UNITED STATES DEPARTMENT OF COMMERC
National Oceanic and Atmospheric Administratio
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

JUN 30 1999

MEMORANDUM TO: Gary C. Matlock
Director
Office of Sustainable Fisheries

FROM: Hilda Diaz-Soltero
Director
Office of Protected Resources

SUBJECT: Biological Opinion on Managing the Southeast Alaska Salmon Fisheries Subject to the Fishery Management Plan for Salmon Fisheries off the Coast of Alaska and the U.S. Letter of Agreement Regarding Chinook Salmon Fisheries in Alaska

Enclosed is the biological opinion prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act on management of the 1999 summer and 1999/2000 winter salmon fisheries subject to the Fishery Management Plan for salmon off the coast of Alaska as managed under the terms of the 1999 Pacific Salmon Treaty Chinook Annex (CA).

The Biological Opinion concludes that that the proposed salmon fisheries are not likely to jeopardize the continued existence of the Upper Willamette River chinook salmon, Lower Columbia River chinook salmon, or Puget Sound chinook salmon or destroy or adversely modify designated critical habitat. The Biological Opinion includes an Incidental Take Statement, although projected levels of incidental take associated with these fisheries have been reduced recently.

The United States and Canada recently reached an agreement under the Pacific Salmon Treaty (PST) on a long-term, comprehensive management plan that would govern salmon fisheries in southeast Alaska (SEAK), British Columbia, and Washington fisheries. One component of this agreement is an abundance-based management system for chinook salmon. However, final approval of this agreement is contingent on 1) existence of the ESUs impacted by these fisheries, and 2) congressional appropriations for implementation of key aspects of the agreement. Given the complexity and magnitude of the work required to complete a biological opinion on the new agreement and the time for congressional deliberation, neither is expected to be completed before the fisheries in SEAK are scheduled to begin on July 1, 1999. However, NMFS must complete its biological opinion on the comprehensive PST agreement by December 31, 1999. In the interim, Alaska proposes to manage the 1999 and 2000 SEAK fisheries under the terms of the 1999 CA.

This biological opinion is a one-year opinion for the 1999 summer and 1999/2000 winter season SEAK salmon fisheries. In addition to the circumstances for reinitiating consultation provided in 50 CFR 402.16, consultation on the proposed action would also be reinitiated in the event that 1) the 1999/2000 Alaska fishery is proposed to be managed under provisions other then those defined in the 1999 PST CA, 2) the Alaska fishery in combination with the Canadian and/or PFMC fisheries are not expected to meet either the 30% or 50% base period exploitation rate reduction standards for Snake River fall chinook, 3) current consultation standards effecting the Alaska fisheries are revised, or; 4) Alaskan fisheries are found to be inconsistent with final jeopardy standards for the ESUs covered under this opinion.

Attachments

Endangered Species Act - Reinitiated Section 7 Consultation

BIOLOGICAL OPINION
AND INCIDENTAL TAKE STATEMENT

Managing the Southeast Alaska Salmon Fisheries Subject to the Fishery Management Plan for Salmon Fisheries off the Coast of Alaska and the U.S. Letter of Agreement Regarding Chinook Salmon Fisheries in Alaska

A1

Agency: National Marine Fisheries Service

Consultation Conducted By: National Marine Fisheries Service
Protected Resources Division
Northwest Regional Office

Date Issued: June 30, 1999

Table of Contents

AV

A9

INTRODUCTION

The National Marine Fisheries Service (NMFS) is required under section 7 of the Endangered Species Act (ESA) to conduct consultations which consider the impacts of ocean salmon fisheries (NMFS 1998) on salmon species listed under the ESA. The objective of this biological opinion is to determine if fisheries conducted in conformance with the Fishery Management Plan (FMP) for the salmon fisheries in the Exclusive Economic Zone (EEZ) off the coast of Alaska and in adjacent state waters, and the 1999 Southeast Alaska fisheries conducted under the terms of the 1999 Chinook Annex (CA) of the Pacific Salmon Treaty (Annex IV, Chapter 3) are likely to jeopardize the continued existence of newly listed salmon ESUs (Puget Sound chinook, Lower Columbia River chinook, Upper Willamette chinook, Ozette Lake sockeye, Hood Canal summer-run or Columbia River chum, and Mid-Columbia and Southern California steelhead) or result in the destruction or adverse modification of their critical habitat.

The United States and Canada recently reached agreement under the Pacific Salmon Treaty (PST) on a long-term comprehensive management plan that would govern salmon fisheries in SEAK, British Columbia and Washington fisheries. One component of this agreement is an abundance based management system for chinook. However, final approval of this agreement is contingent on 1) completion of a biological opinion concluding that the agreement will not jeopardize the continued existence of the ESUs impacted by these fisheries, and; 2) congressional appropriations for implementation of key aspects of the agreement. Given the complexity and magnitude of the work required to complete a biological opinion on the new agreement and the time for congressional deliberation, neither is expected to be completed before SEAK fisheries are scheduled to begin on July 1, 1999. In the interim, Alaska proposes to manage the 1999/2000 SEAK fisheries under the terms of the 1999 CA.. NMFS must complete its biological opinion on the comprehensive PST agreement by December 31, 1999.

The North Pacific Fisheries Management Council (NPFMC) has conditionally deferred regulation and management of Alaska salmon fisheries in the EEZ off the coast of Alaska to the State of Alaska under the April 1990 North Pacific Fisheries Management Plan (NPFMP). The NMFS Alaska Regional Administrator oversees state management to assure consistency with the Salmon FMP, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), PST, ESA, and other applicable laws. Thus, state management regulations, limited entry licensing programs, reporting requirements, and other management-related actions, are applied to the EEZ unless the NMFS Alaska Regional Administrator determines that he must issue a specific regulation for the salmon fisheries in the EEZ to ensure compliance with applicable Federal law including the FMP, MSFCMA, PST, and ESA. In addition, NPFMC reserves the right to specify management measures applicable to the EEZ that differ from those of the state if it is deemed that state actions are inconsistent with the FMP or other applicable law.

Since state regulations governing salmon management do not differentiate between EEZ and state waters, the NPFMC review will apply to salmon fisheries in the EEZ and in state waters within three miles. Under its obligation to coordinate management, the NPFMC decision to continue to defer management will necessarily evaluate the EEZ and state water fisheries. It is this decision to defer that allows consultation with NMFS to insure that the NPFMC's action does not jeopardize the continued existence of species listed under the ESA. Management of the 1999/2000 SEAK fisheries under this arrangement will be determined by the terms of the 1999 CA. This opinion, therefore, considers the impacts of the 1999/2000 SEAK fisheries to the newly listed ESUs as defined under the terms of the 1999 CA.

CONSULTATION HISTORY

NMFS considered the impacts to salmon species listed under the ESA resulting from SEAK fisheries managed under the 1996 U.S. Letter of Agreement Regarding Chinook Salmon Fisheries in Alaska (LOA) in a previous biological opinion dated June 29,1998. That opinion was programmatic in that it considered the agreement itself rather than just annual regulation and provides continuing coverage of fisheries conducted in accordance with the LOA over the period it is in effect, for Snake River ESUs, Sacramento River winter chinook, the three coho ESUs, Umpqua River cutthroat and the previously listed steelhead ESUs (NMFS 1998b). The evaluation of PFMC FMP Amendment 13 regarding Oregon Coastal coho (April 28, 1999, NMFS 1999b) included impacts in SEAK fisheries.

Nine additional ESUs of chinook, sockeye, and chum salmon and steelhead were listed on March 24, 1999 (Table 1). The effects of SEAK fisheries on these species have not been previously considered. This biological opinion therefore considers the effects of the SEAK fisheries as managed by the State of Alaska under NPFMC oversight and as conducted under the terms of the 1999 PST Chinook Annex (CA): Upper Columbia River spring chinook, Upper Willamette River chinook, Lower Columbia River chinook, Puget Sound chinook, Hood Canal summer-run chum, Lower Columbia River chum, Ozette Lake sockeye, Middle Columbia River steelhead and Upper Willamette River steelhead.

Three chinook salmon ESUs currently are proposed for listing: California Central Valley fall and late fall chinook, California Central Valley spring chinook, and southern Oregon/northern California coastal chinook, as are Deschutes River fall chinook which are proposed to be included in the Snake River fall chinook ESU. NMFS extended the deadline for final listing determination on these populations until September 9, 1999. The basis for the extension was the existence of substantial scientific disagreement regarding the sufficiency and accuracy of data relevant to final listing determinations. These scientific disagreements concern the consistency of analysis used to identify temporal runs of chinook salmon in the same basin, the data needed to determine the geographic boundaries of certain ESUs, and information related to the risk assessment for some chinook salmon ESUs. Should any of the proposed ESUs become listed, NMFS may reinitiate section 7 consultation.

Table 1. Summary of salmon species listed and proposed for listing under the Endangered Species Act.

Species	Evolutionarily Significant Unit	Present Status	Federal Register	
Chinook Salmon (*O. tshawytscha*)	Sacramento River Winter	Endangered	54 FR 32085	8/1/89
	Snake River Fall	Threatened	57 FR 14653	4/22/92
	Snake River Spring/Summer	Threatened	57 FR 14653	4/22/92
	Central Valley Spring	Proposed Endangered	63 FR 11481	3/9/98
	Central Valley Fall	Proposed Threatened	63 FR 11481	3/9/98
	S. Oregon and California Coastal	Proposed Threatened	63 FR 11481	3/9/98
	Puget Sound	Threatened	64 FR 14308	3/24/99
	Lower Columbia River	Threatened	64 FR 14308	3/24/99
	Upper Willamette River	Threatened	64 FR 14308	3/24/99
	Upper Columbia River Spring	Endangered	64 FR 14308	3/24/99
Chum Salmon (*O. keta*)	Hood Canal Summer-Run	Threatened	64 FR 14570	3/25/99
	Columbia River	Threatened	64 FR 14570	3/25/99
Coho Salmon (*O. kisutch*)	Central California Coastal	Threatened	61 FR 56138	10/31/96
	S. Oregon/ N. California Coastal	Threatened	62 FR 24588	5/6/97
	Oregon Coastal	Threatened	63 FR 42587	8/10/98
Sockeye Salmon (*O. nerka*)	Snake River	Endangered	56 FR 58619	11/20/91
	Ozette Lake	Threatened	64 FR 14528	3/25/99
Steelhead (*O. mykiss*)	Southern California	Endangered	62 FR 43937	8/18/97
	South-Central California	Threatened	62 FR 43937	8/18/97
	Central California Coast	Threatened	62 FR 43937	8/18/97
	Upper Columbia River	Endangered	62 FR 43937	8/18/97
	Snake River Basin	Threatened	62 FR 43937	8/18/97
	Lower Columbia River	Threatened	63 FR 13347	3/19/98
	California Central Valley	Threatened	63 FR 13347	3/19/98
	Upper Willamette River	Threatened	64 FR 14517	3/25/99
	Middle Columbia River	Threatened	64 FR 14517	3/25/99
Cutthroat Trout Sea-Run (*O. clarki clarki*)	Umpqua River	Endangered	61 FR 41514	8/9/96
	Southwest Washington/Columbia River	Proposed Threatened	64 FR 16397	4/5/99

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BIOLOGICAL OPINION

I. Description of the Proposed Action

A. Proposed Action

The biological assessment received from the State of Alaska originally proposed to manage the SEAK fisheries under the terms of the LOA; this biological opinion was drafted in response to that proposed action. The Pacific Salmon Treaty (PST) negotiations have been ongoing for several months. Although a final agreement was anticipated, it was not clear if and when it would occur. Absent agreement, fisheries were to be managed under the 1996 LOA. On June 24, 1999, NMFS was notified that final agreement had been reached and received notice that Alaska would manage the SEAK fisheries under the terms of the new PST Chinook Annex (CA) rather than the LOA (Scott 1999) Since the fishery was scheduled to start on July 1, NMFS has necessarily had to work with the existing opinion to consider the proposed fisheries. This opinion, therefore, analyzes the effect of the fishery that will be implemented in 1999 under the CA and its affect on newly listed species recognizing 1) the treaty itself is subject to consultation which is to be completed by December 31, 1999; 2) fisheries impacts to listed salmon under the CA will be less than those that would have occurred under the LOA, and; 3) that for previously listed species, NMFS concluded that fisheries allowed under the LOA in 1999 are not likely to jeopardize listed salmon (NMFS 98, PFMC 99).

NMFS considered the impacts to salmon species listed under the ESA resulting from SEAK fisheries managed under the 1996 U.S. Letter of Agreement Regarding Chinook Salmon Fisheries in Alaska (LOA) in a previous biological opinion dated June 29,1998. That opinion was programmatic in that it considered the agreement itself rather than just annual regulation and therefore, provided continuing coverage of fisheries conducted in accordance with the LOA, for the Snake River ESUs, Sacramento River winter chinook, the three coho ESUs, Umpqua River cutthroat and the previously listed steelhead ESUs (NMFS 1998b). The Biological Opinion on PFMC FMP Amendment 13 regarding Oregon Coastal coho salmon included an analysis of the effects of SEAK fisheries (April 28, 1999, NMFS 1999b).

The proposed action evaluated in this Biological Opinion is implementation of fishery regulations for Southeast Alaska developed in accordance with terms of the 1999 CA of the Pacific Salmon Treaty (Annex IV, Chapter 3), and the Fishery Management Plan for salmon fisheries in the EEZ off the coast of Alaska and in adjacent state waters. The objective of this biological opinion is to determine whether fisheries conducted in conformance with these regulations are likely to jeopardize the continued existence of newly listed salmon ESUs (Puget Sound chinook, Lower Columbia River chinook, Upper Willamette and Upper Columbia River chinook, Ozette Lake sockeye, Hood Canal summer-run chum, Columbia River chum, Middle Columbia River and Upper Willamette River steelhead) or result in the destruction or adverse modification of their critical habitat.

Background on the SEAK fisheries under the PST

For 1985-1992, all-gear base catch ceilings were established for Southeast Alaska commercial and recreational fisheries by the Pacific Salmon Commission (PSC), the negotiating body of the Pacific Salmon Treaty. (The base catch ceilings excluded a PST allowance for Alaska hatchery add-ons and specified terminal area catches.) These ceilings were part of a coordinated coastwide 15-year rebuilding program for depressed U.S. and Canadian natural chinook stocks which extends through 1998 (for more explanation see PSC 1994). The PSC rebuilding program consisted of: 1) chinook ceilings for all-gear commercial and recreational fisheries in Southeast Alaska and North/Central British Columbia (NCBC), the commercial troll fishery off the west coast Vancouver Island (WCVI), and Georgia Straits troll and recreational fisheries; and 2) pass-through provisions which apply to depressed natural chinook stocks in the non-ceilinged fisheries of Canada, Washington and Oregon.

In 1995, Alaska proposed to change the management of the Alaska fishery from the ceiling-based management system to one designed to achieve a specified target harvest rate (Clark et. al. 1995). The target harvest rate would be achieved by annually adjusting catch in response to changes in abundance (abundance-based management). The ideas proposed in 1995 continued to develop, culminating in 1996 in the LOA among the U.S. Commissioners of the PSC (Allen et. al. 1996, Sands and Koenings 1997). The agreement provided a framework for management of Alaska salmon fisheries through 2003.

