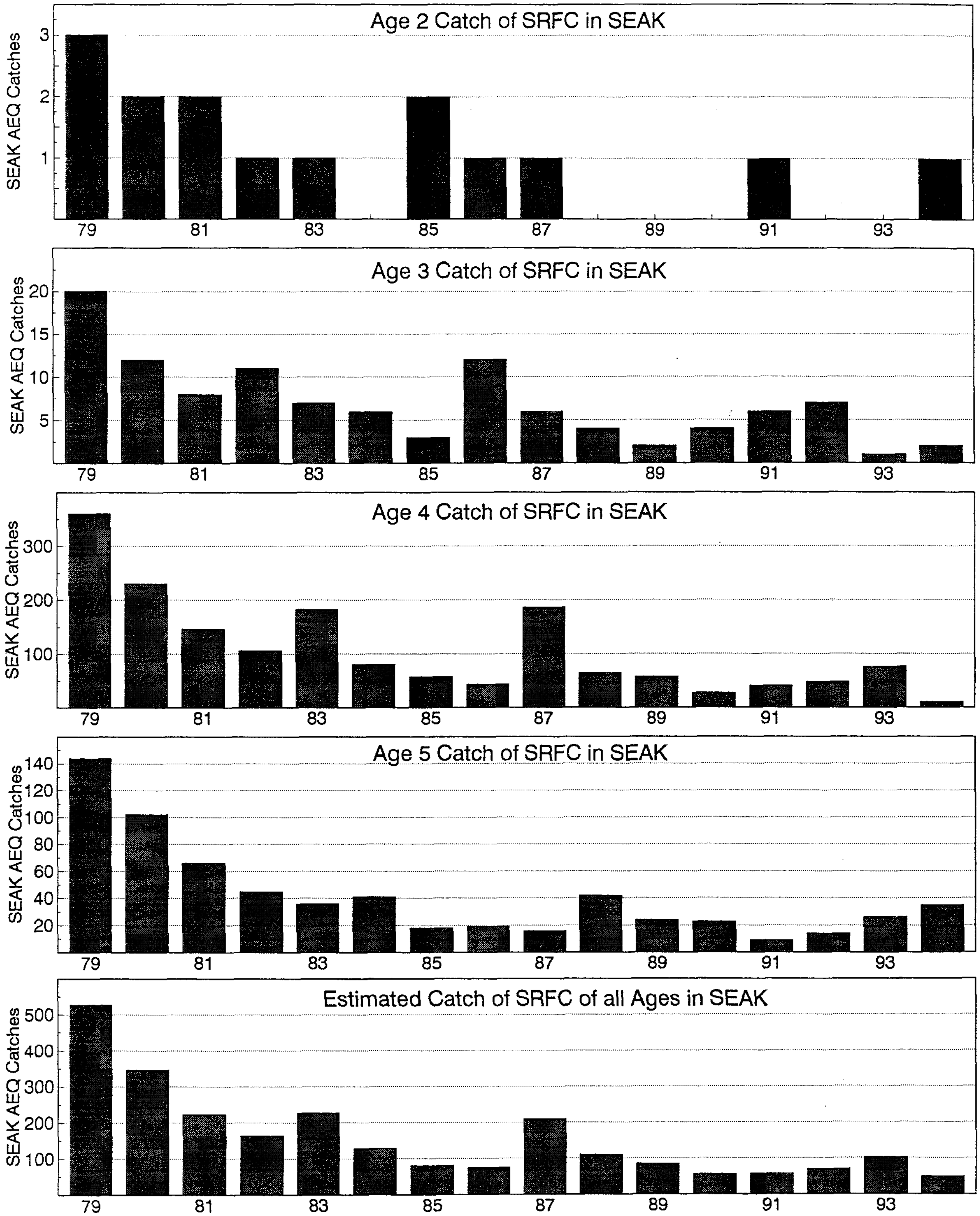


Figure 14. Estimated catches of Snake River fall chinook salmon by age in Southeast Alaska from 1979-1994 using Pacific Salmon Commission chinook model output.

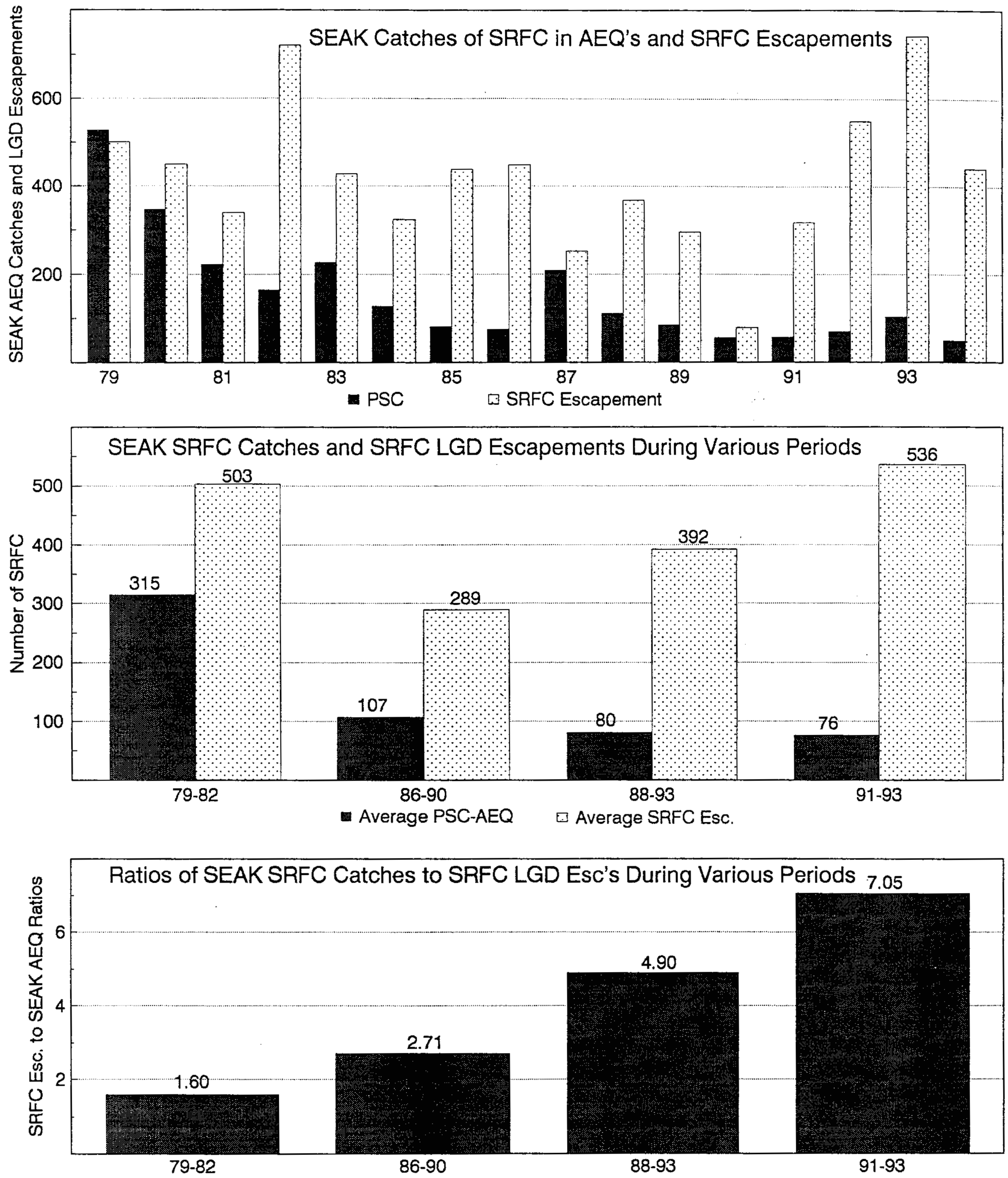


Figure 15. Relationship between catches of Snake River fall chinook (SRFC) in Southeast Alaska (SEAK) in adult equivalents (AEQ) to escapements of SRFC over Lower Granite Dam (LGD) from 1979 to 1984 and and averages during four alternate periods. SEAK catches of SRFC in AEQ's are based on Pacific Salmon Commission chinook model.

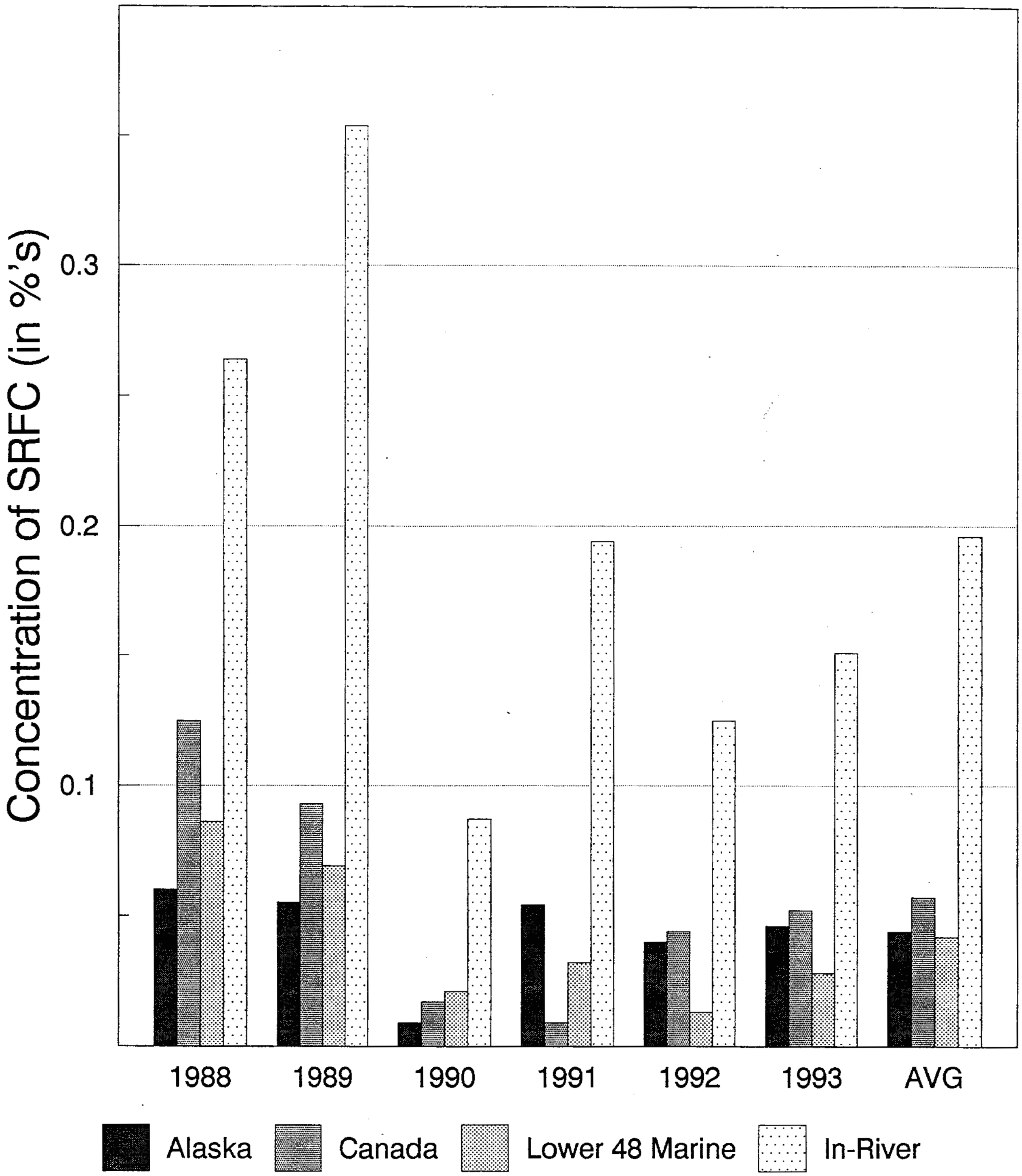


Figure 16. Concentrations of Snake River fall chinook salmon in various fisheries, 1988-1993 (values listed as percents; ie., a value of 0.1 = 1:1,000).

