

## 5 Status Determination Criteria for West Coast Salmon

The following description provides an overview of the process the Pacific Fishery Management Council (Pacific Council) and the NMFS West Coast Region use to specify biological management and references points. This is intended as a brief overview, as the specifics of salmon management in the Pacific region are complex, involving a large number of stocks, three States, Pacific Treaty Obligations with Canada, tribes, hatchery fish, and ESA requirements. The overview describes the process used by the Pacific Council to prevent overfishing as required under NS1 of the Magnuson-Stevens Act.

The following topics are specifically covered in the discussion paper, noting that future analysis would need to relate these issues to Alaska-specific situations:

- Management objectives and definition of managed stocks
- Annual management process and NEPA
- Catch limits and status determination criteria
- Management and accountability measures
- Inseason management

### 5.1 Managed Stocks

The Magnuson-Stevens Act requires FMPs contain a description of the fishery, including the species of fish and their locations. The Pacific coast salmon FMP (PCFMP) covers recreational and commercial fisheries that occur within the EEZ and off the coasts of the Oregon, Washington, and California. The PSFMP includes Essential Fish Habitat (EFH) designation in the marine areas with the EEZ and estuarine and freshwater habitat in the internal waters of Oregon, Washington, Idaho, and California. However, the PCFMP does not extend its authority to management in State waters (including EFH), but must account for mortality in state waters, and incorporate ESA issues, noting that the ESA may have requirements that reach into State waters (including inland waters). State, Pacific Salmon Treaty requirements, and tribal allocations are also considered in the PCFMP's management objectives and processes.

Stocks in the PCFMP are broadly categorized as stocks and stock complexes in or out of the fishery, and whether the stock or complex is a target or non-target, based on its importance in the ocean salmon fishery. Management objectives are provided in the PCFMP for salmon species that are measurably impacted by fisheries within the Council jurisdiction. Stocks caught in small amounts (termed "inconsequential") are considered non-target stocks for which management objectives are not provided. For example, no fishery management objectives are provided for chum, sockeye, steelhead, sea-run cutthroat, or spring run Chinook from the mid-Columbia tributaries (i.e., White Salmon, Klickitat, Yakima, Deschutes, John Day, Umatilla, and Walla Walla basins).

The PCFMP partitions the coastwide aggregate of Chinook, coho, pink, and those salmon into various stock components and stock complexes with specific management objectives. While all species of salmon fall under the plan, fishery management objectives are only set for certain runs of Chinook, coho, pink (odd-numbered years), and those salmon listed under the ESA. These stocks include both hatchery and non-hatchery stocks, with hatchery stocks relying solely on propagation and non-hatchery stocks have at

least some component of the stock that relies on natural production, although some hatchery production and naturally spawning fish may contribute to abundance and spawning escapement estimates.

Stock complexes are groups of stocks of sufficient similarity in geography, life history, and vulnerabilities to the fishery such that management actions on the stocks are similar. Stock complexes are created to facilitate management requirements, such as setting ACLs in a mixed stock fishery. A stock complex contains multiple stock components, with management of the stock components considered in the conservation objective and ultimately in the harvest control measures. For example, comparing **Table 5-1** with **Table 5-2**, the Central Valley Fall Chinook Stock complex has component stocks of Sacramento River fall, Sacramento River late fall, and San Joaquin River fall runs. The methods used to relate these stocks to the conservation objectives and status determination criteria are described in **Table 5-2**. The PCFMP describes these stocks, indicating whether ESA consultation or international treaty exceptions apply and catch limits are established set under non- Magnuson-Stevens Act authorities (i.e., Pacific Salmon Treaty). Of note is that only three stocks out of 32 total stocks (or stock complexes) have requirements for ACLs. All other stocks are managed under other authorities such as limits set through ESA consultation, an international treaty, or of hatchery origin.

The PCFMP also defines “Ecosystem Species” that are shared with other FMPs. Directed fishing for these species is prohibited until the Council has had an adequate opportunity to assess potential impacts to existing fisheries, communities, and the marine ecosystem. These species include two species of herring, sand lance, Pacific saury, silversides, smelts, and pelagic squids. No salmon species are EC components.

**Table 5-1 Excerpt from PCPCFMP Chinook stock designation Table 1-1. This is table 1 of 4 for Chinook, and separate tables are used for each species in the fishery.**

Stocks and Complexes In The Fishery		Description	Target/Non-Target
Stock or Stock Complex	Component Stocks		
<b>Central Valley Fall Chinook Stock Complex</b>		Fall and late fall Chinook from the Sacramento and San Joaquin basins; the indicator stock is Sacramento River Fall Chinook.	
	Sacramento River Fall	Primarily hatchery stock with smaller natural component. Single largest contributor to ocean fisheries off California, a significant contributor off southern and central Oregon, and present north into British Columbia. Primary impact south of Pt. Arena; considerable overlap with coastal and Klamath River fall Chinook between Pt. Arena and Horse Mt.	Target
	Sacramento River Late Fall	Natural and hatchery components from upper Sacramento basin. Minor contributions to ocean fisheries.	Target
	San Joaquin River Fall	Natural and hatchery components. Minor contributions to ocean fisheries.	Target
Sacramento River Spring		ESA-listed Threatened. Minor contributions to ocean fisheries off California, also known to occur off Oregon.	Non-Target ESA
Sacramento River Winter		ESA-listed Endangered. Minor contributions to ocean fisheries south of Pt. Arena.	Non-Target ESA
California Coastal Chinook		ESA-listed Threatened. Eel, Mattole, Mad Rivers fall and spring stocks. Minor contributions to ocean fisheries off northern California and southern Oregon.	Non-Target ESA
<b>Southern Oregon Northern California Chinook Stock Complex</b>		Natural and hatchery stocks south of the Elk River, Oregon to, and including, the Klamath River, plus Umpqua River spring Chinook; the indicator stock is Klamath River fall Chinook.	
	Klamath River Fall	Natural and hatchery components from the Klamath basin. Major contributions to ocean fisheries from Humbug Mt. to Horse Mt. and to Klamath River tribal and recreational fisheries. Significant contributions to ocean fisheries from Cape Falcon to Pt. Sur.	Target
	Klamath River Spring	Natural and hatchery components from the Klamath basin. Minor contributions to ocean fisheries from Cape Falcon to Pt. Sur.	Non-Target
	Smith River	Natural spring and fall stocks from the Smith River basin. Minor contributions to ocean fisheries off northern California and Oregon.	Non-Target
	Southern Oregon Coast	Aggregate of natural and hatchery fall and spring stocks in all streams south of Elk River, plus Umpqua spring stock; Rogue River fall stock is used to indicate relative abundance and ocean contribution rates. Significant contributions to ocean fisheries off northern California and Oregon.	Target

