

Consultation Number: 2006/00754

**Endangered Species Act (ESA) Section 7 Consultation – Supplemental Biological Opinion**

**Action Agency:** National Marine Fisheries Service


**Species/Evolutionarily Significant Units Affected:**

Species	Evolutionarily Significant Unit	Present Status	Federal Register Notice	
Chinook Salmon ( <i>O. tshawytscha</i> )	Snake River Fall	Threatened	70 FR 37160	6/28/05
	Lower Columbia River	Threatened	70 FR 37160	6/28/05
	Upper Willamette River	Threatened	70 FR 37160	6/28/05
	Puget Sound	Threatened	70 FR 37160	6/28/05
	Sacramento River Winter-run	Endangered	70 FR 37160	6/28/05
	Central Valley Spring-run	Threatened	70 FR 37160	6/28/05
	California Coastal	Threatened	70 FR 37160	6/28/05

**Activities considered:** Reinitiation of Section 7 Consultation Regarding the Pacific Fisheries Management Council's Groundfish Fishery Management Plan

**Consultation conducted by:** National Marine Fisheries Service  
 Sustainable Fisheries Division, Northwest Region.  
 Consultation Number:

The National Marine Fisheries Service (NMFS) first conducted an Endangered Species Act (ESA) section 7 consultation on the Pacific Fishery Management Council's (PFMC) Groundfish Fishery Management Plan (FMP) in 1990. As described below, NMFS has since reviewed and revised the associated biological opinion on several occasions. The currently applicable biological opinion regarding the Groundfish FMP was completed in 1999 NMFS (1999). The Incidental Take Statement in the 1999 opinion defined the level of expected bycatch of Chinook salmon (in summary here) as 11,000 Chinook per year in the whiting fishery, and 6,000-9,000 Chinook per year in the bottom trawl fishery. NMFS is reinitiating consultation now because these levels of expected bycatch were exceeded in 2005 in the whiting fishery, and in two of three years between 2002 and 2004 in the trawl fishery. The purpose of this supplemental biological opinion is to review these events and other related information, and determine if they suggest the need to change the prior no jeopardy conclusion or associated Incidental Take Statement. This supplemental biological opinion has been prepared in accordance with section 7 of the Endangered Species Act (ESA), as amended (16 U.S.C. 1531 et seq.). A complete administrative record of this consultation is on file with NMFS, Sustainable Fisheries Division in Seattle, Washington.

**Approved by:**   
 D. Robert Lohn, Regional Administrator

**Date:** 3/14/06

## Introduction

The National Marine Fisheries Service first conducted an Endangered Species Act (ESA) section 7 consultation on the Pacific Fishery Management Council's (PFMC) Groundfish Fishery Management Plan (FMP) in 1990. As described below, NMFS has since reviewed and revised the associated biological opinion on several occasions. The currently applicable biological opinion regarding the Groundfish FMP was completed in 1999 NMFS (1999). Through that opinion, and prior opinions, NMFS considered the effect of the Groundfish FMP on all 25 salmon Evolutionarily Significant Units (ESU) and steelhead Distinct Population Segments (DPS) listed at that time. (One steelhead DPS (Northern California) and on coho ESU (Lower Columbia River) have since been listed under the ESA as threatened.) NMFS concluded the bycatch of salmonids in the groundfish fisheries was limited almost exclusively to Chinook salmon. The incidental take statement in the 1999 opinion therefore defined the level of expected bycatch (in summary here) as 11,000 Chinook per year in the whiting fishery, and 9,000 Chinook per year in the bottom trawl fishery. NMFS is reinitiating consultation now because these levels of expected bycatch were exceeded in 2005 in the whiting fishery, and in two of three years between 2002 and 2004 in the trawl fishery. The purpose of this supplemental biological opinion is to review these events and other related information, and determine if they suggest the need to change the prior no jeopardy conclusion or associated Incidental Take Statement.

Before getting into the substance of the events related to the whiting and bottom entry trawl fisheries, it is useful to provide a brief review of the sequence of section 7 consultation activities related to the Groundfish FMP and an update on the status of the species most likely to be affected by these activities. The background is pertinent to subsequent discussions. Figure 1 is a map that shows management areas that are discussed and other reference points.

## Consultation History

NMFS has considered the impacts to salmon species listed under the ESA resulting from implementation of the Groundfish FMP in several previous biological opinions. The sequence of consultation activities related to the Groundfish FMP is summarized in Table 1.

On August 10, 1990, NMFS issued a biological opinion that considered the effects that Amendment 4 to the Groundfish FMP would have on threatened and endangered populations off California, Oregon, and Washington. The opinion reviewed impacts to marine mammals, sea turtles, and Sacramento River winter-run Chinook salmon, and concluded that the FMP, as amended, would not jeopardize the continued existence of any of the species considered.

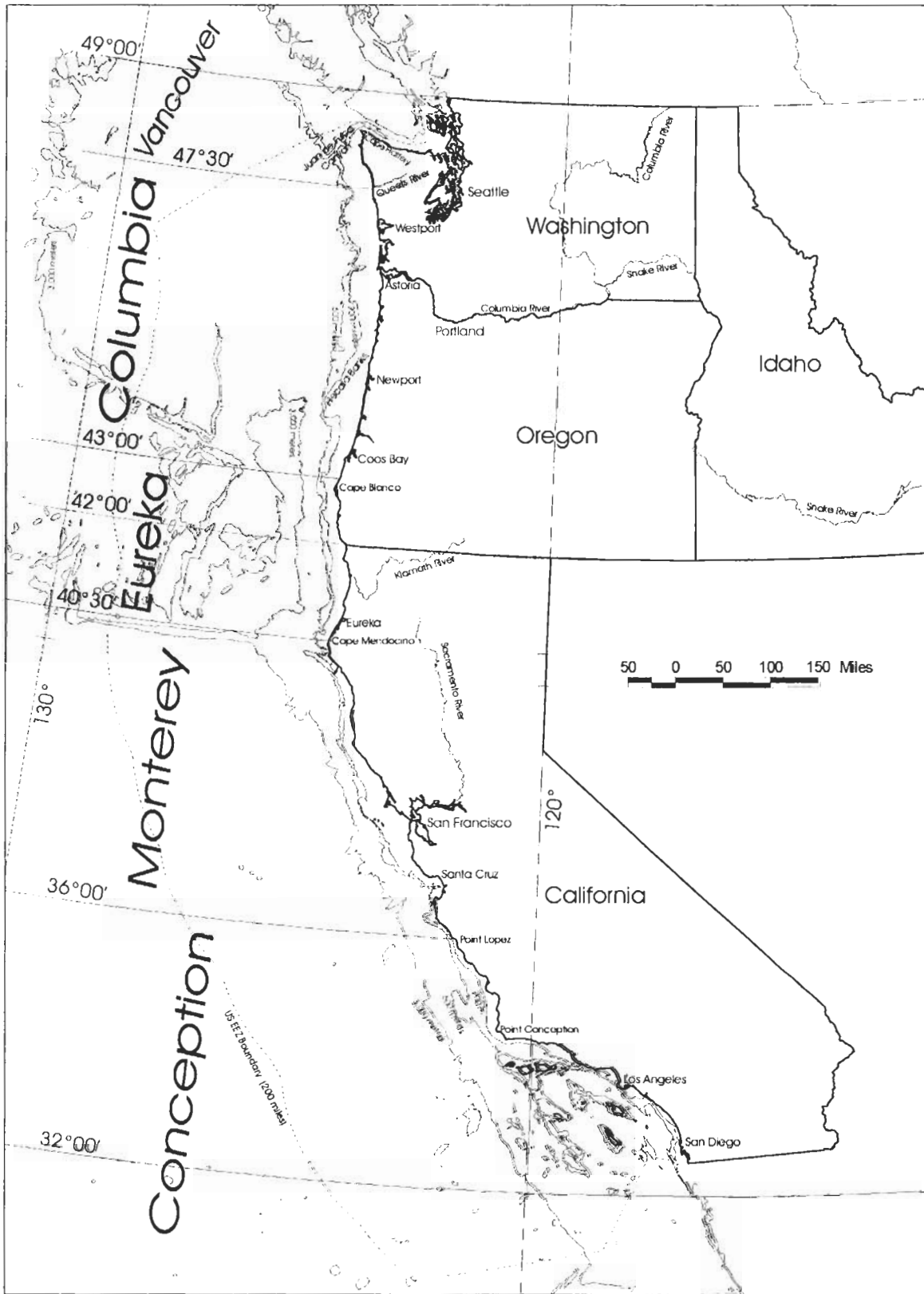


Figure 1. Ocean management areas for groundfish fisheries off the Pacific Coast.

NMFS completed a second biological opinion on November 26, 1991, that considered the impact of the whiting fishery on Sacramento River winter-run Chinook salmon in more detail, and also briefly addressed the effects on Snake River sockeye salmon, which had been newly listed (November 20, 1991) just as the opinion was being finalized.

NMFS consulted again on August 28, 1992 to consider the effects of the Groundfish FMP on additional listed salmon species including Sacramento River winter-run Chinook salmon, Snake River sockeye salmon, Snake River spring/summer Chinook salmon, and Snake River fall Chinook salmon. The biological opinion concluded that impacts of fishing conducted under the Groundfish FMP on Sacramento River winter-run Chinook, Snake River sockeye, and Snake River spring/summer Chinook salmon were negligible. The opinion further concluded that the estimated bycatch of Snake River fall Chinook salmon was low, most likely on the order of a few tens of fish per year. Based on the available information, NMFS concluded that operation of the fishery under the Groundfish FMP was not likely to jeopardize the continued existence of these species.

NMFS reinitiated section 7 consultation in 1993 to consider what turned out to be an unexpectedly high bycatch of pink salmon in the whiting fishery. When the pink salmon were included as part of the aggregate of salmon bycatch, the incidental bycatch limit of 0.05 salmon/mt whiting specified in the opinion was exceeded. Since the bycatch limits specified in the August 1992 opinion were designed to protect Chinook salmon, the September 27, 1993 opinion amended the incidental take statement to clarify that the 0.05 salmon/mt of whiting bycatch rate limit would in the future be expressed in terms of Chinook salmon with the expectation that the total bycatch of salmon in the whiting fishery would not exceed 11,000 "Chinook" salmon per year or 0.05 "Chinook" salmon/mt whiting.