In 1999, this framework was revised when the United States and Canada tentatively agreed on a comprehensive management plan that would govern salmon fisheries in SEAK, British Columbia and Washington fisheries for the next 10 years. One component of this agreement is an abundance based management systems for chinook. However, final approval of this agreement is contingent on 1) completion of a biological opinion concluding that the agreement will not jeopardize the continued existence of the ESUs impacted by these fisheries; and; 2) congressional appropriations for implementation of key aspects of the agreement. Given the complexity and magnitude of the work required to complete a biological opinion on the new agreement and the time for congressional deliberation, neither is expected to be completed before SEAK fisheries are scheduled to begin on July 1, 1999. This opinion, therefore, considers the effects of SEAK fisheries as defined under the terms of the 1999 PST CA on newly-listed species of salmon.

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The management system under the 1999 PST CA allows for a potential inseason adjustment in the target catch based on a reassessment of fishery abundance. The PST CA inseason mechanism increases or decreases the allowable harvest based on stepped increments keyed to changes in abundance. At an abundance index of less than 1.0, the harvest rate index is 0.437. Between an abundance index of 1.0 and 1.205, the harvest rate varies linearly with abundance. Between an abundance index of 1.205 and 1.5, the harvest rate index is 0.6, and above 1.5 the harvest rate index is 0.65. (This is an index of harvest rate relative to the 1979-1982 model base years and not absolute harvest rate.) For example, at a preseason estimate of abundance of 1.3 the target harvest rate index for the Alaska fishery in 1999 would be 0.60 with a resulting target catch of 252,000. The harvest rate index will remain at 0.60 so long as the abundance index is between 1.205 and 1.5. Target catch may increase or decrease with abundance because it is calculated as a proportion of abundance. If the inseason estimate of abundance exceeded 1.5, the harvest rate index would step up to 0.65 according to the PST CA, resulting in increased impacts to the UWR, LCR and some stocks within the PS ESUs. It is highly unlikely that abundance will increase beyond 1.5 in 1999 since the projected abundance index falls in the lower part of the range, but such an increase is allowed for under this biological opinion. If the inseason abundance index fell below 1.205, the inseason mechanism would step down appropriately. For purposes of this consultation, it was also assumed that the target catch may increase or decrease according to the calculation procedures of the1999 PST CA. This agreement is similar to, but more conservative than, the 1996 LOA. For example, under the 1996 LOA, an abundance index of 1.3 would result in a harvest rate index of 0.65 and a target catch of approximately 271,000 fish.

Fishery Structure

The Southeast Alaska commercial troll fishery consists of two general fishing seasons. The winter season extends from October 1 through April 14 and the summer seasons extends from April 15 through September 30, although the summer season commercial fisheries do not generally begin until June. The accounting year for the fisheries begins with the winter season.

The summer season troll fisheries include several terminal hatchery access fisheries that occur in late May and June and are designed to target Alaskan hatchery-origin fish, and the main summer fishery which is scheduled to begin on July 1, 1999. Net fisheries occur in the summer and recreational fisheries occur throughout the year. The annual commercial catch in Southeast Alaska fisheries by species is included in Tables 2 and 3.

The number of chinook available for the main summer season troll fishery under the Pacific Salmon Treaty (PST) is determined by subtracting chinook catches that have occurred in prior fisheries and that will occur in the net and recreational fisheries from the total allowable PST catch for that year. PST chinook are those fish that come under the PST regulation and do not include the Alaska hatchery add-on or terminal exclusion catches. Catch rates in the main summer season troll fishery in recent years have been quite high. As a result, chinook-directed fisheries have lasted only several days or a few weeks. During the remainder of the summer season, troll fisheries directed at coho continue, but chinook retention is prohibited. Mortality associated with the hooking and release of chinook continues during the non-retention fisheries. Non-retention mortality of chinook is estimated and accounted for in stock assessment analyses, but is not included in the total allowable catch which otherwise limits the catch. Annual SEAK chinook catches by gear group are summarized in Table 4.

Consideration of the 1998/1999 winter fishery was included in the 1998 consultation (NMFS 1998) with the understanding that the catch in the winter fishery would be small relative to the total target catch for the 1998/1999 accounting year and would be considered again at this time as part of the overall consultation for the 1999/2000 Alaska salmon fishery.

This consultation also covers the 1999/2000 winter season fishery. As in past years, the following winter fishery is included in the consultation first, because it is a relatively small component of the annual catch, and second, so that the consultation process will be coincident with the annual management cycle that provides the necessary information on anticipated fisheries and associated impacts.

B. Conservation Measures Included in the Proposed Action

The FMP defines the management units for the NPFMC fisheries as the stocks of salmon that are harvested off the coasts of Southeast Alaska. The management unit is comprised of several specific stocks or stock groups. The FMP requires that the fisheries must be managed consistently with the requirements of the ESA.

C. Action Area

Southeast Alaska salmon fisheries are conducted in Federal and state waters from the international boundary in Dixon Entrance to the longitude of Cape Suckling (143°53' 36"W) (Figure 1). Since, under the arrangement with the NPFMC, state regulations governing salmon management do not differentiate between EEZ and state waters, the NPFMC review will apply to salmon fisheries in the EEZ and in state waters within three miles. Therefore, for the purposes of this opinion, the action area is the EEZ and state waters within three miles. All are considered directly affected by the federal action.

Table 2. Southeast Alaska region annual commercial salmon catches, in numbers, by species, 1960 to 1997 (Sands and Gaudet 1999).

Year	Large Chinook[a]		Small Chinook[b]		Sockeye		Coho		Pink		Chum		Total
1960	301,344	(6%)	-		533,118	(10%)	681,604	(13%)	2,712,146	(53%)	932,430	(18%)	5,160,642
1961	220,397	(1%)	-		682,292	(4%)	833,609	(5%)	11,459,298	(73%)	2,446,331	(16%)	15,641,927
1962	196,650	(1%)	-		727,437	(5%)	1,156,277	(8%)	11,255,790	(74%)	1,837,010	(12%)	15,173,164
1963	257,706	(1%)	-		675,750	(3%)	1,265,328	(6%)	19,115,942	(84%)	1,470,239	(6%)	22,784,965
1964	357,139	(2%)	-		919,124	(4%)	1,586,258	(7%)	18,580,259	(80%)	1,927,834	(8%)	23,370,614
1965	287,109	(2%)	-		1,076,998	(7%)	1,543,807	(10%)	10,879,097	(71%)	1,466,256	(10%)	15,253,267
1966	308,042	(1%)	-		1,046,075	(4%)	1,218,827	(5%)	20,350,917	(78%)	3,227,402	(12%)	26,151,263
1967	300,938	(4%)	-		966,398	(14%)	864,250	(12%)	3,109,343	(44%)	1,806,940	(26%)	7,047,869
1968	331,511	(1%)	-		826,195	(3%)	1,539,686	(5%)	25,077,871	(82%)	2,636,207	(9%)	30,411,470
1969	314,012	(4%)	-		811,232	(11%)	596,407	(8%)	4,869,056	(68%)	561,366	(8%)	7,152,073
1970	322,315	(2%)	-		667,909	(4%)	758,900	(5%)	10,657,293	(72%)	2,446,110	(16%)	14,852,527
1971	333,997	(3%)	-		623,269	(5%)	914,420	(7%)	9,344,830	(71%)	1,946,105	(15%)	13,162,621
1972	286,826	(2%)	-		916,720	(5%)	1,508,654	(8%)	12,399,801	(69%)	2,942,712	(16%)	18,054,713
1973	343,786	(3%)	-		1,011,595	(10%)	836,167	(8%)	6,455,487	(62%)	1,832,215	(17%)	10,479,250
1974	346,570	(4%)	-		687,422	(8%)	1,276,941	(14%)	4,888,711	(55%)	1,684,315	(19%)	8,883,959
1975	300,707	(5%)	-		245,191	(4%)	427,357	(8%)	4,026,520	(71%)	686,615	(12%)	5,686,390
1976	241,762	(3%)	-		595,259	(7%)	821,801	(10%)	5,329,598	(66%)	1,030,877	(13%)	8,019,297
1977	285,178	(2%)	-		1,085,143	(6%)	944,654	(6%)	13,843,520	(82%)	738,723	(4%)	16,897,218
1978	401,411	(2%)	-		788,319	(3%)	1,714,505	(7%)	21,243,378	(85%)	868,963	(3%)	25,016,576
1979	363,593	(2%)	-		1,073,657	(7%)	1,284,603	(9%)	10,978,333	(75%)	888,273	(6%)	14,588,459
1980	324,610	(2%)	-		1,108,349	(6%)	1,116,237	(6%)	14,500,066	(78%)	1,641,514	(9%)	18,690,776
1981	268,490	(1%)	-		1,072,201	(5%)	1,358,806	(6%)	19,038,296	(84%)	837,240	(4%)	22,575,033
1982	292,220	(1%)	-		1,490,034	(5%)	2,117,303	(7%)	24,211,210	(82%)	1,329,501	(5%)	29,440,268
1983	289,451	(1%)	-		1,556,554	(4%)	1,946,995	(5%)	37,528,811	(88%)	1,168,541	(3%)	42,490,352
1984	270,227	(1%)	-		1,214,687	(4%)	1,909,281	(6%)	24,701,608	(77%)	4,083,346	(13%)	32,179,149
1985	255,125	(0%)	-		1,861,637	(3%)	2,598,824	(4%)	51,952,508	(87%)	3,274,964	(5%)	59,943,058
1986	262,381	(0%)	1,158	(0%)	1,442,990	(3%)	3,404,109	(6%)	46,172,277	(84%)	3,358,886	(6%)	54,641,801
1987	261,396	(2%)	1,786	(0%)	1,377,717	(9%)	1,543,353	(10%)	10,280,422	(64%)	2,721,664	(17%)	16,186,338
1988	263,847	(2%)	1,028	(0%)	1,460,396	(8%)	1,046,662	(6%)	11,207,162	(64%)	3,535,594	(20%)	17,514,689
1989	280,964	(0%)	4,005	(0%)	2,124,838	(3%)	2,204,044	(3%)	59,460,203	(90%)	1,968,890	(3%)	66,042,944
1990	342,379	(1%)	3,454	(0%)	2,155,717	(5%)	2,868,127	(7%)	32,342,002	(81%)	2,217,894	(6%)	39,929,573
1991	325,063	(0%)	5,585	(0%)	2,061,588	(3%)	3,194,073	(5%)	61,919,097	(87%)	3,334,327	(5%)	70,839,733
1992	233,822	(1%)	2,296	(0%)	2,666,410	(6%)	3,695,388	(8%)	34,963,308	(75%)	4,936,489	(11%)	46,497,713
1993	280,849	(0%)	3,956	(0%)	3,190,717	(4%)	3,665,007	(5%)	57,299,342	(79%)	7,879,850	(11%)	72,319,721
1994	241,335	(0%)	6,265	(0%)	2,392,364	(3%)	5,715,764	(7%)	57,646,063	(75%)	10,397,421	(14%)	76,399,212
1995	218,459	(0%)	1,675	(0%)	1,795,006	(3%)	3,345,616	(5%)	47,964,133	(74%)	11,157,425	(17%)	64,482,314
1996	213,637	(0%)	831	(0%)	2,800,231	(3%)	3,156,812	(4%)	64,620,421	(75%)	15,933,075	(18%)	86,725,007
1997	303,955	(1%)	497	(0%)	2,476,778	(5%)	1,952,099	(4%)	28,983,668	(64%)		(26%)	45,466,837
Average[b]													
1960-97	290,242	(1%)	2,711	(0%)	1,321,245	(4%)	1,805,594	(6%)	23,983,363	(78%)	3,286,931	(11%)	30,688,231
1988-97	270,431	(0%)	2,959	(0%)	2,312,405	(4%)	3,084,359	(5%)	45,640,540	(78%)	7,311,081	(12%)	58,621,774
Preliminary													
1998	235,732	(0%)	1,704	(0%)	1,375,306	(2%)	2,954,241	(5%)	42,518,815	(68%)	15,596,883	(25%)	62,682,681

[a] Large Chinook (>=28") troll harvest is calendar year for 1960 through September 1979, and by season (October-September) for 1980-1997.

[b] Small Chinook salmon (<=21") average for 1986-1996.

Table 3. Southeast Alaska sport fish harvest by species, 1987-1997[a] (from Howe et al. 1998). The harvest includes the hatchery component. The chinook harvest includes hatchery and add-on components (Sands and Gaudet 1999).

Year	Chinook	Sea-run coho	Sockeye	Pink	Chum	Steelhead trout	Cutthroat trout
1987	24,324	50,284	9,374	57,060	5,207	4,677	14,247
1988	26,160	43,688	7,711	45,023	9,913	4,309	16,317
1989	31,071	90,789	13,114	70,822	8,932	5,409	18,861
1990	51,218	105,212	9,848	65,208	4,962	4,274	45,660
1991	60,492	123,946	9,715	57,859	5,593	4,632	9,672
1992	42,892	99,939	9,318	54,101	6,041	2,439	12,957
1993	49,246	121,874	17,419	51,436	9,380	1,249	15,351
1994	42,365	191,860	13,023	52,263	11,561	685	6,476
1995	49,667	97,128	13,491	42,958	11,438	233	4,547
1996	41,717	161,615	14,246	79,469	17,238	54	4,486
1997	69,672	167,641	17,462	57,237	14,472	365	5,009

[a] Harvest estimates for 1998 are not yet available.

Table 4. Annual chinook catches by gear group in the SEAK fishery and the corresponding ceiling or target harvest level. For the years 1979-1984, the catches (in *italics*) represent total landed catch, and for the years 1985-1996 (years under the PST), the catches represent treaty catches (landed catches minus hatchery add-on and terminal exclusion). (Sands and Gaudet 1999)

Year	Chinook Catch				Ceiling or Target Harvest
	Troll	Net	Sport	Total[a]	
1979	*334,306*	*28,465*	*16,581*	*379,342*	None
1980	*303,885*	*20,114*	*20,213*	*344,212*	286,000-320,000
1981	*248,791*	*18,951*	*21,300*	*289,042*	243,000-286,000
1982	*242,315*	*48,999*	*25,756*	*317,070*	243,000-286,000
1983	*269,790*	*19,655*	*22,321*	*311,766*	243,000-272,000
1984	*235,629*	*32,398*	*22,050*	*290,077*	243,000-272,000
1985	212,166	34,168	23,031	269,366	263,000
1986	231,590	20,483	19,185	271,259	254,000
1987	231,051	13,952	20,456	265,459	263,000
1988	217,083	17,443	22,248	256,744	263,000
1989	224,181	18,540	26,790	269,512	263,000
1990	263,558	16,100	41,360	321,019	302,000
1991	231,622	20,048	45,133	296,803	273,000
1992	162,570	23,995	35,348	221,913	263,000
1993	212,414	16,503	42,697	271,613	263,000
1994	177,074	23,272	35,501	235,848	240,000
1995[b]	115,260	28,600	34,871	178,732	230,000
1996	108,086	9,200	29,122	146,408	140,000-155,000
1997	221,899	13,892	55,787	291,578	302,000
1998	183,408	13,441	47,951	244,799	260,000

[a] Catches are allowed a 7.5% management error in relation to the catch ceiling.

[b] Catches in 1995 were stopped early due to an injunction from the Confederate Tribes case.