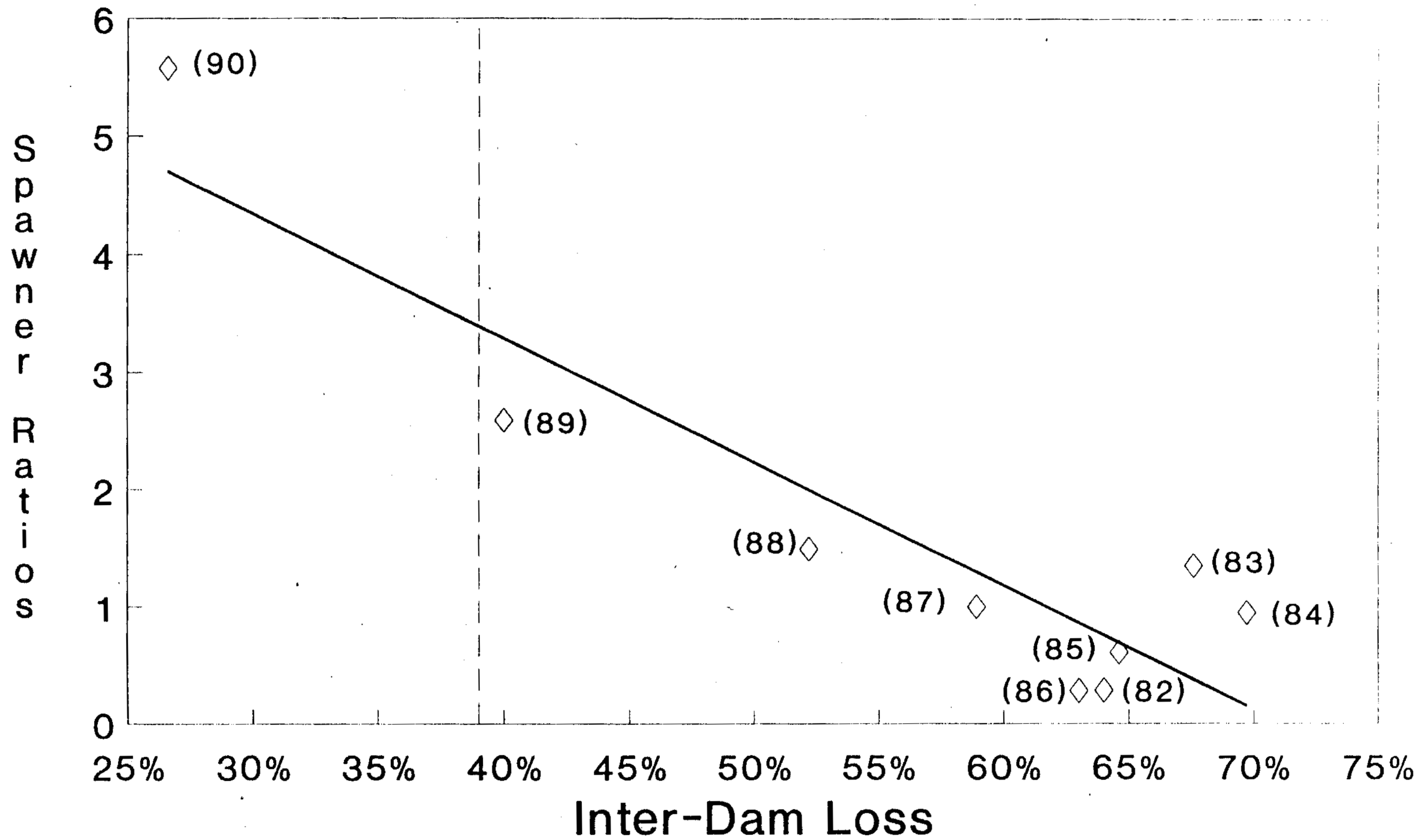


Figure 17. Relationship between spawner to spawner replacement rates and inter-dam loss estimates for Snake River fall chinook salmon.

Figure 18a. Comparison of the median escapements by year for a transport benefit ratio of 1:1.

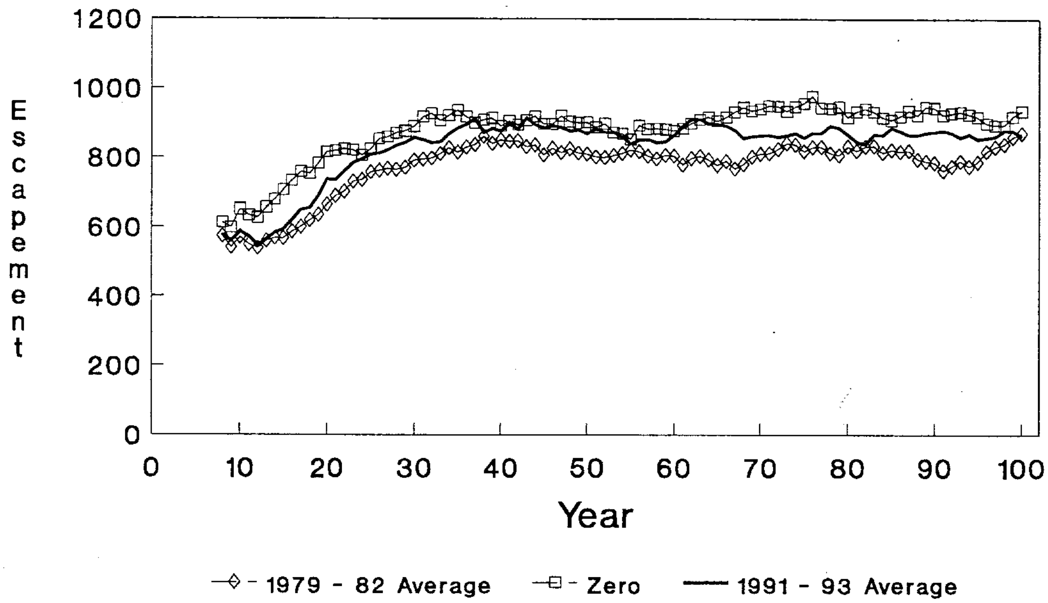


Figure 18b. Comparison of the median escapements by year for a transport benefit ratio of 2:1.

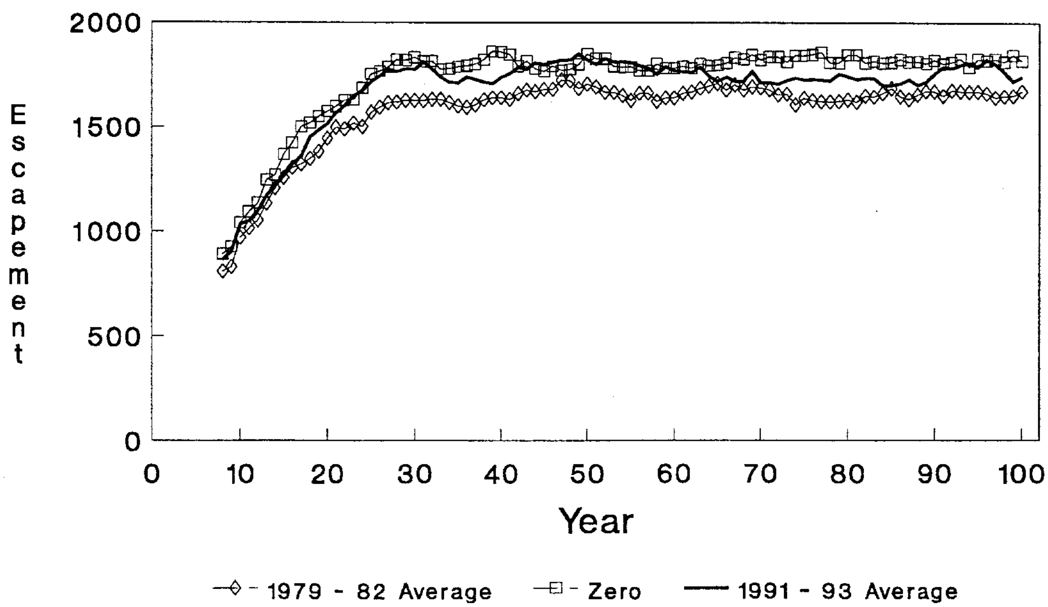


Figure 19a. Eight year mean escapements with zero exploitation rate in Alaska and transport benefit of 1:1.

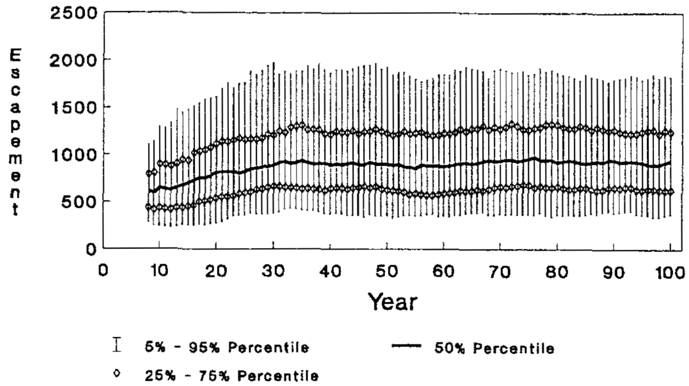


Figure 19b. Eight year mean escapements with 1991 - 1993 exploitation rate and transport benefit of 1:1.

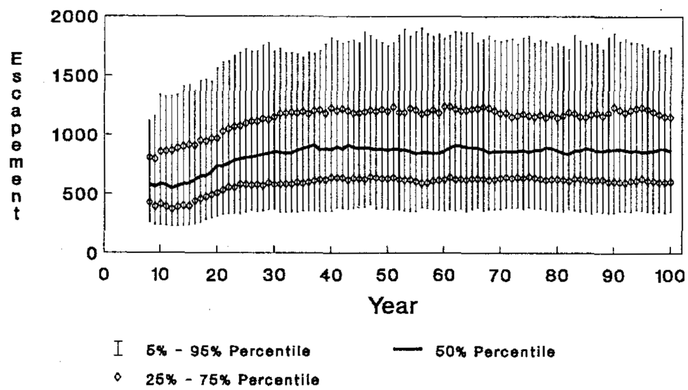


Figure 19c. Eight year mean escapements with 1979-82 average exploitation rate and transport benefit of 1:1.

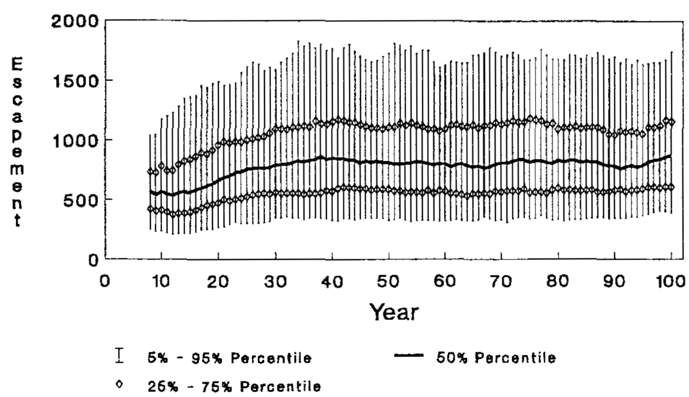


Figure 20a. Eight year mean escapements with zero exploitation rate in Alaska and transport benefit of 2:1.

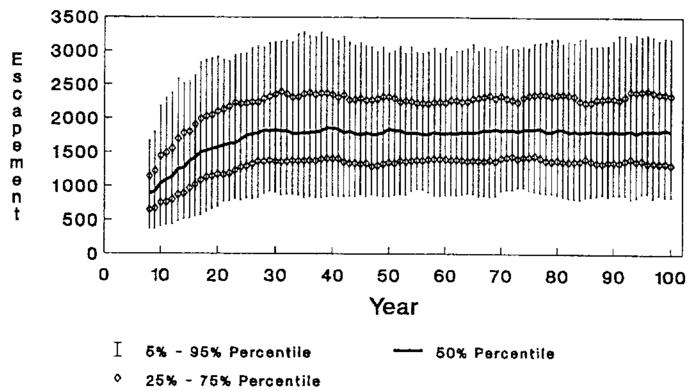


Figure 20b. Eight year mean escapements with 1991 - 1993 exploitation rate and transport benefit of 2:1.

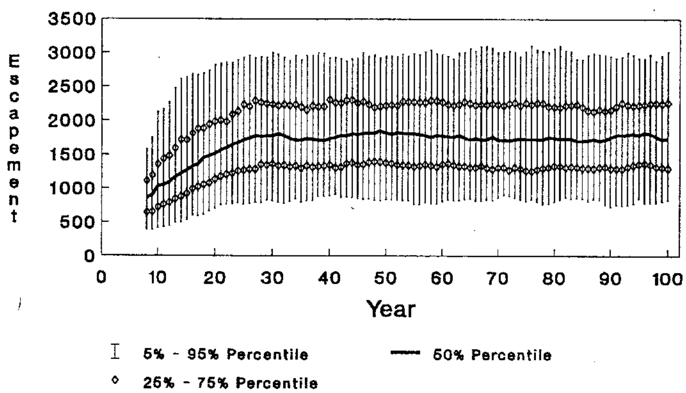
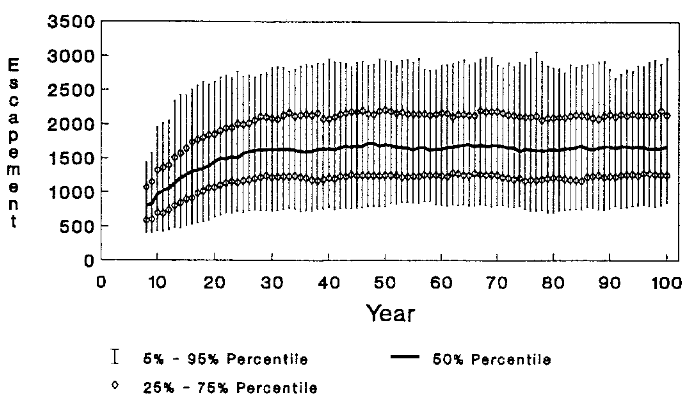


Figure 20c. Eight year mean escapements with 1979-82 average exploitation rate and transport benefit of 2:1.