NMFS again reinitiated consultation after the 1995 whiting season because bycatch in the 1995 fishery was estimated to be 14,557 Chinook salmon (0.08 Chinook/mt whiting,) exceeding the limits designated in the August 1992 and September 1993 opinions. The resulting May 1996 opinion concluded that, although the Chinook limit was exceeded, this was not likely to jeopardize the continued existence of listed salmon species because impacts to listed species remained low and within the numerical range anticipated during the original analysis.

In 1999, NMFS again reinitiated consultation to consider the effects of the Groundfish FMP on the 22 new threatened and endangered ESUs of salmonids that had been listed since the previous consultation in May 1996 (Table 1). The new opinion also considered updated information for the Snake River fall Chinook ESU. Based on this review, NMFS concluded that continued implementation of the Groundfish FMP would not jeopardize the continued existence of any of the salmonid ESUs listed, or proposed for listing, as threatened or endangered under section 7 of the ESA. The December 15, 1999 biological opinion reaffirmed the incidental catch limit of 0.05 Chinook/mt of whiting and 11,000 Chinook per year in the whiting fishery.

Because the 1999 opinion is the current opinion for the Groundfish FMP the basis for the no jeopardy conclusion is summarized here briefly. NMFS reviewed the species status, environmental baseline, cumulative effects, and particularly the effects of the action. For species other than Chinook it was apparent that bycatch in the groundfish fisheries were very low. For

steelhead and sockeye individuals were occasionally observed, but estimates of bycatch in most years were zero. For coho and chum, estimates of bycatch averaged on the order of 100-200 per year. The majority of these were presumed to be unlisted hatchery or natural origin fish. The effects on listed sockeye, chum, and coho ESUs, and steelhead DPSs were therefore judged to be negligible.

The bycatch of Chinook was obviously more substantial. NMFS first considered the overall bycatch of Chinook. For the whiting fishery it was apparent that Chinook bycatch had been constrained and was generally within the limits (i.e., 11,000) set in prior opinions. The whiting fishery was closely monitored to provide reasonable assurance of continued compliance, and substantive management actions had been taken to reduce bycatch. For the bottom trawl fishery there was no observer program or new information that allowed a direct assessment of bycatch relative the expected level of 6,000-9,000 specified in the incidental take statement. But it was observed that landings and effort in the bottom trawl fishery had declined by about half over the last decade.

NMFS then reviewed information related to likely impacts to each of the listed Chinook ESUs. The review relied primarily on observations from coded wire tags, and inferences made using salmon fishery management models and the magnitude and distribution of the Chinook bycatch. NMFS concluded that some of the ESUs were likely not taken at all or only rarely in the groundfish fishery (e.g., Upper Columbia River spring Chinook and Snake River spring/summer Chinook). NMFS concluded that Puget Sound Chinook, Lower Columbia River Chinook, Snake River fall Chinook, and Upper Willamette River Chinook were the ESUs most likely to be subject to measurable catches. The opinion included some qualitative estimates of the level of expected bycatch. For Snake River fall Chinook it was characterized as on the order of 30-60 fish per year. For other ESUs the estimates were characterized as annual exploitation rates that ranged from a "small fraction of 1% per year" to "less than 1% per year" depending on the ESU or populations being considered. Based on this information, NMFS concluded that the Groundfish FMP was not likely to jeopardize any of the ESA listed salmonid species.

NMFS again reviewed elements of the biological opinion in 2002. During 2000, the bycatch of Chinook salmon in the whiting fishery was 11,527, exceeding the expected take level specified in the incidental take statement from the 1999 opinion. As described in the resulting April 25, 2002 memorandum, NMFS assessed the circumstances and decided to wait until after 2001 to complete the reinitiated consultation to determine whether there were changes in the fishery or the status of the listed fish that would require substantive changes in the fishery or the conclusions of the 1999 consultation. During the 2001 Pacific whiting fishery, the Chinook bycatch was less than 7,000. Based on its review of how the whiting fisheries were conducted in 2000 and 2001 (including industry bycatch minimization measures), its review of the status of the affected species, environmental baseline information, and the incidental take statement of the 1999 consultation, NMFS confirmed the no jeopardy conclusion of the 1999 opinion, including the associated incidental take statement.

Table 1. ESA section 7 consultation activities related to the PFMC Groundfish FMP.

Date	ESU and/or event considered
August 10, 1990	Sacramento River winter-run Chinook salmon, marine mammals, turtles
November 26, 1991	Sacramento River winter-run Chinook salmon and Snake River sockeye salmon
August 28, 1992	Sacramento River winter-run Chinook salmon, Snake River sockeye salmon, Snake River spring/summer Chinook salmon, and Snake River fall Chinook salmon
September 27, 1993	High bycatch of pink salmon, incidental take statement revised
May 14, 1996	Bycatch of 14,557 Chinook in the 1995 whiting fishery
December 15, 1999	Consultation on the effects of the FMP on 22 newly listed ESUs
April 25, 2002	Bycatch of 11,513 Chinook in the 2000 whiting fishery

Species Status

NMFS discussed the listed species likely to be affected by fisheries managed under the Groundfish FMP in prior consultations. From these reviews it is apparent that Chinook are caught in the fisheries, but bycatch of other salmon species and steelhead is limited (see below for more details). Of the listed Chinook ESUs NMFS concluded in prior biological opinions that only a few are likely to be significantly affected by ocean fisheries including Snake River fall Chinook, Upper Willamette River Chinook, Lower Columbia River Chinook, and Puget Sound Chinook. Conclusions regarding which of the listed Chinook ESUs were likely to be affected by the groundfish fisheries relied primarily on the observation that the bycatch of Chinook occurred primarily off the Oregon coast and areas to the north. A result of this review is that there is more bycatch, particularly in the bottom trawl fishery, as least as far south as northern California. This increases the likelihood of encountering Chinook from the listed Chinook ESUs from California including Sacramento River winter-run Chinook, California coastal Chinook, and Central Valley spring-run Chinook. The number of coded wire tags observed in the bycatch from these ESUs continues to low (e.g. ODFW 2005). Nonetheless, we provide a comparable status summary for the listed California Chinook ESUs.

Updated information regarding the status of these species is provided here largely by referring to other recent opinions and related documents that include more detailed updates. These are incorporated by reference.

The species status summaries provided here are brief and are intended primarily to make the point that the status of populations within the ESUs have been stable or more often increasing since 1999. The 1999 opinion is used as a reference point since that is when the effects of the action on most of the ESUs were first considered. Snake River fall Chinook was considered in earlier opinions, but the improving status since 1999 is still relevant. The 1999 opinion also includes the currently applicable Incidental Take Statement that specifies the level of expected

take. One of the questions to be considered in this review is whether it is necessary to reconsider the no jeopardy determination made in prior consultations. The status of the ESU now relative to when the original determination was made is relevant to that determination.

NMFS has made significant progress in developing recovery plans for many of the listed salmonids. These recovery plans provide better information about viability goals for the listed salmonids and their component populations, and thus provide more specific benchmarks for judging the status of listed species. Available recovery plans and other information that further defines recovery objectives are referenced in the following discussions. It is apparent that the status of most of the listed Chinook ESUs has improved, but most still have a way to go before they can be considered viable.

#### *Snake River Fall Chinook*

The status of Snake River fall Chinook was reviewed in May 9, 2005 in the biological opinion on 2005-2007 Interim Management Agreement (NMFS 2005a). All of the available abundance indicators for Snake River fall Chinook are strongly positive including escapements of natural-origin fish to Lower Granite Dam, redd counts, estimates of sub-yearling outmigrants, and jack counts. From 2000-2004 the average escapement of natural-origin fish over Lower Granite Dam was 3,381. During that same time the total return of hatchery and natural-origin fish to Lower Granite Dam has been 11,373. From 1995-1999 the number of natural-origin Snake River fall Chinook returning to Lower Granite Dam averaged 599 while the total return averaged 1,823. The total return of fall Chinook to Lower Granite Dam in 2005 was 11,170. Estimates of the natural-origin component in 2005 are not yet available.

NMFS previously described an interim abundance target of 2,500 for Snake River fall Chinook (see discussion in NMFS 2005a). The Interior Columbia Basin Technical Recovery Team (ICTRT) recently provided further recommendations regarding viability goals for Snake River fall Chinook (Cooney et. al. 2005). In that report the ICTRT recommended a minimum abundance threshold of 3,000 natural origin spawners for the extant Snake River fall Chinook population. No fewer than 2,500 of those natural origin spawners should be distributed in mainstem Snake River habitat. The ICTRT also identified five major spawning areas in the upper and lower mainstem, and in the lower reaches of the Clearwater, Tucannon, and Grand Ronde rivers each of which has the capacity to support a minimum of 500 or more spawners. Consistent with their practice for other ESUs, the ICTRT expressed productivity objectives for Snake River fall Chinook in terms of viability curves that relate abundance and productivity corresponding to various levels of risk. The ICTRT did not report on the status of Snake River fall Chinook relative to the recommended viability criteria. However, it is apparent that abundance of natural-origin fish has increased significantly in recent years and on average exceeded the minimum abundance threshold of 3,000. How the fish have been distributed among the major spawning areas, and where the ESU falls with respect to productivity objectives is unknown. Nonetheless, it is clear that the status of Snake River fall Chinook has improved significantly relative to the years up to and including 1999 when NMFS completed the 1999 biological opinion on the Groundfish FMP.

### *Upper Willamette River Spring Chinook*

The status of Upper Willamette River spring Chinook was reviewed recently in the opinion on 2005-2007 Interim Management Agreement (NMFS 2005a). The abundance of Upper Willamette Spring Chinook has increased significantly since 1999. The total return of Spring Chinook entering the Columbia River from 1995-1999 averaged 42,400 compared to an average return for 2000-2004 of 105,960. The return in 2005 was 61,000 and it is expected to be lower still in 2006. The above run size estimates include both hatchery and natural-origin fish. The status of natural-origin fish is indicated by counts at Leaburg Dam on the McKenzie River. The average returns of natural origin fish to Leaburg Dam from 1995-1999 and 2000-2004 were 1,165 and 3,865, respectively. Estimates for 2005 are likely lower than the recent average, but are not available at this time.