II. Status of the Listed Species and Critical Habitat

A. Species and Critical Habitat Description

NMFS considered the impacts to salmon species listed under the ESA resulting from SEAK fisheries managed under the 1996 U.S. Letter of Agreement Regarding Chinook Salmon Fisheries in Alaska (LOA) in a previous biological opinion dated June 29,1998. That opinion was programmatic in that it considered the agreement itself rather than just annual regulation and therefore, provided continuing coverage of fisheries conducted in accordance with the LOA, for the Snake River ESUs, Sacramento River winter chinook, the three coho ESUs, Umpqua River cutthroat and the previously listed steelhead ESUs (NMFS 1998b). The evaluation of PFMC FMP Amendment 13 regarding Oregon Coastal coho (April 28, 1999, NMFS 1999b) included impacts in SEAK fisheries. These ESUs will not be considered further in this biological opinion.

Sections II.D and IV below discuss the effects of the proposed action on the listed ESUs subject to consideration in the opinion. It is apparent from that discussion that the expected take from the SEAK ocean salmon fisheries of Ozette Lake sockeye salmon; Upper Columbia River spring chinook salmon; Hood Canal summer-run chum salmon; Columbia River chum salmon; and Middle Columbia River and Upper Willamette River steelhead are not likely to be adversely affected by the proposed action and will not be considered in later sections of this Biological Opinion. The following discussions regarding the Status of the Species and the Environmental Baseline therefore focuses on the four chinook ESUs that will be considered in later sections of this Biological Opinion.

Upper Willamette spring-run chinook (UWR)(*Oncorhynchus tshawytscha*) were listed as threatened (March 24, 1999, 64 FR 14308), effective May 24, 1999. The UWR chinook ESU occupies the Willamette River and tributaries upstream of Willamette Falls. Historically, access above Willamette Falls was restricted to the spring when flows were high. In autumn low flows prevented fish from ascending past the falls. The Upper Willamette spring chinook are one of the most genetically distinct chinook groups in the Columbia River Basin. Fall chinook salmon spawn in the Upper Willamette but are not considered part of the ESU because they are not native. None of the hatchery populations in the Willamette River are listed although the spring-run hatchery stocks were included in the ESU.

Lower Columbia River chinook (LCR)(*Oncorhynchus tshawytscha*) were listed as threatened (March 24, 1999, 64 FR 14308), effective May 24, 1999. The LCR ESU includes all native populations from the mouth of the Columbia River to the crest of the Cascade Range, excluding populations above Willamette Falls. Celilo Falls, which corresponds to the edge of the drier Columbia Basin Ecosystem and historically may have presented a migrational barrier to chinook salmon at certain times of the year, is the eastern boundary for this ESU. Not included in this ESU are "stream-type" spring-run chinook salmon found in the Klickitat River (which are considered part of the Mid-Columbia River Spring-Run ESU) or the introduced Carson spring-chinook salmon strain. "Tule" fall chinook salmon in the Wind and Little White Salmon Rivers are included in this ESU, but not introduced "upriver bright" fall-chinook salmon populations in the Wind, White Salmon, and Klickitat Rivers. For this ESU, the Cowlitz, Kalama, Lewis, White Salmon, and Klickitat Rivers are the major river systems on the Washington side, and the Willamette and Sandy Rivers are foremost on the Oregon side. The majority of this ESU is represented by fall-run fish and includes both north migrating tule-type stocks and far-north migrating bright stocks. There is discussion among some co-managers as to whether any natural-origin spring chinook salmon persist in this ESU. None of the hatchery populations in the Lower Columbia River are listed, although several are included in the ESU.

Puget Sound chinook (*Oncorhynchus tshawytscha*) were listed as threatened (March 24, 1999, 64 FR 14308), effective May 24, 1999. The PS chinook ESU includes all runs of chinook salmon in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula. Chinook salmon in this area all exhibit an ocean-type life history although there are several populations with an adult spring run timing and ocean distribution. Although some spring-run chinook salmon populations in the PS ESU have a high proportion of yearling smolt emigrants, the proportion varies substantially from year to year and appears to be environmentally mediated rather than genetically determined. Several hatchery populations are also listed including spring run chinook from Kendall Creek, the North Fork Stillaguamish River, White River, and Dungeness River, and fall run fish from the Elwha River.

A final determination on critical habitat has not yet been designated pending a one year extension to complete necessary biological assessments and consultation with affected tribes (March 24, 1999, 64 FR 14308). All of these ESUs utilize the Pacific Ocean areas for growth and development, although the degree to which they use the ocean areas off of Alaska are not well understood. However, to date, critical habitat designations for salmon ESUs have not included the open ocean habitat because it has not yet been determined to be in need of special management consideration (e,g,. 64 FR 5740). If additional evidence supports the inclusion of marine areas, NMFS may revise designated critical habitat.

B. Life History

Chinook salmon are the largest of the Pacific salmon. The species' distribution historically ranged from the Ventura River in California to Point Hope, Alaska in North America, and in northeastern Asia from Hokkaido, Japan to the Anadyr River in Russia (Healey 1991). Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Of the Pacific salmon, chinook salmon exhibit arguably the most diverse and complex life history strategies. Healey (1986) described 16 age categories for chinook salmon, 7 total ages with 3 possible freshwater ages. This level of complexity is roughly comparable to sockeye salmon (*O. nerka*), although sockeye salmon have a more extended freshwater residence period and utilize different freshwater habitats (Miller and Brannon 1982, Burgner 1991). Two generalized freshwater life-history types were initially described by Gilbert (1912): "stream-type" chinook salmon reside in freshwater for a year or more following emergence, whereas "ocean-type" chinook salmon migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for "ocean-type" and "stream-type" to describe two distinct races of chinook salmon. This racial approach incorporates life history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations. For the purposes of this Opinion, those chinook salmon (spring and summer runs) that spawn upriver from the Cascade crest are generally "stream-type"; those which spawn downriver of the Cascade Crest (including in the Willamette River) are generally "ocean-type".

The generalized life history of Pacific salmon involves incubation, hatching, and emergence in freshwater, migration to the ocean, and subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. Juvenile rearing in freshwater can be minimal or extended. Additionally, some male chinook salmon mature in freshwater, thereby foregoing emigration to the ocean. The timing and duration of each of these stages is related to genetic and environmental determinants and their interactions to varying degrees. Salmon exhibit a high degree of variability in life-history traits; however, there is considerable debate as to what degree this variability is the result of local adaptation or the general plasticity of the salmonid genome (Ricker 1972, Healey 1991, Taylor 1991). More detailed descriptions of the key features of chinook salmon life history can be found in Myers, et al. (1998) and Healey (1991).

C. Population Dynamics and Distribution

1. Upper Willamette River Chinook

Chinook populations in this ESU have a life history pattern that includes traits from both ocean- and stream-type life histories. Ocean distribution of chinook in this ESU is consistent with an ocean-type life history with the majority of chinook being caught off the coasts of British Columbia and Alaska. However, smolt emigrations occur as young of the year and as age-1 fish. Adults return to the Willamette River primarily during March through May at ages 3-5. Historically, spawning occurred between mid-July and late October. However, the current spawn timing of hatchery and wild chinook is September and early October likely due to hatchery fish introgression.

The abundance of naturally-produced spring chinook in the ESU has declined substantially from historic levels. Historically, the predominant areas producing spring chinook were the Molalla, Santiam, McKenzie, and Middle Fork Willamette river basins, which were thought to produce several hundreds of thousands of spring chinook (Nicholas 1995). However, between 1952-1968 dams were built on all of the major tributaries occupied by spring chinook, blocking over half the most important spawning and rearing habitat. Dams on the South Fork Santiam and Middle Fork Willamette eliminated wild spring chinook in those systems. The available habitat in the North Fork Santiam and McKenzie rivers was reduced to 1/4 and 2/3, respectively, of its original capacity. The habitat that remains has been degraded by alterations of flow and temperature regimes and other habitat modifications related to urbanization, logging, road building, and irrigation. Mitigation hatcheries were built to offset the habitat losses and, as a result, 85%-95% of the production in the basin are now hatchery origin fish. Although the predominance of hatchery-origin fish is problematic with respect to domestication and homogenation of diverse populations, it is also true that some or all of these populations would not have persisted absent the hatchery programs and that they now provide some of the genetic resources necessary for recovery.

Currently, the McKenzie River is the primary natural production area within the ESU. From 1946-50, the geometric mean of Willamette Falls counts for spring chinook was 31,000 fish (Myers *et al.* 1998), which represented primarily naturally-produced fish. The most recent 5 year (1992-96) geometric mean escapement above the falls was 26,000 fish, comprised predominantly of hatchery-produced fish (Table 9). Nicholas (1995) estimated 3,900 natural spawners in 1994 for the ESU, with approximately 1,300 of these spawners being naturally produced. Myers *et al.* (1998) showed strong short-term negative trends (>-7%) in spring chinook abundance for all natural populations in the ESU where data existed. The long-term trend for total spring chinook abundance within the ESU has been generally stable although the great majority of returning fish to the Willamette River in recent years have been of hatchery-origin.

Table 9. Run size of spring chinook at the mouth of the Willamette River and counts at Willamette Falls and Leaburg Dam on the McKenzie River (Nicholas 1995; ODFW and WDFW 1998).

Return Year	Estimated number entering Willamette River	Willamette Falls Count	Leaburg Dam Count (hatchery and wild fish combined, 1985-1995)
1985	57,100	34,533	825
1986	62,500	39,155	2,061
1987	82,900	54,832	3,455
1988	103,900	70,451	6,753
1989	102,000	69,180	3,976
1990	106,300	71,273	7,115
1991	95,200	52,516	4,359
1992	68,000	42,004	3,816
1993	63,900	31,966	3,617
1994	47,200	26,102	1,526
1995	42,600	20,592	1,622
1996	34,600	21,605	1,086 (wild fish only)
1997	35,000	26,885	981 (wild fish only)

2. *Lower Columbia River Chinook Salmon*

The LCR ESU includes spring stocks and fall tule and bright components. Spring-run chinook salmon on the lower Columbia River, like those from coastal stocks, enter freshwater in March and April well in advance of spawning in August and September. Historically, fish migrations were synchronized with periods of high rainfall or snowmelt to provide access to upper reaches of most tributaries where fish would hold until spawning (Fulton 1968, Olsen *et al.* 1992, WDF *et al.* 1993).

There are no estimates of historic abundance for this ESU, but there is widespread agreement that natural production has been substantially reduced over the last century. Though abundance in this ESU is still relatively high, the majority of the fish appear to be hatchery-produced. Long- and short-term trends in abundance are mostly negative, some severely so. The pervasive influence of hatchery fish in almost every river in this ESU and the degradation of freshwater habitat suggests that many naturally-spawning populations are not self-sustaining.

The remaining spring chinook stocks in the LCR ESU are found in the Sandy and Clackamas rivers on the Oregon side and Lewis, Cowlitz, and Kalama on the Washington side. Spring chinook in the Clackamas River are considered part of the UWR ESU. Naturally spawning spring chinook in the Sandy River are included in the ESU despite substantial influence of Willamette hatchery fish from past years since they likely contain all that remains of the original genetic legacy for that system. Recent escapements above Marmot Dam average 2,800 and have been increasing (ODFW 1998).

On the Washington side spring chinook were present historically in the Cowlitz, Kalama, and Lewis rivers. Spawning areas were blocked by dam construction in the Cowlitz and Lewis. The native Lewis run became extinct soon after completion of Merwin Dam in 1932. Production in the Kalama was limited by the dams and by 1950 only a remnant population remained. Spring chinook in the Cowlitz, Kalama, and Lewis are currently all hatchery fish. There is some natural spawning in the Kalama and Cowlitz rivers, but primarily from hatchery strays. The Lewis and Kalama hatchery stocks have been mixed with out of basin stocks, but are nonetheless included in the ESU. The Cowlitz stock is largely free of introductions and is considered essential for recovery although not listed. The number of spring chinook returning to the Cowlitz, Kalama, and Lewis rivers have declined in recent years, but still number several hundred to a few thousand in each system (Table 10). Continued attention to the status of these hatchery stocks is warranted.

Table 10. Estimated Lower Columbia River spring chinook returns, 1992-1997. (Source: ODFW Status Report for Columbia River Fish Runs and Fisheries, 1938-1997.)

Year	Sandy R.	Cowlitz R.	Lewis R.	Kalama R.	Total Returns Excluding the Willamette System
1992	8,600	11,900	6,000	2,700	38,400
1993	6,400	9,900	6,700	3,000	29,500
1994	3,500	3,400	3,000	1,300	14,400
1995	2,500	2,500	3,800	700	9,700
1996	4,100	2,000	1,600	600	9,200
1997	5,200	1,900	1,900	500	11,400

Fall chinook predominate the Lower Columbia River salmon runs. Fall chinook return to the river in mid-August and spawn within a few weeks (WDF et al. 1993, Kostow 1995). The majority of fall-run chinook salmon emigrate to the marine environment as subyearlings (Reimers and Loeffel 1967, Howell et al. 1985, WDF et al. 1993). A portion of returning adults whose scales indicate a yearling smolt migration may be the result of extended hatchery-rearing programs rather than of natural, volitional yearling emigration. It is also possible that modifications in the river environment may have altered the duration of freshwater residence. Adults return to tributaries in the Lower Columbia River at 3 and 4 years of age for fall-run fish and 4 to 5 years of age for spring-run fish. This may be related to the predominance of yearling smolts among spring-run stocks. Marine coded-wire-tag recoveries for lower Columbia River stocks tend to occur off the British Columbia and Washington coasts, though a small proportion of the tags are recovered in Alaskan waters.

There are no reliable estimates of historic abundance for this ESU, but it is generally agreed that there have been vast reductions in natural production over the last century. Recent abundance of spawners includes a 5-year geometric mean natural spawning escapement of 29,000 natural spawners and 37,000 hatchery spawners (1991-95), but according to the accounting of PFMC (1996), approximately 68% of the natural spawners are first-generation hatchery strays.

All basins in the region are affected to varying degrees by habitat degradation. Major habitat problems are related primarily to blockages, forest practices, urbanization in the Portland and Vancouver areas, and agriculture in flood plains and low-gradient tributaries. Substantial chinook salmon spawning habitat has been blocked (or passage substantially impaired) in the Cowlitz (Mayfield Dam 1963, RKm 84), Lewis (Merwin Dam 1931, RKm 31), Clackamas (North Fork Dam 1958, RKm 50), Hood (Powerdale Dam 1929, RKm 7), and Sandy (Marmot Dam 1912, RKm 48; Bull Run River dams in the early 1900s) rivers (WDF et al. 1993, Kostow 1995).

Hatchery programs to enhance chinook salmon fisheries in the lower Columbia River began in the 1870s, expanded rapidly, and have continued throughout this century. Although the majority of the stocks have come from within this ESU, over 200 million fish from outside the ESU have been released since 1930. A particular concern at the present time is straying by Rogue River fall-run chinook salmon, which are released into the lower Columbia River to augment harvest opportunities. Available evidence indicates a pervasive influence of hatchery fish on natural populations throughout this ESU, including both spring- and fall-run populations (Howell et al. 1985, Marshall et al. 1995). In addition, the exchange of eggs between hatcheries in this ESU has led to the extensive genetic homogenization of hatchery stocks (Utter et al. 1989).

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3. *Puget Sound Chinook Salmon*

This ESU encompasses all runs of chinook salmon in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula. Chinook salmon in this area all exhibit an ocean-type life history. Although some spring-run chinook salmon populations in the Puget Sound ESU have a high proportion of yearling smolt emigrants, the proportion varies substantially from year to year and appears to be environmentally mediated rather than genetically determined. Puget Sound stocks all tend to mature at ages 3 and 4 and exhibit similar, coastally-oriented, ocean migration patterns.