## 5.2 Abundance Estimation

The ocean fisheries occur on mixed stock salmon fisheries with multiple age classes impacted by fishing activities. This requires adult equivalency models to forecast harvest scenarios and assess the impact of harvest on naturally spawning stocks. For salmon, adult spawner equivalents are the basis for abundance estimates used in the salmon PCFMP. Units used for forecasting abundance and the NS1 control rules are the number of would-be spawners represented, absent any fishing (i.e., how many spawners are potentially vulnerable to fishing mortality). The total abundance,  $N$ , used in the PCFMP control rules is pre-fishery ocean abundance discounted for natural maturity and maturation. This is different from adult equivalency in the catch (i.e., AEQ), which would account for mortality on multiple year classes, not just spawners returning to their natal stream or hatchery. Hatchery fish also play a big role in the accounting for removals and may constitute part of the natural spawners as well as fishery removals. In some situations, accounting and modeling methods are used in an attempt to assess these components.

The ocean fishery impacts, including the impacts of removals on spawning stocks, are evaluated each year in the preseason reports. The methods used to determine stock impacts (and ocean harvest levels) vary depending on the stock, ocean area fished, and the data available. Details on these methods are beyond this discussion paper; however, to provide a brief description of the potential complexity, the Klamath river model is a data rich situation and provides a general idea of the methods involved in assessing ocean harvest. The model is used annually for forecasting impacts on fisheries, and to forecast the expected number of natural spawners as a result of those fisheries (e.g., the Klamath Ocean Harvest Model- KOHM). The KOHM consists of projecting the age-specific (ages 3, 4, 5) preseason forecasted abundance through various ocean fisheries by month (see Mohr 2006). Thus, the ocean fishery impacts are assessing both in river returns and fishery impacts across cohorts using cohort reconstruction methods (a form of virtual population analysis). This modeling exercise requires fishing effort and removal estimates (e.g., fish ticket information), estimates of stock contribution to the fishery and contact rates by cohort (e.g., CWT, scales), preseason abundance (age-year specific), cohort projections, estimates of release mortality, recreational mortality, stray rates, and many other inputs. In its essence, the model is projecting impacts on each cohort as they become vulnerable to the fishery. Other fisheries and ocean areas use less complex methods.

Alaska would need to tailor its data collection and forecasting efforts to fit management needs for the stocks or complexes impacted by the fishery. The STT provides the expertise and advice to Pacific Region for assessing the ocean fishery impacts, and Alaska would likely need a similar group to evaluate methodology and establish conservation objectives in the FMP.

## 5.3 Optimum Yield

Optimum yield (OY) means the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreation opportunities, and taking into account protection of marine ecosystems. It is prescribed on the basis of Maximum Sustainable Yield (MSY) from the fishery; reduced by relevant economic, social, and ecological factors; and provides for the rebuilding of an overfished stock, taking into the account the effects of uncertainty and management imprecision.

MSY in the PCFMP is usually approached in terms of the number of adult spawners (SMSY, i.e., production) needed to achieve the largest long-term yield. However, in situations where data are insufficient to directly estimate  $S_{MSY}$ , MSY proxies derived from more general estimates of productive capacity coupled with harvest strategies are used to achieve long-term catch approximating MSY.

To achieve OY, the PCFMP provides criteria used by the Pacific Council to specify annual management measures that comply with management and conservation needs. These annual measures rely on the best available scientific information, and include setting annual catch limits and control rules to provide for the conservation of the management of the stocks. In establishing criteria by which to determine the status of salmon stocks, the Pacific Council must consider the uncertainty and theoretical aspects of MSY as well as the complexity and variability unique to naturally producing salmon populations. These unique aspects include the interaction of a short-lived species with frequent, sometimes protracted, and often major variations in both the freshwater and marine environments. These variations may act in unison or in opposition to affect salmon productivity in both positive and negative ways. In addition, the Pacific Council must consider uncertainty that variations in natural populations may sometimes be difficult to measure due to masking by hatchery-produced salmon.

A characteristic of salmon management is high uncertainty in specifying annual management measures that meet management and conservation objectives. The management process used by the Pacific Council is an adaptive process of forecasting run size, assessing potential management measures based on forecasting, implementing annual measures using the forecasts, and assessing realized catch and escapement relative to conservation and management objectives after the season is completed (e.g., ACLs).

#### **5.4 Annual Process**

On an annual basis, the Pacific Council recommends management measures to comply with ACLs and to achieve stock conservation objectives for each stock or stock complex, based on the estimated MSY or MSY proxy, rebuilding schedule, or ESA consultation standard; while simultaneously seeking to fulfill, to the extent practicable, the harvest and allocation objectives that reflect the Council's social and economic considerations. The PCFMP describes these goals and methods for salmon management, including measure to comply with annual catch limits. Management tools such as season length, quotas, and bag limits vary depending on salmon abundance and are used to meet conservation objectives.