### *Lower Columbia River Chinook*

The status of Lower Columbia River Chinook was also reviewed in the opinion on 2005-2007 Interim Management Agreement (NMFS 2005a). Additionally, NMFS considered information in the Draft Interim Regional Recovery Plan for Washington developed by the Lower Columbia Fish Recovery Board. NMFS intends to rely on recovery plans as they are finalized and become available for various recovery domains. Although the Interim Plan was still in draft during this review, it nonetheless summarizes relevant information related to population structure of the Lower Columbia River Chinook ESU, and population-specific and ESU level viability criteria.

Most of the spring Chinook populations in the Lower Columbia River Chinook occurred historically in areas above dams that are no longer accessible. Their recovery will rely on reintroduction programs. In the meantime, the genetic heritage of these populations is maintained in hatchery programs. For the time being it is important that hatchery escapement goals be met. Hatchery goals have been met and abundance has increased in recent years. Total returns of spring Chinook to the Cowlitz, Kalama, Lewis and Sandy rivers all increased significantly since 1999. The average returns to river for the four populations from 1995-1999 were 1,778, 643, 2,203, and 3,812, respectively (ODFW/WDFW 2006). Average returns for 2000-2004 were 8,294, 3,037, 5,208, and 7,011, respectively. Returns in 2005 and expected returns in 2006 are comparable to the more recent year returns.

Tule fall Chinook populations that are prioritized for high viability in the recent draft Recovery Plan include, among others, the Coweeman and East Fork Lewis rivers. The Coweeman population is also used currently as the harvest indicator stock. Escapements of natural origin fall Chinook to these systems have been stable or increasing. The 1995-1999 escapements averaged 897 in the Coweeman and 110 in the Lewis River. The 2000-2004 escapements averaged 857 and 278, respectively. The Washington Department of Fish and Wildlife (WDFW) escapement goal for the Coweeman has been 1,000 fish based on current conditions. Average escapements have therefore been at least close to their goal in recent years. This escapement goal has been used as a benchmark of stock status in previous years. Abundance related viability goals from the Recovery Plan for the Coweeman and East Fork Lewis are 3,600 and 2,900, respectively. Achieving these higher recovery goals will presumably also require improvements in habitat productivity and capacity that will accrue over time.



The Lower Columbia River Chinook ESU also includes populations with a north-migrating “bright” type life history. The North Fork Lewis and Sandy river populations are included. The Lewis stock has been used as the primary indicator for the bright component of the ESU. The WDFW has a management goal of 5,700 spawners that has been exceeded consistently over the last 20 years or more. Average escapements for the periods from 1995-1999 and 2000-2004 have been 7,678 and 12,176, respectively. The Recovery Plan specifies an abundance related viability goal of 11,600 for the population.

#### *Puget Sound Chinook*

The status and description of Puget Sound Chinook was reviewed extensively in March 2005, in NMFS’ determination on the Puget Sound Chinook Harvest Management Plan (2004-2009)(NMFS 2005b), and its associated Final Environmental Impact Statement (NMFS 2005c). The analysis considered data through 2002 and concluded that recent year escapements for all populations were stable or had increased when compared with the period prior to listing (1990-1998). Overall escapements since 2002 continued that pattern, however, very low escapements occurred in 2003 and 2004 for several of the smaller populations in Puget Sound. The South Fork Stillaguamish, mid-Hood Canal, South Fork Nooksack, Upper Sauk and Sammamish populations experienced escapements less than 200 in one or both of 2003 and 2004, although within the range of escapements observed historically. Low visibility during stream surveys due to increased sedimentation may have resulted in underestimates of escapement for some of these populations. Table 2 includes comparison of average escapements for individual Puget Sound Chinook populations. Escapements are reported for natural-origin adults where that information is available. (The time frame used for comparing abundance measures for Puget Sound populations relied on existing summaries and therefore differ slightly from the time frame used for the other ESUs (1995-1999 and 2000-2004)).

As part of its status evaluation, NMFS identified critical and viable escapement thresholds (Table 2). The critical abundance threshold generally represents a boundary “...below which populations are at relatively high risk of extinction in the near future.” The viable escapement threshold is a higher abundance level “...above which populations have negligible risk of extinction due to local factors.”<sup>1</sup> (McElhane *et al.* 2000). However, viable and critical thresholds in this context are a level of spawning escapement associated with rebuilding to recovery, consistent with current environmental conditions<sup>1</sup>. Ten of the twenty-two Puget Sound Chinook populations are above their respective viable thresholds. Twelve are above their respective critical levels, but below their respective viable levels. No population in the ESU is considered to be below its critical threshold based on recent years’ average escapement, although several populations are near this threshold.

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<sup>1</sup> For most populations, these thresholds are well below the escapement levels associated with recovery, but achieving these goals under current conditions is a necessary step to eventual recovery when habitat and other conditions are more favorable. As part of the development of a recovery plan for the Puget Sound Chinook ESU, the Puget Sound Technical Recovery Team (PSTRT) has recently provided long term viability planning targets for individual Puget Sound Chinook populations (NMFS 2005d). The distinction between abundance thresholds used for assessing status under current conditions and planning targets presumed for recovery are discussed in NMFS 2005d.

Table 2. Recent average annual escapement levels compared with NMFS-derived critical and viable thresholds for Puget Sound Chinook salmon management units and individual populations.

Management Unit	Population	Average Escapement		NMFS-derived Thresholds	
		1990 to 1998	1999 to 2004	Critical <sup>1</sup>	Viable <sup>2</sup>
Nooksack	Natural-Origin Spawner:	297	429	400	500
	North Fork Nooksack	144	208	200	-
	South Fork Nooksack	153	222	200	-
Skagit Summer/Fall	Natural Spawners:	8,698	14,713	-	-
	Upper Skagit River	6,676	11,287	967	7,454
	Lower Sauk River	539	803	200	681
	Lower Skagit River	1,484	2,623	251	2,182
Skagit Spring	Natural Spawners:	1,014	1,110	-	-
	Upper Sauk River	392	389	130	330
	Suiattle River	398	395	170	400
	Upper Cascade River	224	326	170	1,250
Stillaguamish	Natural-Origin Spawners:	828	965	-	-
	N.F. Stillaguamish River	557	734	300	552
	S.F. Stillaguamish River	271	231	200	300
Snohomish	Natural-Origin Spawners:	2,627	3,936	-	-
	Skykomish River	1,625	2,118	1,650	3,500
	Snoqualmie River	1,003	1,818	400	1,200
Lake Washington	Natural Spawners:	624	767	-	-
	Cedar River	417	448	200	1,250
	Sammamish River	208	268	200	1,250
Green River	Natural Spawners: Duwamish-Green River	6,739	10,481	835	5,523
White River	Natural Spawners: <b>White River</b>	403	1,324	200	1,000
Puyallup	Natural Spawners: South Prairie Index	1,032	1,029	200	1,200
Nisqually	Natural Spawners: Nisqually River	893	1,448	200	1,100
Skokomish	Natural Spawners: Skokomish River	981	1,589	200	1,250
Mid-Hood Canal	Natural Spawners: Mid-Hood Canal Rivers	178	323	200	1,250
Dungeness	Natural Spawners: Dungeness River	138	345	200	925
Elwha	Natural Spawners: Elwha River	1,994	2,070	200	2,900

<sup>1</sup> Critical threshold under current habitat and environmental conditions.

<sup>2</sup> Viable thresholds under current habitat and environmental conditions. They are not the same as recovery goals that are based on recovered habitat conditions.

### *Sacramento River Winter-run Chinook*

The status of Sacramento River winter-run Chinook was reviewed in a 2004 biological opinion (NMFS 2004) and in a report that updated the status of listed salmon and steelhead species (Good et. al. 2005). A significant risk for the ESU is that there is only one population in the ESU. Impassable dams exclude access to most of its historic habitat. Nonetheless the status

report concluded that the population had been growing rapidly since the early 1990s based on information available through 2002. Those trends have continued in recent years. The average return to of adult winter-run Chinook to Red Bluff Diversion Dam on the Sacramento River average of 1,081 from 1995-1999 and 4,647 from 2000-2004 (PFMC 2005).

#### *Central Valley Spring-run Chinook*

The status of Central Valley spring-run Chinook was reviewed in a report that updated the status of listed salmon and steelhead species (Good et. al. 2005). Extant populations in the ESU include those returning to Mill, Deer, and Butte creeks. The status report relied on data available through 2001. The report concluded that increases in abundance that started in the early 1990s have continued, and that there had been significant habitat improvements in the watersheds, as well as reduced ocean fisheries and a favorable terrestrial and marine climate. The improving trends in abundance have continued in recent years. The average combined return to the three spawning areas increased from an average of 8,457 from 1995-1999 to 16,355 from 2000-2004 (PFMC 2005).

#### *California Coastal Chinook*

The status of California coastal Chinook was also reviewed in the updated status report for listed salmon and steelhead species (Good et. al. 2005). Information on the distribution and abundance of Chinook in the ESU is very limited. Current information indicates that abundance is depressed in most basins where they have been monitored. There have been strong returns to the Russian River in recent years, but the relevance of this is not clear because the genetic composition of these fish is unknown (Good et. al. 2005). The PFMC reports on returns to two index areas in the Eel River (Sprowl and Tomki creeks) and another on the Mad River (Canon Creek) (PFMC 2005). Returns to these index areas are small, but have all increased in recent years. Returns to Sprowl, Tomki, and Canon index areas averaged 90, 52, and 101 from 1995-1999, and 144, 93, and 138 from 2000-2004.

#### Whiting Fishery

The 1999 biological opinion is the current opinion and still provides the operable incidental take statement. That opinion requires that section 7 consultation be reinitiated if either the shoreside, catcher/processor, mothership, or Tribal components of the fishery exceed or are expected to exceed the bycatch rate of 0.05 Chinook salmon/mt whiting and the expected total bycatch of Chinook is expected to exceed 11,000 fish (NMFS 1999).