The peak recorded harvest landed in Puget Sound occurred in 1908, when 95,210 cases of canned chinook salmon were packed. This corresponds to a run-size of approximately 690,000 chinook salmon at a time when both ocean harvest and hatchery production were negligible. (This estimate, as with other historical estimates, needs to be viewed cautiously; Puget Sound cannery pack probably included a portion of fish landed at Puget Sound ports but originating in adjacent areas, and the estimates of exploitation rates (ER) used in run-size expansions are not based on precise data.) Recent mean spawning escapements totaling 71,000 correspond to a run entering Puget Sound of approximately 160,000 fish. Based on an exploitation rate of one-third in intercepting ocean fisheries, the recent average potential run-size would be 240,000 chinook salmon (PSC 1994).

The 5-year geometric mean of spawning escapement of natural chinook salmon runs in North Puget Sound for 1992-96 is approximately 13,000. Both long- and short-term trends for these runs were negative, with few exceptions. In South Puget Sound, spawning escapement of the natural runs has averaged 11,000 spawners. In this area, both long- and short-term trends are predominantly positive.

WDF et al. (1993) classified 11 out of 29 stocks in this ESU as being sustained, in part, through artificial propagation. Nearly 2 billion fish have been released into Puget Sound tributaries since the 1950s. The vast majority of these have been derived from local returning fall-run adults. Returns to hatcheries have accounted for 57% of the total spawning escapement, although the hatchery contribution to spawner escapement is probably much higher than that, due to hatchery-derived strays on the spawning grounds.

The status of stocks within the PS chinook ESU varies. Of the 29 chinook stocks identified by WDF et al. (1993) 10 were classified as healthy, 8 as depressed, 4 as critical, and 3 as unknown. The critical stocks are all spring-run chinook stocks. Although problems associated with habitat degradation and hatchery influence are common to all stocks, at least some stocks are in reasonably good shape. The Snohomish, Stillaguamish, and Skagit chinook stocks are the largest contributors to the Puget Sound ESU. Returns in 1998 exceeded the escapement goal in the Snohomish, were very close to goal in the Skagit, and although not at goal in the Stillaguamish, were the largest in seven years. These increased returns can be attributed, at least in part, to recent reductions in harvest in Canadian and U.S. fisheries.

Habitat throughout the ESU has been blocked or degraded. In general, upper tributaries have been impacted by forest practices and lower tributaries and mainstem rivers have been impacted by agriculture or urbanization or both. Diking for flood control, draining and filling of freshwater and estuarine wetlands, and sedimentation due to forest practices and urban development are cited as problems throughout the ESU (WDF et al. 1993). Blockages by dams, water diversions, and shifts in flow regime due to hydroelectric development and flood control projects are major habitat problems in several basins. Bishop and Morgan (1996) identified a variety of critical habitat issues for streams in the range of this ESU including 1) changes in flow regime (all basins), 2) sedimentation (all basins), 3) high temperatures (Dungeness, Elwha, Green/Duwamish, Skagit, Snohomish, and Stillaguamish Rivers), 4) stream bed instability (most basins), 5) estuarine loss (most basins), 6) loss of large woody debris (Elwha, Snohomish, and White Rivers), 7) loss of pool habitat (Nooksack, Snohomish, and Stillaguamish Rivers), and 8) blockage or passage problems associated with dams or other structures (Cedar, Elwha, Green/Duwamish, Snohomish, and White Rivers). The Puget Sound Salmon Stock Review Group (PSSSRG 1997) provided an extensive review of habitat conditions for several of the stocks in this ESU. It concluded that reductions in habitat capacity and quality have contributed to escapement problems for Puget Sound chinook salmon. It cited evidence of direct losses of tributary and mainstem habitat, due to dams; of slough and side-channel habitat, caused by diking, dredging, and hydro modifications; and also cited reductions in habitat quality due to land management activities.

D. Analysis of Other Species Likely to be Affected

Upper Columbia River Spring Chinook Salmon

The timing and ocean distribution of UCRS chinook are such that there is almost no harvest in ocean fisheries (ODFW and WDFW 1998). The average harvest for all ocean fisheries combined for 1978-93 was 0.6% (Chapman, et al. 1995). No coded-wire tags have been recovered in the SEAK fisheries in the 1985-1997 period. Upper Columbia River Spring chinook are therefore similar to Snake River spring/summer chinook which are also subject to little harvest in ocean fisheries (NMFS 1996). Although they are a north migrating stock, their migration timing and offshore distribution are such that UCRS chinook appear to be rarely caught in SEAK fisheries, if at all.

Winter season

Sockeye, steelhead and chum salmon retention is prohibited in the SEAK winter troll fishery. Listed sockeye or chum salmon are not likely to be caught or encountered given the huge numbers of chum and sockeye salmon from regions outside the listed ESUs that migrate through the same area The ocean distributions for listed steelhead are not known in detail, but steelhead are caught only rarely in ocean salmon fisheries and are, therefore, not likely to be caught in Alaskan fisheries.

Summer season

In general, maturing chum salmon in the North Pacific begin to enter coastal waters from June to November. Columbia River chum enter fresh water from mid-October through mid-December and spawn from early November through mid-January (WDF et al. 1993). The majority of chum caught in SEAK summer fisheries is caught in late July through early September in terminal net fisheries targeted on local stocks of maturing adults. Chum are not targeted in the troll fisheries that occur offshore (N. Sands, pers. comm). Although no information is available for the presence of Columbia River chum ESU in Alaskan fisheries, per se, stock composition data from chum caught in June in the Aleutian Islands area indicate very small contributions of Washington chum stocks (0-2%)(Seeb and Crane, 1999). The Northern Boundary Technical Committee (NBTC 1991) concluded that, based on chum tagging studies, chum caught in the Northern Boundary fisheries between Alaska and Canada were from Alaska and Canada (in 1996-1998, 14 out of 2,221 recoveries were Canadian, none were from WA or OR, and the rest were from Alaska). There has been some speculation based on past catch patterns (Henry 1953) that Columbia River chum ocean distribution may be more southerly, similar to the present distribution of Columbia River coho salmon (Sandercock 1991). Only an estimated 25 coded-wire tagged Columbia River coho were caught in Alaskan fisheries between 1979 and 1993 (Weitkamp et al. 1995). In addition, as with the winter fishery, the large numbers of chum from regions outside the listed ESUs migrating through the same area, relative to the much smaller abundances of the listed ESUs, make it extremely unlikely that listed chum salmon are caught.

Ozette Lake sockeye enter the Ozette Lake system from April to early August (WDF et al. 1993) or from May to August (Dlugokenski et al. 1981) and spawning occurs between mid-late November through early February (WDF et al. 1993) or from late November through early April (Dlugokenski et al. 1981). Hood Canal summer chum enter freshwater from early August through mid October and spawn from late August through mid-October (WDF et al. 1993). It is unlikely that these ESUs would be encountered in the SEAK summer fishery since adults of this species are well into their homeward journey when the fishery would occur (July-September) and are not likely to be found in Alaskan waters. Fraser River stocks are the only southern sockeye stocks (south of Queen Charlotte Strait) documented to have been caught in SEAK fisheries (Sands and Gaudet 1999). Stock composition data from Canadian fisheries in the Strait of Juan de Fuca indicates significant Hood Canal summer chum presence in August, trailing off rapidly in early September (data from G. Graves, NWIFC). In fact, some data suggests that Puget Sound chum, including Hood Canal summer chum, may not make an extended migration into northern British Columbian and Alaskan waters, but instead may travel directly offshore into the north Pacific Ocean (Hartt and Dell 1986). Therefore, available stock composition data and the timing of the Ozette Lake sockeye and Hood Canal summer-run ESUs suggests that they are well into their homeward migration prior to the start of the SEAK summer fisheries.

The ocean distributions for listed steelhead are not known in detail, but steelhead are caught only rarely in ocean salmon fisheries and are, therefore, not likely to be caught in Alaskan fisheries. During 1982-1993, when the SEAK seine landings were sampled for CWTed steelhead, only one tag was recovered, although tag releases of southern U.S. steelhead were quite high. Since then, only one other steelhead CWT has been recovered while sampling for other species.

Although the extent of ocean distribution and migration for these listed ESUs is not well understood, the available data suggests that the Ozette Lake sockeye, Hood Canal summer-run chum, Columbia River chum, Middle Columbia River and Upper Willamette River steelhead ESUs are unlikely to be caught in SEAK salmon fisheries. NMFS therefore concludes that these ESUs are not likely to be adversely affected by the proposed fisheries and will not be considered further in this opinion. NMFS will continue to evaluate available stock composition information and may re-examine this conclusion if the data indicates otherwise. Chinook salmon are targeted in the fishery and caught in substantial numbers. The effect of the proposed fisheries on the four recently listed chinook ESUs that are the primary subject of this opinion are considered in more detail below.

III. Environmental Baseline

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02).

A. Status of the Species and Critical Habitat within the Action Area

The assessments of the size, variability and stability of chinook populations, described in the previous sections, are made in fresh water spawning and migratory environments and closely reflect the status of chinook populations in the marine environment.

Critical habitat has not been designated for any of the chinook ESUs considered in this opinion. Marine habitats (i.e., oceanic or near shore areas seaward of the mouth of coastal rivers) are clearly vital to the species, and ocean conditions are believed to have a major influence on chinook salmon survival and productivity (see review in Pearcy, 1992). However, there does not appear to be a need for special management actions to protect this habitat at this time. NMFS has not included marine areas when designating critical habitat for other salmon ESUs. In the event that marine areas are designated for chinook salmon, the effect of ocean fisheries on critical habitat will be reconsidered at that time.

B. Factors Affecting Species Environment Within the Action Area

Salmon are taken incidentally in the Bering Seas/Aleutian Islands and the Gulf of Alaska groundfish fisheries off of the coast of Alaska. NMFS has conducted section 7 consultations on the impacts of fishing conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans (BSAI/GOA FMP) of the NPFMC on ESA listed species and concluded that impacts on species listed at that time were low and not likely to jeopardize the listed species (NMFS 1992, NMFS 1994). A reinitiated consultation on impacts to the newly listed ESUs is not yet been completed. However, information from these previous opinions can be used characterize the potential catch of these fisheries on the newly listed ESUs.

Only the easternmost area of the Gulf of Alaska (GOA) groundfish fishery is within the action area. The total incidental catch of all chinook in the GOA groundfish fisheries has averaged 15,582 and 0.04 chinook/metric ton groundfish (range = 0 to 1 chinook/metric ton groundfish) (1990-1998)(NOAA 1999). The most recent biological opinion on the groundfish fisheries (NMFS 1995) concluded that it was difficult to determine the region of origin or life history type in the GOA fishery, although it did surmise that the GOA fishery would include more stream-type fish than the SEAK fishery, because of the dominance of stream-type fish in the BSAI fishery which is further north and west. The Upper Willamette spring and Lower Columbia River brights are both ocean-type, far north migrating stocks. It is reasonable to assume that these stocks are less impacted in the GOA fishery than in the SEAK fishery given the probable lower presence of ocean-type fish in the GOA fishery. Exploitation in the GOA fishery on UWR springs is likely to be less than 3% given that exploitation rates in the in the SEAK fishery averaged 5% over the 1990-1993 brood years (Table 11), a fishery that is several orders of magnitude higher than that of the groundfish bycatch. The catch of LCR brights in the GOA groundfish fishery is likely to be less than 23 fish (1.5 LCR brights/1000 SEAK catch (Fisheries Resource and Assessment Model 0799). However, the northern distribution of the LCR bright stock and the possibility that the increase in exploitation rate on the LCR bright stock observed in the SEAK salmon fishery in the last several years may also be occurring in the GOA FMP fisheries warrants consideration of the incidental catch of LCR chinook in the groundfish fishery as part of the analysis of the effect of the salmon fishery on the ESU.

The available information is insufficient to estimate impacts in the GOA groundfish fishery on Upper Columbia River spring chinook ESU. However, the Upper Columbia River spring and Snake River spring/summers share similar life history and presumably ocean distribution patterns. In its 1994 biological opinion, NMFS concluded that the catch of Snake River spring/summer chinook in the GOA fishery was unlikely to average more than one fish per year. Although Puget Sound chinook and LCR tules are caught more frequently than UCR springs in ocean fisheries, they have a more southerly distribution and are therefore also not likely to be caught in the GOA groundfish fishery. Although it is possible that UCR spring, Puget Sound or LCR tule chinook are taken in the GOA groundfish fishery, the lack of or low numbers of coded-wire tag (CWT) recoveries in the SEAK salmon fisheries which take many more chinook suggest that the annual catch of listed fish would be extremely low. A more definitive analysis of the incidental catch of listed chinook will be made in the re-initiated groundfish opinion.

There are no other tribal, local, private, or federal actions unrelated to the salmon FMP or activities under the ESA that substantially affect the environment of listed chinook in the action area.

C. Activities Affecting Chinook Outside the Action Area

Harvest Mortality

Non-salmonid fisheries

Bering Sea/Aleutian Islands

Salmon are taken incidentally in the Bering Seas/Aleutian Islands groundfish fishery off of the coast of Alaska. NMFS has conducted section 7 consultations on the impacts of fishing conducted under the Bering Sea and Aleutian Islands and Gulf of Alaska Fishery Management Plans (BSAI/GOA FMP) of the NPFMC on ESA listed species and concluded that impacts on species listed at that time were low and not likely to jeopardize the listed species (NMFS 1992, NMFS 1994). A reinitiated consultation on impacts to the newly listed ESUs is not yet been complete. However, information from these previous opinions can be used characterize the potential catch of this fishery on the newly listed salmon species.

The incidental total catch of all chinook in the groundfish fisheries has averaged 40,150 and 0.01 chinook/metric ton groundfish (range = 0 to 6 chinook/metric ton groundfish) (1990-1998)(NOAA 1999). The most recent biological opinion on the groundfish fisheries (NMFS 1995) concluded that, given the a bycatch of approximately this size, the catch of ocean-type fall chinook in the BSAI fishery would be on the order of 2,200 per year. The Upper Willamette spring and Lower Columbia River brights are both ocean-type, far north migrating stocks. Since the incidental catch of ocean-type chinook off the Alaskan coast is unlikely to exceed more than a few thousand fish per year including those from British Columbia, the Washington coast and the unlisted hatchery components, the catch of listed Upper Willamette spring chinook is likely to be only a rare event. This conclusion is supported by the analysis of exploitation rates (see sections II.D and IV) in the ocean salmon fishery which are generally low despite a catch in the salmon fishery that is more than an order of magnitude higher than that of the groundfish bycatch. However, the northern distribution of the LCR bright stock and the possibility that the increase in exploitation rate on the LCR bright stock in the SEAK salmon fishery in the last several years may also be occurring in the BSAI fisheries warrants consideration of the incidental catch of LCR chinook in the groundfish fishery as part of the analysis of the effect of the salmon fishery on the ESU.

