

**Estimates of Snake River Fall Chinook Impacts
in the 1997 Southeast Alaska Salmon Fishery and
Forecasts for 1998-2003**

**A supplementary report to
“The Biological Assessment for the Southeast Alaska Salmon Fishery for
1997-2003 under Section 7 of the Federal Endangered Species Act”
(Sands & Koenings March 1997)**

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Table of Contents

Introduction	1
Snake River fall chinook 1997 take and run reconstruction	2
1998-2003 impact on Snake River fall chinook by SEAK fishery.....	3
The 30%-50% impact reduction criteria.	4
References	10

List of tables

Table 1. Number of indicator-stock fish (i.e., appropriate CWTed subyearling fall chinook) released by the Lyons Ferry Hatchery and the number of CWTs subsequently recovered in the SEAK fishery by brood year.	5
Table 2. The number of CWTs recovered from the indicator stock (i.e., appropriate subyearling Lyons Ferry Hatchery fall chinook releases) in the SEAK catches from 1987-1997.....	6
Table 3. The seasonal distribution of coded-wire tags recovered in the SEAK fishery from the indicator stock.....	6
Table 4. Estimates of Snake River fall chinook landed catch and incidental mortality in the SEAK fishery based on CWT analysis.	7
Table 5. Run reconstruction for naturally spawning Snake River fall chinook.....	7
Table 6. The accrual of additional Snake River fall chinook salmon to other fisheries, dam loss, and escapement if there were no SEAK fishery exerting mortality on this stock.	8
Table 7. The estimated Snake River fall chinook landed catch from the SEAK fishery, the total number of chinook landed by the SEAK fishery (Treaty plus hatchery add-on), and the percentage Snake River fall chinook in the total catch of chinook salmon by the SEAK fishery.	8

List of Figures

Figure 1. Exploitation rates on Snake River fall chinook salmon by the SEAK fishery, the Canadian fishery, and the southern U.S. marine fishery, the inriver fishery, dam mortality, and the percentage of the run remaining for spawning escapement.....	9
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Introduction

“The Biological Assessment for the Southeast Alaska Salmon Fishery for 1997-2003 under Section 7 of the Federal Endangered Species Act” (Sands & Koenings March 1997) (Biological Assessment) was written for the period from 1997-2003, and was written prior to the 1997 fishing season. The Biological Assessment analyzed the impact of the Southeast Alaska (SEAK) fisheries on Snake River fall chinook using cohort analysis based on indicator stock (Lyons Ferry Hatchery fall chinook) tag recoveries. The Biological Assessment concluded that the SEAK fishery will not jeopardize the continued existence of ESA listed salmon so long as the fishery is managed in accordance with the harvest rates specified by the 1996 U.S. Letter of Agreement (Allen et al. 1996) (LOA), for the following reasons¹:

- 1) *“The SEAK fishery incidentally catches only a small number of Snake River fall chinook salmon each year and this number is a small percentage (8%) of the total run of the stock (Table 9). [Table 5]*
- 2) *The contribution of Snake River fall chinook salmon to the SEAK catch is very low, incidental level of around 0.05% (Table 12). [Table 7]*
- 3) *Under the LOA chinook management plan (Table 3), SEAK harvest rates will remain within recent levels and these levels average 35-40% below the 1979-1982 base period average.*
- 4) *There is a high likelihood of escapements of Snake River fall chinook salmon being in excess of the levels required by the NMFS jeopardy standard given that the proposed continued harvest levels in the SEAK fishery match recent past harvest levels (see jeopardy analysis, Clark et al. 1995).*
- 5) *Any reasonable manipulation of the SEAK salmon fishery to increase escapement of Snake River fall chinook is an ineffective fishery management action if the intent is to significantly increase the number of chinook salmon on the spawning ground (Table 10). [Table 6]*
- 6) *Snake River fall chinook salmon appear to be rebuilding; the escapement of naturally spawning Snake River fall chinook salmon in 1996 is high compared to recorded levels during recent years (Table 9) [Table 5], and further increases in escapements are expected based upon favorable out migration program in 1996 (NMFS 1996d).*

¹ Quoted from the Biological Assessment (p. 34, Sands and Koenings 1997). Table references in italics refer to tables in Sands and Koenings, 1997; table references in non-italicized text refer to this document.