By July of 2005, it was apparent that bycatch rates in 2005 were high and that the 11,000 Chinook reinitiation trigger was likely to be exceeded. On July 18, 2005 NMFS wrote a letter to the whiting industry indicating that 9,950 Chinook had already been taken with only 52% of the whiting allocation harvested (Freese 2005a). Simple extrapolation suggested that the bycatch could reach 20,000 fish or more unless action was taken to reduce bycatch. In the July 18 letter NMFS encouraged the industry to take immediate voluntary action to reduce bycatch and began a process of consultation with the various fleet sectors to better understand events to date and emphasize the need for voluntary action. NMFS posted and thereafter maintained a summary of bycatch-to-date for each sector on their public website, and indicated their intention to consider a nearshore closure to further reduce bycatch for the remainder of the season. Such a closure, if implemented, had to be done by emergency rule under Magnuson-Stevens Act authority at

§305(c). Since emergency rules take a few weeks to implement, a nearshore closure could not be implemented immediately.

On August 15, 2005, NMFS provided an update of developments in a memo to the record that described developments and decisions made since the July 18 letter (Freese 2005b). By that time it was apparent that the bycatch rate had decreased considerably as is usually the case later in the season, and that the projected season total would likely be in the range of 12,000 to 14,000 Chinook. NMFS announced in the August 15 memo its intention to close the fishery, by emergency rule, shoreward of 100 fathoms in order to reduce salmon bycatch.

The emergency rule closing the fishery shoreward of 100 fathoms became effective August 26, 2005 (70 FR 51682 August 31, 2005). The rule remains in effect through February 27, 2006 with the possibility for extension for an additional 180 days. The 2005 whiting fishery is closed; the last of the active fishing sectors (at-sea processors) completed their fishing in late November 2005. The final total bycatch of Chinook in the 2005 whiting fishery was 11,916.

Two questions arise in conjunction with the events of the 2005 whiting fishery. The first is whether the fact that the 11,000 Chinook reinitiation trigger was exceeded in 2005 suggests the need to change the no jeopardy conclusion from prior biological opinions. The second question relates to how the fishery can be managed in the future to minimize the bycatch of Chinook in the whiting fishery to the maximum extent possible and thereby provide greater assurance that the bycatch remains at or below the specified level in the future.

#### *The 11,000 Chinook Reinitiation Trigger*

To address the jeopardy question it is necessary to understand the origin and context of the 11,000 Chinook bycatch trigger as it was used in past biological opinions. This context is summarized here, but is discussed in more detail in the August 15, 2005 memo (Freese 2005b).

Prior biological opinions considered the consequence of implementing the Groundfish FMP over time. For the whiting fishery the assumption was that Chinook bycatch would vary over time, would generally be less than 11,000, but might also exceed 11,000 at least occasionally. To provide the opportunity for periodic review 11,000 was set as a benchmark in the incidental take statement that required reinitiation of consultation. From the conclusion of the 1996 opinion:

“Objective standards such as 0.05 chinook/mt whiting and 11,000 chinook overall are necessary for monitoring impacts to listed species. Exceeding these standards suggests the need for review to ensure that impacts to the listed species do not exceed those anticipated and to reconsider whether additional management actions may be appropriate to reduce salmon bycatch. That review will continue to be accomplished as necessary through reinitiated consultation.”

In fact, the expectations about the level of bycatch that would occur in the whiting fishery over time have proved correct. Bycatch has generally been well below 11,000 (averaging 7,281 since 1991), but did exceed 11,000 significantly once (14,533), and now twice more by small margins (11,513 and 11,916). Table 3 shows estimates of the bycatch of Chinook salmon and other

salmonids that has occurred since 1991. Table 4 provides details related to the bycatch of Chinook by the various fishing sectors over time.

Table 3. Annual bycatch of salmonids in the whiting fishery.

Year	Salmonid Species							Total
	Chinook	Coho	Pink	Chum	Sockeye	Steelhead	Unidentified	
1991	6,206	138	24	8	0	0	NA	6,376
1992	5,353	193	0	48	0	0	NA	5,594
1993	5,262	17	3397	58	116	0	NA	8,850
1994	4,207	69	32	214	0	0	NA	4,522
1995	14,533	1381	1590	182	6	0	NA	17,692
1996	3,803	64	0	178	0	0	NA	4,045
1997	5,404	350	497	114	0	0	NA	6,365
1998	5,261	122	4	35	1	0	NA	5,423
1999	10,584	122	507	465	0	0	NA	11,678
2000	11,513	101	18	19	2	0	18	11,671
2001	6,154	138	303	87	3	0	312	6,997
2002	3,759	183	0	148	0	0	4	4,094
2003	6,512	186	3774	20	0	0	192	10,684
2004	8,751	216	0	109	0	0	9	9,085
2005	11,916	467	480	28	0	0	8	12,899
<b>Average</b>	<b>7,281</b>	<b>250</b>	<b>708</b>	<b>114</b>	<b>9</b>	<b>0</b>	<b>91</b>	<b>8,398</b>

Table 4. Summary of Chinook Salmon Bycatch in the Pacific Whiting Fishery by Sector - Years 1991-2005 [whiting in metric tons (mt), chinook in numbers of fish]. Numbers in bold represent those years that were above annual bycatch rate of 0.05 chinook/mt whiting and a total bycatch of 1,000 chinook specified in the the Incidental Take Statement of the December 15, 1999 biological opinion.

	1991*	1992*	1993*	1994*	1995*	1996*	1997*	1998	1999	2000	2001	2002	2003	2004	2005
<b>MOTHERSHIP</b>															
CHINOOK (number of fish)	2580	2869	1223	2568	8487	795	845	966	1687	4421	1721	709	2078	417	2206
WHITING (mt)	79803	36172	14515	91926	40588	44416	50402	50087	47580	46840	35823	26593	26021	24102	48571
RATE: (# chinook/mt whiting)	0.0323	0.0793	0.0843	0.0279	0.2091	0.0179	0.0168	0.0193	0.0355	0.0944	0.0480	0.2269	0.0798	0.0173	0.0450
<b>CATCHER/PROCESSOR</b>															
CHINOOK (number of fish)	3585	1994	3620	1058	3092	650	553	511	2704	1839	847	970	570	388	1754
WHITING (mt)	117102	116277	84588	87147	61571	68359	70771	70365	67679	67815	58628	36341	41214	73175	78890
RATE: (# chinook/mt whiting)	0.0306	0.0171	0.0428	0.0121	0.0502	0.0095	0.0078	0.0073	0.0400	0.0271	0.0144	0.0265	0.0138	0.0053	0.0222
<b>TOTAL NONTRIBAL ATSEA</b>															
CHINOOK (number of fish)	6165	4862	4843	3626	11579	1445	1398	1477	4391	6260	2568	1679	2648	805	3960
WHITING (mt)	196905	152448	99103	179073	102159	112775	121173	120452	115259	114655	94451	62934	67235	97277	127461
RATE: (# chinook/mt whiting)	0.0313	0.0319	0.0489	0.0202	0.1133	0.0128	0.0115	0.0123	0.0381	0.0546	0.0272	0.0267	0.0394	0.0083	0.0311
<b>TRIBAL (MOTHERSHIP)</b>															
CHINOOK (number of fish)	na	na	na	na	na	1707	2524	2085	4497	1947	959	1018	3430	3690	3862
WHITING (mt)	na	na	na	na	na	14999	24839	24509	25844	6251	6080	21793	19375	23313	23419
RATE: (# chinook/mt whiting)	na	na	na	na	na	0.1138	0.1016	0.0851	0.1740	0.3115	0.1577	0.0467	0.1770	0.1583	0.1649
<b>TOTAL OF ALL ATSEA</b>															
CHINOOK (number of fish)	6165	4862	4843	3626	11579	3152	3922	3562	8888	8207	3527	2697	6078	4495	7822
WHITING (mt)	196905	152448	99103	179073	102159	127774	146012	144961	141103	120906	100531	84727	86610	120590	150880
RATE: (# chinook/mt whiting)	0.0313	0.0319	0.0489	0.0202	0.1133	0.0247	0.0269	0.0246	0.0630	0.0679	0.0351	0.0318	0.0701	0.0373	0.0518
<b>TRIBAL SHORE-BASED</b>															
CHINOOK (number of fish)	na	na	na	na	na	na	na	na	na	na	na	na	9	50	76
WHITING (mt)	na	na	na	na	na	na	na	na	na	na	na	na	4079	5335	10938
RATE: (# chinook/mt whiting)	na	na	na	na	na	na	na	na	na	na	na	na	0.0021	0.0094	0.0069
<b>SHORE-BASED</b>															
CHINOOK (number of fish)	41	491	419	581	2954	651	1482	1699	1696	3306	2627	1062	425	4206	4018
WHITING (mt)	20359	49092	41926	72367	73397	84680	87499	87627	83388	85563	73326	45276	51061	89670	97378
RATE: (# chinook/mt whiting)	0.0020	0.0100	0.0100	0.0080	0.0402	0.0077	0.0169	0.0194	0.0203	0.0386	0.0358	0.0235	0.0083	0.0469	0.0413
<b>TOTAL ALL FISHERIES</b>															
CHINOOK (number of fish)	6206	5353	5262	4207	14533	3803	5404	5261	10584	11513	6154	3759	6512	8751	11916
WHITING (mt)	217264	201540	141029	251440	175556	212454	233511	232588	224453	206471	173857	130003	141885	215176	259196
RATE: (# chinook/mt whiting)	0.0286	0.0266	0.0373	0.0167	0.0828	0.0179	0.0231	0.0226	0.0472	0.0558	0.0354	0.0289	0.0459	0.0409	0.0460

\* NOTE: 1991-1997 is based final inseason data files and may vary from estimates derived from NORPAC data. Shoreside data updated from: Nottage and Parker 2005.