Annually, the Council follows a preseason process to develop recommendations for the management of ocean fisheries (Figure xx). A schedule of this process is in Appendix XX. Public involvement begins in late February, when reports describing the previous salmon season are released. These reports are followed by a Council meeting in early March to propose management alternatives. Public hearings on these alternatives are held in late March or early April, and the final recommendations are adopted at the Council meeting in April. Through rulemaking, NMFS implements the management measures to be effective May 1 – April 30. This process requires technical input provided by the SSC, the Salmon Technical Team (STT), the Salmon Advisory Subpanel (SAS), and the Model Evaluation Workgroup (MEW):

STT: The STT provides technical analysis of data, preseason run forecasts, evaluating postseason run information, and analyzing the effects of the Council's recommendations. The STT is composed of eight people drawn from state, federal, and tribal fishery management agencies, all of whom have technical expertise in salmon management. Meetings held by the STT are open to the public.

- SAS: This panel plays a large role in developing the Council's annual salmon management options in March and April. The panel is made up of 17 members who represent commercial, recreational, and tribal interests, as well as a public and conservation representative.
- MEW: This group reviews and modifies models used to predict the effects of harvest on conservation objectives and allocation provisions. The MEW is made up of scientists from the state, tribal and federal management agencies. MEW meetings are open to the public.

The STT prepares the primary decision documents. These are the annual Stock Assessment and Fishery Evaluation Report (SAFE), and three preseason reports that, together, form an Environmental Assessment (EA) of the management actions being considered:

- Preseason Report I presents key salmon stock abundance estimates and level of precision, harvest, and escapement estimates using recent regulatory regimes that are projected on the forecasted abundance. This report also serves as a tool for the development of management alternatives. State and Tribal agencies hold constituent meetings to review the abundance projections and ranges of probable fishery outcomes. From this, the Council and its advisory committees adopt regulatory alternatives for public review. The status determination of "approaching an overfishing condition" is made in this report because this determination relies on preseason forecasting and proposed fishing regulations. Release of this document to the public occurs in February.
- Preseason Report II presents the range of regulatory ocean fishery alternatives that the Council is considering for the coming salmon season. The report is distributed to the public and reviewed in public hearings to solicit public input of preferred management measures. This report contains public hearing schedules, comment instructions, management alternatives, and summaries of the biological and economic impact of the proposed management alternatives. The Pacific Council uses this document to select its final regulatory measures, based on public input. This document is finalized in the beginning of April and is released in February.
- Preseason Report III is the final document in the series prepared by the STT. It details the final management measures adopted by the Council for recommendation to NMFS for the coming season's regulations. It includes an analysis of the effects of the management measures on conservation objectives for key salmon stocks. This document along with Preseason Reports I and II constitute an EA analyzing the effects of the annual regulation alternatives on the environment. The public is able to comment on and recommend alternatives. The final EA is finalized by the end of April, with a goal of having the Federal ocean salmon regulations published May 1.

Establishing the OFL, acceptable biological catch (ABC), and ACL is an annual process that relies on forecasted abundance estimates to establish limits, and postseason recalculation to assess compliance. Forecasts and catch limits are calculated using the best information, which is generally available at the time of releasing Preseason Report I (updates may also occur in Preseason Reports II or III). The final

stock status is evaluated in the SAFE (review in January) after completion of the fishery and realized escapement is estimated. Except for the status of “approaching an overfished condition”, NMFS makes its status determination based on the results of the SAFE.

The Pacific Council’s annual SAFE report provides an annual review of ocean fisheries (post-season). This report provides a summary of important biological and social and economic data from which to assess the status of managed stocks, impacts of past management actions and to determine how well management objectives are being met, and to provide recommendations for improvement. The SAFE provides a summary of regulations and landings, and assessment of management objectives as outlined in the PCFMP and other laws (e.g., ESA). Finally, the status determinations for overfishing, overfished, not overfished/rebuilding, and rebuilt are reported in the annual SAFE document. The Secretary of Commerce (i.e., NMFS) makes a final status determination based on the information in the final SAFE document.

Not all stocks requiring conservation and management under the Magnuson-Stevens Act require preseason forecasting for setting the ACL. Stocks that are under the Pacific Salmon Treaty do not require an ACL, nor do stocks managed under ESA consultation since the consultation standard applies. However, ocean fisheries on high abundant stocks interact with stocks of low abundance, and these situations are considered in setting conservation objectives and annual management measures.

## **5.5 Status Determination and Harvest Control**

To address the requirements of the Magnuson-Stevens Act, the Pacific Council established criteria based on biological reference points associated with MSY exploitation rate and MSY spawning escapement. The status criteria are based on the unique life history of salmon and the large variations in annual stock abundance due to numerous environmental variables. Uncertainty and imprecision surrounding the estimates of MSY, fishery impacts, and spawner escapements are considered in setting the harvest specifications.

The PCFMP conservation objectives are generally expressed in terms of an annual fishery or spawning escapement estimated to be optimum for producing MSY over the long-term. The escapement objective may be (1) a specific number or a range for the desired number of adult spawners (spawner escapement), (2) a specific number or range for the desired escapement of a stock from the ocean or at a particular location, such as a dam, that may be expected to result in the target number of spawners, or (3) based on the exploitation rate that would produce MSY over the long-term. Objectives may be expressed as fixed or stepped exploitation or harvest rates and may include lower limits for spawners (i.e., spawner floors) or substantially reduced harvest rates at low abundance levels. The Pacific Council must also consider requirements provided in the Pacific Salmon Treaty or NMFS consultation standards for stocks listed under the ESA. These legal issues would likely not be of concern for Alaska since no ESA stocks of concern originate in Alaska nor are the stocks in the affected area under the authority of the Pacific Salmon Treaty. The fisheries in the PCFMP also interact with complicated array of hatchery programs, the output and needs of which require consideration in setting catch limits and harvest objectives.