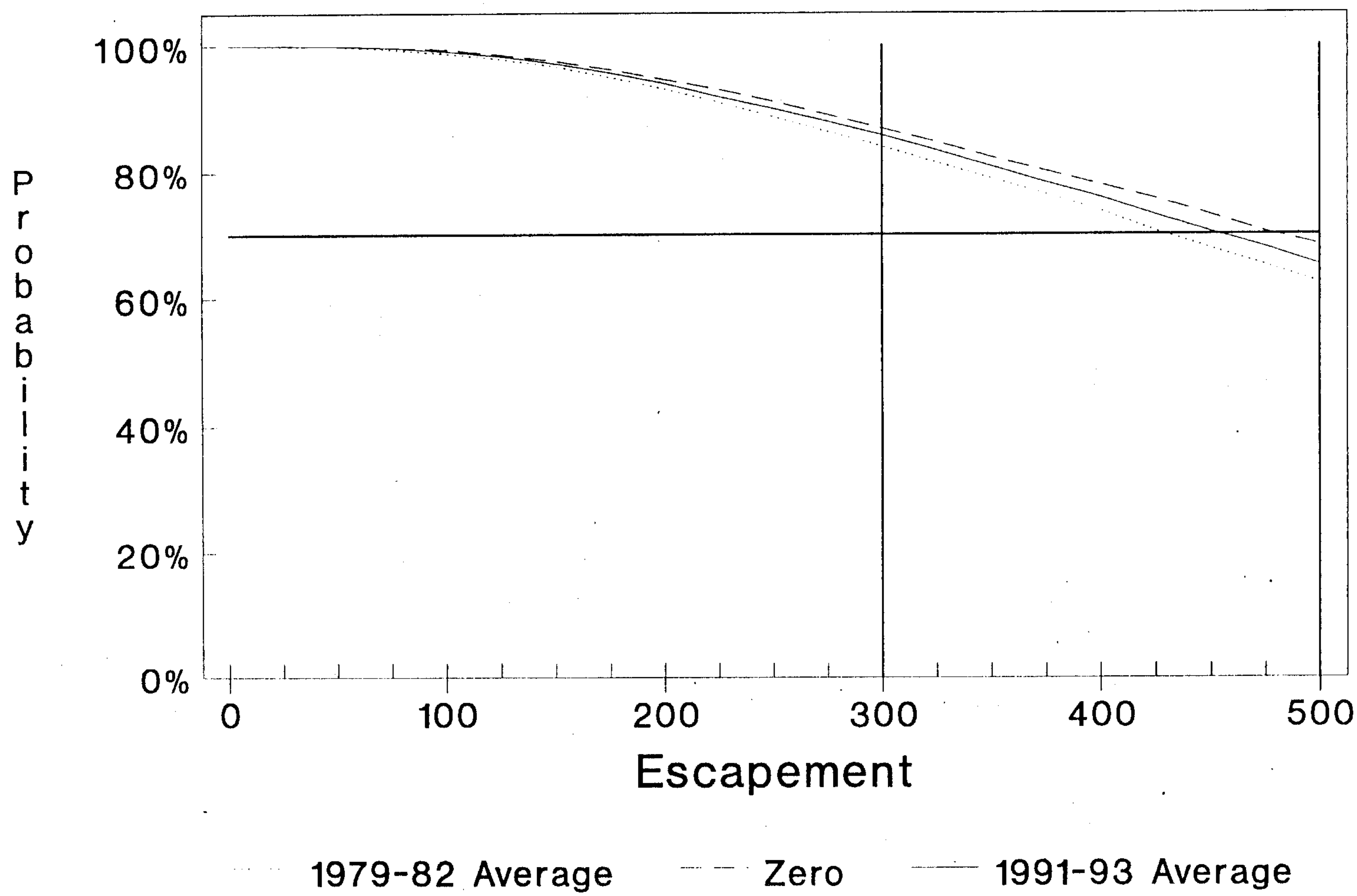


Figure 21. Probability that an escapement is at or above the given level of escapement (24 years and transport benefit of 1:1).

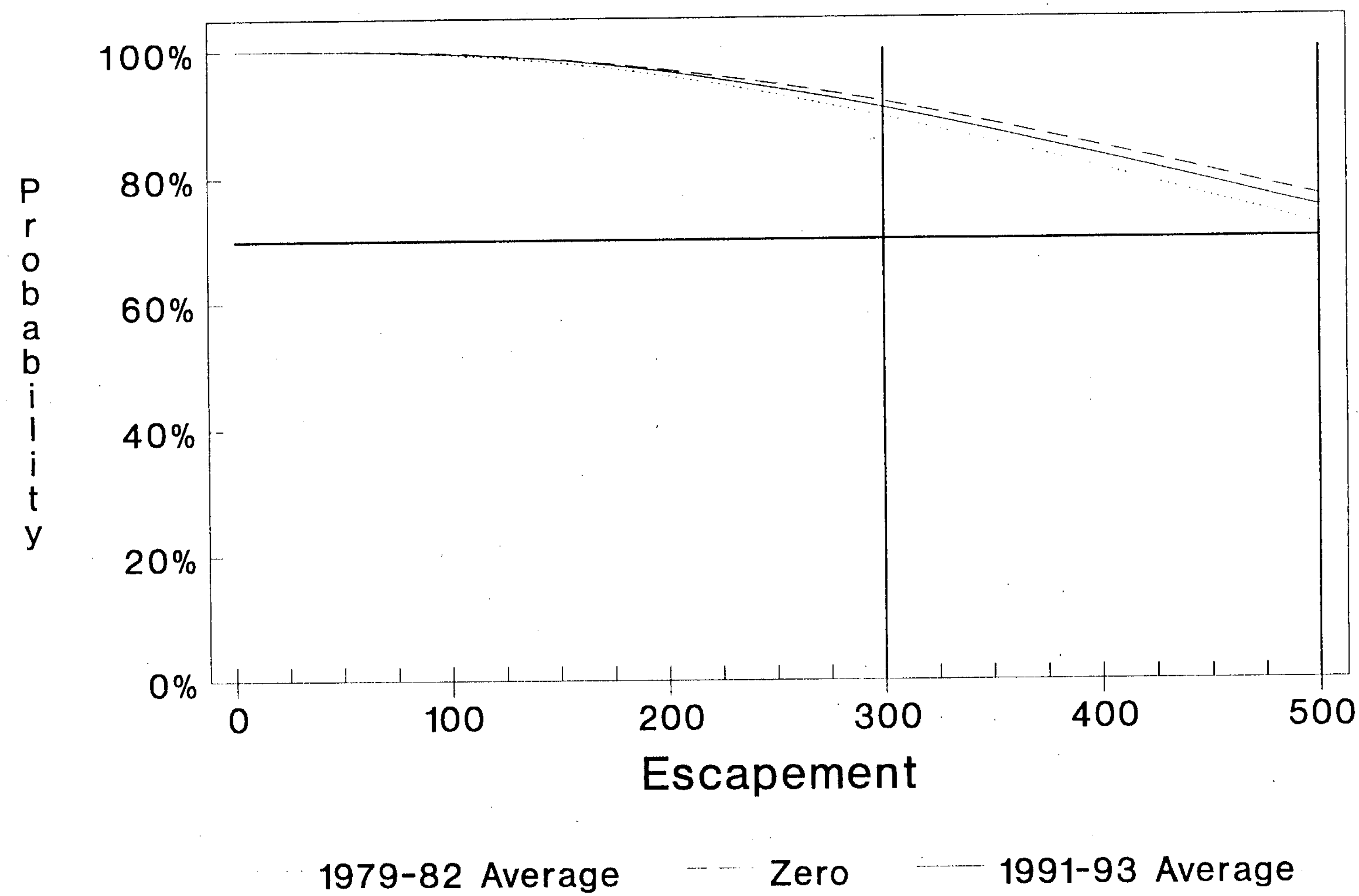


Figure 22. Probability that an escapement is at or above the given level of escapement (100 years and transport benefit of 1:1).

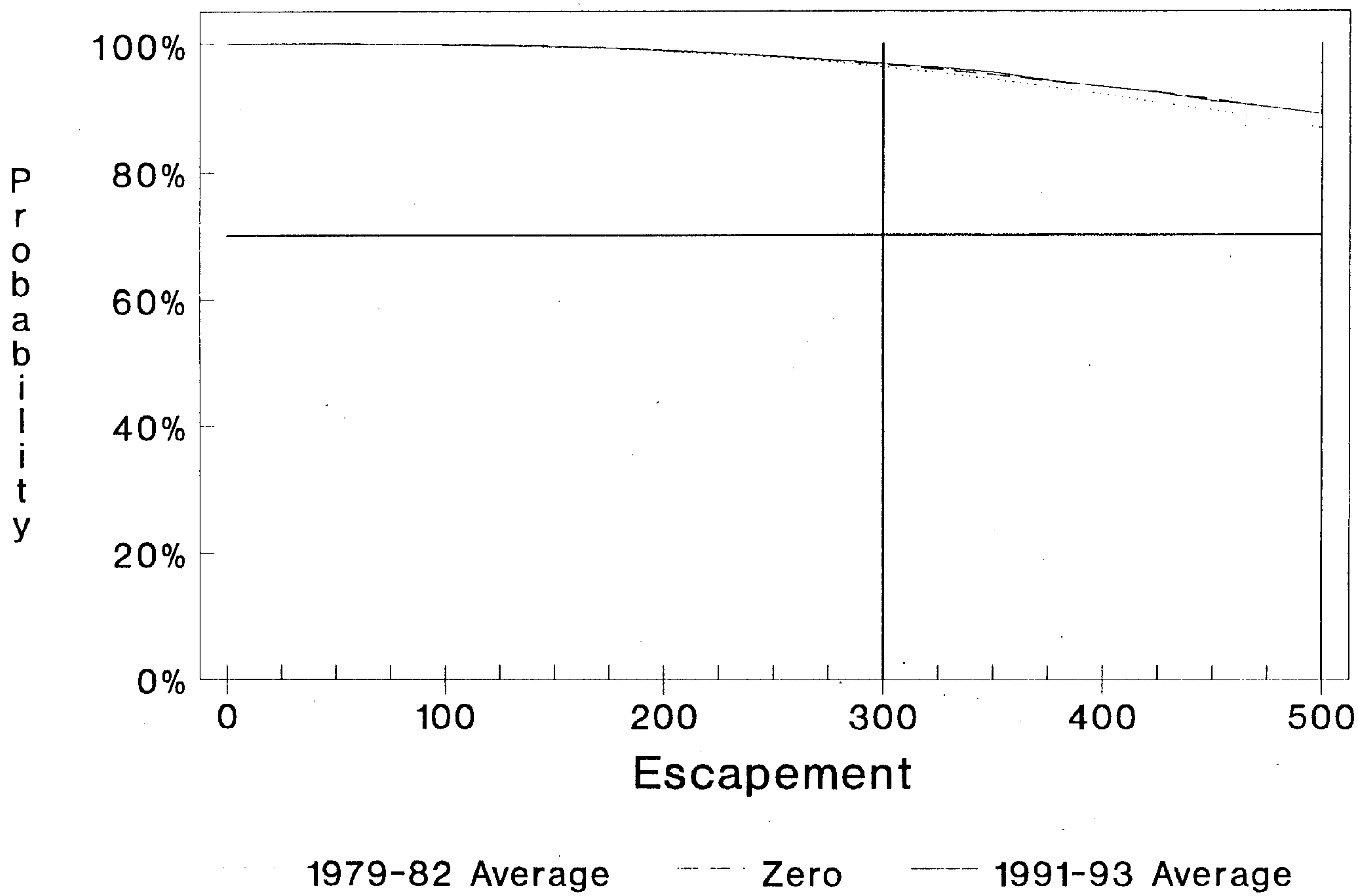


Figure 23. Probability that an escapement is at or above the given level of escapement (24 years and transport benefit of 2:1).