2002 shore-based landings does not include 432 mt of whiting or salmon taken in trip limit fishery

2003 shore-based landings does not include 195 mt of whiting or salmon taken in trip limit fishery

2004 shore-based landings does not include 1,644 mt of whiting or salmon taken in trip limit fishery - first year of video monitoring at-sea

2005 shore-based landings does not include 310 mt of whiting or salmon taken in trip limit fishery

So, although the bycatch of Chinook in the 2005 whiting fishery did exceed 11,000, NMFS concludes that prior consultations had expected such occurrences, at least on occasion, and were therefore considered during the prior jeopardy determinations. Jeopardy determinations in prior opinions also considered information related to the status of the listed species, the effects of the action, the environmental baseline, and cumulative effects. Information related to the status of the species most likely to be affected by the fishery is discussed above. Other information in the referenced opinions is also incorporated by reference.

The 1999 biological opinion (NMFS 1999) considered the effects on virtually all of the currently listed salmonids, with Lower Columbia River coho being the exception. (Lower Columbia River coho were listed as threatened in 2005.) The 1999 opinion concluded the bycatch of salmonids in the whiting fishery was almost exclusively Chinook salmon, with little or no bycatch of coho, chum, sockeye, or steelhead. An update to the information related to the bycatch of salmonids confirms the prior conclusion (Table 3). Sockeye and steelhead are rarely caught. The bycatch of coho and chum has averaged 250 and 114, respectively, per year coast wide, levels that are considered insignificant.

The opinion further concluded that, of the listed Chinook ESUs, those most likely to be subject to more than just an occasional take were Snake River fall Chinook, Upper Willamette River Chinook, Lower Columbia River Chinook, and Puget Sound Chinook. NMFS reviewed the status of these ESUs as related to the whiting fishery in 2002 as part of its review of events from the 2000 and 2001 fisheries (NMFS 2002). More recent status reviews of Snake River, Upper Willamette, and Lower Columbia River Chinook are included in a biological opinion on fisheries proposed in the Columbia River for 2005-2007 (NMFS 2005a). The status of Puget Sound Chinook is summarized in the evaluation and determination document for the Resource Management Plan that was considered under section 4(d) (NMFS 2005b). These status summaries are incorporated by reference.

The first question related to events in the 2005 fishery was whether the higher bycatch observed in 2005 suggests the need to change the no jeopardy conclusion from prior biological opinions. NMFS concludes that bycatch rates of salmon in the whiting fishery resulting from implementation of the whiting fishery as described in the Groundfish FMP are consistent with expectations considered during prior consultation. Chinook bycatch has averaged about 7,300 over the last 15 years and only occasionally exceeded the reinitiation trigger of 11,000. Since 1999 when NMFS completed the current opinion, Chinook bycatch has averaged about 8,450. The status of the Chinook ESUs most likely to be affected by the whiting fishery has generally improved since the 1999 consultation. Although these species remain at risk as indicated by their threatened listing, NMFS concludes that the higher observed bycatch in 2005 does not require a reconsideration of its prior no jeopardy conclusion with respect to the fishery.

### *Minimizing the Bycatch of Chinook in the Whiting Fishery*

The second issue that is relevant here is how to minimize the bycatch of Chinook in the whiting fishery to the maximum extent possible and thereby ensure that the bycatch remains within the specified limits both annually and over the long term. The need to minimize Chinook bycatch is required by the ESA to ensure that implementation of the Groundfish FMP remains consistent with the terms of the biological opinion's incidental take statement. Minimizing bycatch is also a primary objective of the Magnuson-Stevens Act's National Standard 9: "Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." Because NMFS is both the action agency responsible for implementing the Magnuson-Stevens Act, and the consulting agency responsible for ESA review, it has an interest and responsibility under both statutes for minimizing bycatch.

As a result of the previous consultations, the whiting fishery is already subject to several conservation related constraints designed to minimize the bycatch of Chinook salmon in particular (NMFS 1999):

- Targeted harvest of whiting is restricted shoreward of 100 fathoms (183 m) in the Eureka catch area (40°30' – 43°00' N. lat.) year round
- The start of the at-sea whiting fishery north of 42°00' N. lat. is delayed annually until at least May 15.
- At-sea processing and night fishing (midnight to one hour after official sunrise) are prohibited south of 42°00' N. lat.
- All whiting fishing is prohibited within the nearshore Klamath and Columbia River Salmon Conservation Zones.
- Shore-based fishing is allowed beginning April 1 between 40°30' and 42°00' N. lat., but only 5% of the shore-based allocation may be taken prior to the opening of the main shore-based fishery on June 15.

The whiting fishery is also subject to intensive inseason monitoring through various Federal, state, Tribal, and industry programs. The primary monitoring programs include the Shoreside Whiting Observation Program (SWOP), and the North Pacific Groundfish Observer Program (NPGOP) for the at-sea fishery sectors.

In 1997, participants in the catcher/processor sector of the Pacific whiting fishery formed the Pacific Whiting Conservation Cooperative (PWCC) to reduce the bycatch and increase yields from the harvest of Pacific whiting. The PWCC members also voluntarily set up an information sharing system to help avoid bycatch "hotspots." The program is managed by Sea State, a private sector firm specializing in fisheries data collection and analysis. PWCC members report catch and bycatch data electronically to Sea State. Sea State collates the data and reports back to PWCC vessels on a "real time" basis, advising vessel captains to avoid areas in which high bycatch is likely to occur. Each PWCC member vessel is required to carry two federal fishery observers to monitor catch and bycatch. PWCC members bear the cost of observer coverage. PWCC assesses a tonnage fee from its members, which is used to fund scientific research, including stock assessment and bycatch avoidance programs.



NMFS and whiting industry participants took additional actions to reduce salmon bycatch in 2005 in response to the reports of high Chinook bycatch. During 2005, the catcher/processor fleet voluntarily confined their fishery to areas seaward of 100 fathoms. In response to NMFS' July 18, 2005 letter advising the industry of the 2005 Chinook bycatch problem (Freese 2005a), the catcher/processor fleet indicated that they would voluntarily fish seaward of 150 fathoms for the remainder of the year (Waldeck 2005). The area shoreward of 100 fathoms was closed by emergency rule on August 27, 2005. The Makah Tribal fishery is confined to their Usual and Accustomed fishing area (north of 42°02'15" N. lat., and east of 125°44' W. long.,) and therefore has less flexibility to move offshore or to other areas to avoid salmon. However, they experimented in 2005 with a salmon excluder device that may help them reduce bycatch in the future. By November 2005, it had become apparent that the mothership sector had about 7,000 mt of unused whiting allocation that could be reallocated to other sectors of the fleet. NMFS received inquiries indicating that the catcher/processor sector at least would be interested in reallocation. NMFS decided not to reallocate the unused portion of the whiting quota largely because the 11,000 Chinook reinitiation trigger had already been exceeded. The agency had made a similar decision not to reallocate in 2000 in response to higher than usual salmon bycatch (Robinson 2002).

NMFS has previously reviewed the circumstances related to the high bycatch of Chinook in the whiting fishery (Dorn 1995, Robinson 2002). Two general observations emerged. First, much of the bycatch occurs in relatively few tows. When NMFS reviewed fishery information after both the 1995 and 2000 high bycatch events, it found that approximately 1% of the tows had accounted for more than one third of the total bycatch. For the catcher/processors and non-Tribal motherships from 2001-2005, 22% of sampled hauls had one or more Chinook salmon. Although the statistics are not identical to those from the earlier reports, they continue to reflect that much of the bycatch occurs in relatively few hauls. The results are different for the Tribal fishery, where 66% of sampled hauls included one or more Chinook salmon.

The second general observation was that higher bycatch tows tend to occur in shallow water. Industry representatives have consistently reported that fishing shallow, generally shoreward of 100 fathoms (183 m), increases the risk of high bycatch tows (Robinson 2002). Recent observations continue to show higher bycatch inshore for the catcher/processors and motherships. A similar depth effect is not apparent in the Tribal fishery (Table 5). As a result, the catcher/processors began the season by voluntarily limiting their tows to areas seaward of 100 fathoms. Nearshore closures impose additional costs to the other sectors of the fleet. The Tribal fishery is confined geographically. The shorebased fleet in particular tends to fish closer to shore largely because of the time savings and fuel costs associated with moving offshore. As a result, the bycatch rate tends to be higher in the shorebased fishery.

Table 5. Bycatch rate of Chinook salmon (Chinook/metric ton whiting) in the mothership and catcher/processor and Tribal sectors by depth.

Depth Interval (Fathoms)	2001-2005 Average	
	Catcher/Processor and Mothership	Tribal
< 100	0.096	0.136
100 – 199	0.033	0.140
200 - 299	0.006	0.043
> 300	0.004	0.121

Another pattern that is apparent from recent observation is that bycatch rates tend to be highest early in the season. The at-sea portion of the fishery starts on May 15. Chinook bycatch rates were highest in May, declined in the month of June, and remained at low levels through the remainder of the season (Table 6). The main portion of the shoreside fishery in the area north of 42°00' N. lat. begins on June 15. Chinook bycatch rates declined through the first three weeks of the 2005 fishery and stabilized at lower levels thereafter (Table 7). Note that the overall bycatch rates in the shoreside fishery were higher than for the at-sea fishery in 2005. As discussed above, the shoreside fishery tends to fish closer to shore to reduce operating costs. But as a consequence, bycatch rates in the shoreside fishery tend to be higher overall.

Table 6. Bycatch rate of Chinook salmon (Chinook/metric ton whiting) in the mothership and catcher/processor sectors by month.

Month	2001-2005 Average	2005
May	0.047	0.068
June	0.026	0.022
July	0.007	0.001
August	0.001	0.000
September	0.001	0.000
October	0.004	0.001
November	0.007	0.011

Table 7. Bycatch rate of Chinook salmon (Chinook/metric ton whiting) in the shoreside sector by week.

<b>Week</b>	<b>Chinook Salmon Bycatch (Chinook/metric ton whiting)</b>
6/12 to 6/18	0.192
6/19 to 6/25	0.104
6/26 to 7/2	0.045
7/3 to 7/9	0.017
7/10 to 7/16	0.035
7/17 to 7/23	0.021
7/24 to 7/30	0.022
7/31 to 8/6	0.010
8/7 to 8/13	0.024
8/14 to 8/20	0.016

NMFS previously considered whether high bycatch events were associated with higher Chinook abundance, but there does not appear to be an obvious or consistent correlation (Robinson 2002). Chinook stocks returning to the Oregon coast and Columbia River were up substantially from prior years during the period from 2001-2004 (CTC 2005). Returns of Chinook stocks coast-wide in 2005 were down from the most recent years coast-wide and much lower than preseason forecasts further supporting the idea that Chinook bycatch and abundance are not closely related.