Conservation objectives are generally expressed as fixed quantities that provide the necessary guidance during the annual pre-season planning/forecasting process. These fixed quantities are expressed in terms

of each stock in the fishery; the conservation objective for that stock; the number of spawners that are expected to achieve MSY ( $S_{MSY}$ ); Maximum Fishing Mortality Thresholds (MFMT), Minimum Stock Size Threshold (MSST), and fishing mortality criteria for setting Annual Catch Limits (e.g., Table 5-2). These conservation criteria are specific to naturally spawning fish, and may be set for an indicator stock that represents multiple stocks within a stock complex, or a specific stock. The control rule for  $S_{MSY}$  is generally expressed as total number of spawners needed to achieve MSY (on average) as either an absolute number or, in a few cases, as the number of fish per mile of stream during peak spawning periods.

The PCFMP defines the following Status Determination Criteria:

- **Overfishing:** A stock is subject to overfishing when the postseason estimate of fishing mortality exceeds the MFMT, where the MFMT is generally defined as less than or equal to the fishing mortality rate that results in MSY over the long-term (i.e.,  $F_{MSY}$  or a proxy for  $F_{MSY}$ ). Stock-specific overfishing determinations are made annually and are based on exploitation during a single biological year.
- **Overfished:** A stock is considered overfished when the 3-year geometric mean of the annual spawning escapement (postseason) falls below a specified proportion (generally 0.5 or 0.75) of the number of adult spawners that are expected, on average, to produce MSY (i.e., MSST).
- Not overfished/rebuilding status occurs when the most recent 3-year geometric mean spawning escapement is less than MSST
- A stock is rebuilt when the most recent 3-year geometric mean spawning escapement exceeds the number of number of adult spawners that are expected to produce MSY, on average.

**Overfishing Limits:** OFLs are defined in terms of spawner escapement ( $S_{OFL}$ ) and are determined annually based on stock abundance, in spawner equivalent units (N) and exploitation rate  $F_{OFL}$  (defined as being equal to  $F_{MSY}$  or the MFMT). The OFLs are initially determined preseason using forecasts and revised post-season in the annual SAFE. However, annual status determination, including whether an OFL or ACL is exceeded, is determined using post-season estimates of abundance in the annual SAFE. For most stocks, a simple control rule is defined that sets a fixed MFMT and  $F_{MSY}$  that maybe the same value or different values depending on the stock. For example, Queets River coho have an MFMT of 65% and an  $F_{MSY}$  of 68%, whereas the North Fork Lewis River Fall has the MFMT=  $F_{MSY}$ =76%. This is done on a stock-by-stock or stock group basis. In other situations, treaty and ESA obligations drive conservation objectives. In general, these limits are set based on available information, legal status of the stock, and biological characteristics of the stock.

$$S_{OFL}=N*(1-F_{OFL})$$

**ABC:** The ABC, in terms of spawner escapement ( $S_{ABC}$ ), is derived from an ABC control rule and is equal to the ACL. On an annual basis, the spawner escapement is determined based on stock abundance, in terms of N and exploitation rate (i.e.,  $F_{ABC}$ ). The  $F_{ABC}$  is a fixed value, reduced from  $F_{MSY}$  (or proxy), to account for scientific uncertainty (i.e., the ABC buffer). The calculation requires applying the  $F_{ABC}$  to the adult spawner abundance estimate (N).



The PCFMP defines two tiers for establishing the  $F_{ABC}$ : Tier 1 is a 5% buffer from  $F_{MSY}$  and is used for stocks where  $F_{MSY}$  can be directly estimated; and Tier 2 is a 10% buffer from  $F_{MSY}^{proxy}$  and is used when  $F_{MSY}$  cannot be directly estimated. Like the OFLs, the ABC/ACL is generally determined preseason based on forecasting models, and the management performance evaluated postseason in the annual SAFE. Note that  $F_{ABC}$  is equal to  $F_{ACL}$ , and  $F$  target is less than or equal to  $F_{ABC}$ , resulting in the forecasted escapement exceeding the estimated  $S_{ACL}$ . This is an upper limit associated with preventing overfishing and is not necessarily a harvest objective that would use a target F-value.

The ABC control rule defines two tiers:

Tier 1:  $F_{ABC}=F_{MSY} \times 0.95$

Tier 2:  $F_{ABC}=F_{MSY} \times 0.90$

$S_{ABC}=N*(1-F_{ABC})$  or equivalently  $S_{ACL}=N*(1-F_{ACL})$  since  $F_{ABC}$  is equal to  $F_{ACL}$

- **Preseason:** During the preseason salmon management process (i.e., Preseason Reports I-III), the number of spawners corresponding to the ACL limit ( $S_{ACL}$ ) is estimated using a fixed exploitation rate and the preseason spawner abundance forecast (i.e.,  $N$ ). The Council recommends fishery management measures to NMFS that are anticipated to result in an expected spawning escapement that is at or above the  $S_{ACL}$ . The management measures may be designed to achieve a targeted exploitation rate that is less than the  $F_{ACL}$  as a result of stock specific conservation objectives, which results in the forecast escapement exceeding the estimated  $S_{ACL}$ .
- **Postseason:** The post season value of the  $S_{ACL}$  is determined annually using a fixed  $F_{ACL}$  exploitation rate and the post season estimate of spawner abundance for a stock (i.e.,  $N$ ). The postseason value of  $S_{ACL}$  is compared to the realized spawner escapement to determine if realized escapement was below the  $S_{ACL}$ . This evaluation is necessary to determine whether AMs should be triggered, and whether the ACL performance standards are being met: not meeting the performance standard more than once in four years results in a re-evaluation of the ACL framework (i.e., the rules for setting the ACL).