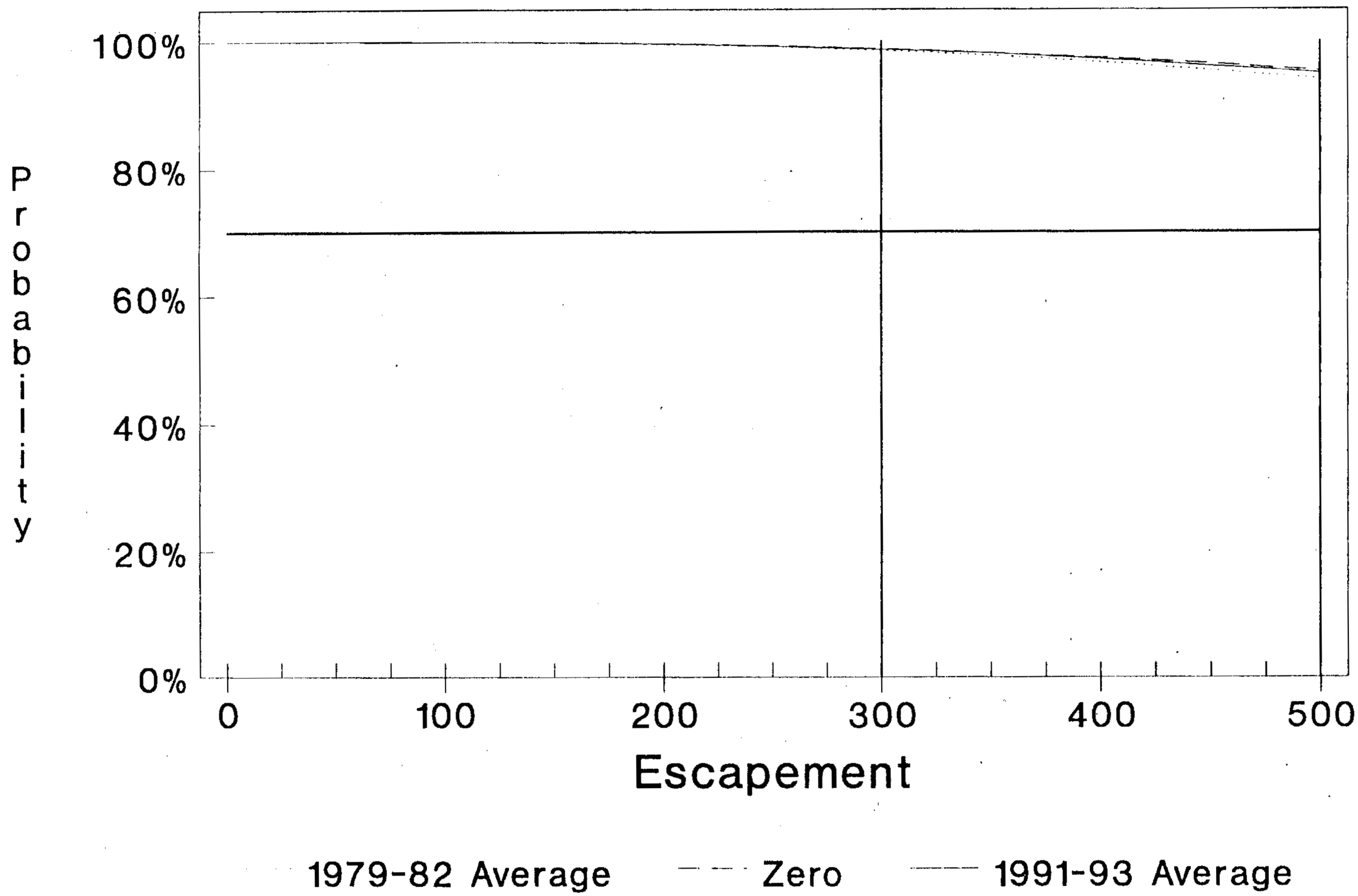


Figure 24. Probability that an escapement is at or above the given level of escapement (100 years and transport benefit of 2:1).

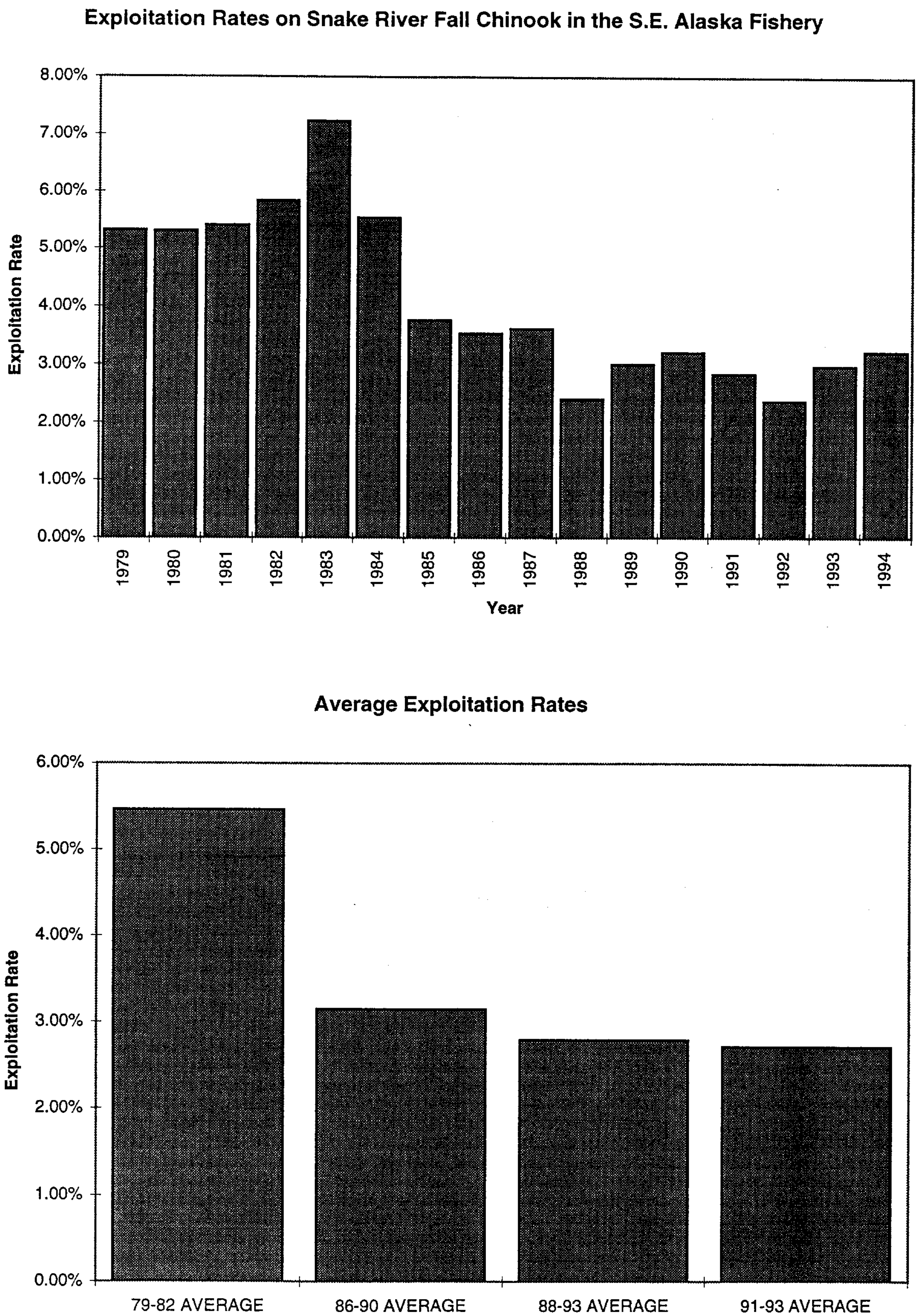


Figure 25. Estimated exploitation rates for Snake River fall chinook salmon in Southeast Alaska, 1979-1994 (upper) and averages for the periods: 1979-1982; 1986-1990; 1988-1993; and, 1991-1993 (lower).

SOUTHEAST ALASKA DRIFT GILLNET FISHERY

MANAGEMENT PLAN, 1995

Regional Information Report No. [1] 1J95-15

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division
Southeast Region
Juneau, Alaska

May 1995

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[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Commercial Fisheries Management and Development Division.

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MANAGEMENT APPROACH

The lack of accurate preseason forecasts for salmon returns to the drift gillnet fishing areas requires a flexible management approach. Thus, this management plan presents only a general outlook of how the season is expected to develop. Some specific management approaches may be altered depending on inseason assessments of salmon run strength. Fishermen are encouraged to contact department management staff listed at the end of this plan for more detailed information.

The primary objectives for management of the 1995 drift gillnet fishery are:

1. Obtain overall salmon spawning escapement goals with the best possible distribution to all systems;

2. Provide for an orderly fishery while harvesting those fish in excess of escapement needs;

3. Promote the harvest and processing of good quality fish within the constraints dictated by run size;

4. Manage the fisheries for a maximum Southeast drift gillnet catch of 7,600 chinook salmon, exclusive of Alaska hatchery-produced fish [5 AAC 33.365. (10)(B)]; and

5. Minimize, to the extent possible, the interception of salmon destined for locations where weak returns are expected.

Achievement of these management objectives will be accomplished by inseason adjustments of fishing time to control harvests in specific areas in accordance with salmon run strength and timing. Comparisons of current-year fishing performance to historical fishing success (i.e., catch per unit effort, or CPUE analysis) are a major component of inseason run strength assessment. This approach assumes that catch rates are an accurate reflection of run strength by time period and can be relied upon to indicate salmon escapements through the fishing area.

Past experience has demonstrated that management of salmon fisheries based only on CPUE data can be misleading, especially for mixed-stock fisheries. Therefore, although fishery performance will be important to inseason management, other available run strength indicators will also be used. For example, information on spawning escapements, stock separation using scale characteristics or otoliths, test fishing, observed salmon concentrations in sanctuary areas, catches from other fisheries, and salmon run timing models will also be utilized.

The increasing availability of hatchery-produced salmon, in particular coho and summer chum salmon, has become a major factor in the management of the Southeast Alaska drift gillnet fisheries. Where inseason management is based on fishery performance, it may be difficult to gauge natural stock run

CHINOOK SALMON CATCH

Regulation 5 AAC 33.365. (10)(B) specifies a catch limit of 7,600 chinook salmon (exclusive of Alaska hatchery fish) for the Southeast Alaska drift gillnet fishery. The Alaska Board of Fisheries adopted this regulation to ensure that the various user groups maintain their recent-year share of the total chinook salmon harvest quota.

The need for management measures to comply with the drift gillnet harvest quota for chinook salmon will depend on inseason evaluation of chinook salmon catch rates relative to the 7,600 fish ceiling. If the need arises, nighttime fishing closures may be implemented in certain areas to reduce the incidental catch of immature, "feeder" chinook salmon. As in past years, early-season area closures will be maintained to minimize the incidental harvest of mature, "spawner" chinook salmon returning to the Stikine River in District 8, the Taku River in District 11, and the Chilkat River in District 15.

TREE POINT AND PORTLAND CANAL FISHERY

Introduction

The Tree Point and Portland Canal gillnet area consists of Sections 1-A and 1-B. This fishery targets on summer chum and sockeye salmon early in the season, followed by pink salmon, and finally fall chum and coho salmon at the end of the season.

1995 Outlook

Sockeye salmon returns to Canadian systems, which contribute significant numbers of fish to the Tree Point drift gillnet fishery, are expected to be average during the 1995 season. Returns to Hugh Smith Lake, a local Alaska spawning system, are expected to be below average. If the returns of sockeye salmon develop as predicted, early-season fishing time and area may be affected. Chum salmon returns to natural spawning systems are expected to be above average to most areas, based on parent-year spawning levels to systems in Boca de Quadra and Behm Canal. Chum salmon returns to Portland Canal are expected to be below average.

Hatchery returns of summer chum, fall chum, and coho salmon to the Nakat Inlet remote release site operated by SSRAA are expected to contribute significantly to the Tree Point gillnet fishery in 1995. The 1995 projected returns are approximately 157,900 summer chum, 256,700 fall chum, and 9,200 coho salmon. Peak chum salmon catches from these releases are expected between mid-July to mid-August for summer chum and late August and early September for fall chum and coho salmon.

levels. Sockeye salmon run strength to both Canadian and Alaskan systems will be considered when establishing fishing periods.

As in recent years, the catch of hatchery-produced, summer chum salmon returning to the Nakat Inlet release site will not be included in the evaluation of natural stock fishery performance. The contribution of Nakat Inlet chum salmon will be estimated by inseason analysis of coded wire tag data. Hatchery chum salmon have contributed as much as 71% of weekly catches at Tree Point and as much as 31% of the total harvest in recent years.

The PST requires that interception of Portland Canal chum salmon be minimized to assure rebuilding of these stocks. In 1995, no fishing in Section 1-A for Portland Canal chum salmon should be expected unless it is determined that a harvestable surplus exists. Any management decision to fish Portland Canal must assume there is sufficient additional surplus fish to support a Canadian as well as an Alaskan fishery.

The Section 1-B gillnet fishery will be managed according to the Pink Salmon Management Plan starting July 16. The overall pink salmon return to southern Southeast Alaska is expected to be weak in 1995. As allowed by regulation, a minimum gillnet mesh size of six inches may be required to protect pink salmon during the fall season.