- 7) *The current analysis of the impact of SEAK fishery on Snake River fall chinook salmon through 1996 and the projection of similar levels of impact through 2003 supports the conclusions presented in Clark et al. (1995) of minimal impact and no jeopardy to the continued existence and recovery of Snake River fall chinook salmon.*"

The results from this supplementary report, based on the evaluation of the actual impacts of the 1997 SEAK fisheries on Snake River fall chinook, continue to support these statements. The purpose of the evaluation presented in this report was to determine if the 1997 impacts of the SEAK fisheries on Snake River fall chinook were within the range of, or less than, that observed from 1979-1996. This being the case, the conclusion that the SEAK fisheries do not jeopardize the continued existence of Snake River fall chinook remains valid.

The updated estimates are based on 1997 indicator-stock tag recoveries in the Southeast Alaska (SEAK) salmon fishery, 1996 tag recoveries in the non-Alaskan fisheries (1997 tag recoveries are not yet available, average exploitation rates² are used), tag returns to the Lyons Ferry Hatchery, and estimates of dam loss and escapement of naturally spawning Snake River fall chinook from the Technical Assessment Committee Subgroup (TACS 1998). The indicator stock used for the listed Snake River fall chinook evolutionarily significant unit (ESU) are subyearling releases of fall chinook from the Lyons Ferry hatchery. The last tagged release of an indicator stock was in 1993 (1992 brood year) and the last expected tag recovery in SEAK fisheries was in 1997.

Snake River fall chinook 1997 take and run reconstruction

There have been no releases of Snake River fall chinook indicator stock from the Lyons Ferry Hatchery since the 1992 brood-year release in 1993. Returns from this release are 5 year olds in the 1997 catch. One tagged recovery from this release was made in the 1997/1998 Southeast Alaska (SEAK) winter fishery and 3 tagged recoveries were made in the 1997 summer fisheries; the expanded estimate from these recoveries is 6 tagged hatchery indicator fish in the SEAK catch. Tables 5-7 in Sands and Koenings (1997), giving tag recoveries by year, age class, and season, are updated and presented here in Tables 1-3.

Since only age 5 year old tagged indicator stock were present in the fisheries in 1997, average exploitation rates for age 3- and 4-year-old naturally spawning chinook were used, working back from the known escapement and estimates of dam loss and inriver fishery mortalities (TAC 1998), to estimate the exploitation by marine fisheries. The estimated landing of naturally spawning Snake River fall chinook from the SEAK fishery is 115 fish, with an incidental mortality of 44 chinook, giving a total mortality of 159 fish, or 152 adult equivalent (AEQ) chinook (Table 4). Substantial uncertainty exists regarding these estimates of Snake River fall chinook mortality due to the small numbers of tags recovered in the SEAK fishery (Table 2), the lack of indicator stock for all brood years (Table 1), the lack of age data for the wild stock, and the uncertainty in how well the indicator stock mimics the wild stock in spatial and age distribution and catchability. This, and the fact that the annual take of Snake River fall chinook

² Exploitation rate is the percentage of the total run taken by a fishery.

in the SEAK fishery has not varied greatly over the past 10 years (Table 4), makes it difficult to detect differences in impact, whether expressed as absolute or relative numbers, from year to year.

Escapement estimates for naturally spawning Snake River Fall chinook are provided by TACS (1998). The Snake River fall chinook escapement in 1997 was 797 fish, the highest on record since 1976 (Table 5). The 1997 escapement is over twice as large as the 1995 escapement and is about 25% larger than the 1996 escapement of 639 chinook. The projected escapement in 1998 is 992 (TACS 1998). This projection is about 25% larger than the 1997 escapement and continues the trend of increasing escapements and stock size.

Estimates of fishing mortality by all fisheries and the estimated total run based on the cohort tag-recovery analysis of Sands and Koenings (1997) are provided in Table 5 and show an increasing run size from 1995 to 1997. It is also evident that dam losses continue to take a large proportion of the annual Snake River fall chinook saved from restricting the fisheries (Figure 1). For the last several years, the mortality of Snake River fall chinook from dam loss exceeds that of the entire Pacific Northwest harvest sector.

1998-2003 impact on Snake River fall chinook by SEAK fishery

The projected abundance index for chinook salmon in SEAK fisheries is 1.33 from the Chinook Technical Committee (CTC) chinook model calibration 9703(c). The 1998 model calibration will not be ready before the end of April 1998, but is not expected to be very different from the 9703(c) projection (personal communication, John Carlile). Under the 1996 Letter of Agreement (LOA) presented in Allen et al. (1996), an abundance index of 1.33 gives the SEAK fishery a target harvest rate index (SPFI³) of 0.65 which, in turn, translates into an all-gear chinook allowable treaty catch (i.e., not including hatchery add-on nor terminal catches) of 277,182 fish. No reduction in the harvest rate index is necessary for stock conservation (as defined in paragraph 5 of LOA), and no inseason adjustment to the harvest rate index is expected since the projected abundance index falls in the middle of the range (1.18-1.9) that gives the target SPFI of 0.65.