**Table 5-2 Example table showing stock, conservation objective, and reference points for several stocks in the Pacific Salmon PCFMP. Excerpted from Table 3-1 on page 20 of the Pacific Salmon PCFMP.**

TABLE 3-1. Conservation objectives and reference points governing harvest control rules and status determination criteria for salmon stocks and stock complexes in the Pacific Coast salmon FMP. These may change periodically. The most recent values are reported annually in Preseason Reports I and III. (Page 1 of 7)

CHINOOK					
Stocks In The Fishery	Conservation Objective	S <sub>MSY</sub>	MSST	MFMT (F <sub>MSY</sub> )	ACL
Sacramento River Fall Indicator stock for the Central Valley fall (CVF) Chinook stock complex.	122,000-180,000 natural and hatchery adult spawners (MSY proxy adopted 1984). This objective is intended to provide adequate escapement of natural and hatchery production for Sacramento and San Joaquin fall and late-fall stocks based on habitat conditions and average run-sizes as follows: Sacramento River 1953-1960; San Joaquin River 1972-1977 (ASETF 1979; PFMC 1984; SRF CRT 1994). The objective is less than the estimated basin capacity of 240,000 spawners (Hallock 1977), but greater than the 118,000 spawners for maximum production estimated on a basin by basin basis before Oroville and Nimbus Dams (Reisenbichler 1986).	122,000	91,500	78% Proxy (SAC 2011a)	Based on F <sub>ABC</sub> and annual ocean abundance. F <sub>ABC</sub> is F <sub>MSY</sub> reduced by Tier 2 (10%) uncertainty
Sacramento River Spring ESA Threatened	NMFS ESA consultation standard/recovery plan: Conform to Sacramento River Winter Chinook ESA consultation standard (no defined objective for ocean management prior to listing).	Undefined	Undefined	Undefined	ESA consultation standard applies.
Sacramento River Winter ESA Endangered	NMFS ESA consultation standard/recovery plan: Recreational seasons: Point Arena to Pigeon Point between the first Saturday in April and the second Sunday in November; Pigeon Point to the U.S./Mexico Border between the first Saturday in April and the first Sunday in October. Minimum size limit ≥ 20 inches total length. Commercial seasons: Point Arena to the U.S./Mexico border between May 1 and September 30, except Point Reyes to Point San Pedro between October 1 and 15 (Monday through Friday). Minimum size limit ≥ 26 inches total length. Guidance from NMFS in 2010 and 2011 required implementation of additional closures and/or increased sized limits in the recreational fishery South of Point Arena. A new winter-run management framework and consultation standard is expected to be in place for the 2012 fishing season, or no later than March 1, 2012. (NMFS ESA Guidance for 2011).	Undefined	Undefined	Undefined	
California Coastal Chinook ESA Threatened	NMFS ESA consultation standard/recovery plan: Limit ocean fisheries to no more than a 16.0% age-4 ocean harvest rate on Klamath River fall Chinook.	Undefined	Undefined	Undefined	
Klamath River Fall Indicator stock for the Southern Oregon Northern California (SONC) Chinook stock complex.	At least 32% of potential adult natural spawners, but no fewer than 40,700 naturally spawning adults in any one year. Brood escapement rate must average at least 32% over the long-term, but an individual brood may vary from this range to achieve the required tribal/nontribal annual allocation. Natural area spawners to maximize catch estimated at 40,700 adults (STT 2005).	40,700	30,525	71% (STT 2005)	Based on F <sub>ABC</sub> and annual ocean abundance. F <sub>ABC</sub> is F <sub>MSY</sub> reduced by Tier 1 (5%) uncertainty
Klamath River - Spring	Undefined	Undefined	Undefined	Undefined	Component stock of SONC complex; ACL indicator stock is KRFC
Smith River	Undefined	Undefined	Undefined	78% Proxy (SAC 2011a)	
Southern Oregon	Unspecified portion of an aggregate 150,000 to 200,000 natural adult spawners for Oregon coast (Thompson 1977 and McGie 1982) measured by 60-90 fish per mile in index streams. ODFW developing specific conservation objectives for spring and fall stocks that may be implemented without plan amendment upon approval by the Council.	60 fish per mile in index streams	30 fish per mile in index streams	78% Proxy (SAC 2011a)	

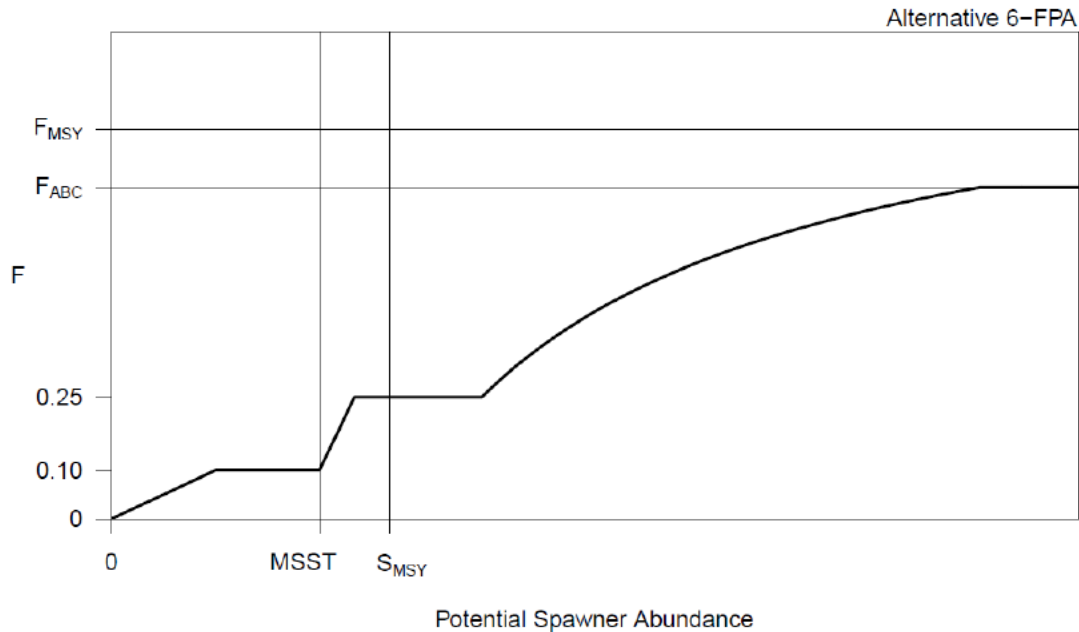
The ocean fisheries occur on mixed stocks, some of which are likely at low levels. Stocks with low adult abundance require management measures that allow enough spawning adults to meet conservation objectives. Thus, stocks of low abundance can limit fisheries on stocks with adequate abundance to support a target fishery. Prior Amendment 16, the PCFMP used a “conservation alert” mechanism that required the closure of all Council-area salmon fisheries that affected stocks that were projected to not meet their conservation objective. However, since these are mixed stock fisheries, this provision resulted in the closure of fisheries and foregone harvest of more abundant stocks, and in other cases resulted in the promulgation of emergency rules by NMFS to gain access to more abundant stocks.