Fall management at Tree Point starts after the end of the pink salmon season. During the fall season, the Tree Point fishery targets primarily on fall chum and coho salmon. Little is known about the stock composition of the chum and coho salmon at this time of the year, however, the estimated exploitation rate of the Hugh Smith Lake coho salmon stock reaches 80% in some years and has averaged about 67% since 1982. If the same exploitation rate holds true for adjacent areas, then wild coho stocks in the surrounding Tree Point area may benefit from a closing date at Tree Point of approximately September 20. Due to the uncertainties of the escapement levels of the stocks being harvested, the documented high exploitation rate of Hugh Smith Lake coho salmon, and the high preponderance of hatchery fish in the harvest, the department will continue to take a conservative approach to the fall season at Tree Point. However, fishing periods may be allowed after September 20 if fisheries performance data indicates above average returns of wild chum and coho salmon.

Increasing hatchery production of fall chum and coho salmon from the Nakat Inlet release site has resulted in increased effort late in the season at Tree Point. This increase in effort has likely increased harvest rates on wild stocks. In the last four years, approximately 50% of the fall chum and coho have been hatchery fish. Nakat Inlet fish not harvested in the common property fisheries can be harvested in the Nakat Inlet Special Harvest Area which remains open to commercial fishing through late October.

Management Goals

Management goals for the District 6 and 8 gillnet fisheries during the 1995 season are as follows:

1. Minimize the interception of mature spawning chinook salmon returning to the Stikine River while harvesting increased numbers of enhanced sockeye returning to the Stikine River.

2. Obtain pink salmon spawning escapement goals in District 6 and District 7.

3. Maintain spawning escapement goals of sockeye salmon in local Alaskan systems while harvesting increased numbers of enhanced sockeye returning to the Stikine River

4. Manage the Districts 6 and 8 gillnet fisheries consistent with the provisions of the PST (5 AAC 33.361). Discussions between the U.S. and Canada are ongoing, hence this management plan is subject to change.

Management Plan

The sockeye salmon fishery in District 6 and 8 will be managed in accordance with existing provisions of the Transboundary Rivers (TBR) Annex of the PST. The TBR annex has proven to be highly beneficial to both Canadian and Alaskan fishing fleets and it is anticipated Canada will also abide by the existing Annex provisions. The TBR Annex generally allows the District 6 fishery to be managed for harvesting local Alaskan sockeye salmon stocks and is not influenced under most conditions by the presence of sockeye salmon stocks of Stikine River origin. Management of the District 8 fishery will be based on the need to harvest sockeye salmon of Stikine River origin as allowed by the sharing provisions of the TBR Annex and the conservation of the resource. The 1995 Stikine River returns should be strong enough to fulfill PST obligations and allow drift gillnetting in District 6 and increased fishing time in District 8.

The season will start at noon on Monday, June 12 for a 24-hour open period in District 8, and at noon Sunday, June 18 for a 48-hour open period in District 6 and District 8. During the second week in June, only the outer portions of District 8 will be open to evaluate the run strength of Stikine River sockeye and the availability of chinook salmon. Depending upon the number of sockeye salmon harvested, and the numbers of chinook salmon incidentally harvested, additional fishing time may be granted during the first fishing week.

Management actions during the sockeye salmon fishing season will be based on analysis of CPUE and stock identification data to determine the availability of Stikine River fish. These stock abundance indicators, along with fishery performance and stock composition data obtained from Canadian

TAKU/SNETTISHAM GILLNET FISHERY

Introduction

The Taku/Snettisham (District 11) gillnet area encompasses Section 11-B (Taku Inlet, Port Snettisham, and Stephens Passage south to Midway Island) and Section 11-C (Midway Island south to a line from Point League to Point Hugh). This fishery has traditionally targeted on sockeye salmon during the early portion of the season, and fall chum and coho salmon later in the season.

1995 Outlook

The Taku River sockeye salmon return is expected to be about average in 1995. The 1990 parent-year Taku River escapement of 93,000 was 6% below the 1985 to 1994 average of 99,000, but exceeded the interim escapement goal of 71,000 to 80,000. The initial returns of age-5 sockeye salmon from the joint U.S./Canada Taku River enhancement program are expected to be fairly small in 1995. It is difficult to anticipate production of natural sockeye salmon from Alaskan spawning areas in Port Snettisham, but approximately 20,000 sockeye salmon are expected to return from Snettisham Hatchery fry plants in Sweetheart Lake. Sweetheart Lake returns will be harvested in the traditional wild stock sockeye fishery, the terminal fishery at the NSRAA Special Harvest Area (SHA) at the head of Gilbert Bay, and in a personal use fishery in Sweetheart Creek.

Coho and summer chum salmon returns to the District 11 area are expected to be above average. Parent-year Taku River coho salmon escapements were excellent. Hatchery contributions of summer chum and coho salmon to the District 11 gillnet harvest should be substantial in 1995. Additional fishing time may be allowed to harvest the expected return of 131,000 chum salmon to the Limestone Inlet remote release site jointly operated by NSRAA and the Douglas Island Pink and Chum (DIPAC) hatchery. The DIPAC hatchery is also projecting returns of 600,000 chum and 100,000 coho salmon to it's Gastineau Channel facilities in 1995; portions of these returns will be available for incidental harvest in the directed wild stock sockeye and coho salmon fisheries.

Returns of pink salmon to the Taku River and Stephens Passage streams are expected to be well below average because of extremely poor parent-year escapements in 1993. The return of fall chum salmon is also expected to be poor.

River have surpassed the escapement goal during the past six years, the department plans to manage the fishery more aggressively early in the season to harvest available surpluses of early-migrating Taku River sockeye salmon stocks. Extensions of fishing time late in the sockeye season are less likely because a weak return is expected to Tatsamenie Lake and adequate escapement is needed to fulfill broodstock requirements of the joint U.S./Canada sockeye salmon enhancement program conducted on this system.

To minimize the harvest of mature Taku River chinook salmon, Taku Inlet will be closed north of the latitude of Jaw Point during the first week of the fishery. If necessary, night closures may be instituted during the early portion of the season to limit incidental catches of immature chinook salmon. Harvests and CPUE of chinook salmon in the Juneau recreational fishery prior to the opening of the gillnet fishery, and catches during initial gillnet openings, will be evaluated to determine the need for night closures during the 1995 season.

Extended fishing time is expected in Stephens Passage to maximize the harvest of returns of enhanced chum salmon returning to Limestone Inlet. The department may implement a 6-inch minimum mesh size restriction in Section 11-B south of Circle Point beginning in early July to minimize the incidental harvest of Port Snettisham sockeye salmon during these openings.

Harvest rates on Snettisham natural sockeye salmon in outer portions of Taku Inlet and Stephens Passage are expected to be sufficient to harvest available surpluses of these stocks. Port Snettisham will again be closed inside a line from Point Anmer to Point Styleman through approximately August 12 to limit overall harvest rates on Snettisham sockeye stocks and rebuild escapements of these stocks to historic levels.

As in 1994, the NSRAA expects to conduct cost recovery in the Gilbert Bay SHA at the southern end of Gilbert Bay. Proceeds from the cost recovery of returns from Sweetheart Lake sockeye salmon fry plants will aid NSRAA in operating the Snettisham Hatchery. The state and NSRAA are currently arranging final details of the proposed transfer of the hatchery from the state. A personal use fishery will also be allowed in Sweetheart Creek to ensure the run is totally utilized; the creek is blocked to anadromous fish migration several hundred yards upstream from the mouth.

Pink salmon will be harvested in Section 11-B incidental to the sockeye and enhanced summer chum salmon fisheries. Fishing time for pink salmon in Section 11-C will depend on the strength of returns in lower Stephens Passage, Seymour Canal, and the northern portions of District 10. Pink salmon escapements into most of these areas were very poor in 1993 and fishing time in Section 11-C is not expected in 1995.

Beginning in mid-August, management of the Taku/Snettisham gillnet fishery will be based on the run strength of fall chum and coho salmon. Inseason management will be based on evaluation of the fishery catch, effort, CPUE relative to historical levels, and on escapement estimates from the Taku River mark-recapture project. Coho salmon is the primary species managed for during the fall season, but area and time restrictions may be necessary to further protect the weaker fall chum salmon returns.

Lynn Canal, a record index count of 12,200 spawners was recorded in the Berners River system. Coho salmon escapements to other major index systems in upper Lynn Canal, including Chilkoot and Chilkat lakes and the Tahini River were all well above average. As a result, coho salmon returns to Lynn Canal are expected to be above average in 1995.

Management Goals

Specific management goals for the 1995 Lynn Canal drift gillnet fishery are as follows:

1. Obtain an escapement of between 53,000 and 92,000 sockeye salmon through the Chilkoot Weir. The escapement objective for the early stock is approximately 22,000 fish prior to Statistical Week 29 (about July 12), and 40,000 fish for the late stock.

2. Obtain an escapement of between 52,000 and 106,000 sockeye salmon through the Chilkat Weir. The escapement objective for the early stock is approximately 18,000 fish through Statistical Week 33 (about August 15), and 48,000 for the late stock.

3. Provide for sufficient chum and coho salmon spawning escapements to the Chilkat, Chilkoot, and Berners Rivers and other Lynn Canal systems, while harvesting those fish in excess of escapement needs.

4. Minimize, to the extent practical, the incidental harvest of chinook salmon.

Management Plan

The 1995 Lynn Canal gillnet fishery will open on Sunday, June 18, for a 48-hour fishing period. The open area will include portions of both Sections 15-A and 15-C. During the initial fishing period, the waters of Section 15-A will be closed north of the northern tip of Sullivan Island to provide additional protection for mature chinook salmon returning to the Chilkat River. During early July, after mature chinook salmon interception is less of a management concern, adjustments to open areas will be made to allow opportunity to adequately harvest the early run sockeye stocks. Depending on abundance, nighttime fishing or area restrictions may be necessary to reduce catches of immature "feeder" chinook salmon.

Chilkat Inlet, as well as Chilkoot Inlet south of the latitude of Mud Bay Point, may remain closed until Chilkat River sockeye run strength can be adequately assessed. Following the initial opening, gillnet fishing time and area adjustments will be based on stock-specific catch and escapement information obtained from CPUE analysis, scale sampling, weir counts, and the Chilkat inriver fishwheel program.

(ADF&G). No common property drift gillnet fisheries are expected in the Neets Bay or Carroll Inlet (SSRAA) terminal areas.

Northern Southeast Regional Aquaculture Association Terminal Area Fisheries

The terminal hatchery fishery at Deep Inlet will be managed jointly with NSRAA and according to Board of Fisheries management plans. The open gillnet fishing times will be announced by ADF&G news releases prior to, and during, the fishing season.

Terminal Area - Deep Inlet

NSRAA expects a return of 450,000 chum salmon to the Deep Inlet remote release site and the Medvejie Hatchery in 1995. Of this return, approximately 345,000 will be available for common property harvest in the Deep Inlet Terminal Harvest Area (THA). The fishery will be managed jointly with NSRAA, and in accordance with the Deep Inlet Terminal Harvest Management Plan (5 AAC 33.376). The plan provides for the distribution of the harvest of hatchery-produced chum salmon between the purse seine and drift gillnet fleets. The ratio of gillnet fishing time to purse seine fishing time will be 2:1. Additionally, the Board of Fisheries has allowed trolling to occur when net fisheries are closed and when trolling does not interfere with cost recovery.

The Deep Inlet drift gillnet fishing area includes the waters of Deep Inlet, Aleutkina Bay and contiguous waters south of a line from a point at the east entrance to Pirates Cove at 135°22'10" W. longitude, 56°59'18" N. latitude, to a point on the west side of Long Island at 135°21'50" W. longitude, 56°59'50" N. latitude, to the easternmost tip of Long Island to the southeasternmost tip of Emgeten Island to the southernmost tip of Error Island to the southernmost tip of Boidarkin Island to a point at 135°17'31" W. longitude, 57°00'38" N. latitude.

When chum salmon begin returning to the Deep Inlet THA, in approximately mid-July, the area will be open to purse seine, drift gillnet, troll, and cost recovery according to the following schedule:

Mid-July through August 19:	Sunday and Wednesday - purse seine (16 hours/day); Monday, Tuesday, Thursday, and Friday - gillnet (16 hours/day); Saturday - cost recovery and troll.
August 20 through September 2:	Sunday - purse seine (12 hours/day); Thursday and Friday - gillnet (12 hours/day); Monday through Wednesday and Saturday - cost recovery and troll.
September 3 through end of run:	Sunday and Wednesday - seine (16 hours/day); Monday, Tuesday, Thursday, and Friday - gillnet (16 hours/day); Saturday - cost recovery and troll.