The available information is insufficient to estimate impacts in the BSAI fisheries on Upper Columbia River spring chinook ESU. However, the Upper Columbia River spring and Snake River spring/summers share similar life history and presumably ocean distribution patterns. In its 1994 biological opinion, NMFS concluded that the catch of Snake River spring/summer chinook in the BSAI fisheries was unlikely to average more than one fish per year. Although PS chinook and LCR tules are caught more frequently than UCR springs in ocean fisheries, they have a more southerly distribution and are therefore also not likely to be caught in BSAI fisheries. Although it is possible that UCR spring, Puget Sound or LCR tule chinook are taken in the BSAI fisheries, the lack of or low numbers of coded-wire tag (CWT) recoveries in the SEAK salmon fisheries which take many more chinook, and the fact that the majority of chinook caught in the BSAI fisheries are of Alaskan or Asian origin (NMFS 1994) suggest that the annual catch of listed fish would be extremely low. A more definitive analysis of the incidental catch of listed chinook will be made in the re-initiated groundfish opinion.

Washington, Oregon, California Coast

Salmon are also taken incidentally in the groundfish fishery off Washington, Oregon, and California. NMFS has conducted section 7 consultations on the impacts of fishing conducted under the Pacific Coast Groundfish Fishery Management Plan (PCGFMP) on ESA listed species and concluded that impacts on species listed at that time were low and not likely to jeopardize the listed species (NMFS 1996). NMFS has reinitiated consultation on the PCGFMP regarding impacts to recently listed species. Most salmon caught incidental to the whiting fishery are chinook. (For example, the 1991-97 average annual catch of pink, coho, chum, sockeye, and steelhead in the whiting fishery are approximately 800, 300, 100, 20, and 0 fish, respectively, out of an annual catch of 143 metric tons of whiting)

Although the reinitiated consultation is not yet complete, the incidental total catch of all chinook in the groundfish fisheries is generally low. The estimated catch of chinook in the whiting fishery for example has averaged 6,300 annually from 1991 to 1997 (Anon. 1998). The incidental catch of chinook in other components of the groundfish fishery are comparable in magnitude to those in the whiting fishery (NMFS 1996). Since the incidental catch of all chinook off the Washington coast is unlikely to exceed more than a few thousand fish per year, the catch of listed fish is likely to be no more than a few tens of listed fish per year spread across the six listed chinook ESUs. A more definitive analysis of the incidental catch of listed chinook will be made in the reinitiated groundfish opinion.

Salmonid fisheries

Until recently the total exploitation rates on most of the chinook ESUs being considered here have been too high for many of the component stocks and have contributed to their decline particularly because of what we now know about the long-term decline in ocean productivity (see following section). Upper Columbia River spring chinook is an exception. The timing and distribution of these stocks is such that ocean harvest mortality is near zero. Inriver harvest rates over the last 15 or 20 years have been 10% or less (ODFW/WDFW 1998). The current status of UCRS chinook is therefore largely unrelated to harvest.

The following series of tables shows the magnitude and distribution of exploitation rates for the chinook ESUs or components of the ESUs. The tables show the total adult equivalent exploitation rates by brood year as well as how that exploitation was distributed across the major fisheries. The estimates are based on coded-wire-tag (CWT) recoveries which provides the most direct estimates of exploitation rates. The adult equivalent calculation is a procedure that discounts catch for expected future natural mortality which would occur prior to spawning. The estimates are reported by brood year. For example, the exploitation rate of the 1992 brood accounts for harvest mortality that occurred on age 2-5 fish in years 1994-97. The data is complete through the 1992 brood and 1997 fishery. The 1993 brood is reported, but is incomplete in that the five year old recoveries from the 1998 fishery are not yet available. There is generally a year-long time lag in updating the coast-wide CWT data base necessary to provide these estimates.

Exploitation rates can also be calculated using harvest management models by catch year. These models use the same CWT data to model exploitation rates that occurred in past years. However, once the models are calibrated, they can also be used for management planning purposes to estimate exploitation rates that would be associated with a given fishery structure in particular year. Because the models are projections, they can be used to characterize exploitation rate trends from past years and how they compare to the most recent years - 1998 and 1999 in this case - that are not available when using the more direct brood year, CWT estimates. In some cases, the model estimates are reported as an index calculated as the ratio of current exploitation rate divided by the 1989-93 average exploitation rate. Model estimates of ER for the 1999 fisheries are also reported. Although these are preliminary model estimates, the final estimates of preseason exploitation rates should not be substantially different.

The ocean harvest on UWR occurs primarily in the Alaskan and northern Canadian fisheries. Because of their northerly distribution and earlier return timing, the exploitation rate of UWR chinook in Pacific Fisheries Management Council (PFMC) fisheries is low, averaging 0.01 both in the past and most recent years (Table 11). The exploitation rate in the river fishery is higher, averaging 0.35 through 1990. Harvest in the river fisheries has declined substantially in recent years because of concerns for Snake River spring/summer chinook and other upriver spring stocks. Commercial harvest in the mainstem have been largely eliminated since 1992. The lower river sport fishery has been closed since 1995. Sport fisheries in the Willamette River and the tributaries have been increasingly restrictive as the return of hatchery and wild fish has declined through the 1990s. The Oregon Department of Fish and Wildlife (ODFW) is now implementing a mass marking and selective fishery program that is expected to reduce inriver recreational harvest rates on natural fish by 80% relative to the 1980-96 average once fully implemented in 2002 (Kruzic 1999).

The Lower Columbia River chinook ESU has three components including spring stocks, tule stocks, and far-north migrating bright stocks. These components have different distributions and are subject to different rates of harvest. The time series of ER for the spring component is not currently available, but the model base period (1979-82) ER for Cowlitz spring chinook in PFMC fisheries, is 10.8% and 15.9% in all ocean fisheries combined.

The distribution of the tule stocks is more southerly with the ocean harvest concentrated in Canadian and PFMC fisheries. Exploitation rates in the PFMC fishery averaged 0.25 through 1990 and 0.09 for the 1991-93 brood years. The long-term exploitation rate in the river fisheries averaged 0.18. The most recent 3 year average is 0.15 (Table 12).

North Fork Lewis River fall chinook are the primary representative of the bright component of the Lower Columbia River ESU and one of the few healthy wild stocks in the Lower Columbia River. This is a far-north migrating stock so the ocean harvest occurs primarily in Alaska and Canada. The long term average exploitation rate in PFMC is 0.05. The more recent average ER is 0.01. Inriver ERs have averaged 0.22 through 1990 and 0.11 in recent years (Table 13).

Most of the harvest of Puget Sound spring and fall chinook stocks occurs in Canadian and Puget Sound fisheries, although the timing of the fall stocks is such that they are subject to somewhat higher ERs than the spring component. Neither is harvested to any great extent in PFMC fisheries. The ER on Puget Sound springs in PFMC fisheries averaged 0.01 through 1990 and 0.00 for the most recent brood years (Table 14). The ER on fall stocks in PFMC fisheries averaged 0.03 through 1990 and 0.01 from 1991-93 (Table 15). The most recent brood year estimates show an ER in Puget Sound fisheries of 0.38 and 0.36 on spring and fall stocks, respectively. This represents a reduction of approximately 15% and 22%, respectively, over the long-term average through 1990.

A time series of model estimates of total exploitation rates are also available for the Puget Sound spring and fall chinook stocks. These are reported as an index relative to the 1989-93 average ER. The estimated total ER indices for spring and fall stocks in 1999 are 0.67 and 0.76, respectively. This is thus an indicator of the magnitude of ER reductions across all fisheries in 1999. Although the decline in ER is moderate relative to the 1989-93 base period, Figure 1 indicates that the ER has declined steadily and more substantially since 1983.

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Table 11. Summary of total adult equivalent exploitation rates for the Upper Willamette River chinook ESU.

Willamette Spring Hatchery

Brood Year	Total	SEAK	Canada	PFMC	Columbia R.	Other
1971						
1972						
1973						
1974						
1975	0.51	0.02	0.14	0.01	0.32	0.02
1976	0.66	0.13	0.27	0.03	0.22	0.00
1977	0.38	0.06	0.12	0.01	0.18	0.01
1978	0.41	0.06	0.10	0.01	0.23	0.01
1979	0.54	0.12	0.12	0.03	0.26	0.01
1980	0.44	0.05	0.07	0.01	0.32	0.00
1981	0.48	0.13	0.07	0.01	0.26	0.00
1982	0.48	0.08	0.06	0.00	0.33	0.02
1983	0.73	0.16	0.10	0.02	0.44	0.00
1984	0.55	0.07	0.07	0.01	0.38	0.00
1985	0.54	0.04	0.05	0.01	0.43	0.00
1986	0.61	0.10	0.05	0.01	0.45	0.00
1987	0.66	0.10	0.03	0.00	0.53	0.01
1988	0.52	0.08	0.04	0.03	0.37	0.01
1989	0.61	0.12	0.04	0.02	0.43	0.00
1990	0.47	0.04	0.02	0.00	0.40	0.00
1991	0.51	0.06	0.02	0.00	0.44	0.00
1992	0.26	0.02	0.01	0.01	0.22	0.01
1993	0.29	0.08	0.02	0.02	0.17	0.00
1975-1990	0.54	0.09	0.08	0.01	0.35	0.01
1991-1993	0.35	0.05	0.02	0.01	0.27	0.00

Table 12. Summary of total adult equivalent exploitation rates for an aggregate of tule stocks from the Lower Columbia River chinook ESU.

		Tule (Spring Creek, Stayton Ponds, Cowlitz, Bonneville)				
Brood Year	Total	SEAK	Canada	PFMC	Columbia R.	Other
1971						
1972	0.89	0.00	0.27	0.27	0.29	0.05
1973	0.93	0.00	0.15	0.44	0.28	0.06
1974	0.86	0.00	0.22	0.33	0.24	0.07
1975	0.84	0.00	0.32	0.28	0.19	0.05
1976	0.85	0.01	0.35	0.27	0.16	0.06
1977	0.80	0.02	0.28	0.34	0.11	0.04
1978	0.75	0.01	0.32	0.27	0.11	0.04
1979	0.82	0.02	0.31	0.31	0.15	0.03
1980	0.73	0.01	0.41	0.15	0.10	0.06
1981	0.70	0.01	0.42	0.08	0.15	0.02
1982	0.67	0.02	0.28	0.18	0.15	0.05
1983	0.76	0.01	0.29	0.15	0.27	0.04
1984	0.77	0.01	0.25	0.20	0.27	0.04
1985	0.79	0.01	0.26	0.24	0.22	0.06
1986	0.65	0.02	0.16	0.26	0.15	0.05
1987	0.59	0.04	0.22	0.18	0.10	0.05
1988	0.59	0.02	0.23	0.17	0.14	0.03
1989	0.69	0.02	0.18	0.34	0.09	0.05
1990	0.56	0.01	0.17	0.19	0.15	0.04
1991	0.38	0.02	0.24	0.01	0.10	0.02
1992	0.45	0.01	0.03	0.24	0.16	0.01
1993	0.34	0.03	0.10	0.03	0.18	0.00
1972-1990	0.75	0.01	0.27	0.25	0.18	0.05
1991-1993	0.39	0.02	0.12	0.09	0.15	0.01

Table 13. Summary of total adult equivalent exploitation rates for the North Fork Lewis River bright stock from the Lower Columbia River chinook ESU.

		Bright (Lewis River)				
Brood Year	Total	SEAK	Canada	PFMC	Columbia R.	Other
1971						
1972						
1973						
1974						
1975						
1976						
1977	0.51	0.09	0.19	0.06	0.16	0.01
1978	0.56	0.15	0.14	0.09	0.16	0.02
1979	0.50	0.10	0.16	0.07	0.17	0.01
1980						
1981						
1982	0.59	0.09	0.16	0.02	0.31	0.00
1983	0.67	0.06	0.20	0.06	0.35	0.01
1984	0.45	0.03	0.15	0.03	0.24	0.00
1985	0.45	0.08	0.12	0.07	0.17	0.02
1986	0.41	0.05	0.15	0.05	0.16	0.01
1987	0.37	0.04	0.13	0.05	0.15	0.01
1988	0.46	0.05	0.16	0.03	0.21	0.01
1989	0.43	0.00	0.08	0.05	0.30	0.00
1990	0.45	0.08	0.09	0.01	0.27	0.00
1991	0.32	0.13	0.06	0.02	0.11	0.00
1992	0.27	0.15	0.00	0.01	0.11	0.00
1977-1990	0.49	0.07	0.14	0.05	0.22	0.01
1991-1992[1]	0.29	0.14	0.03	0.01	0.11	0.00

[1]Unresolved data uncertainties associated with CWT recoveries of this stock in the 1997 return year precluded reporting of results for the 1993 brood year.

Table 14. Summary of total adult equivalent exploitation rates for a composite of Puget Sound spring chinook stocks.

	Puget Sound Spring					
Brood Year	Total	SEAK	Canada	PFMC	Puget Snd	Other
1971						
1972						
1973						
1974						
1975						
1976						
1977						
1978						
1979	0.90	0.00	0.02	0.03	0.86	0.00
1980	0.76	0.02	0.32	0.00	0.41	0.00
1981	0.72	0.01	0.41	0.00	0.29	0.00
1982	0.81	0.00	0.42	0.00	0.38	0.00
1983	0.78	0.00	0.19	0.01	0.59	0.00
1984	0.68	0.00	0.32	0.01	0.36	0.00
1985	0.72	0.00	0.20	0.02	0.50	0.00
1986	0.77	0.00	0.15	0.02	0.60	0.00
1987	0.60	0.00	0.17	0.01	0.42	0.00
1988	0.61	0.00	0.29	0.01	0.31	0.00
1989	0.59	0.01	0.27	0.01	0.31	0.00
1990	0.65	0.00	0.21	0.00	0.43	0.00
1991	0.55	0.00	0.00	0.00	0.55	0.00
1992	0.47	0.00	0.17	0.00	0.29	0.00
1993	0.55	0.00	0.25	0.00	0.29	0.00
1979-1990	0.71	0.00	0.25	0.01	0.45	0.00
1991-1993	0.52	0.00	0.14	0.00	0.38	0.00

A9

Table 15. Summary of total adult equivalent exploitation rates for a composite of Puget Sound fall chinook stocks.

			Puget Sound Fall			
Brood Year	Total	SEAK	Canada	PFMC	Puget Snd	Other
1971	0.82	0.00	0.29	0.05	0.48	0.00
1972	0.89	0.00	0.56	0.01	0.32	0.00
1973	0.90	0.00	0.43	0.03	0.44	0.00
1974	0.93	0.00	0.49	0.02	0.43	0.00
1975	0.91	0.00	0.40	0.05	0.45	0.00
1976						
1977						
1978	0.87	0.00	0.34	0.03	0.49	0.02
1979	0.95	0.00	0.36	0.02	0.57	0.01
1980	0.93	0.00	0.34	0.01	0.58	0.00
1981	0.83	0.00	0.24	0.01	0.57	0.00
1982	0.79	0.00	0.32	0.03	0.44	0.00
1983	0.77	0.00	0.28	0.02	0.46	0.00
1984	0.85	0.00	0.33	0.04	0.44	0.04
1985	0.76	0.00	0.25	0.04	0.47	0.00
1986	0.79	0.00	0.27	0.05	0.47	0.00
1987	0.75	0.01	0.25	0.03	0.46	0.00
1988	0.79	0.00	0.25	0.06	0.48	0.00
1989	0.81	0.01	0.33	0.07	0.40	0.00
1990	0.69	0.00	0.25	0.01	0.42	0.00
1991	0.58	0.02	0.20	0.01	0.35	0.00
1992	0.55	0.00	0.16	0.02	0.36	0.00
1993	0.57	0.01	0.19	0.01	0.35	0.00
1971-1990	0.83	0.00	0.33	0.03	0.46	0.00
1991-1993	0.57	0.01	0.18	0.01	0.36	0.00

Combined Effects Across the Range of the Species

The conclusions of this biological opinion are made with consideration of the incidental take in the fisheries outside the NPFMC action areas. The exemption of the incidental take associated with those activities occurs primarily through separate section 7 processes. One exception is the Canadian fishery which is not under U.S. authority or subject to direct review under the ESA. However, these fisheries will be included in the consultation on the recent bilateral agreement regarding chinook fisheries through the Pacific Salmon Treaty process described in I. A above. The take of listed fish is nevertheless accounted for when making jeopardy determinations regarding U.S. ocean fisheries (see for example NMFS 1998a,b). Many of the currently listed chinook ESUs are highly vulnerable to Canadian fisheries. The change in Canadian harvest management policy that has been implemented in recent years is therefore highly relevant. Catch levels in Canadian fisheries have been declining for some time, but beginning in 1995 Canadian managers became particularly concerned about their own chinook and coho stocks and implemented even more substantial reductions in catch. This trend in harvest reductions is reflected by the decline in chinook catch off the North Coast of British Columbia, West Coast Vancouver Island, and in Georgia Strait (Figure 2). These reductions have directly benefitted UWRS chinook, LCR chinook, and PS chinook in particular.