Amendment 16 expanded the use of *de minimis* fishing provisions. These provisions are defined in the PCFMP and provide flexibility to the process of setting annual regulations when the conservation objectives for limiting stocks are projected to not be met (i.e., potential spawners is less than a conservation goal). Hence, the provisions allow exploitation while minimizing the risk of overfishing on a low abundance stock. Specifically, the provisions provide opportunity for fishers to access abundant salmon stocks that are typically available in the Council management area when the status of at least one stock may otherwise preclude all ocean salmon fishing in a large region. Allowing low levels of exploitation mitigates severe economic consequences to local communities and States (satisfying National Standard 8). However, while this action seeks to provide management flexibility in times of scarcity, there remains an overriding mandate to preserve the long-term productive capacity of all stocks, and to ensure the total fishing mortality rate does not exceed  $F_{MSY}$ .

For example, the *de minimis* measures are implemented for the Klamath River fall Chinook and Sacramento River Fall Chinook. The control rule describes a target exploitation rate that is less than the ACL exploitation rate. The Council is to consider the following factors when setting the *de minimis* exploitation rate: spawner abundance in recent years, the status of co-mingled stocks, indicators of marine and freshwater environmental conditions, minimal needs for tribal fisheries, whether the stock is currently approaching an overfished condition or overfished, other relevant information, and the exploitation rates used must not jeopardize the long-term capacity of the stock produce MSY on a continuing basis.

In its general form, a *de minimis* provision uses an F-based control rule that, as the stock declines, the allowable exploitation rate declines from  $F_{ABC}$ , until a basement F rate is reached (e.g.,  $F=0.25$ ), where F might remain constant, or potentially be reduced further at certain potential spawner abundance levels, and is analogous to an  $F_{Target}$  for the purpose of discussion (i.e.,  $F_{Target}$  where  $F_{Target} < F_{ACL}$ ). Setting the  $F_{Target}$  below the  $F_{ACL}$  is implemented to address stock-specific conservation concerns since it results in the forecasted escapement to exceed the escapement at  $S_{ACL}$ . However, the spawner goal under the  $F_{target}$  is not used to assess compliance with ACL requirements- ACL rules are fixed. Figure XX provides an example of a control rule used for the Sacramento river Fall Chinook with two levels of *de minimis* exploitation ( $F=0.25$  and  $F=0.10$ ), noting that there are other methods of specifying *de minimis* control rules defined in the PCFMP and considered during implementation (e.g., Figure 5-1, NMFS 2011, page ES-15). The example control rule adjusts  $F_{Target}$  to low levels to allow some exploitation at low spawner levels.

**Figure 5-1** Example of control rule for the *de minimis* fishing provision (from NMFS 2011). The control rule describes the maximum allowable exploitation rates at any given level of abundance.



## 5.6 Process of ABC Specification and SSC Approval

The SSC was involved in the review and approval of the control rules initially specified in the PCFMP, and has an ongoing role in reviewing technical documents and recommending ABCs to the Council. This includes reviewing work by the STT on forecasting methods, methods to project compliance with the control rules, and annual model input data (e.g. Preseason Report I). The STT is delegated responsibility for applying the control rules and developing annual management specifications, but in all other aspects, the SSC is responsible for review and oversight of the process, and making recommendations to the Council.

## 5.7 Accountability Measures

Accountability measures (AM) are required for all stocks and stock complexes that are required to have management and conservation. The purpose of AMs is to prevent escapement below the  $S_{ACL}$  and to correct or mitigate these situations. AMs are specified in the PCFMP as preseason and inseason, or post-season measures. Preseason measures are enacted during the preseason planning process, while postseason measures are implemented through monitoring and reporting requirements.

**Preseason and Inseason:** The PCFMP provides for the use of the following measures that may be implemented during the preseason planning process or inseason to meet the intent of preseason management objectives and to help ensure compliance with ACLs.

- In-season authority to manage quota fisheries– allows NMFS to close fisheries on short notice when mixed stock quotas are projected to be met. As described above, quotas are designed to ensure that ACLs and conservation objectives for component stocks are met.
- Mixed stock quota monitoring (PCFMP § 7.1) – collection of data on a daily basis during the season allows projection of when quotas will be met.
- Quota partitioning (PCFMP § 5.3 and 10.2) – partitioning overall quota among fishery sectors and port areas and time periods allows finer scale management, thereby reducing the chance that overall quota will be exceeded.
- Quota trading (PCFMP § 5.3 and 10.2) – quota trading allows overages in one sector/time/area to be made up by reductions in others.
- Changes to gear/bag/size/trip limits (PCFMP § 6 and 10.2) – allow a measure of control over catch rates to reduce the chance of quotas being exceeded.
- Boundary modifications (PCFMP § 6 and 10.2) – allow limited control over catch composition to limit impacts on constraining stocks.
- Landing restrictions (PCFMP § 6 and 10.2) - allow better accounting of the location of catches and thus better estimates of catch composition.
- In-season monitoring and reporting requirements. (PCFMP § 7) – collection of data on a daily basis during the season allows projection of when quotas will be met.
- Annual catch targets - intended to account for management uncertainty.