FISHERY CONTACTS

The following people are Commercial Fisheries contacts for this management plan:

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The following is a list of telephone numbers that may be called during the gillnet fishing season to obtain recorded announcements concerning areas open to gillnet fishing:

Ketchikan	-	(907) 225-6870
Petersburg	-	(907) 772-3700
Sitka	-	(907) 747-5022
Juneau	-	(907) 465-8905

SOUTHEAST ALASKA DRIFT GILLNET FISHERY

MANAGEMENT PLAN, 1995

Regional Information Report No. [1] 1J95-15B

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division
Southeast Region
Juneau, Alaska

May 1995

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1 The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Commercial Fisheries Management and Development Division.

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INTRODUCTION

This management plan provides an overview of the expected salmon run sizes, management issues, and harvest strategies for the Southeast Alaska drift gillnet fisheries in 1995.

There are approximately 480 limited entry permits in the Southeast Alaska drift gillnet fishery of which over 95% are actively fished each year. Drift gillnet landings have averaged approximately 2,155,000 salmon annually since 1960. Of the total commercial salmon harvest in Southeast Alaska, the drift gillnet fishery harvests an average of 39% of the sockeye, 23% of the chum, 13% of the coho, 4% of the pink, and 4% of the chinook salmon.

The drift gillnet fishery targets primarily on sockeye, pink, and summer chum salmon during the summer season, and on coho and fall chum salmon during the fall season. Chinook salmon are usually harvested incidentally, although some targeted chinook salmon fisheries are allowed in terminal hatchery areas in the spring. Currently, there are no directed gillnet fisheries for natural stocks of chinook salmon in Southeast Alaska.

There are five drift gillnet fishing areas in Southeast Alaska: District 1 (Tree Point and Portland Canal), District 6 (Prince of Wales), District 8 (Stikine), District 11 (Taku-Snettisham), and District 15 (Lynn Canal). In addition, drift gillnet fisheries occur in several terminal areas adjacent to hatchery facilities. Each of these gillnet fisheries are discussed separately in this management plan.

SALMON RETURNS

In Southeast Alaska, the Alaska Department of Fish and Game (ADF&G) issues a preseason return forecast only for pink salmon. Otherwise, the projected returns of sockeye, chum, and coho salmon presented in this management plan are strictly qualitative and should not be considered official department forecasts. The return projections are calculated primarily from parent-year catch and escapement data and are expressed in terms of probable magnitude of return relative to historic levels.

Average returns of sockeye salmon to most drift gillnet fishing areas are expected in 1995, with above average returns expected to the Stikine River. Returns of natural summer chum salmon stocks are anticipated to be average in most areas, while increased hatchery production should provide an above average, overall return. Returns of hatchery-produced, summer chum salmon are expected to contribute significantly to the District 1, 11, and 15 gillnet fisheries. Poor returns of fall chum salmon are expected to the Taku/Snettisham and Lynn Canal fisheries. Overall, returns of coho salmon should be above average owing, in part, to significant hatchery contributions. A weak pink salmon return is forecasted for the 1995 season. The total, all-gear pink salmon harvest is expected to be between 15,000,000 and 25,000,000 fish. The major portion of this harvest will be taken by purse seine gear.

MANAGEMENT APPROACH

The lack of accurate preseason forecasts for salmon returns to the drift gillnet fishing areas requires a flexible management approach. Thus, this management plan presents only a general outlook of how the season is expected to develop. Some specific management approaches may be altered depending on inseason assessments of salmon run strength. Fishermen are encouraged to contact department management staff listed at the end of this plan for more detailed information.

The primary objectives for management of the 1995 drift gillnet fishery are:

1. Obtain overall salmon spawning escapement goals with the best possible distribution to all systems;

2. Provide for an orderly fishery while harvesting those fish in excess of escapement needs;

3. Promote the harvest and processing of good quality fish within the constraints dictated by run size;

4. Manage the fisheries for a maximum Southeast drift gillnet catch of 7,600 chinook salmon, exclusive of Alaska hatchery-produced fish [5 AAC 33.365. (10)(B)]; and

5. Minimize, to the extent possible, the interception of salmon destined for locations where weak returns are expected.

Achievement of these management objectives will be accomplished by inseason adjustments of fishing time to control harvests in specific areas in accordance with salmon run strength and timing. Comparisons of current-year fishing performance to historical fishing success (i.e., catch per unit effort, or CPUE analysis) are a major component of inseason run strength assessment. This approach assumes that catch rates are an accurate reflection of run strength by time period and can be relied upon to indicate salmon escapements through the fishing area.

Past experience has demonstrated that management of salmon fisheries based only on CPUE data can be misleading, especially for mixed-stock fisheries. Therefore, although fishery performance will be important to inseason management, other available run strength indicators will also be used. For example, information on spawning escapements, stock separation using scale characteristics or otoliths, test fishing, observed salmon concentrations in sanctuary areas, catches from other fisheries, and salmon run timing models will also be utilized.

The increasing availability of hatchery-produced salmon, in particular coho and summer chum salmon, has become a major factor in the management of the Southeast Alaska drift gillnet fisheries. Where inseason management is based on fishery performance, it may be difficult to gauge natural stock run strength if significant numbers of hatchery fish are present in the catch. Where possible, the hatchery component of the catch will be separated when evaluating fishery performance.

Weekly Fishing Announcements

Inseason management of the District 1 drift gillnet fishery is conducted by the Ketchikan Area management staff, Districts 6 and 8 by the Petersburg and Wrangell area staff, District 11 by the Juneau area staff, and District 15 by the Haines area staff. Because permit holders can move freely among all drift gillnet fisheries, weekly fishing announcements for all areas will be coordinated by the Juneau regional office. These will normally be released simultaneously in all area offices by mid-afternoon each Thursday during the fishing season.

Weekly Fishing Periods

Weekly fishing periods can generally be expected to begin on Sunday at 12:01 p.m. Exceptions are the Northern and Southern Southeast Regional Aquaculture Association's (NSRAA & SSRAA) terminal fisheries in Deep Inlet, Nakat Inlet, and Earl West Cove, where rotational harvest plans for drift gillnet, seine, and troll fisheries will apply, and the Wrangell Narrows (Crystal Lake Hatchery) terminal hatchery fishery that will begin on Monday.

U.S./CANADA PACIFIC SALMON TREATY

The U.S./Canada Pacific Salmon Treaty (PST) will influence management of the Districts 1, 6, 8, and 11 drift gillnet fisheries. Although negotiations for the 1995 season are still not complete, these fisheries will be managed consistent with provisions of existing PST annexes for the transboundary rivers (Taku and Stikine) and the northern boundary area (northern British Columbia and southern Southeast Alaska). The management provisions specified by the PST will be considered separately under the specific management plan for each respective fishery. Gillnet fishermen are encouraged to contact local department staff for more detailed information concerning Alaska's PST obligations as it becomes available. Because PST negotiations are ongoing, management plans are subject to change.

CHINOOK SALMON CATCH

Regulation 5 AAC 33.365. (10)(B) specifies a catch limit of 7,600 chinook salmon (exclusive of Alaska hatchery fish) for the Southeast Alaska drift gillnet fishery. The Alaska Board of Fisheries adopted this regulation to ensure that the various user groups maintain their recent-year share of the total chinook salmon harvest quota.

The need for management measures to comply with the drift gillnet harvest quota for chinook salmon will depend on inseason evaluation of chinook salmon catch rates relative to the 7,600 fish ceiling. If the need arises, nighttime fishing closures may be implemented in certain areas to reduce the incidental catch of immature, "feeder" chinook salmon. As in past years, early-season area closures will be maintained to minimize the incidental harvest of mature, "spawner" chinook salmon returning to the Stikine River in District 8, the Taku River in District 11, and the Chilkat River in District 15.

TREE POINT AND PORTLAND CANAL FISHERY

Introduction

The Tree Point and Portland Canal gillnet area consists of Sections 1-A and 1-B. This fishery targets on summer chum and sockeye salmon early in the season, followed by pink salmon, and finally fall chum and coho salmon at the end of the season.

1995 Outlook

Sockeye salmon returns to Canadian systems, which contribute significant numbers of fish to the Tree Point drift gillnet fishery, are expected to be average during the 1995 season. Returns to Hugh Smith Lake, a local Alaska spawning system, are expected to be below average. If the returns of sockeye salmon develop as predicted, early-season fishing time and area may be affected. Chum salmon returns to natural spawning systems are expected to be above average to most areas, based on parent-year spawning levels to systems in Boca de Quadra and Behm Canal. Chum salmon returns to Portland Canal are expected to be below average.

Hatchery returns of summer chum, fall chum, and coho salmon to the Nakat Inlet remote release site operated by SSRAA are expected to contribute significantly to the Tree Point gillnet fishery in 1995. The 1995 projected returns are approximately 157,900 summer chum, 256,700 fall chum, and 9,200 coho salmon. Peak chum salmon catches from these releases are expected between mid-July to mid-August for summer chum and late August and early September for fall chum and coho salmon.

The Pink Salmon Management Plan (5 AAC 33.260) establishes gillnet fishing time in Section 1-B in relation to District 1 purse seine fishing time when both gear types are concurrently harvesting the same pink salmon stocks. By regulation, the plan starts on the third Sunday in July (July 16) with the following fishing time schedule:

1. When the purse seine fishery is open for any portion of one day during a fishing week, the drift gillnet fishery must be open for 48 hours during the same fishing week.

2. When the purse seine fishery is open for any portion of two days during a fishing week, the drift gillnet fishery must be open for 96 hours during the same fishing week.

3. When the purse seine fishery is open for any portion of three or more days during a fishing week, the drift gillnet fishery must be open for 120 hours during the same fishing week.

4. Conservation concerns for other salmon species may reduce the fishing time specified in the Pink Salmon Management Plan.

Management Goals

The following are additional specific management goals for the 1995 Tree Point drift gillnet fishery:

1. Manage the fishery in accordance with the Pink Salmon Management Plan (5 AAC 33.360).

2. Manage the fishery consistent with the provisions of the PST (5 AAC 33.361).

As specified in the PST, the sockeye salmon catch by the Tree Point fishery will be limited to an average harvest of 130,000 sockeye salmon per year. This catch limit is viewed as a level to be maintained over the long term. An average seasonal catch of approximately 164,000 sockeye salmon has occurred during the PST period from 1985 through 1994.

Management Plan

The Tree Point gillnet fishery will open by regulation in Section 1-B for a four-day fishing period beginning 12:01 p.m., Sunday, June 18. The duration of subsequent fishing periods, through mid-July, will be based on observed run strength of sockeye and summer chum salmon returns and fishing effort levels. Sockeye salmon run strength to both Canadian and Alaskan systems will be considered when establishing fishing periods.

As in recent years, the catch of hatchery-produced, summer chum salmon returning to the Nakat Inlet release site will not be included in the evaluation of natural stock fishery performance. The contribution of Nakat Inlet chum salmon will be estimated by inseason analysis of coded wire tag data. Hatchery chum salmon have contributed as much as 71% of weekly catches at Tree Point and as much as 31% of the total harvest in recent years.

The PST requires that interception of Portland Canal chum salmon be minimized to assure rebuilding of these stocks. In 1995, no fishing in Section 1-A for Portland Canal chum salmon should be expected unless it is determined that a harvestable surplus exists. Any management decision to fish Portland Canal must assume there is sufficient additional surplus fish to support a Canadian as well as an Alaskan fishery.

The Section 1-B gillnet fishery will be managed according to the Pink Salmon Management Plan starting July 16. The overall pink salmon return to southern Southeast Alaska is expected to be weak in 1995. As allowed by regulation, a minimum gillnet mesh size of six inches may be required to protect pink salmon during the fall season.

Fall management at Tree Point starts after the end of the pink salmon season. During the fall season, the Tree Point fishery targets primarily on fall chum and coho salmon. Little is known about the stock composition of the chum and coho salmon at this time of the year, however, the estimated exploitation rate of the Hugh Smith Lake coho salmon stock reaches 80% in some years and has averaged about 67% since 1982. If the same exploitation rate holds true for adjacent areas, then wild coho stocks in the surrounding Tree Point area may benefit from a closing date at Tree Point of approximately September 20. Due to the uncertainties of the escapement levels of the stocks being harvested, the documented high exploitation rate of Hugh Smith Lake coho salmon, and the high preponderance of hatchery fish in the harvest, the department will continue to take a conservative approach to the fall season at Tree Point. However, fishing periods may be allowed after September 20 if fisheries performance data indicates above average returns of wild chum and coho salmon.

Increasing hatchery production of fall chum and coho salmon from the Nakat Inlet release site has resulted in increased effort late in the season at Tree Point. This increase in effort has likely increased harvest rates on wild stocks. In the last four years, approximately 50% of the fall chum and coho have been hatchery fish. Nakat Inlet fish not harvested in the common property fisheries can be harvested in the Nakat Inlet Special Harvest Area which remains open to commercial fishing through late October.