Figure 1. Total adult equivalent exploitation rate index for a composite of Puget Sound spring and fall chinook stocks relative to the 1989-93 average ER.

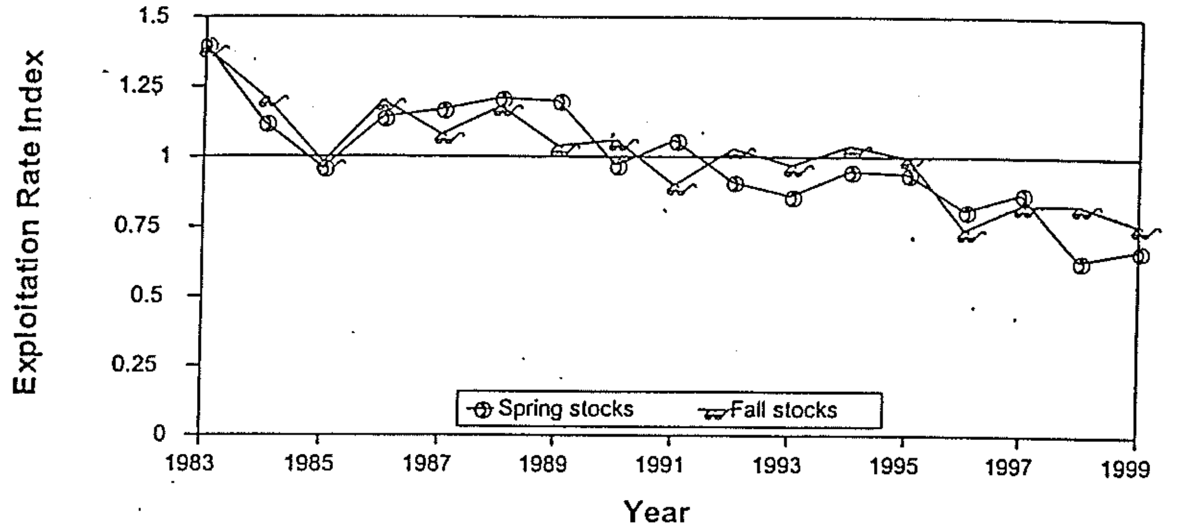
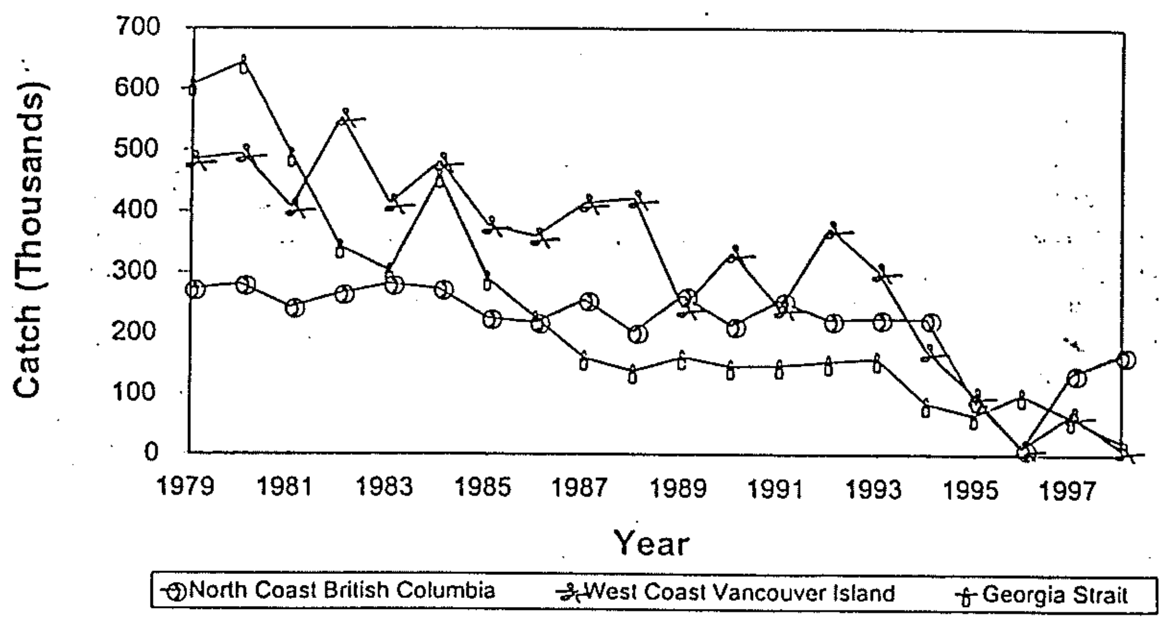


Figure 2. Catch of chinook salmon in Canadian fisheries.



Although the two countries were still in negotiations during 1999 U.S. domestic planning, Canadian fishery managers conveyed to their U.S. counterparts that the Canadian fishery plans for their primary west coast troll fisheries in 1999 are designed to achieve harvest rates comparable to those that occurred in recent years. This provided the basis for analyzing Canadian fishery impacts in 1999 (PFMC 1999).

A second consideration related to the conclusion in the biological opinion is the catch in Puget Sound fisheries. Figure 1 shows the relative decline in ER across all fisheries. Tables 12 and 13 indicate, not surprisingly, that a substantial portion of the harvest occurs in Puget Sound. NMFS did not consult on Puget Sound fisheries in 1999 because there was no applicable federal action occurring after the effective date of the listing, and so NMFS has not specifically reviewed Puget Sound fisheries relative to jeopardy. However, NMFS is aware that state and tribal managers have been substantially more restrictive in management in 1998 and 1999. These more restrictive actions in recent years are not reflected in the most recent brood year estimates of ER.

Harvest has contributed to the decline of many of the stocks of concern here. However, the general long-term and cumulative affects of habitat degradation due to hydro development, logging, road building, agriculture, grazing, mining activities, urbanization, stream channelization, dams, wetland loss, water withdrawals and unscreened diversions for irrigation have eliminated large portions of the original habitat and substantially degraded much of the rest. The determination of whether a given activity that incidentally takes listed chinook does or does not jeopardize the continued existence of the species ideally requires analysis of the activity within the context of the full range of human and environmentally induced mortality, during all life history stages of the listed species. These considerations should include the increased risk of extinction to listed chinook resulting from all harvest, the full range of land use activities, artificial propagation, as well as changes in ocean and freshwater productivity. Determining the risk to the ESU would also require an assessment of the relative importance of the hatchery and naturally spawning populations to the continued existence of an ESU as a whole.

Such an analysis requires a life cycle model capable of evaluating many complexities, including separation of natural and hatchery production, juvenile migration, the fate of adults surviving natural mortality, and the relationship between habitat and egg production, in-stream mortality rates, and smolt production. Life-cycle models require extraordinary levels of detailed information on survival between key life-history stages. Efforts are underway to develop models capable of dealing with these complexities and assessing the risk of various management actions to the species. Although these models are under development, they are not likely to be available in the near future, particularly for recently listed species. In the meantime, necessary decisions must be made about particular actions within the broader context of the species' status and ongoing activities that have and will affect the species in the past and future.

Natural Factors Causing Variability in Population Abundance

Changes in the abundance of chinook as well as other salmonid populations are a result of variations in freshwater and marine environments (Helle and Hoffman 1995, Mantua 1996, Quinn and Marshall 1989). For example, large scale changes in climatic regimes, such as El Niño, likely affect changes in ocean productivity; much of the Pacific coast was subject to a series of very dry years during the first part of the decade which adversely affected some stocks. In more recent years, severe flooding has negatively affected many stocks. For example, the anticipated low return of Lewis River bright fall chinook in 1999 is attributed to flood events during both 1995 and 1996.

Chinook salmon are exposed to high rates of natural predation, particularly during freshwater rearing and migration stages. Ocean predation likely also contributes to significant natural mortality, although the levels of predation are largely unknown. In general, chinook are prey for pelagic fishes, birds, and marine mammals, including harbor seals, sea lions, and killer whales. There have been recent concerns that the rebounding of seal and sea lion populations, following their protection under the Marine Mammal Protection Act of 1972, has resulted in substantial mortality for salmonids. In recent years, for example, sea lions have learned to target UWR spring chinook at Willamette Falls and have gone so far as to climb into the fish ladder where they can easily pick-off migrating spring chinook.

A key factor that has substantially affected many west coast salmon stocks has been the general pattern of long-term decline in ocean productivity. However, the mechanism whereby stocks are affected is not well understood. The pattern of response to these changing ocean conditions has differed between stocks, presumably due to differences in their timing and distribution. It is presumed that ocean survival is driven largely by events between ocean entry and recruitment to a sub-adult life stage. One indicator of early ocean survival can be computed as an index of CWT recoveries at age 2 relative to the number of CWTs released from that brood year. Indices are available for Upper Willamette River spring chinook, Lewis River fall chinook, and Nooksack Spring chinook and Samish Fall chinook, which are indicators of spring and fall-type stocks from Puget Sound. The patterns differ between stocks, but each shows a highly variable or declining trend in early ocean survival with very low survivals in recent years (Figures 3-6).

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Figure 3. Early ocean survival rate index for Lewis River fall chinook.

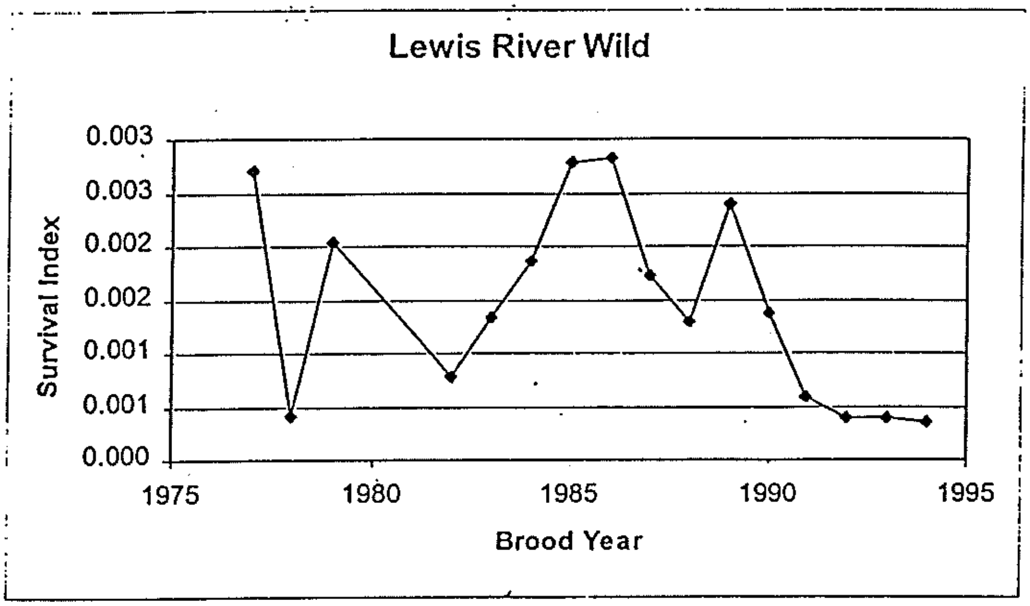


Figure 4. Early ocean survival rate index for Upper Willamette River chinook.

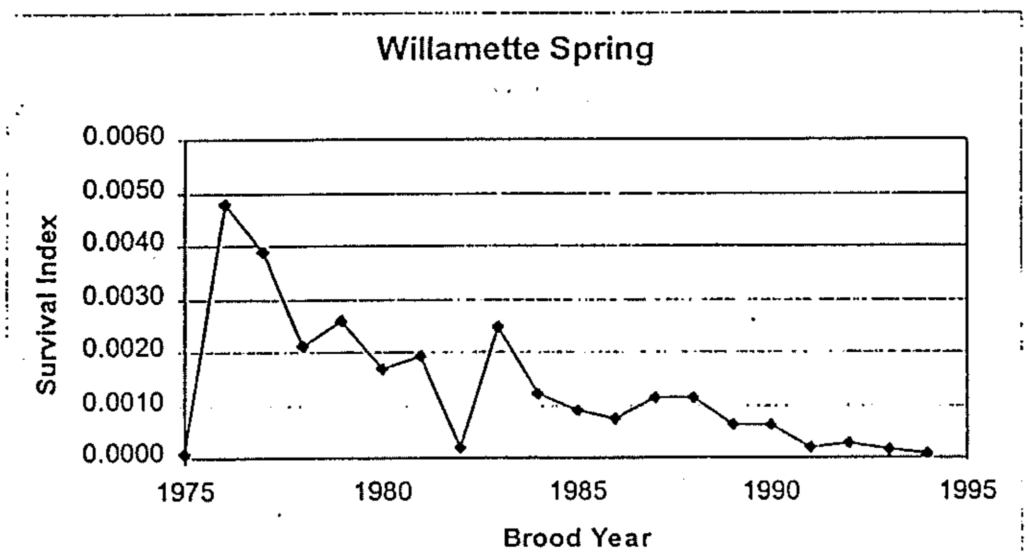


Figure 4. Early ocean survival rate index for Nooksack spring chinook from Puget Sound.