**Postseason:** The AMs are implemented through the assessment and review phases of the salmon management process:

- Salmon Methodology Review Process: re-evaluation of management objectives, reference points, and modifications to models that relate impacts to stock-specific objectives.
- SAFE- post season assessment of objectives and management performance.
- Report on escapement shortfalls in the Council preseason reports and notify state, tribal, and federal managers. If necessary, problems can be corrected in the assessment and changes in management methods can be made during the annual review of salmon methods and management.

## **5.8 Inseason Management**

Inseason changes are made to meet the preseason intent of the management measures described in the Preseason III report, but must also meet the Council's PCFMP goals, especially in regard to conservation and allocation goals, Federally-recognized Indian fishing rights, consultation standards for ESA-listed salmon stocks, and obligations under the PST.

As an example, inseason actions that are anticipated for the 2016-2017 management season included, but are not limited to, the following possibilities:

- Adjustments in landing limits and days open for non-Indian commercial fisheries.
- Changing the days or number of days of fishing allowed per calendar week for recreational fisheries.

- Transfer of coho quotas among recreational port areas north of Cape Falcon.
- Trading portions of Chinook and coho quotas between recreational and non-Indian commercial sectors north of Cape Falcon.
- Routine openings and closings, and other management measures associated with quota management, including modifying open areas, bag limits, species retention limits, and mark-selective retention restrictions.
- Transferring unused or exceeded quota to subsequent fisheries on an impact neutral, fishery equivalent basis.
- Closing Oregon recreational and commercial fisheries scheduled to open March 15, 2017 if necessary to meet 2017 management objectives.
- Closing California recreational fisheries scheduled to open April 1, 2017, or commercial fisheries scheduled to open April 16, 2017, if necessary to meet 2017 management objectives.
- Adjustments to incidental Pacific halibut catch regulations in commercial fisheries, including landing and possession ratios and landing and possession limits per trip.

Inseason actions are generally accomplished through NMFS sponsored conference calls attended by representatives of affected state and tribal management agencies, the Council, the Salmon Advisory Subpanel (SAS), and the STT. The Council may also make recommendations for inseason actions at any of its regularly scheduled meetings. State water fisheries also occur, and these fisheries are considered when establishing annual management measures and setting ocean fishery limits.

## **5.9 Inseason Analysis**

The preseason reports form the EA on annual salmon management measures. The EA evaluates whether an action being considered by a Federal agency has significant environmental impacts. The first part of the EA (Preseason Report I), includes a description of the No Action Alternative and analysis of effects of the No Action Alternative on salmon stocks managed under the PCFMP. The forecasts are applied against the previous year's management measure to assess the No Action Alternative. The second component, Preseason Report II, provides a statement of purpose and need, a description of the affected environment, and a description of alternative regulatory measures the Council is to consider for meeting conservation objectives (e.g., **Table 5-3**). The Council solicits public comments on the alternatives. The final component of the EA, a description and analysis of the Proposed Action, is provided in Preseason Report III, which also indicates whether the Council's recommendations are anticipated to meet applicable conservation objectives in the PCFMP- i.e., ACLs, protection requirements under ESA consultation, and obligations under the Pacific Salmon Treaty. NMFS publishes the recommended measures through rulemaking with waived notification. Notification is waived since such notification is impractical due to the short preseason planning period being compressed into a two month period (February and March), and the need for management measures to be effective by May 1.

Staffing is required to shepherd the analysis through the process and complete the regulatory package. The Pacific Council has a staff person dedicated to the annual salmon process, and NMFS has several staff members responsible for policy development, inseason management, and regulatory writing. In addition, the STT requires technical staff to provide assessment and input, NMFS has assessment authors dedicated to salmon, and the Salmon Advisory Subpanel are comprised of user groups and staffed by the

Pacific Council. Alaska Region and the Alaska Fishery Science Center would need to develop this staffing capacity since salmon is not an actively managed species by NMFS in Alaska.