PRINCE OF WALES AND STIKINE FISHERIES

Introduction

The District 6 drift gillnet fishery occurs in the waters of northern Clarence Strait and Sumner Strait, in Sections 6-A, 6-B and 6-C, and portions of Section 6-D. The Stikine fishery encompasses the waters of District 8 surrounding the terminus of the Stikine River. Due to their close proximity, management of these fisheries is interrelated, resulting in some major stocks being subject to harvest by both fisheries. Two distinct management areas exist within each district; the Frederick Sound (Section 8-A) and Wrangell (Section 8-B) portions of District 8, and the Sumner Strait (Section 6-A) and Clarence Strait (Sections 6-B, 6-C, and 6-D) portions of District 6. Terminal hatchery fisheries for harvesting returns to the Crystal Lake (ADF&G) and Earl West Cove (SSRAA) hatchery facilities will be discussed in the "Terminal Hatchery Fisheries" portion of this management plan.

Historical information indicates that Stikine River sockeye salmon stocks represent a major proportion of the fish available in District 8, a small proportion of the fish in Section 6-A, and a very low proportion in Sections 6-B, 6-C and 6-D. Management of these fisheries is based on sockeye salmon abundance early in the season, pink salmon abundance in the middle, and coho salmon abundance at the end of the fishing season.

1995 Outlook

The 1995 Stikine River sockeye salmon return is expected to be strong and increased effort on these stocks is anticipated. Although sockeye salmon returns to local Alaskan spawning areas have been average in recent years it is difficult to anticipate their production for 1995.

Below average pink salmon returns are forecast for District 6 spawning streams. Because returns are harvested in mixed stock fisheries prior to entering District 6, it is difficult to anticipate local availability. Pink salmon returns to southern Southeast Alaska are forecast to be below average in 1995. Because the District 6 gillnet fishery occurs in a major migration corridor, pink salmon destined for other districts will be available at certain times. The return of natural coho salmon stocks is expected to be about average. Chinook, coho, and chum salmon returns to enhancement facilities are also expected to contribute significantly to these fisheries. The projected returns to the Eastern Passage Special Harvest Area (Earl West Cove) are 20,000 coho, 197,000 summer chum, and 8,500 chinook salmon.

Management Goals

Management goals for the District 6 and 8 gillnet fisheries during the 1995 season are as follows:

1. Minimize the interception of mature spawning chinook salmon returning to the Stikine River while harvesting increased numbers of enhanced sockeye returning to the Stikine River.

2. Obtain pink salmon spawning escapement goals in District 6 and District 7.

3. Maintain spawning escapement goals of sockeye salmon in local Alaskan systems while harvesting increased numbers of enhanced sockeye returning to the Stikine River

4. Manage the Districts 6 and 8 gillnet fisheries consistent with the provisions of the PST (5 AAC 33.361). Discussions between the U.S. and Canada are ongoing, hence this management plan is subject to change.

Management Plan

The sockeye salmon fishery in District 6 and 8 will be managed in accordance with existing provisions of the Transboundary Rivers (TBR) Annex of the PST. The TBR annex has proven to be highly beneficial to both Canadian and Alaskan fishing fleets and it is anticipated Canada will also abide by the existing Annex provisions. The TBR Annex generally allows the District 6 fishery to be managed for harvesting local Alaskan sockeye salmon stocks and is not influenced under most conditions by the presence of sockeye salmon stocks of Stikine River origin. Management of the District 8 fishery will be based on the need to harvest sockeye salmon of Stikine River origin as allowed by the sharing provisions of the TBR Annex and the conservation of the resource. The 1995 Stikine River returns should be strong enough to fulfill PST obligations and allow drift gillnetting in District 6 and increased fishing time in District 8.

The season will start at noon on Monday, June 12 for a 24-hour open period in District 8, and at noon Sunday, June 18 for a 48-hour open period in District 6 and District 8. During the second week in June, only the outer portions of District 8 will be open to evaluate the run strength of Stikine River sockeye and the availability of chinook salmon. Depending upon the number of sockeye salmon harvested, and the numbers of chinook salmon incidentally harvested, additional fishing time may be granted during the first fishing week.

Management actions during the sockeye salmon fishing season will be based on analysis of CPUE and stock identification data to determine the availability of Stikine River fish. These stock abundance indicators, along with fishery performance and stock composition data obtained from Canadian commercial, test, and subsistence fisheries, will be incorporated into a Stikine sockeye management model. As the season progresses the model will be the primary tool used to estimate the availability of sockeye for harvest by the Alaskan fishery in District 8 and the Canadian inriver fisheries. Any increased fishing measures required for Stikine River sockeye salmon will first be implemented in District 8, followed by Sumner Strait in District 6. Mid-week openings will be used when additional fishing time is needed. Mid-week openings will be based upon the most recent Stikine sockeye model update and the current weekly sockeye harvest. In order to adjust the mid-week period to best follow the most current catch data, announcements for the mid-week opening will be announced on the fishing grounds by 10:00 a.m. of the last day of the regular fishery opening. Open area and fishing time may not necessarily be the same as the general weekly opening. It is anticipated that the first mid-week opening will occur on approximately June 21. If the sockeye returns to local Alaskan island systems are determined to be weak, area and time restrictions may be necessary in District 6.

The area adjacent to the Stikine River mouth, and other milling areas for Stikine River chinook salmon in District 8, will be closed during the early portions of the sockeye season to reduce the incidental harvest of Stikine River chinook salmon. Area restrictions will be maintained during fishing periods directed at sockeye salmon through early July. As the season progresses, the restrictions will generally be reduced. If areas of high concentrations of chinook are identified during initial weekly openings they will be closed during any subsequent mid-week openings. To avoid harvesting chinook salmon, the Stikine flats will not open until the first Sunday in July.

Pink salmon should begin entering District 6 in significant numbers by the third or fourth week of July. Early-season pink salmon gear restrictions (i.e., large mesh gillnets) are not anticipated. The early portion of the pink salmon fishery will be managed primarily on CPUE. By mid-August, pink salmon destined for local systems will begin to enter the fishery in greater numbers and at that time, management will be based on observed local escapements. If the run strength of the local returns are not evenly dispersed within the district, area restrictions or closures of the district may be necessary.

The coho salmon season will occur during late August and early September. Management of the District 6 fishery will be based predominantly on wild stock CPUE. Inseason estimates from coded wire tag recovery data will be used to identify the hatchery component of the catch. Only the catch of wild coho will be used for fishery performance evaluation.

Regulations allow gillnetting along the Screen Island shore of Section 6-D during the early and late portions of the season. Specifically, this area encompasses those waters of Section 6-D west of a line from Mariposa Rock Buoy to the northernmost tip of Point Harrington to a point on the shore of Etolin Island at 56°09'35" N. latitude, 132°42'42" W. longitude to the southernmost tip of Point Stanhope. The periods when fishing may be allowed are: 1) from the second Sunday in June (June 11) through the last Saturday in July (July 29), and 2) from the second Sunday in September (September 10) until the season is closed. During this time, gillnetting is allowed during the same time periods that the adjoining waters of Section 6-C are open.

TAKU/SNETTISHAM GILLNET FISHERY

Introduction

The Taku/Snettisham (District 11) gillnet area encompasses Section 11-B (Taku Inlet, Port Snettisham, and Stephens Passage south to Midway Island) and Section 11-C (Midway Island south to a line from Point League to Point Hugh). This fishery has traditionally targeted on sockeye salmon during the early portion of the season, and fall chum and coho salmon later in the season.

1995 Outlook

The Taku River sockeye salmon return is expected to be about average in 1995. The 1990 parent-year Taku River escapement of 93,000 was 6% below the 1985 to 1994 average of 99,000, but exceeded the interim escapement goal of 71,000 to 80,000. The initial returns of age-5 sockeye salmon from the joint U.S./Canada Taku River enhancement program are expected to be fairly small in 1995. It is difficult to anticipate production of natural sockeye salmon from Alaskan spawning areas in Port Snettisham, but approximately 20,000 sockeye salmon are expected to return from Snettisham Hatchery fry plants in Sweetheart Lake. Sweetheart Lake returns will be harvested in the traditional wild stock sockeye fishery, the terminal fishery at the NSRAA Special Harvest Area (SHA) at the head of Gilbert Bay, and in a personal use fishery in Sweetheart Creek.

Coho and summer chum salmon returns to the District 11 area are expected to be above average. Parent-year Taku River coho salmon escapements were excellent. Hatchery contributions of summer chum and coho salmon to the District 11 gillnet harvest should be substantial in 1995. Additional fishing time may be allowed to harvest the expected return of 131,000 chum salmon to the Limestone Inlet remote release site jointly operated by NSRAA and the Douglas Island Pink and Chum (DIPAC) hatchery. The DIPAC hatchery is also projecting returns of 600,000 chum and 100,000 coho salmon to it's Gastineau Channel facilities in 1995; portions of these returns will be available for incidental harvest in the directed wild stock sockeye and coho salmon fisheries.

Returns of pink salmon to the Taku River and Stephens Passage streams are expected to be well below average because of extremely poor parent-year escapements in 1993. The return of fall chum salmon is also expected to be poor.

Management Goals

Management goals for the 1995 Taku/Snettisham drift gillnet fishery are as follows:

1. Provide for sufficient salmon spawning escapements to the Taku River and Port Snettisham and Stephens Passage streams while harvesting those fish in excess of escapement needs.

2. Minimize, to the extent practical, the incidental harvest of feeder chinook salmon, within the confines of the 7,600 PST gillnet allocation.

3. Manage the fishery consistent with current provisions of the PST (5 AAC 33.361). Discussions between the U.S. and Canada are ongoing, hence this management plan is subject to change,

4. Maximize the harvest of hatchery-produced chum salmon returning to Limestone Inlet while minimizing the incidental harvest of Port Snettisham wild sockeye salmon.

Management Plan

The sockeye salmon fishery in District 11 will be managed in accordance with the Transboundary River (TBR) Annex of the PST. A comprehensive PST harvest sharing agreement between the U.S. and Canada has not been reached as of the date this management plan was drafted, hence this management plan is subject to change. The expired TBR Annex in place for the years 1988 through 1993 specified an 18% Canadian harvest share of the total allowable catch (TAC) of natural sockeye salmon originating from the Canadian portion of the Taku River. In addition the Canadian fishery was allowed to harvest a maximum of 3,000 coho salmon and incidental harvests of chinook, pink, and chum salmon. Returns from joint U.S./Canada Taku River sockeye salmon enhancement projects are to be shared equally among the nations through 1995.

The fishery will be managed through mid-August primarily on the basis of sockeye salmon abundance. Run strength will be evaluated using fishery CPUE data and weekly inriver run size estimates derived from the Taku River fish wheel mark-recapture project operated by ADF&G at Canyon Island. Contribution of enhanced stocks of sockeye salmon will be estimated in-season by analysis of salmon otoliths sampled from the commercial harvests. The age and stock compositions of the harvest of natural stock sockeye salmon will be determined after the fishing season by analysis of scale pattern and parasite incidence data from commercial catch samples.

Section 11-B will initially open for a 72-hour period on the third Sunday of June (June 18). Fishing time in subsequent weeks will be dependent on run strength. Since overall sockeye escapements to the Taku

River have surpassed the escapement goal during the past six years, the department plans to manage the fishery more aggressively early in the season to harvest available surpluses of early-migrating Taku River sockeye salmon stocks. Extensions of fishing time late in the sockeye season are less likely because a weak return is expected to Tatsamenie Lake and adequate escapement is needed to fulfill broodstock requirements of the joint U.S./Canada sockeye salmon enhancement program conducted on this system.

To minimize the harvest of mature Taku River chinook salmon, Taku Inlet will be closed north of the latitude of Jaw Point during the first week of the fishery. If necessary, night closures may be instituted during the early portion of the season to limit incidental catches of immature chinook salmon. Harvests and CPUE of chinook salmon in the Juneau recreational fishery prior to the opening of the gillnet fishery, and catches during initial gillnet openings, will be evaluated to determine the need for night closures during the 1995 season.

Extended fishing time is expected in Stephens Passage to maximize the harvest of returns of enhanced chum salmon returning to Limestone Inlet. The department may implement a 6-inch minimum mesh size restriction in Section 11-B south of Circle Point beginning in early July to minimize the incidental harvest of Port Snettisham sockeye salmon during these openings.

Harvest rates on Snettisham natural sockeye salmon in outer portions of Taku Inlet and Stephens Passage are expected to be sufficient to harvest available surpluses of these stocks. Port Snettisham will again be closed inside a line from Point Anmer to Point Styleman through approximately August 12 to limit overall harvest rates on Snettisham sockeye stocks and rebuild escapements of these stocks to historic levels.