There is no correlation between the SEAK total treaty catch of chinook and the SEAK impact on Snake River fall chinook. The average SEAK impact from 1988-1997 has been an AEQ total mortality (catch plus incidental impact) of 169 Snake River fall chinook (Table 5); the impact for the years the LOA has been in effect was 112 chinook in 1996 and 152 chinook in 1997. It is anticipated that the impact, as long as the SEAK chinook fishery is managed under the LOA, will fall within the range of 66 to 273 Snake River fall chinook (80% CI on 1988-1997 average).

³ SPFI = stratified proportional fisheries index as defined by LOA and calculated by CTC analysis.

The 30%-50% impact reduction criteria.

Since 1995, the standard that NMFS has applied in determining whether the SEAK fisheries jeopardize the continued existence of Snake River fall chinook has involved: 1) achieving a 30% reduction in the total adult equivalent exploitation rate of Snake River fall chinook relative to a 1988-1993 base period for all ocean fisheries combined; or 2) achieving a 50% reduction in the Snake River fall chinook exploitation rate for all U.S. ocean fisheries combined. The 30%-50% criteria are purportedly based on the Proposed Recovery Plan for Snake River Salmon (March 1995), although they are not included in the text of the Proposed Recovery Plan distributed for public review and comment.

The State of Alaska objects to the use of the 30%-50% criteria in ESA section 7 consultations on the SEAK fishery on both technical and legal grounds; see State of Alaska Review Comments Concerning NMFS Proposed Recovery Plan for Snake River Salmon (ADF&G 1995) and Notices of Intent to Sue dated August 28, 1995 and April 5, 1995. Without waiving those objections, ADF&G has considered the 1998 season and 1998/1999 winter season SEAK fisheries in terms of the 30%-50% reduction of impacts on Snake River fall chinook relative to the 1988-1993 base period.

Based on the run reconstruction presented here (Table 5), the coastwide fishing mortality on Snake River fall chinook was 29% in 1997 compared to the base period (1988-1993) average of 55%; that is a reduction of 47%. The 1998 exploitation rate index on Snake River fall chinook in U.S. fisheries is expected to be less than that in 1997, and for the Canadian fisheries the exploitation rate index is expected to be similar to 1997, resulting in even a greater reduction in the coastwide exploitation rate index in 1998. The Pacific Fishery Management Council has also predicted a reduction of 47% in the coastwide index as stated in their recent news bulletin (PFMC 1998). The 1998 exploitation rate index reduction for all ocean salmon fisheries on threatened Snake River fall chinook should far exceed the 30% reduction from the 1988-1993 base period as required by National Marine Fisheries Service (NMFS).

Table 1. Number of indicator-stock fish (i.e., appropriate CWTed subyearling fall chinook) released by the Lyons Ferry Hatchery and the number of CWTs subsequently recovered in the SEAK fishery by brood year. Only nontransported releases are included except for 1990 when only barged releases were made (barged CWT numbers in *italics*). An NR indicates 'no release' of an appropriate indicator group of fish for that brood-year. (Table 5 in Sands & Koenings 1997.)

BROOD YEAR	TAGGED SUBYEARLING RELEASES	CWTs RECOVERED IN THE SEAK FISHERY				
		AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
1984	234,985	0	3	9	4	16
1985	246,625	0	0	6	4	10
1986	251,646	0	0	11	1	12
1987	248,739	0	0	2	0	2
1988	226,478	0	0	1	0	1
1989	246,873	0	0	3	4	7
1990	222,532	<i>1</i>	<i>2</i>	<i>16</i>	<i>6</i>	<i>25</i>
1991	None	NR	NR	NR	NR	NR
1992	203,177	0	0	9	3	12
TOTAL	1,881,055	1	5	57	22	85

Table 2. The number of CWTs recovered from the indicator stock (i.e., appropriate subyearling Lyons Ferry Hatchery fall chinook releases) in the SEAK catches from 1987-1997. The data are from Table 1 arranged by recovery year instead of brood year. Only nontransported releases are included except for 1990 brood year for which only barged releases were made (barged CWT recoveries in *italics*). An NR indicates 'no release' of an appropriate indicator group of fish for that brood-year. (Table 6 in Sands & Koenings 1997.)