**Table 5-3 Example of management alternatives from the 2016 Preseason Report III.**

TABLE 1. Commercial troll management Alternatives adopted by the Council for non-Indian ocean salmon fisheries, 2016 (Page 1 of 10)		
A. SEASON ALTERNATIVE DESCRIPTIONS		
ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
North of Cape Falcon	North of Cape Falcon	North of Cape Falcon
Supplemental Management Information	Supplemental Management Information	Supplemental Management Information
<p>1. Overall non-Indian TAC: 114,600 (non-mark-selective equivalent of 110,000) Chinook and 45,000 coho marked with a healed adipose fin clip (marked).</p> <p>2. Non-Indian commercial troll TAC: 56,000 Chinook and 7,200 marked coho.</p> <p>3. Trade: May be considered at the April Council meeting.</p> <p>4. Overall Chinook and/or coho TACs may need to be reduced or fisheries adjusted to meet NMFS ESA guidance, FMP requirements, upon conclusion of negotiations in the North of Falcon forum, or upon receipt of preseason catch and abundance expectations for Canadian and Alaskan fisheries.</p>	<p>1. Overall non-Indian TAC: 60,000 Chinook and the equivalent coho mortality of a TAC of 35,000 coho consisting of 14,700 marked coho retained in the recreational fishery in the Columbia River Subarea and non-retention coho mortality in the recreational fisheries in the Neah Bay, La Push, and Westport Subareas and the commercial troll fishery north of Cape Falcon.</p> <p>2. Non-Indian commercial troll TAC: 30,000 Chinook and the equivalent coho mortality of the commercial portion of the overall non-Indian coho TAC consisting of non-retention coho mortality in the commercial troll fishery north of Cape Falcon.</p> <p>3. Overall Chinook and/or coho TACs may need to be reduced or fisheries adjusted to meet NMFS ESA guidance, FMP requirements, upon conclusion of negotiations in the North of Falcon forum, or upon receipt of preseason catch and abundance expectations for Canadian and Alaskan fisheries.</p>	<p>Closed.</p>
<p><b>U.S./Canada Border to Cape Falcon</b></p> <ul style="list-style-type: none"> <li>May 1 through the earlier of June 15 or 28,000 Chinook, no more than 9,000 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 9,000 may be caught in the area between Leadbetter Pt. and Cape Falcon.</li> </ul> <p>Seven days per week with a landing and possession limit of 60 Chinook per vessel per trip from the U.S./Canada Border to the Queets River and a landing and possession limit of 75 Chinook per vessel per trip in the area between Leadbetter Pt. and Cape Falcon (C.1). All salmon except coho (C.4, C.7). Chinook minimum size limit of 28 inches total length (B). When it is projected that 21,000 Chinook have been landed overall, or 6,750 Chinook have been landed in the area between the U.S./Canada border and the Queets River, or 6,750 Chinook have been landed in the area between Leadbetter Pt. and Cape Falcon,</p>	<p><b>U.S./Canada Border to Cape Falcon</b></p> <ul style="list-style-type: none"> <li>May 1 through the earlier of June 30 or 18,000 Chinook, no more than 5,700 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 5,800 may be caught in the area between Leadbetter Pt. and Cape Falcon.</li> </ul> <p>Five days per week, Friday through Tuesday with a landing and possession limit of 40 Chinook per vessel per trip from the U.S./Canada Border to the Queets River and a landing and possession limit of 50 Chinook per vessel per trip in the area between Queets River and Cape Falcon (C.1). All salmon except coho (C.4, C.7). Chinook minimum size limit of 28 inches total length (B). When it is projected that 13,500 Chinook have been landed overall, or 4,275 Chinook have been landed in the area between the U.S./Canada border and the Queets River, or 4,350 Chinook have been landed in the area between Leadbetter</p>	<p><b>U.S./Canada Border to Cape Falcon</b></p> <p>Closed.</p>

**Table 5-4 PFMC’s schedule and process for developing 2017 Ocean Salmon Measures.**

**PACIFIC FISHERY MANAGEMENT COUNCIL PROPOSED SCHEDULE AND PROCESS FOR DEVELOPING 2017 OCEAN SALMON FISHERY MANAGEMENT MEASURES**

Nov. 13-21, 2016	The Council and advisory entities meet at the Hyatt Regency Orange County, Garden Grove, California, to consider any changes to methodologies used in the development of abundance projections or regulatory alternatives.
Jan. 17-20, 2017	The Salmon Technical Team (STT) meets in Portland, Oregon to draft The Stock Assessment and Fishery Evaluation (SAFE) document <i>Review of 2016 Ocean Salmon Fisheries</i> . This report summarizes seasons, quotas, harvest, escapement, socioeconomic statistics, achievement of management goals, and impacts on species listed under the Endangered Species Act. (Available early February.)
Feb. 21-24	STT meets in Portland, Oregon to complete <i>Preseason Report I Stock Abundance Analysis and Environmental Assessment Part 1 for 2017 Ocean Salmon Fishery Regulations</i> . This report provides key salmon stock abundance estimates and level of precision, harvest, and escapement estimates when recent regulatory regimes are projected on 2017 abundance, and other pertinent information to aid development of management options. (Available early March.)
Feb. 24 -Mar. 6	State and tribal agencies hold constituent meetings to review preseason abundance projections and range of probable fishery options.
Mar. 7-14	Council and advisory entities meet at the Hilton Hotel in downtown Vancouver, Washington to adopt 2017 regulatory alternatives for public review. The Council addresses inseason action for fisheries opening prior to May 1 and adopts final alternatives for public review.
Mar. 15-21	The STT completes Preseason Report II: Proposed Alternatives and Environmental Assessment Part 2 for 2017 Ocean Salmon Fishery Regulations. (Available late March.)
Mar. 15-31	Management agencies, tribes, and the public develop their final recommendations for the regulatory alternatives. North of Cape Falcon Forum meetings are held between the March and April Council meetings.
Mar. 22	Council staff distributes <i>Preseason Report II: Proposed Alternatives and Environmental Assessment Part 2 for 2017 Ocean Salmon Fishery Regulations</i> to the public. The report includes the public hearing schedule, comment instructions, alternative highlights, and tables summarizing the biological and economic impacts of the proposed management alternatives.
Mar. 27-28	Tentative sites and dates of public hearings to review the Council's proposed regulatory options are: Westport, Washington (March 27); Coos Bay, Oregon (March 27); and Ft. Bragg, California (March 28). Comments on the alternatives will also be taken during the April Council meeting in Sacramento, California.
Apr. 6-12	Council and advisory entities meet to adopt final regulatory measures at the DoubleTree by Hilton in Sacramento, California. Preseason Report II: Proposed Alternatives and Environmental Assessment Part 2 for 2017 Ocean Salmon Fishery Regulations, results from the public hearings, and information developed and public comment received at the Council meeting are considered during the course of the week.
Apr. 13-21	The STT and Council staff complete Preseason Report III: Analysis of Council-Adopted Management Measures and Environmental Assessment Part 3 for 2016 Ocean Salmon Fishery Regulations (Available April 21). Council and NMFS staff completes required National Environmental Policy Act documents for submission.
Apr. 21	Council staff distributes adopted ocean salmon fishing management recommendations, and Preseason Report III is available to the public.
May 1	NMFS implements Federal ocean salmon fishing regulations.