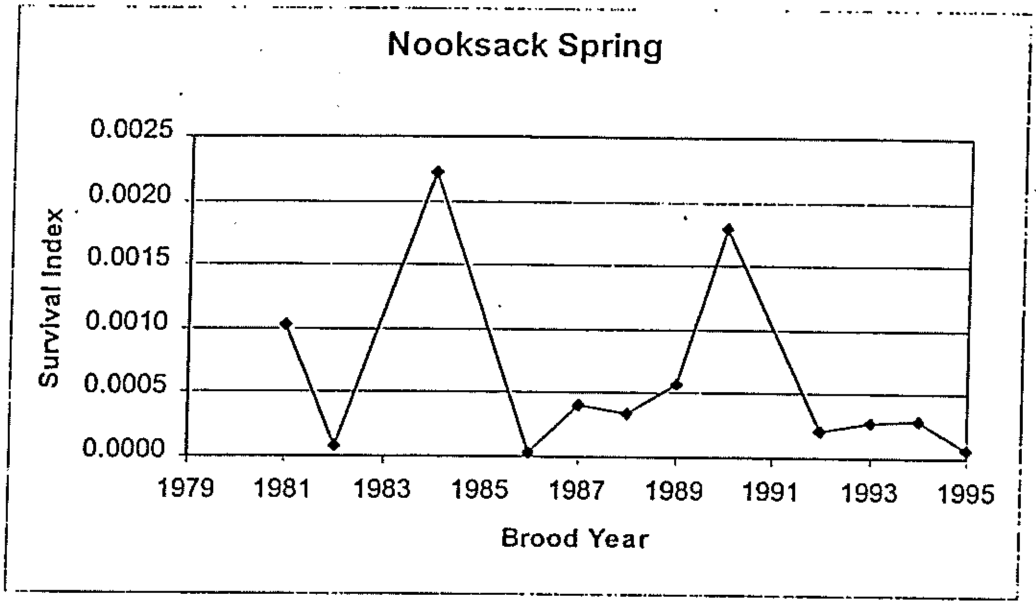
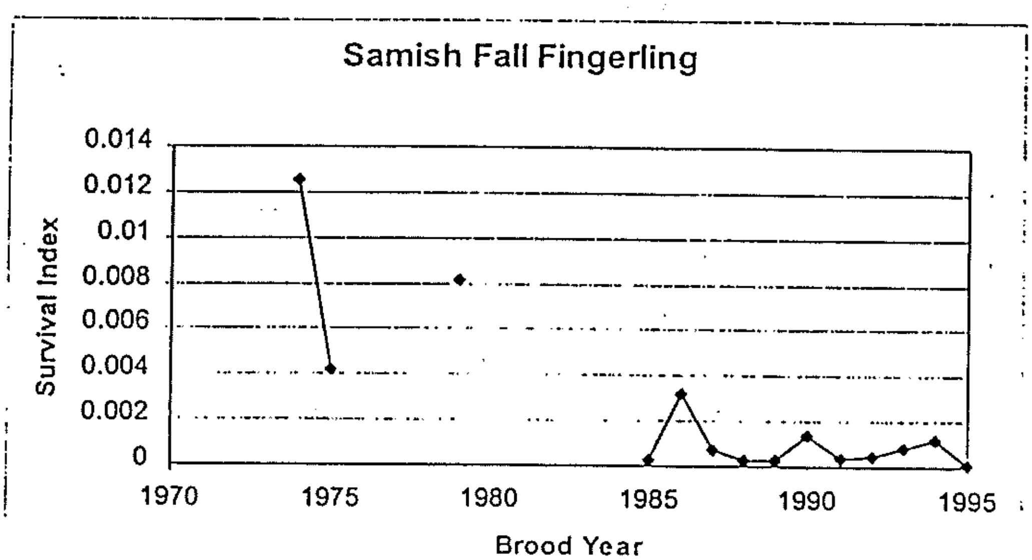


Figure 6. Early ocean survival rate index for Samish River fall chinook from Puget Sound.



IV Effects of the Action

The standards for determining jeopardy and destruction or adverse modification of designated critical habitat are set forth in Section 7(a)(2) of the ESA as defined at 50 CFR §402.02. The analysis necessary for making these determinations involves: 1) defining the status, life history, habitat, and distributional characteristics of the listed species; 2) defining the environmental baseline and its relevance to the species' current status; 3) determining the effects of the proposed or continuing action on listed species; 4) determining whether the species can be expected to survive with an adequate potential for recovery given the effects of the proposed or continuing actions, the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages of the species; and 5) identifying the reasonable and prudent alternatives to a proposed action that is likely to jeopardize the continued existence of listed species (USFWS/NMFS 1998).

The purpose of this consultation is to determine if the Southeast Alaska salmon fisheries managed consistent with the FMP and for harvest levels consistent with the conditions of the 1999 PST CA, are likely to jeopardize the continued existence of the listed species. The determinations as to jeopardy in this opinion are based on the consideration of the proposed management actions taken to reduce the catch of listed fish, the magnitude of the remaining harvest, particularly in comparison to the period of decline, and available risk assessment analyses. The jeopardy determinations are largely qualitative at this time. The ESUs considered here have just recently been listed. More quantitative and holistic analyses and risk assessments are therefore not yet available. Such analyses will necessarily be developed over time. In the meantime, NMFS must rely on the best available information in making its judgement about the risk of the proposed action to the newly listed ESUs. Consultation will be re-initiated in the event that the SEAK fisheries are not consistent with these analyses.

A. Effects on Listed ESUs

As proposed, the Alaska salmon fisheries for the 1999/2000 season will be managed consistent with the abundance-based approach described in the 1999 PST CA. Although the model calibration used to assess preseason abundance is not yet complete, the preseason estimate of abundance in the Alaska fishery is expected to result in an abundance index of approximately 1.3 (Sands and Gaudet 1999). Under the provisions of the 1999 PST CA this would result in an all gear catch of "treaty chinook" of approximately 252,000. This compares to preseason estimates of abundance and target catch for 1998 of 1.33 and 277,000 and for 1997 of 1.44 and 298,000. The current post-season estimate of abundance for 1998 is 1.38 although the estimate can be expected to vary somewhat between model calibrations. The observed catch of treaty chinook in 1998 was 272,500.

The preseason target may vary with the final model calibration and abundance estimates. The State of Alaska has stated its intent to manage by the abundance index and target catch determined by the final model calibration. That calibration may not be finalized until after July 1, 1999 when the fishery is scheduled to begin. Until the calibration is complete and the target catch and harvest rate index finalized, the State of Alaska will "adopt a conservative approach to the duration of the initial troll chinook salmon opening" so as not to exceed the final target catch or harvest rate index (Marshall 1999).

Based on the available information it is assumed that Canadian troll fisheries will be managed to approximate the harvest rates observed in recent years (PFMC 1999). This continues the pattern of recent years characterized by more restrictive fisheries in Canada resulting from domestic conservation concerns. Chinook fisheries managed by the PFMC will be very restrictive off the Washington coast and similar to those of recent years south of the Columbia River (PFMC 1999).

This agreement is similar to, but more conservative than, the 1996 LOA. For example, under the 1996 LOA, an abundance index of 1.3 would result in a harvest rate index of 0.65 and a target catch of approximately 271,000. NMFS considered the impacts to salmon species listed under the ESA (the Snake River ESUs, Sacramento River winter chinook, the three coho ESUs, Umpqua River cutthroat and the previously listed steelhead ESUs) resulting from SEAK fisheries managed under the 1996 LOA in a previous biological opinion dated June 29,1998 and found that it would not jeopardize the continued existence of the those listed ESUs. The proposed fishery was also found to meet the Snake River fall chinook jeopardy standard (Del Simmons pers. comm to Peter Dygert June 1999, PFMC 1999). Given the anticipated lower harvest rate index and target catch in the 1999 SEAK fishery relative to the 1996 LOA, and the Snake River assessment, there is nothing to suggest that the conclusions reached in the 1998 biological opinion would change.

1. Upper Willamette River Spring Chinook

The SEAK fishery has been the second to the Canadian ocean fisheries in harvest of UWR chinook, reflecting the more northerly ocean distribution of the ESU. Estimates of the exploitation rate in the SEAK fisheries during the PFMC model base period (1979-82) is 2.7%. The model estimate for the ER in 1999 SEAK fisheries is 2.9%. The total brood year ER on UWR chinook in SEAK fisheries is estimated to be 9% over the long-term (1975-1990 broods) and 5% over the more recent 1991-93 brood years (Table 11).

Exploitation rates in the other ocean fisheries have been substantially reduced in recent years. The magnitude of that reduction is probably not fully reflected in Table 11 given the very substantial reductions in harvest in Canadian fisheries in the last few years (Figure 1). The effect of this reduction in catch will be more apparent when the 1994 and 1995 brood year estimates become available. The conservative harvest regime implemented in 1998 is expected to carried through at least 1999 (PFMC 1999). ODFW estimated that the total ocean harvest rate in 1999 would be 5% compared to a range of 16-20% observed from 1981-97 (Kruzic 1999). These reductions, coupled with the more restrictive inriver regulations and implementation of selective fisheries may is expected to result in total exploitation rates in the future that are 13% or less.

A preliminary risk assessment of the management strategy suggests that the extinction risk is very low (2%) under the proposed harvest plan (Extinction in this analysis was defined conservatively as falling below an escapement of 300)(Beamesderfer 1999). The selective fishery option, coupled with a management strategy equivalent to a 15% fixed total harvest rate, would increase the prospects for rebuilding the stock.

2. Lower Columbia River Chinook

In this Biological Opinion, NMFS has considered three components of the LCR chinook ESU consisting of the spring, tule, and bright stocks.

There is less information available on the harvest rates of the LCR spring stocks. The chinook management model base period (1979-82) ER for the Cowlitz River spring chinook is 0.3% for the SEAK fisheries. The 1999 model estimates are for a SEAK ER of 0.3% and a total ocean fishery ER of 9.0%. This suggests that LCR spring stocks have a more southerly distribution than the upriver spring stocks consistent with the ocean-type juvenile life history characteristic of all LCR chinook. The total exploitation rate on LCR spring stocks in 1999 is estimated to be 10% or less through the mainstem Columbia River fisheries.

Harvest of LCR tule stocks is low in SEAK fisheries. Exploitation rates averaged 1% through the 1990 brood year, with a slight increase to 2% more recently (Table 12). Model estimates for the 1999 SEAK fisheries are for an ER of 1.46% out of a total ocean ER of 16.73%. The majority of the harvest occurs in Canadian and southern U.S ocean fisheries which have shown significant reductions in recent years (27% to 12% and 25% to 9% brood year ERs, respectively). As with UWR chinook, the ER reductions in the Canadian fisheries will likely be even larger once the estimates for the 1994 and 1995 brood years become available.

There are only two or three self-sustaining natural populations of tule chinook in the Lower Columbia River (Coweeman, East Fork Lewis, and possibly Clackamas) that are not substantially influenced by hatchery strays. Returns to the East Fork and Coweeman have been stable and near interim escapement goals in recent years. Recent 5 and 10 year average escapements to the East Fork Lewis have been about 300 compared to an interim escapement goal of 300. Recent 5 and 10 year average escapements to the Coweeman are 900 and 700, respectively compared to an interim natural escapement goal of 1000 (pers. comm., from G. Norman, WDFW to P. Dygert NMFS, February 22, 1999). The status of the Clackamas stock is uncertain, but may also be supported in part by hatchery strays.

Apart from these, there are few if any self-sustaining natural populations remaining in the Lower Columbia River. Instead, the system is dominated by hatchery production and whatever natural spawning does occur is heavily influenced by hatchery strays. Many of the hatchery stocks are included as part of the ESU although not considered essential for recovery or listed. The remaining wild stocks appear stable and sufficiently abundant (see previous paragraph). Therefore, NMFS did not consider that specific harvest constraints for the protection of tule stocks in PFMC fisheries were warranted (Stelle and Hogarth 1999). However, NMFS does expect to revisit this conclusion in the future and believes the appropriate course is to integrate harvest management actions with recovery planning efforts that will seek to rebuild a broad range of self-sustaining, naturally producing tule stocks.

The LCR bright stocks are one of the few healthy natural chinook stocks in the Columbia River Basin. Escapement to the North Fork Lewis River has exceed its escapement goal of 5,700 by a substantial margin every year since 1980 with a recent five year average escapement of 10,000. The PSC Chinook Technical Committee has assessed this stock to be "stable at goal" in reference to the PSC rebuilding program (NMFS 1999). The forecast in 1999 is for an exceptionally low return of about 2,500 and if correct would obviously be under the escapement goal. The low return in 1999 has been attributed to severe flooding that occurred in 1995 and 1996 and not part of a longer-term decline.

There are two smaller populations of LCR brights in the Sandy and East Fork Lewis River. Average run sizes in the Sandy have averaged about 1000 and have been stable for the last 10-12 years. There is also a late spawning component in the East Fork Lewis that is comparable in timing to the other bright stocks. The escapement of these fish is less well documented, but it appears to be stable (ODFW 1998a). At this time, the data are insufficient to estimate the impacts of ocean fisheries on these populations; however, based on similarities between the biology and ecology of these runs, there is no reason to believe the effects of SEAK fisheries would differ from those for the North Fork Lewis stock.

The brood year ER on the North Fork Lewis River bright stock averaged 49% through 1990 including about 7% taken in SEAK fisheries. The average ER for the more recent broods was 29% including 14% in SEAK fisheries. The model estimates for the 1999 ocean fisheries are for an ER of 10.7% with 4.0% taken in SEAK fisheries.

NMFS did not propose harvest constraints for the LCR bright stocks in 1999 since it does not appear that the low return projected for 1999 is indicative of a population at risk of extinction. While brood year exploitation rates in the SEAK fisheries have doubled in recent years (Table 13) they are not of concern currently given the stability of the population.

3. *Puget Sound Chinook*

There are both spring and fall-run stocks in the PS ESU. As a group, the spring stocks from the Dungeness, Nooksack, and White rivers are considered in critical health status while the Skagit springs and later timed stocks are generally less depressed. Harvest on the Puget Sound spring stocks occurs primarily in Canadian and Puget Sound fisheries. Exploitation rate reductions are reflected to a degree in the most recent reported brood years. However, management planning in Puget Sound has focused more attention on spring stocks over the last couple of years. The effects of these actions should become apparent once the 1994 and 1995 brood year exploitation rates are available. These stocks have also benefitted from Canadian fishery reductions. The resulting reductions in exploitation rate over the last two years have been substantial. The projected ER for 1999 is down by 33% relative to the 1989-93 average (Figure 1).

Exploitation rates in the SEAK fisheries on the PS spring chinook aggregate have averaged less than 1% (Table 14). Data suggests that the SEAK fisheries impact the Nooksack spring stocks more so than the other stocks within the aggregate. The 1999 PFMC model projects SEAK fisheries will account for 11% of the harvest mortality of these stocks, compared with less than 1% for other stocks within the aggregate. Model estimates for the 1999 SEAK fisheries indicate an ER of about 0.52% on the aggregate and 1.4% and 0.9% ERs on the North Fork Nooksack and South Fork Nooksack stocks, respectively.

The ocean distribution of fall stocks are similar to the PS spring stocks in that they are harvested primarily in Canadian and Puget Sound fisheries with little catch occurring in Alaska. There are particular stocks within the ESU that have a somewhat more northerly distribution and higher ERs in Alaskan fisheries. The long-term brood year average ER through 1990 is 0% and has slightly increased to 1% over the last three brood years (Table 15). Model estimates for the 1999 fisheries are for an ER of less than 1% in SEAK fisheries compared with 14.3% in all ocean fisheries. Further reductions in harvest across all fisheries have been made in 1998 and 1999. The exploitation rate in 1999 is expected to be reduced by 24% relative to the 1989-93 average (Figure 1). Unlike the spring stocks which are severely depressed, the status of fall stocks within the Puget Sound chinook ESU varies from healthy to depressed. Many have significant portions of hatchery strays, but most of the historically large chinook producers remain dominated by natural production. Although these stocks have declined since the mid-1970s, they appear to have stabilized at low levels since 1991 (PSC 99). Returns in 1998 exceeded the Snohomish River escapement goal, were very close to the goal for the Skagit and were the largest Stillaguamish escapement in seven years (Sands and Gaudet 1999).