As in 1994, the NSRAA expects to conduct cost recovery in the Gilbert Bay SHA at the southern end of Gilbert Bay. Proceeds from the cost recovery of returns from Sweetheart Lake sockeye salmon fry plants will aid NSRAA in operating the Snettisham Hatchery. The state and NSRAA are currently arranging final details of the proposed transfer of the hatchery from the state. A personal use fishery will also be allowed in Sweetheart Creek to ensure the run is totally utilized; the creek is blocked to anadromous fish migration several hundred yards upstream from the mouth.

Pink salmon will be harvested in Section 11-B incidental to the sockeye and enhanced summer chum salmon fisheries. Fishing time for pink salmon in Section 11-C will depend on the strength of returns in lower Stephens Passage, Seymour Canal, and the northern portions of District 10. Pink salmon escapements into most of these areas were very poor in 1993 and fishing time in Section 11-C is not expected in 1995.

Beginning in mid-August, management of the Taku/Snettisham gillnet fishery will be based on the run strength of fall chum and coho salmon. Inseason management will be based on evaluation of the fishery catch, effort, CPUE relative to historical levels, and on escapement estimates from the Taku River mark-recapture project. Coho salmon is the primary species managed for during the fall season, but area and time restrictions may be necessary to further protect the weaker fall chum salmon returns.

In order to avoid gear conflicts, the District 11 drift gillnet fishery will not be open concurrent with the Juneau Golden North Salmon Derby. Consequently, during statistical week 34, the District 11 gillnet fishery will not open until Monday, August 21.

LYNN CANAL FISHERY

Introduction

The Lynn Canal drift gillnet fishery includes Section 15-A in upper Lynn Canal, Section 15-C in Lower Lynn Canal, and Section 15-B (Berners Bay). Sockeye salmon is the primary species targeted during the summer season. Chum and coho salmon dominate the catch from late August through the end of the season.

1995 Outlook

Sockeye salmon returns to Lynn Canal are expected to provide for average or above harvest levels during the 1995 season. The 1990 parent-year produced an average harvest of 179,000 Chilkoot sockeye and the resulting escapement through the Chilkoot Lake weir of 76,000 spawners was near the upper end of the escapement goal range. Chilkat Lake sockeye stocks produced a 1990 parent-year harvest of 159,500 sockeye salmon with an escapement of 60,200 fish, near the mid-point of the escapement goal range. The age-6 component (normally 38% of the run) will return from a 1989 parent-year escapement of 140,500 sockeye salmon. High survival rates documented for the previous two brood years should result in an above average return to Chilkat lake during the 1995 season.

During the 1991 parent year, approximately 210,200 chum salmon were harvested in the District 15 gill net fishery of which 85,100 were summer-run stocks. Fall chum salmon escapements in the parent-year were extremely poor throughout the Chilkat River drainage including the mainstem spawning areas. As a result, fall chum salmon returns to Lynn Canal are expected to very poor during 1995.

Summer chum salmon harvests in lower Lynn Canal (Section 15-C) will be supplemented by hatchery chum salmon returning to the Boat Harbor and Amalga Harbor remote hatchery release sites. The projected return to Boat Harbor of 80,000 adult chum salmon is less than in 1995. Amalga Harbor returns are expected to exceed 1994 and harvests of over 200,000 chum salmon could occur.

The total harvest of coho salmon during the 1991 parent year was approximately 128,400 fish, the largest on record at that time. Coho salmon escapements were also well above average. For example, in lower

Lynn Canal, a record index count of 12,200 spawners was recorded in the Berners River system. Coho salmon escapements to other major index systems in upper Lynn Canal, including Chilkoot and Chilkat lakes and the Tahini River were all well above average. As a result, coho salmon returns to Lynn Canal are expected to be above average in 1995.

Management Goals

Specific management goals for the 1995 Lynn Canal drift gillnet fishery are as follows:

1. Obtain an escapement of between 53,000 and 92,000 sockeye salmon through the Chilkoot Weir. The escapement objective for the early stock is approximately 22,000 fish prior to Statistical Week 29 (about July 12), and 40,000 fish for the late stock.

2. Obtain an escapement of between 52,000 and 106,000 sockeye salmon through the Chilkat Weir. The escapement objective for the early stock is approximately 18,000 fish through Statistical Week 33 (about August 15), and 48,000 for the late stock.

3. Provide for sufficient chum and coho salmon spawning escapements to the Chilkat, Chilkoot, and Berners Rivers and other Lynn Canal systems, while harvesting those fish in excess of escapement needs.

4. Minimize, to the extent practical, the incidental harvest of chinook salmon.

Management Plan

The 1995 Lynn Canal gillnet fishery will open on Sunday, June 18, for a 48-hour fishing period. The open area will include portions of both Sections 15-A and 15-C. During the initial fishing period, the waters of Section 15-A will be closed north of the northern tip of Sullivan Island to provide additional protection for mature chinook salmon returning to the Chilkat River. During early July, after mature chinook salmon interception is less of a management concern, adjustments to open areas will be made to allow opportunity to adequately harvest the early run sockeye stocks. Depending on abundance, nighttime fishing or area restrictions may be necessary to reduce catches of immature "feeder" chinook salmon.

Chilkat Inlet, as well as Chilkoot Inlet south of the latitude of Mud Bay Point, may remain closed until Chilkat River sockeye run strength can be adequately assessed. Following the initial opening, gillnet fishing time and area adjustments will be based on stock-specific catch and escapement information obtained from CPUE analysis, scale sampling, weir counts, and the Chilkat inriver fishwheel program.

Total-run models for each specific sockeye salmon stock will be utilized to assess run strength on a weekly basis and to help gauge the exploitation rate required to achieve escapement objectives.

Beginning with the first opening of the 1995 season, portions of section 15-C will be opened to assess the abundance of wild and hatchery stocks of summer chum salmon. As a general guideline, targeted fishing effort on Chilkoot and Chilkat Lake sockeye salmon stocks will not be conducted in section 15-C unless adequate run strength is demonstrated for both stocks. Section 15-B, Berners Bay, is not expected to be opened as long as adequate harvests of Berners stocks occurs outside of the bay. Closures in Section 15-C may be necessary to ensure adequate escapement of wild summer chum salmon stocks. Management priority will continue to be provided to wild stock pink and chum salmon returning to lower Lynn Canal systems.

Hatchery chum salmon returns to the Boat Harbor remote release site are expected to contribute approximately 80,000 adults, considerably less than the previous season. Special openings along the western shoreline of Section 15-C, including extended fishing time, will be conducted to optimize the harvest of these fish. Large numbers of hatchery chum salmon returning to the Amalga Harbor remote release site are expected to be present in lower Lynn Canal during July and August this season. To the extent possible, opportunity will be provided to allow the harvest of surplus hatchery chum salmon which will be available in the Lynn Canal district. However, an area in the southeast portion of 15-C may be closed to provide for DIPAC cost recovery needs. Incidental catches of Berners Bay sockeye and chum salmon stocks are expected to coincide with openings targeted on surplus hatchery fish. Following the period of peak availability of summer chum and pink salmon stocks, the fishery will return to sockeye salmon management and areas along the eastern shoreline may be closed.

Fall season management will begin in late August or early September. A conservative management approach will again be implemented to ensure fall chum salmon escapement during the early weeks of the fall season. The Chilkat river fall chum salmon population is expected to be at critically low levels. Chilkat Inlet and large additional areas outside of the Inlet will be closed. Management of section 15-C during the fall season will be based on coho and chum salmon overall run strength and fishing effort levels. Fishing effort will be directed at harvesting expected strong returns of coho salmon in lower Lynn Canal while conserving fall chum salmon in upper Lynn Canal terminal areas during the late fall.

The Juneau Golden North Salmon Derby will end on Sunday, August 20. In order to avoid gear conflicts, the opening of the District 15 drift gillnet fishery will be delayed until Monday, August 21.

TERMINAL HATCHERY FISHERIES

For the 1995 season, drift gillnet terminal area fisheries can be expected in Deep Inlet, Nakat Inlet, and Earl West Cove (Eastern Passage) to harvest salmon returning to NSRAA and SSRAA enhancement facilities, and in portions of Blind Slough to harvest salmon returning to the Crystal Lake Hatchery

(ADF&G). No common property drift gillnet fisheries are expected in the Neets Bay or Carroll Inlet (SSRAA) terminal areas.

Northern Southeast Regional Aquaculture Association Terminal Area Fisheries

The terminal hatchery fishery at Deep Inlet will be managed jointly with NSRAA and according to Board of Fisheries management plans. The open gillnet fishing times will be announced by ADF&G news releases prior to, and during, the fishing season.

Terminal Area - Deep Inlet

NSRAA expects a return of 450,000 chum salmon to the Deep Inlet remote release site and the Medvejie Hatchery in 1995. Of this return, approximately 345,000 will be available for common property harvest in the Deep Inlet Terminal Harvest Area (THA). The fishery will be managed jointly with NSRAA, and in accordance with the Deep Inlet Terminal Harvest Management Plan (5 AAC 33.376). The plan provides for the distribution of the harvest of hatchery-produced chum salmon between the purse seine and drift gillnet fleets. The ratio of gillnet fishing time to purse seine fishing time will be 2:1. Additionally, the Board of Fisheries has allowed trolling to occur when net fisheries are closed and when trolling does not interfere with cost recovery.

The Deep Inlet drift gillnet fishing area includes the waters of Deep Inlet, Aleutkina Bay and contiguous waters south of a line from a point at the east entrance to Pirates Cove at 135°22'10" W. longitude, 56°59'18" N. latitude, to a point on the west side of Long Island at 135°21'50" W. longitude, 56°59'50" N. latitude, to the easternmost tip of Long Island to the southeasternnmost tip of Emgeten Island to the southernmost tip of Error Island to the southernmost tip of Boidarkin Island to a point at 135°17'31" W. longitude, 57°00'38" N. latitude.

When chum salmon begin returning to the Deep Inlet THA, in approximately mid-July, the area will be open to purse seine, drift gillnet, troll, and cost recovery according to the following schedule:

Mid-July through August 19:	Sunday and Wednesday - purse seine (16 hours/day); Monday, Tuesday, Thursday, and Friday - gillnet (16 hours/day); Saturday - cost recovery and troll.
August 20 through September 2:	Sunday - purse seine (12 hours/day); Thursday and Friday - gillnet (12 hours/day); Monday through Wednesday and Saturday - cost recovery and troll.
September 3 through end of run:	Sunday and Wednesday - seine (16 hours/day); Monday, Tuesday, Thursday, and Friday - gillnet (16 hours/day); Saturday - cost recovery and troll.

The department will issue a news release in early May listing the open fishing dates for each gear type. Fishermen should check with the department or NSRAA prior to fishing to obtain updated fishery information. Fishermen are advised that inseason modifications of the above schedule may be necessary. Fishermen are also requested to ensure that fish caught in terminal areas are reported correctly on their fish tickets. This will enable the accurate documentation of fish taken from the Deep Inlet THA.

Southern Southeast Regional Aquaculture Association Terminal Area Fisheries

The terminal hatchery fisheries at Earl West Cove (Eastern Passage) and Nakat Inlet will be managed jointly with SSRAA and according to Board of Fisheries management plans. The open gillnet fishing times will be announced by ADF&G news releases prior to, and during, the fishing season.

Terminal Area - Eastern Passage

The Eastern Passage drift gillnet fishing area includes the waters of Eastern Passage south of 56°24'50" N. latitude and west of 132°06'36" W. longitude.

Crystal Lake Hatchery Chinook and Coho Salmon Terminal Fishery

The two terminal fishing areas for harvesting chinook salmon returns to the state-operated Crystal Lake Hatchery are at the mouth of Crystal Creek in the Wrangell Narrows portion of District 6, and at the mouth of Ohmer Creek in District 8.

The chinook salmon return to the District 8 (Ohmer Creek) terminal area is expected to be less than 75 fish. This project has been terminated and no fishery will take place in Ohmer Creek in 1995 or the near future. In the Wrangell Narrows (District 6) terminal area, the expected return is lower than in previous years and no fishery is anticipated. If inseason indicators show the return is stronger than anticipated, gillnetting will be allowed. Open fishing periods will depend upon the egg take needs of the hatchery and the availability of surplus chinook. If a fishery is warranted, the openings will occur on Mondays to minimize conflicts between fishing vessels and other vessels traveling Wrangell Narrows. Fishing would be limited to the daylight hours, and the length of gillnets will be limited to 75 fathoms.

The coho salmon return to the Crystal Lake hatchery is expected to produce 2,000 fish available for harvest in Wrangell Narrows. A limited number of one-day periods to harvest these returns can be expected beginning in mid- to late-August. Fishing time will be limited to daylight hours; openings will occur on Mondays, and gillnets will be limited to 75 fathoms in length.

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The following is a list of telephone numbers that may be called during the gillnet fishing season to obtain recorded announcements concerning areas open to gillnet fishing:

Ketchikan	-	(907) 225-6870
Petersburg	-	(907) 772-3700
Sitka	-	(907) 747-5022
Juneau	-	(907) 465-8905