Finding other patterns related to the Chinook bycatch is complicated by the dynamic nature of the ocean, which affects the distribution and abundance of whiting, salmon, and other species. Events related to the high bycatch in 2000 were summarized in the 2002 consultation (Robinson 2002). It was apparent at the time that ocean productivity had increased beginning in 1999. Forage fish that are prey for both salmon and whiting (e.g. herring and anchovy) had increased dramatically. Salmon ocean survival rates had correspondingly increased, as indicated by the dramatic increases in adult returns to areas like the Columbia River Basin. The colder waters off the West Coast had also truncated the migration of whiting north along the West Coast. This is evidenced by the shortfall of catch in the Canadian whiting fishery. In the past, the Canadian fishery off the West Coast of Vancouver Island had routinely taken its full allocation of whiting. In 2000 and 2001, the Canadians were only able take 25% and 65%, respectively, of their target whiting catch. The tribal fishery was also limited by the availability of whiting in 2000 and 2001. The greater availability of forage fish was reported to have scattered the whiting into smaller schools. Dispersed distribution of the whiting seemed particularly problematic in 2000. Industry representatives reported greater difficulty in finding schools, and that the school densities were generally low. This resulted in more prospecting and a greater temptation to fish closer to shore, behavior that likely contributed to the higher bycatch in 2000.

By 2005, it was apparent that ocean productivity was again on the decline. Returns of Chinook in 2004 and particularly 2005 were down substantially from preseason

expectations. There was also very little upwelling off the Oregon and Washington coast in 2005 until weather patterns changed abruptly in mid-July. As a consequence, the ocean off the coast was uncharacteristically warm and clear early in the season when bycatch rates were highest, which may have affected the distribution of whiting and/or Chinook salmon. Although high bycatch events in 2000 and 2005 were associated with anomalous ocean conditions, the anomalies were quite different with more productive cold water in 2000 and less productive warm water in 2005. Identifying causative factors for high bycatch events related to ocean conditions continues to be unsuccessful. Perhaps the best hypothesis at this time is that anomalous ocean conditions affect the distribution of Chinook and whiting in ways we do not really understand, but nonetheless increase the likelihood of high bycatch tows.

#### *Additional Management Actions to Reduce Chinook Bycatch*

As discussed above there are already a number of management actions in place that are designed to minimize the bycatch of salmon in the whiting fishery. As indicated in Table 3, the bycatch of Chinook salmon has averaged less than 7,300 fish annually over the last 15 years while exceeding the 11,000 fish trigger in just three years. The Council has therefore largely been successful at keeping the bycatch well below the reinitiation trigger. Nonetheless, NMFS will continue to consider and implement management measures designed to minimize bycatch to the extent practicable through its authority under the Magnuson-Stevens Act to implement the Groundfish FMP. Based on the events in 2000 and 2005, it is apparent that the likelihood of exceeding the 11,000 fish trigger could be reduced further by providing the management authority to respond inseason when it becomes apparent that bycatch rates are too high. The emergency rule procedures used in 2005 are not an appropriate remedy for problems that can be reasonably anticipated. Other considerations aside, an emergency action can take several weeks to implement, which reduces its utility as a tool for actions that may need to be implemented more quickly. NMFS concludes that developing additional regulatory authority is necessary and appropriate. For 2006, NMFS will use existing mechanisms to provide for a nearshore closure of the shorebased whiting fishery that can be implemented if necessary. NMFS will work through the Council to develop similar inseason authority that will be applicable to all sectors of the whiting fishery for the 2007-2008 biennial cycle and beyond, and also consider other management options designed to minimize the bycatch of salmon.

The shorebased whiting fishery has been managed in recent years subject to the terms of an Experimental Fishing Permit that is issued by NMFS. The primary purpose of the permit in recent years has been to evaluate and implement a program for monitoring bycatch through the use of on-board recording cameras. A similar permit will be issued for the 2006 fishery. All vessels that participate in the shoreside whiting fishery are subject to the terms of the permit. A provision of that permit will provide for the immediate closure of fishing for whiting shoreward of 100 fathoms if and when NMFS determines that the bycatch of Chinook is likely to exceed the 11,000 Chinook bycatch trigger. This inseason provision will apply only to the shoreside fishery in 2006. However, as discussed above, the shoreside vessels tend to fish closer to shore for logistical reasons and, as a consequence, typically have higher Chinook bycatch rates (see

Tables 6 and 7). If a nearshore closure is imposed on the shoreside fishery, NMFS expects that other sectors would comply voluntarily as they have in the past. If necessary, NMFS could again seek to close the nearshore areas to all whiting directed fishing through an emergency rule.

NMFS does not intend to single out the shoreside fishery. However, current regulations for the 2005-2006 biennium do not provide for inseason closures of nearshore areas in the whiting fishery. To provide authority that will apply to all sectors in the future, NMFS will propose that such regulations be developed for the 2007-2008 biennial cycle. NMFS will introduce the proposed regulations as part of the biennial planning cycle in February and March of 2006. Working through the Council process to implement these regulations is appropriate to provide notice to the affected participants and the opportunity to work with them to ensure that regulations are reasonable and effective. The Council has already indicated its willingness to use depth-based management measures to constrain catch of protected species taken incidentally in the groundfish fisheries via its recent Amendment 18 to the Groundfish FMP.

NMFS concludes that development of the regulatory authority for inseason nearshore closures will significantly reduce the likelihood of the fishery exceeding the 11,000 fish reinitiation trigger in the future. However, there may be additional options for achieving the same objective that could be used instead of, or in addition to, the inseason nearshore closure authority. One alternative that NMFS will propose for Council consideration is implementation of a hard bycatch limit that would couple a four-year running average of 11,000 with a year-specific cap of 14,000, or some similar construction. Under such a limit, the bycatch may be as high as 14,000 in any one year, but would also be constrained such that the average bycatch in the current year and previous three years may not exceed 11,000. This would provide some flexibility to account for interannual variability, and strong incentives to keep bycatch as low as possible in all years, since the consequence of hitting such a cap would be a fishery wide closure. Such a rolling average cap would also resolve the ambiguity associated with the current biological opinion that requires reinitiation of consultation if bycatch exceeds 11,000, but without establishing a clear annual limit. From an ESA perspective, limiting the bycatch to an average that can not exceed 11,000 would be consistent with the intent of the current opinion on the Groundfish FMP, and biological opinions on other actions that incorporate, as part of the environmental baseline, assumptions about takes that are expected to occur in other actions including that on the Groundfish FMP. NMFS has not concluded that the above described cap structure is necessary, but will propose it for consideration through the 2007-2008 planning cycle and encourage the industry to propose other ideas. NMFS will evaluate alternatives for limiting bycatch to ensure that they are consistent with ESA requirements, and provide clear guidance regarding bycatch limits, incentives to keep bycatch low, and flexibility that allows the industry discretion to manage the fishery within reasonable limits.

As discussed above, NMFS concludes that the bycatch of Chinook in the whiting fishery has generally been consistent with expectations articulated in prior biological opinions. Chinook bycatch has averaged 7,300 over the last 15 years, and about 8,460 since 1999.

However, it is also apparent that more can be done to further reduce the likelihood of high bycatch events by developing regulatory authority to take inseason management actions. Other options for further reducing bycatch will also be considered through the process for developing regulations for the 2007-2008 biennium. Consideration of future regulatory actions is obviously speculative to a degree, although NMFS is the agency responsible for implementing such regulations. However, even if we disregard these additional actions that might be implemented later, management actions taken previously and additional actions that will be taken in 2006 provide reasonable assurance that the bycatch of Chinook in 2006 and beyond will remain within the limits described in the incidental take statement.

#### Limited Entry Bottom Trawl Fishery

NMFS estimated the incidental bycatch of salmon in the bottom trawl fishery in its 1992 biological opinion (NMFS 1992) as 6,000 to 9,000 annually, with 5,000 to 8,000 taken in the Vancouver and Columbia catch areas (waters north of 43° N. lat.) Estimates of the bycatch of Chinook salmon in the bottom trawl fishery for 2002-2004 were 18,120, 13,862, and 1,978, respectively. (As discussed below, virtually all of the salmon caught were Chinook salmon.) NMFS is therefore also reinitiating its consultation on the Groundfish FMP because these recent year estimates of bycatch in the bottom trawl fishery exceeded those specified in the incidental take statement.

The circumstances related to our understanding of salmon bycatch in the bottom trawl fishery are very different from those of the whiting fishery. The whiting fishery is a comparatively simple single-species target fishery. For the whiting fishery, we have 15 years of information and experience, and therefore a reasonable understanding about the magnitude and characteristics of salmon bycatch in the fishery. Management actions related to bycatch have been reviewed and revised on several occasions through prior consultations. Based on that understanding, NMFS will implement additional management actions to reduce bycatch in the whiting fishery as discussed above. The whiting fishery also has a monitoring program that provides estimates of bycatch that allow for inseason tracking and management of the fishery.

Our understanding of bycatch in the bottom trawl fishery is comparatively limited. The trawl fishery targets several species and uses different gear configurations and fishing strategies. NMFS first developed estimates of salmon bycatch in the bottom trawl fishery through its consultation in 1992 (NMFS 1992). Those estimates were extrapolated from two coast-wide research studies, one related to discards conducted from 1985-1987, and a second related to mesh size conducted from 1988-1990. These were the only relevant data sources until NMFS began placing observers on bottom trawl vessels in August 2001. Estimates of salmon bycatch from the observer program have just recently become available. Unlike the whiting monitoring program, the observer program for the bottom trawl fishery is not designed to provide inseason estimates of bycatch. Instead, estimates will generally be available in September or October of the year following, so October 2006 for the 2005 catch year.