YEAR OF RECOVERY	AGE 2	AGE 3	AGE 4	AGE 5	TOTAL
1987	0	3	NR	NR	3
1988	0	0	9	NR	9
1989	0	0	6	4	10
1990	0	0	11	4	15
1991	0	0	2	1	3
1992	<i>1</i>	0	1	0	2
1993	NR	2	3	0	5
1994	0	NR	<i>16</i>	4	20
1995	NR	0	NR	<i>6</i>	6
1996	NR	NR	9	NR	9
1997	NR	NR	NR	3	3
TOTAL	1	5	57	22	85

Table 3. The seasonal distribution of coded-wire tags recovered in the SEAK fishery from the indicator stock (i.e., nontransported and BY 1990 barged, subyearling, Lyons Ferry Hatchery fall chinook releases). (Table 7 in Sands & Koenings 1997.)

Age	Oct-Dec	Jan-Apr	May-Jun	Jul-Sep	Total
2	0	0	0	1	1
3	5	0	1	4	10
4	7	1	5	45	58
5	0	2	3	11	16
Total	12	3	9	61	85

Table 4. Estimates of Snake River fall chinook landed catch and incidental mortality in the SEAK fishery based on CWT analysis. Total mortality is also given in adult equivalents (AEQ). The percent of total mortality due to incidental mortality is also given. (Table 8 in Sands & Koenings 1997.)

YEAR	FISHING MORTALITY			PERCENT	
	LANDED	INCIDENTAL	TOTAL	TOTAL IN AEQ	INC. OF TOT.
1988	184	29	213	209	14%
1989	190	43	233	224	18%
1990	28	13	41	39	32%
1991	178	51	229	228	22%
1992	100	34	134	132	25%
1993	140	53	193	184	27%
1994	284	42	326	319	13%
1995	81	14	95	94	15%
1996	81	35	116	112	30%
1997	115	44	159	152	28%
Average	138	36	174	169	22%

Table 5. Run reconstruction for naturally spawning Snake River fall chinook. The estimated total fishing mortalities are given in adult equivalents (AEQ) and are based on CWT recoveries of Lyons Ferry Hatchery indicator stock when available and using average exploitation rates otherwise. Dam loss rates and escapements are from TACS (1998). (Table 9 in Sands & Koenings 1997.)

YEAR	FISHERY MORTALITIES					DAM LOSS	ESCAPE-MENT	TOTAL RUN
	ALASKA	CANADA	SOUTH COAST	COLUMBIA INRIVER				
1988	209	1,224	504	1,627	889	368	4,821	
1989	224	867	399	1,331	751	295	3,867	
1990	39	141	105	198	222	78	782	
1991	228	86	121	374	991	318	2,119	
1992	132	428	50	159	580	549	1,897	
1993	184	477	95	199	410	742	2,107	
1994	319	445	49	190	435	406	1,844	
1995	94	144	52	85	622	350	1,347	
1996	112	107	146	43	785	639	1,831	
1997	152	208	131	80	589	797	1,958	
Average	169	413	165	429	627	454	2,257	

Table 6. The accrual of additional Snake River fall chinook salmon to other fisheries, dam loss, and escapement if there were no SEAK fishery exerting mortality on this stock. Numbers of fish are in adult equivalents (i.e., after natural mortality). The accrual rate is the percent of fish from the SEAK fishery that would add to the escapement. (Table 10 in Sands & Koenings 1997.)

YEAR	FISHERY MORTALITIES				DAM LOSS	ESCAPE- MENT	ACCRUAL RATE
	ALASKA	CANADA	SOUTH COAST	COLUMBIA INRIVER			
1988	0	57	21	82	25	24	11%
1989	0	53	22	85	46	18	8%
1990	0	6	5	10	13	5	12%
1991	0	2	12	56	120	37	16%
1992	0	35	1	9	45	42	32%
1993	0	48	10	20	38	69	37%
1994	0	121	3	54	74	68	21%
1995	0	11	3	7	46	26	28%
1996	0	12	7	6	48	39	35%
1997	0	17	10	6	51	68	45%
AVERAGE	0	38	9	33	51	40	25%

Table 7. The estimated Snake River fall chinook landed catch from the SEAK fishery, the total number of chinook landed by the SEAK fishery (Treaty plus hatchery add-on), and the percentage Snake River fall chinook in the total catch of chinook salmon by the SEAK fishery. (Table 12 in Sands & Koenings 1997.)