B. Cumulative Effects

Cumulative effects are defined as the "effects of future state or private activities, not involving federal activities, which are reasonably certain to occur within the action area of the federal action subject to consultation" (50 CFR 402.02). Future Federal actions that are unrelated to the action being considered in this Biological Opinion are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. No such effects are anticipated. For purposes of this analysis, the action area includes ocean fishing areas off the coast of Alaska. Groundfish fisheries in the NPFMC area were considered in previous biological opinions (NMFS 1994, NMFS 1995e), but are not considered cumulative to the proposed action. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. In addition, non-Federal actions that require authorization under section 10 of the ESA will be evaluated under section 7 consultations. Therefore, these actions are not considered cumulative to the proposed action.

V. Integration and Synthesis of Effects

Alaska proposes to manage the 1999/2000 Alaska chinook fisheries consistent with the 1999 PST CA. Based on preseason abundance estimates this would result in a catch of approximately 252,000 chinook (exclusive of hatchery add-ons and terminal area catches). NMFS assumes that the harvest rate index will not exceed 0.60 as a result of any inseason adjustments in target catch that may occur subject to provisions of the PST CA. However, the final model calibration which determined the abundance index and associated harvest rate index and target catch level has not been completed. When that calibration is complete, the State of Alaska has stated its intent to manage the 1999/2000 SEAK fisheries based on its results (Marshall 1999, S. Marshall to P. Dygert, June 24, 1999).

Although this opinion considers the proposed SEAK fisheries in the context of anticipated other ocean and terminal area fisheries, significant improvements regarding survival and recovery will be achieved only through long term modification of all actions that affect the listed salmon species. NMFS considers that the combined impact of these fisheries, when taken in the broader context of the environmental baseline and measures taken that affect other life stages, is consistent with long term survival and recovery of the species. In addition, the new bilateral PST agreement will provide additional protective measures for many of the listed chinook ESUs, in particular, resulting from both its approach to harvest and from the funding provisions for habitat restoration.

The 1999/2000 winter season fisheries are reviewed in this opinion as well. The winter season fisheries are currently limited by allocation rules to a total catch of 45,000. The catch in the winter fishery in recent years, however, as been substantially less reflecting the reduced abundance of salmon in the fishery (Table 16).

Table 16. SEAK winter fishery catch by year

Year	Catch
1994/1995	17,500
1995/1996	9,300
1996/1997	21,000
1997/1998	32,000
1998/1999	32,800

Catch rates on listed spring and fall chinook in the winter fishery are assumed to be the same as those that occur later in the year. Catch allocated to the winter fishery is small relative to the total and, even assuming that substantial additional reductions may be needed, would not preclude maintaining foreseeable limits in the 1999/2000 fisheries. The winter season fishery will again be reviewed in conjunction with the broader analysis of expected impacts during the entire 1999 summer and 2000 winter SEAK fishery to ensure continued compliance with provisions of the LOA.

A. Upper Willamette River Chinook

The available information indicates that the impacts to UWR chinook in SEAK fisheries are low. The estimated ER in SEAK fisheries averaged 9% over the last 15 brood years. The average exploitation rate declined to 5% over 1991-93 brood years, a reduction of 44% over the long term. The model estimate for the 1999 SEAK fisheries is 2.9%. Harvest mortality in both ocean and freshwater fisheries will be lower in 1999 than they have been in past years with expected total ocean ERs of about 13% and reductions in freshwater harvest mortality of 50% or more relative to years prior to 1997. Implementation of mass marking and selective fisheries are expected to lead to even further reductions in freshwater harvest mortality in the future. A preliminary risk assessment of the management strategy suggests that the extinction risk is very low (2%) under the proposed harvest plan, but that it would not provide for substantial increases in average wild escapement that could be used to explore stock productivity and habitat capacity (Beamesderfer 1999). Whether these changes in harvest management policy, coupled with improvements in other sectors, are sufficient to provide for long-term recovery has not been fully analyzed. However, based on the substantial reductions in harvest mortality anticipated in ocean and freshwater fisheries and the fact that harvest mortality in SEAK fisheries is low, NMFS concludes that the proposed SEAK fisheries would not reasonably be expected to appreciably reduce the likelihood of the survival and recovery of UWR chinook salmon in the wild.

B. Lower Columbia River Chinook

What remains of the spring component of the LCR chinook ESU is now confined to the Sandy, Cowlitz, Lewis, and Kalama rivers. There are no natural-origin, self-sustaining populations of LCR spring chinook as all are integrated with and largely dependent on the associated hatchery programs in each basin. Although some natural spawning occurs, most is likely the result of hatchery straying, and it is unlikely that any of the populations would persist given the current habitat conditions absent the existing hatchery programs. The population in the Sandy above Marmot Dam is increasing. Those in the Cowlitz, Lewis, and Kalama are declining, but still number several hundred to a few thousand fish each. Reductions in fisheries to the north will likely benefit LCR spring chinook, and there is very little harvest in the mainstem river fisheries. The available information suggests that the LCR spring stocks are not significantly impacted by the SEAK fishery. The estimated ER on Cowlitz spring chinook in SEAK fisheries both during the base period and that projected for 1999 is 0.3%.

Lower Columbia River tule stocks have been subject to habitat degradation due to the familiar litany of factors related to resource exploitation and land use development. Hatchery programs have been pervasive throughout the LCR in particular for over a hundred year. As a result, there are likely only two or three self-sustaining populations of tule chinook in the lower Columbia River that are not substantially influenced by hatchery strays. Although the status of the Clackamas population is uncertain, escapements to the Coweeman and East Fork Lewis rivers at least are stable and near interim goals.

For these stocks, the broader objective of the ESA, which requires survival and recovery of self-sustaining, naturally-spawning populations, can best be achieved through focused recovery planning efforts that identify habitats that can be rehabilitated, coupled with harvest management programs that provide the necessary protections that will allow for rebuilding wild populations of this species. Until then, harvest of tule stocks will be sufficiently constrained to protect the few remaining, naturally-spawning populations. The harvest in SEAK fisheries is only 1-2%, the overall harvest mortality across all fisheries has declined substantially (from 0.75 to 0.39) in recent years and, most importantly, these populations have been stable with wild populations having been at or near escapement goals for two of three recent years. Therefore, NMFS concludes that the proposed SEAK fisheries would not reasonably be expected to appreciably reduce the likelihood of the Lower Columbia River chinook salmon' survival and recovery in the wild.

The LCR bright component is one of the few healthy wild stocks in the Columbia River Basin. The Lewis River bright stock has exceeded its escapement goal of 5,700 by a substantial margin every year since at least 1980. The low forecast for 1999 has been attributed to severe flooding in 1995 and 1996 that substantially diminished

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production from the 1994 and 1995 brood years that are the primary contributors to the 1999 return. Preseason model estimates are for an ER of 4% in the 1999/2000 SEAK fisheries on the North Fork Lewis bright stock. In summary, the stock is relatively stable; there has been a substantial decline in the harvest of this species across all fisheries in recent years, and the managers of this fishery have taken specific actions in 1999 to hold the combined ER in PFMC and inriver fisheries to 10% or less (3% in PFMC). Therefore, NMFS does not believe that SEAK fisheries are likely to adversely affect the tule salmon stocks in a way that would appreciably reduce the likelihood of survival and recovery of the Lower Columbia River chinook ESU.

Based on the above considerations, NMFS concludes that the proposed SEAK fisheries would not reasonably be expected to appreciably reduce the likelihood of the survival and recovery of LCR chinook in the wild.

C. Puget Sound Chinook Salmon

The spring component of the PS chinook salmon is subject to very little harvest in SEAK fisheries. The average estimated brood-year ER on PS spring stock was 1.0% through 1990, but was 0 for most recent brood-years. The expected ER on Puget Sound spring aggregate in the proposed SEAK fisheries is again less than 1.0%. In particular, the data suggests that the SEAK fisheries adversely affect the Nooksack spring stocks more than the other stocks within the aggregate. However, because the magnitude of the adverse effects to PS spring stocks in the SEAK fisheries are still extremely low, NMFS does not believe they would reasonably be expected to appreciably reduce the likelihood of survival and recovery of PS chinook salmon in the wild.

The ER on the Puget Sound fall chinook component has averaged 1.0% or less over the past twenty two years. The expected ER on fall stocks from the 1999 fisheries is again expected to be about 1%.

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Puget Sound chinook stocks have benefitted substantially from recent harvest reductions in Canadian and inside fisheries. SEAK fisheries remain a minor component of the overall harvest mortality. Given the low expected impacts associated with the proposed SEAK fisheries, NMFS concludes that the proposed SEAK fisheries would not be reasonably expected to appreciably reduce the likelihood of the survival and recovery of PS chinook in the wild.

Conclusions regarding Alaska fisheries in future years depend on the magnitude of Alaska fisheries in combination with Canadian and/or PFMC fisheries. NMFS concludes that 1999/2000 Southeast Alaska fisheries, implemented consistent with the 1999 PST CA, would not reasonably be expected to appreciably reduce the likelihood of the survival and recovery of these steelhead.

VI. Conclusion

After reviewing the current status of Upper Willamette River chinook salmon, Lower Columbia River chinook salmon, or Puget Sound chinook salmon, the environmental baseline for the action area, the effects of the proposed fishery and the cumulative effects, it is NMFS" biological opinion that the southeast Alaska salmon fisheries subject to the Fishery Management Plan for Salmon Fisheries off the Coast of Alaska and the U. S. Letter of Agreement regarding chinook salmon fisheries in Alaska, as proposed is not likely to jeopardize the continued existence of Upper Willamette River chinook salmon, Lower Columbia River chinook salmon, or Puget Sound chinook salmon. No critical habitat has been designated for these species; therefore, none will be affected by the proposed fisheries.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special permit or exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by NMFS. NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If NMFS fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, NMFS must document the progress of the action and its impact on the species as specified in the incidental take statement (50CFR §402.14(I)(3)).

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It 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.

I. Amount or Extent of the Take

While it is not possible to identify individual listed fish that may be taken in a fishery, impacts to listed fish can be limited by specifying limits in terms of either an exploitation rate or total catch. The catch of listed fish will be limited specifically by the measures proposed to limit the total catch of chinook salmon pursuant to provisions of the 1999 PST CA. For the 1999/2000 season the Alaska fishery harvest rate index will be based on the abundance index and target catch generated from the final PSC Chinook Technical Committee model calibration. Inseason adjustment in the Alaska fisheries may occur according to the procedures outlined in the PST CA subject to the assumption that the resulting exploitation rate does not significantly exceed the preseason expectations. Catch during the 1999/2000 winter fishery will be limited to a total catch of 45,000 chinook salmon.

A. Upper Willamette River Spring Chinook

The available information indicates that the impacts to UWR chinook in SEAK fisheries are low. The long term average estimated ER in SEAK fisheries is on the order of 9%, declining to an average of 5% over the last three complete brood years. The model estimate for the 1999/2000 SEAK fisheries is continues the declining pattern, at 2.9%.

B. Lower Columbia River Chinook

The spring component of the LCR chinook ESU differ from upper Columbia River spring stocks in that they have a more southerly distribution. The available information suggests that the LCR spring stocks are not significantly impacted by the SEAK fishery. The chinook management model base period (1979-82) ER for the Cowlitz River spring chinook is less than 1% for the SEAK fisheries. The 1999/2000 model estimates are for a SEAK ER of 0.3%

Like the spring stocks, the LCR tule stocks are also more southerly distributed and are primarily taken in Canadian and southern U.S. fisheries. Exploitation rates averaged 1% through the 1990 brood year, increasing slightly to 2% more recently. Model estimates for the 1999/2000 SEAK fisheries are for an ER of 1.5%.

The ER on LCR bright stocks in SEAK fisheries have averaged 7% in past brood years, but increased to and average of 14% in 1990-93. Model estimates for the 1999/2000 SEAK fisheries are for an ER of 4%.

C. Puget Sound Chinook

The brood year ER on PS spring and fall chinook stocks has averaged 0-1% through the 1993. Model estimates for the 1999/2000 SEAK fisheries are also for an ER of less than 1% on both spring and fall components.

II. Effect of the Take

In the accompanying biological opinion, NMFS determined that the level of anticipated take of salmon from the Ozette Lake sockeye ESU, the Hood Canal summer-run chum ESU, Lower Columbia chum ESU, the UCRS chinook, UWR chinook, LCR chinook, and PS chinook ESU, and the Middle Columbia and Upper Willamette steelhead ESUs in the 1999/2000 SEAK fisheries is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

III. Reasonable and Prudent Measures

In order to minimize and reduce the anticipated level of incidental take of listed Upper Willamette River, Lower Columbia River and Puget Sound chinook salmon, NMFS believes that it is essential: 1) that inseason management actions taken during the course of the fisheries be consistent with the harvest objectives established preseason, 2) that catch and other management measures used to control fisheries be monitored adequately to ensure compliance with management objectives, and 3) that the fisheries be sampled for stock composition and other biological information.

IV. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the specified agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. ADFG in consultation with the Alaska Regional Administrator of the NMFS and the NPFMC chair shall ensure that the preseason management objectives for the 1999/2000 SEAK fisheries are consistent with the abundance index and target catch as generated by the final PSC CTC model calibration.

2. ADFG in consultation with the Alaska Regional Administrator of the NMFS and the NPFMC chair shall ensure that inseason management actions taken during the course of the fisheries are consistent with the harvest objectives established preseason as discussed in this opinion.

3. ADFG in cooperation with the Alaska Regional Administrator of the NMFS and the NPFMC chair shall monitor the catch and implementation of other management measures at levels that are comparable to those used in recent years to ensure that specified management actions used to control the fisheries are fully implemented.

4. ADFG in cooperation with the Alaska Regional Administrator of the NMFS and the 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 listed species.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, to assist recovery plans and/or to collect and analyze additional information. NMFS believes the following conservation recommendations are consistent with these obligations, and therefore should be implemented...

1. The recent bilateral agreement between the U.S. and Canadian Commissioners regarding salmon fishery management in Southeast Alaska proposes implementation of an abundance-based management system that would offer additional protection to natural-origin chinook stocks, including those listed under the ESA. As part of that agreement, technical tasks were identified that would provide better information on which to base chinook management. Although the agreement is contingent upon completion of a biological opinion concluding that it does not jeopardize the continued existence of the listed ESUs, the task list is relevant regardless of the outcome. NMFS encourages the U.S. Commissioners and their Canadian counterparts to direct the joint technical committees to begin work on these tasks with the objective of implementing as many of the findings as possible for the 2000 season to continue to improve management of natural-origin chinook stocks including those listed under the ESA.

2. NMFS, together with the State of Alaska, should gather better information on ocean rearing and migration patterns to improve its understanding of the utilization and importance of these areas to listed ESUs.

REINITIATION OF CONSULTATION

This concludes formal consultation on the 1999/2000 SEAK salmon fishing regulations as determined by the terms of the1999 PST CA . As provided in 50 CFR §402.16, re-initiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

Consultation would also be re-initiated in the event that 1) the 1999/2000 Alaska fishery is proposed to be managed under provisions other then those defined in the 1999 PST CA, 2) the Alaska fishery in combination with the Canadian and/or PFMC fisheries are not expected to meet either the 30% or 50% base period exploitation rate reduction standards for Snake River fall chinook, 3) current consultation standards effecting the Alaska fisheries are revised, or; 4) Alaskan fisheries are found to be inconsistent with final jeopardy standards for the ESUs covered under this opinion.

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