In many ways, and particularly relative to the whiting fishery, we are just beginning to learn about the characteristics of salmon bycatch in the bottom trawl fishery. The purpose of this review is to describe what we know about bycatch based on the best available information, describe expectations for salmon bycatch in the near future, and outline a program for advancing our understanding to the point where effective regulatory action can be taken to reduce bycatch, if necessary. It is also necessary to consider whether the prior no jeopardy conclusion with respect to the bottom trawl fishery, as part of the Groundfish FMP, remains valid.

*Characteristics of Salmon Bycatch in the Limited Entry Bottom Trawl Fishery*

As a preliminary step in describing what we know about salmon bycatch it is useful to review information related to the sampling design in the discard and mesh size studies, the nature of changing regulations during the 2002-2004 fishery, and the chronology of changes in groundfish landings and effort in the bottom trawl fishery. The initial estimates of salmon bycatch were developed from the 1985-1987 discard study and 1988-1990 mesh size study. Sampling in the mesh size study was conducted in all four quarters of the year, but only as far south as south-central Oregon (Table 8, Figure 1). Sampling in the mesh size study occurred only in the third and fourth quarters, but included observations south to central California. The distribution of sampling effort may have influenced our estimates of bycatch.

Table 8. Sampling effort (number of tows) by quarter and area in the 1985-1987 discard and 1988-1990 mesh size studies.

PSMFC Area	INPFC Area	Discard (1985 to 1987)				Mesh Size (1988 to 1990)			
		1	2	3	4	1	2	3	4
3B	Vancouver	13	15	22	13	-	-	232	65
3A	Columbia	49	12	95	74	-	-	101	52
2C	Columbia	45	89	240	100	-	-	115	113
2B	Columbia	46	34	85	95	-	-	115	22
2A	Eureka	5	2	-	-	-	-	25	25
1C	Eureka	-	-	-	-	-	-	40	11
1B	Monterey	-	-	-	-	-	-	23	69
1C	Conception	-	-	-	-	-	-	-	8

The magnitude and distribution of bycatch in the trawl fishery from 2002-2004 was affected by significant changes in regulation and management of the fishery. Between 1999 and 2002, NMFS declared eight groundfish species as overfished pursuant to the Magnuson-Stevens Act: lingcod, Pacific ocean perch, and bocaccio in 1999; canary rockfish and cowcod in 2000; darkblotched rockfish and widow rockfish in 2001, and; Pacific whiting and yelloweye rockfish in 2002. Pacific whiting and lingcod have subsequently been rebuilt. Efforts to limit the catch of darkblotched rockfish with traditional management tools proved particularly difficult. In response, the Council began to implement large-scale marine area closures to minimize incidental catch of overfished groundfish. In September 2002, NMFS implemented the first depth-based

marine closed area, called Rockfish Conservation Areas (RCAs,) to constrain incidental catch of darkblotched rockfish. Since that time, NMFS has used a variety of gear-specific RCAs along the entire length of the U.S. West Coast, intended to constrain the incidental catch of overfished species. Under RCA management, sections of the coast may be closed, for example, to fishing with trawl gear between boundary lines approximating the 100 fathom and 250 fathom depth contours. The depth range of the Trawl RCA has varied from month-to-month (Table 9). RCA closures were always coupled with other management provisions including trip limits, catch quotas, and other gear and area limitations. The last several years have been a period of significant change for the fishery as it has had to adjust to the need to manage under the strict harvest limits for a complex of overfished species. The evolution and testing of RCAs and other regulatory strategies is ongoing, but the time from 2002-2004 in particular was a period of change with respect to fishery management and regulation.

Table 9. Rockfish Conservation Areas (in fathoms) north of 40° 10' N. lat applied to the bottom trawl fishery by month.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2001												
2002									Shore-250	100-250	100-250	100-250
2003	100-250*	100-250*	100-250	100-250	50-200	50-200	75-200	75-200	50-200	50-200	Shore-200*	Shore-200*
2004	75-200*	75-200*	60-200	60-200	60-150	60-150	75-150	75-150	75-150	Shore-250	Shore-250	Shore-250
2005	75-200*	75-200*	100-200	100-200	100-200	100-200	100-200	100-200	100-200	Shore-250	Shore-250	Shore-250

\*Line modified for Petrale Areas.

Finally, it is worth noting that landings and effort in the bottom trawl fishery have declined substantially over the last 15 years (Table 10). The reductions have occurred in response to declining abundance and increasing regulatory efforts to reduce bycatch of stocks of concern. Effort reductions in the last couple of years are also the result the December 2003 trawl permit and vessel buyback program. For this program, Congress had appropriated both a grant and a loan to the industry to purchase vessels and permits back from fleet participants, with the intention of reducing the number of trawl participants in the bottom groundfish fleet. With the funds provided, NMFS was able to purchase 91 trawl vessels and their state and Federal permits, reducing the number of bottom trawl fishery participants by 35%.



Table 10. Effort and catch in the bottom trawl fishery since 1991.

Year	Bottom Trawl (Hours)	Bottom Trawl Groundfish (lbs.)
1991	226,110	162,879,710
1992	232,420	150,392,935
1993	248,553	146,803,641
1994	197,715	119,542,746
1995	197,211	114,340,023
1996	195,419	133,220,662
1997	194,507	115,498,869
1998	147,622	101,432,827
1999	141,499	94,196,658
2000	111,537	54,264,110
2001	105,789	46,834,204
2002	99,728	44,928,953
2003	86,516	49,332,011
2004	65,750	44,539,265

Comparison of the salmon bycatch estimates from the discard and mesh size studies, and 2002-2004 observer program indicate that there were a number of common results. During the discard and mesh size studies, Chinook represented 94% and 98% of the salmon bycatch. From 2002-2004, virtually all of the salmon taken were Chinook with just a few tens of coho and chum taken per year (Table 11). As discussed above, Chinook were also predominant in the bycatch of salmon in the whiting fishery (Table 3).

Table 11. Annual bycatch of salmonids in the bottom trawl fishery.

Year	Salmonid Species				Total
	Chinook	Coho	Chum	Unidentified	
2002	18,120	44	20	177	18,361
2003	13,862	16	14	23	13,915
2004	1,978	60	4	15	2,057
<b>Average</b>	<b>11,320</b>	<b>40</b>	<b>13</b>	<b>72</b>	<b>11,444</b>

NMFS estimated from the discard and mesh size studies that the bycatch of Chinook salmon was on the order of 6,000 to 9,000 per year, with 5,000 to 8,000 likely taken in the Vancouver and Columbia management areas and an addition 1,000 taken off of

southern Oregon and California (see Figure 1). The estimates of Chinook bycatch were higher in 2002 and 2003, and substantially lower in 2004 (Table 12). The areas of highest bycatch were from Cape Falcon to Cape Blanco off the central Oregon coast in 2002 and 2003. The bycatch from southern Oregon to Cape Mendocino was high particularly in 2002, but was also high relative to the estimate of 1,000 fish per year from the discard and mesh size studies. One of the shortcomings of the earlier studies was that there was little sampling effort in the Eureka or Monterey catch areas. Whether the differences in bycatch estimates to the south were in fact lower or the result of limitations in the sampling is unknown.

Table 12. Bycatch of Chinook salmon in the bottom trawl fishery by year.

	2002	2003	2004
US Border to Cape Falcon	3,136	1,795	797
Cape Falcon to Cape Blanco	7,275	9,213	721
<b>Subtotal</b>	<b>10,410</b>	<b>11,008</b>	<b>1,518</b>
Cape Blanco to Cape Mendocino	7,075	2,624	392
Cape Mendocino to US Border	634	230	67
<b>Subtotal</b>	<b>7,710</b>	<b>2,854</b>	<b>460</b>
<b>Total</b>	<b>18,120</b>	<b>13,862</b>	<b>1,978</b>

Results from the discard and mesh size study indicated that bycatch was highest in the first and fourth quarters of the year. This is consistent with results from the recent studies. The data from 2002-2004 was divided by season into winter or summer categories. Winter included the months from January to April, and November to December; summer from ran from May to October. Table 13 shows bycatch and bycatch rates for the winter and summer periods by area and year. The highest bycatch occurred during the winter off the Oregon and northern California coast. Bycatch rates were nearly always highest during the winter, regardless of area or year, except in the area south of Cape Mendocino where bycatch rates were always relatively low. A more detailed inspection of the data indicates that virtually all of the winter bycatch occurs from January to April and that bycatch and bycatch rates were substantially lower in November and December.

Table 13. Bycatch of Chinook salmon and bycatch rate (Chinook/mt groundfish) in the bottom trawl fishery by season.

Year and Area	Chinook			Rate		
	Winter	Summer	Total	Winter	Summer	Total
<b>2002</b>						
US Border to Cape Falcon	1,630	1,506	3,136	0.41	0.14	0.22
Cape Falcon to Cape Blanco	7,198	76	7,275	3.66	0.05	2.04
Cape Blanco to Cape Mendocino	5,565	1,510	7,075	2.19	0.67	1.47
Cape Mendocino to US Border	225	410	634	0.08	0.14	0.11
<b>Total</b>	<b>14,618</b>	<b>3,502</b>	<b>18,120</b>			
<b>2003</b>						
US Border to Cape Falcon	1,058	738	1,795	0.31	0.11	0.17
Cape Falcon to Cape Blanco	9,173	39	9,213	3.76	0.01	1.73
Cape Blanco to Cape Mendocino	2,333	291	2,624	1.29	0.09	0.54
Cape Mendocino to US Border	77	153	230	0.03	0.05	0.04
<b>Total</b>	<b>12,641</b>	<b>1221</b>	<b>13,862</b>			
<b>2004</b>						
US Border to Cape Falcon	586	211	797	0.17	0.03	0.07
Cape Falcon to Cape Blanco	277	444	721	0.13	0.18	0.16
Cape Blanco to Cape Mendocino	372	21	393	0.32	0.01	0.12
Cape Mendocino to US Border	53	14	67	0.03	0.00	0.01
<b>Total</b>	<b>1,288</b>	<b>502</b>	<b>1,978</b>			

The 1992 opinion reported that virtually all of the salmon taken in the trawl fishery were from relatively shallow water. Only 1 salmon was reportedly observed from tows in water greater than 300 fathoms and there were very few taken in water greater than 100 fathoms. The observation that salmon tend to be taken most in nearshore areas was also consistent at the time with observations from the whiting fishery. There were some differences in the bycatch pattern related to depth in the 2002-2004 data. There was still very little bycatch reported seaward of 250 fathoms. But in 2002, the highest bycatch and bycatch rates occurred in depths from 125-250 fathoms at least in the area off the Oregon and northern California coast. In other areas and other years, bycatch and bycatch rates continue to be highest in the nearshore area (Table 14).