Year	Snake River Landed Catch	Total Chinook Catch	Percentage of Catch
1988	184	279,320	0.07%
1989	190	291,030	0.07%
1990	28	366,869	0.01%
1991	178	357,375	0.05%
1992	100	258,667	0.04%
1993	140	304,102	0.05%
1994	284	264,218	0.11%
1995	81	235,746	0.03%
1996	81	217,296	0.04%
1997	115	339,219	0.03%

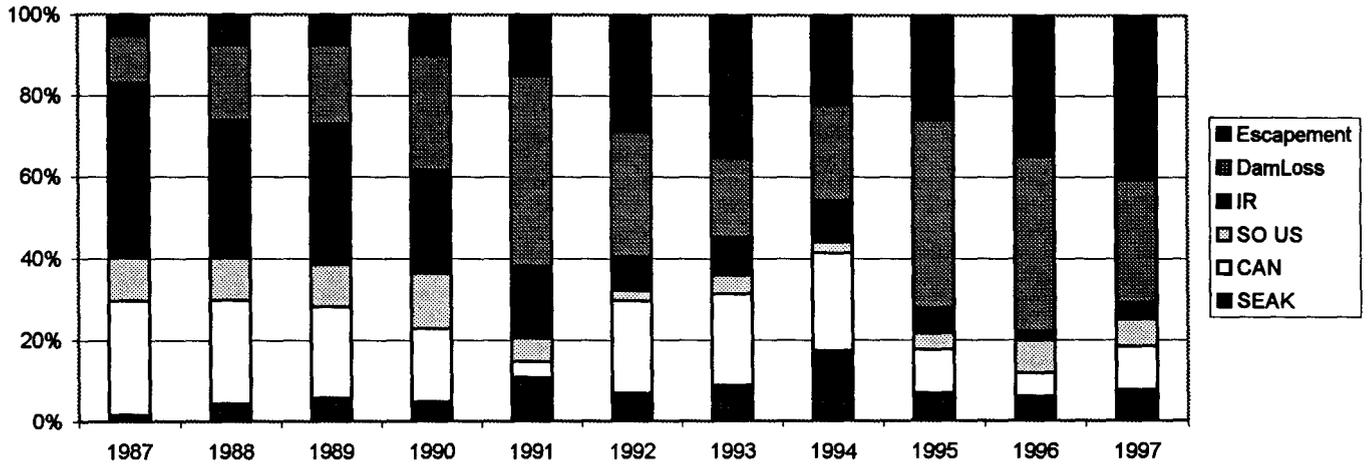


Figure 1. Exploitation rates on Snake River fall chinook salmon by the SEAK fishery, the Canadian fishery, and the southern U.S. marine fishery, the inriver fishery, dam mortality, and the percentage of the run remaining for spawning escapement. (Figure 3 in Sands & Koenings 1997.)

References

- Alaska Department of Fish and Game (ADF&G). 1995. State of Alaska review comments concerning NMFS proposed recovery plan for Snake River salmon. Regional Information Report N. 1J95-23. ADF&G, Douglas, AK. 54 p.
- Allen, W.R., D Benton, & R. Turner. 1996. Letter of agreement regarding an abundance-based approach to managing chinook salmon fisheries in southeast Alaska. US Section Pacific Salmon Commission agreement, June 24, 1996. 6 p + 9 appendices.
- Clark, J.H., J.E. Clark, D. Gaudet, and J. Carlile. 1995. Biological assessment of potential incidental impacts of 1995-1998 southeast Alaska salmon fisheries on ESA listed Snake River salmon. Regional Information Report No. 1J95-15. ADF&G, Douglas, AK. 79 p.
- National Marine Fisheries Service (NMFS). 1996d. Section 7 Consultation - Biological Opinion: Impacts on listed Snake River salmon by fisheries conducted pursuant to the 1996-1998 management agreement for upper Columbia River fall chinook. July 31, 1996. Northwest Region, 7600 Sand Point Way NE, BIN c15700, Bldg 1, Seattle, Washington. 20 p.
- Pacific Fishery Management Council (PFMC). 1998. Final 1988 Salmon Management Recommendations. Council News, 22(2):1-3.
- Sands, N.J. and J. Koenings. 1997. The biological assessment for the Southeast Alaska Salmon Fishery for 1997-2003 under Section 7 of the Federal Endangered Species Act. Alaska Department of Fish and Game, Regional Information Report No. 5J97-04.
- Technical Advisory Committee Subgroup, 1998. Updated tables for the biological assessment of the impacts of anticipated 1996-1998 fall season Columbia River mainstem and tributary fisheries on Snake River salmon species listed under the Endangered Species Act. March 11, 1998, San Francisco, CA.

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