Bycatch of Chinook salmon in the trawl fishery is a relatively rare event with a few large tows accounting for a disproportionate share of the estimates of catch. Of all observed tows, between 5% and 6% have 1 or more Chinook salmon. Of these, about 40% have one Chinook. If we consider the various year, area, depth, and seasonal sampling strata, approximately 45% of all observed Chinook occur in the single largest tow for that stratum. For example, the estimated bycatch of Chinook in 2002, in the area from Cape Falcon to Cape Blanco, in the <125 fathom depth stratum is 2,207 (Table 14). Of 341 observed tows, 24 had one or more salmon. One tow had 179 salmon which accounted for 56% of all the observed salmon used to derive the estimate. The bycatch of salmon is characteristically infrequent and much of what does occur is accounted for by the rare

event where a single tow takes many salmon. The largest tows in a sampling stratum often have tens of fish, but on the rare occasion have a hundred or more.

Table 14. Bycatch of Chinook salmon and bycatch rate (Chinook/mt groundfish) in the bottom trawl fishery by depth.

Year and Area	Depth (Fathoms)							
	Chinook				Rate			
	< 125	125-250	> 250	Total	< 125	125-250	> 250	Total
<b>2002</b>								
US Border to Cape Falcon	2,792	320	24	3,136	0.26	0.15	0.02	0.22
Cape Falcon to Cape Blanco	2,207	5,068	0	7,275	1.53	5.48	0.00	2.04
Cape Blanco to Cape Mendocino	4,042	2,989	44	7,075	2.89	3.62	0.02	1.47
Cape Mendocino to US Border	584	51	0	635	0.56	0.03	0.00	0.11
<b>Total</b>	<b>9,625</b>	<b>8,428</b>	<b>68</b>	<b>18,121</b>				
<b>2003</b>								
US Border to Cape Falcon	1,521	275	0	1,796	0.25	0.12	0.00	0.17
Cape Falcon to Cape Blanco	6,246	2,932	34	9,212	3.99	1.60	0.02	1.73
Cape Blanco to Cape Mendocino	1,155	1,469	0	2,624	2.07	1.27	0.00	0.54
Monterey to US Border	230	0	0	230	0.29	0.00	0.00	0.04
<b>Total</b>	<b>9,152</b>	<b>4,676</b>	<b>34</b>	<b>13,862</b>				
<b>2004</b>								
US Border to Cape Falcon	662	129	6	797	0.11	0.04	0.00	0.07
Cape Falcon to Cape Blanco	454	264	3	721	0.72	0.13	0.00	0.16
Cape Blanco to Cape Mendocino	135	255	3	393	0.21	0.27	0.00	0.12
Cape Mendocino to US Border	61	6	0	67	0.14	0.00	0.00	0.01
<b>Total</b>	<b>1,312</b>	<b>654</b>	<b>12</b>	<b>1,978</b>				

One additional factor that may help reduce the bycatch of salmon in the future is the use of selective flatfish gear. A portion of the bottom trawl fishery targets flatfish in nearshore areas particularly north of 40° 10' N. lat. In 2003, the industry began experimenting with a net design with a modified headrope that was cut back to allow rockfish to escape. The modified net was designed to take advantage of behavioral differences between flatfish, which tend to dive when startled, and rockfish that swim upwards. It is possible that the selective flatfish gear will provide a similar advantage for

salmon, although there is insufficient observational data at this time to test whether the nets do in fact reduce salmon bycatch. Selective flatfish gear was used on an experimental basis in 2004, and voluntarily by some fishermen. In 2005, use of the gear was required in all areas north of 40° 10'. NMFS expects that the gear will continue to be required in the future because of the demonstrated benefits for reducing bycatch of rockfish. If the gear is effective at reducing salmon bycatch it may prove quite beneficial, since the flatfish fishery occurs nearshore and in areas off the northern California and Oregon coast where salmon bycatch rates have been highest.

*Expectations for Salmon Bycatch in the Trawl Fishery in 2005 and Beyond*

As described above, there remains considerable uncertainty about the bycatch of salmon in the bottom trawl fishery. The recent observations and associated analysis provide new information that allow us to characterize better the factors that affect bycatch in the fishery. But patterns are confounded by the complexity of the fishery, and because the data was collected during a period when fishery management and regulation was undergoing significant change. As information accumulates from subsequent fishing years and as management stabilizes, our understanding should develop to the point where bycatch can be projected with greater confidence and targeted regulatory actions can be taken to reduce bycatch, if necessary. To facilitate the required learning about salmon bycatch, NMFS will provide an annual report of salmon bycatch and the characteristics of its timing and distribution. Reports from the bottom trawl observer program are available on or about October 1 of the year following the fishery. An expanded analysis, comparable to that provided for this review, will be completed by NMFS by the end of the calendar year. By the end of 2008, there will be three additional years of data. NMFS will then conduct a comprehensive review of salmon bycatch information for the 2002-2007 fishing years.

In the meantime, it is necessary to characterize the expected catch of salmon for the years 2005-2007. The incidental take statement of the 1999 biological opinion indicated that the expected bycatch of salmon would be in the range of 6,000-9,000 annually. The bycatch of salmon in 2002 and 2003 was substantially higher than 9,000; the bycatch in 2004 was substantially lower. However, NMFS concludes that a bycatch of 9,000 salmon per year remains an appropriate bench mark that can be used to assess the need for further regulatory action in the fishery.

In the whiting fishery, awareness by the industry that salmon bycatch was an important management concern led to a series of voluntary and mandatory management actions directed at reducing bycatch. Changes occurred as a result of continued attention to the salmon bycatch issue and an ongoing dialog with the industry. A comparable dialog with the bottom trawl industry will start now with the distribution of this supplemental biological opinion and associated conversation through the upcoming 2007-2008 biennial management planning cycle. The process of ongoing review will continue in association with development of the annual reports on bycatch and the three year summary at the end of 2008. The 2005 fishery is obviously already over, but efforts by the industry to address bycatch henceforth relative to the 9,000 fish bench mark may diminish the need for salmon-specific regulatory action in the future.

## Conclusion

The purpose of this supplemental biological opinion is to consider whether it is necessary to revise the no jeopardy conclusion regarding the Groundfish FMP from the 1999 biological opinion in light of recent events in the whiting fishery and/or bottom trawl fishery, or change the associated Incidental Take Statement. As discussed above with respect to the whiting fishery, the bycatch of Chinook exceeded the 11,000 fish reinitiation trigger in 2005. However, NMFS concluded that the higher bycatch observed in 2005, and generally over the last 15 years, was consistent with expectations articulated in prior opinions and used to arrive at the no jeopardy conclusion (i.e., that Chinook bycatch would vary over time, would generally be less than 11,000, but might also exceed 11,000 at least occasionally). Bycatch in the trawl fishery also exceeded expectations, particularly in 2002 and 2003. However, the biological opinion is ultimately about implementation of the Groundfish FMP. The incidental take statement in the 1999 opinion describes the expected bycatch as 6,000-9,000 and 11,000, respectively for the trawl and whiting fisheries. The bycatch of Chinook salmon in the combined fisheries in 2002-2004 was 21,879, 20,380, and 10,679. The total bycatch was therefore only marginally higher than the expected total in two of the three years, and substantially less in the third.

NMFS concluded in previous opinions that the effects to the ESA listed sockeye, coho, chum and steelhead were negligible. Of the listed Chinook ESUs NMFS concluded that four (Snake River fall Chinook, Lower Columbia River Chinook, Upper Willamette Chinook, and Puget Sound Chinook) were the ones most likely to be subject to measurable impacts. Qualitative characterizations of these impacts ranged from rare to exploitation rates that ranged from a “small fraction of 1% per year” to “less than 1% per year” depending on the ESU or populations being considered.

Information reviewed in this supplemental opinion indicated that more bycatch, in the bottom trawl fishery in particular, was shifted south into northern California than was previously thought. The shift in bycatch increased the likelihood of encountering listed Chinook from California. This supplemental opinion therefore also included information summarizing the status of Sacramento River winter-run Chinook, California Coastal Chinook, and Central Valley spring-run Chinook. The status information for all of the ESUs indicated that most of the component populations had increased significantly over the last ten years, although a few had remained stable. Although the status of these ESUs has generally improved, developing viability criteria available for some ESUs through the recovery planning process indicate that all populations still require further improvements before reaching viability.

NMFS concludes that Chinook bycatch in the groundfish fisheries will continue to be managed within the overall limits articulated in the Incidental Take Statement of the 1999 biological opinion. The whiting fishery has, on average, been well below the 11,000 Chinook level. As described above, the additional management actions that are being implement in 2006 will further reduce the likelihood of exceeding 11,000 in any one year. Additional management actions are being considered for the 2007-2008 biennium

and beyond that would provide another increment of management control. However, even without these additional management controls, management actions taken previously, and additional actions that will be taken in 2006, provide reasonable assurance that the bycatch of Chinook in 2006 and beyond will remain within the limits described in the Incidental Take Statement.

We know less about the characteristics of salmon bycatch in the bottom trawl fishery. Ordinarily, we have established a schedule and process for collecting necessary information and will work with the industry to keep bycatch within prescribed limits through voluntary actions to the degree possible or regulatory actions if necessary. Based on these and other above described considerations, NMFS reaffirms its prior determination that implementation of the Groundfish FMP is not likely to jeopardize the continued existence of any of the affected ESUs. NMFS further concludes that the Incidental Take Statement in the 1999 biological opinion continues to characterize adequately the level of Chinook bycatch expected to occur as a result of implementing the Groundfish FMP.

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