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Summary of Comments received during Public Comment period 2

Preamble

The following summarizes public comments on the Seafood Watch (SFW) Criteria for Salmon Fisheries from Public Comment period 2. Responses to comments *italicized*.

Criterion 1

Fishing Mortality on Integrated Populations

Seafood Watch received a comment regarding the use of integrated hatchery supplementation programs to support conservation goals for depleted salmon populations. The commenter stated that integrated hatchery or wild fish from such populations should not be the subject of any fishing mortality if the aim of the hatchery supplementation is to ensure recovery of depleted populations.

SFW agrees harvest of conservation hatchery program and wild salmonids from depleted populations should be minimized. To this end, if an ESA listed Stock Management Unit (including integrated hatchery fish) makes up more 5% of a fishery's harvest, the fishery would be scored as 'high concern' for factor 1.1 (abundance). Additionally, if any SMU that is greater than 5% of harvest for a fishery is subject to overfishing, the fishery can at best be scored 'moderate concern' for factor 1.2 (fishing mortality).

Eliminating all harvest of listed wild stocks and conservation hatchery program fish from commercial fisheries would require use of selective fishing techniques in most existing fisheries, except fisheries that do not encounter them. Although SFW encourages a transition toward selective fisheries to minimize impacts on stocks of concern, currently there are very few viable salmon fisheries that are able to selectively release captured stocks of concern in good condition. Additionally, unless integrated hatchery fish are visually marked differently than segregated hatchery program fish (e.g., different fin clipping strategies), distinguishing them in catches for selective release would not be possible. Although this is theoretically possible, it may prove impracticable in many situations. SFW supports efforts to better distinguish stock composition of catches in real-time, for multiple reasons, but is also realistic about the timeframe needed to develop these techniques and strategies. SFW believes that language within the proposed standard sets a high conservation threshold for salmon fisheries, while supporting the continuation of some fisheries if impacts to conservation programs and wild salmon populations are minimal.

Inappropriateness of Maximum Sustainable Yield

A comment was received raising concerns about the appropriateness of MSY-based escapement goals, as its adoption into fisheries management is politicized and it is a harvest-based approach that treats



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salmon (and other species) as commodities, rather than a conservation-based approach which considers salmon as living components of an ecosystem. Most (probably all) salmon populations exhibit some degree of density-dependent recruitment that can generally be characterized by various logistic equations that depict the relationship between total egg deposition (spawner abundance) and juvenile and adult recruitment. Consequently, on the curve derived from any such equation there will be many levels of spawner abundance (egg deposition) greater than the MSY estimate and the unfished equilibrium. S_{max} on a Ricker curve, for instance, generally will provide significantly greater spawner escapement than MSY while allowing for some level of human harvest. Analogous spawner escapement levels can be identified for asymptotic curves such as the Beverton-Holt. In all such estimates it is critical that uncertainties (in data, model form, parameter estimates, and outcome (sensu Peterman and Collie CJFAS 2012) be appropriately taken into account. MSY escapement goal ranges (such as Alaska's SEG and BEG) do not appropriately reflect uncertainty in the estimation of MSY, as they only provide estimates of spawner escapement on either side of the MSY point estimate that will achieve 90% of the estimated MSY harvest; these ranges therefore rely on the same data and estimation procedure that produce the point estimate of MSY. Bayesian methods used in conjunction with a management strategy evaluation that models a range of escapement policies are the appropriate approach, permitting minimum escapement goals to be chosen from the upper tails of posterior distributions, thereby accounting for all uncertainties and giving the benefit of the doubt to the salmon population, not harvest interests. As noted by Peterman and colleagues (see for example Collie et al. 2012 and references therein) spawner-recruit models (and management strategy evaluation using such models) should evaluate time-varying productivity parameters in the spawner-recruit models to account for non-stationarity in spawner-recruit time series data.

The SFW guiding principles currently state that MSY should be the goal for abundance and fishing mortality. The SFW standard also includes provisions for ETP, highly vulnerable species and in cases of uncertainty (which may include salmon), where fishing mortality rates below MSY may be appropriate. Although SFW recognizes there are flaws with MSY, this applies to non-salmonid species as well (i.e., it is a harvest-based approach which considers the fish to be a commodity). Because SFW must ensure consistency across all fishery assessments, before we changed the recommendation for use of MSY-based goals in salmon management, we would need to have clear justification for why management targets for salmon should be developed differently than for other fish. Nevertheless, the SFW standard acknowledges MSY is not always appropriate for setting management reference points and that proxies can be used (see Glossary and Appendix 1). Based on these comments and internal discussions, SFW proposes to add to Appendix 8 within the standard for salmon fisheries, a description of alternative strategies for developing escapement goals for salmonids.

A Consideration of Place-Based Management

As an alternative to an MSY-based approach, a suggestion was made to adopt a place-based approach to management for ensuring healthy populations of salmonids. Place-based approaches create specific escapement goals at the population level (rather than a collective stock management unit) and have been used in Norway. Such an approach is best suited alongside terminal fisheries where you can fully



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identify component stocks and the impact of the fishery upon them, rather than mixed-stock ocean fisheries.

SFW agrees that population-level management may be ideal in most cases for maintaining salmon populations at viable levels, and supports application of this strategy wherever feasible, appropriate and successful. This strategy may be possible in the near-term for a smaller number of populations within a given SMU, especially where spawner targets and sufficient data already exist (e.g., designated 'primary populations' with recovery targets in salmonid recovery plans and on-going monitoring). Although population-level escapement goals consistent with this strategy are used in some places already, most salmonid population escapement targets would need to be developed and monitored. The expense, timeframe, and workload necessary to successfully apply this strategy, has generally prevented development of this strategy in the past and will make it impracticable in the future in many cases. Therefore, requiring a place-based approach for evaluating sustainability of salmonid fisheries would likely result in the majority scoring poorly, even if the fishery is not impeding recovery of captured populations. Additionally, place-based approaches are untested in many locations, and may not prove successful in all cases, even if implemented in a manner similar to published literature. Management strategies that use non-place-based approaches may well prove successful in achieving conservation goals. As an alternative to changing scoring requirements in the standard, SFW proposes to add a description of alternative management strategies in Appendix 8. This would allow for SFW to include the idea as potentially viable for salmonid fisheries management, where resources allow.

Appropriateness of Goals and Availability of Data

Following the concerns regarding the appropriateness of MSY-based approaches, a comment was made relating to the absence of appropriate reference points or management goals and in some cases the absence of goals at the population level. Many Chinook populations encountered in all coastal mixed-stock fisheries often either have no established spawner escapement goal or have MSY goals that are either not regularly met and more often not monitored. The suggestion was that the scoring criteria for factor 1.2 should require that more than 70% of aggregate populations encountered in any mixed-stock fishery have current data regarding the identity of the populations encountered and data sufficient to determine with high probability (>90% of the posterior distribution from an appropriate Bayesian analysis) that the population is achieving sustainable annual spawner escapements and retaining its historical age distribution and sex ratio. It is essential that any mixed-stock salmon fishery scored as sustainable not impose harvest mortality that contributes to any degree to any wild salmon population not achieving its appropriate sustainable escapement level, at least 3 of every 4 years following the Norwegian approach. To achieve this, total harvest mortality rates need to be appropriately lower than the MSY exploitation rate determined from the estimated spawner-recruit productivity parameter (alpha) of the least productive population known or estimated to be a component of the SMU.

If a salmonid fishery catches major SMUs without escapement goals, this greatly reduces the fishery's chances of scoring better than 'moderate concern' under the proposed SFW standard. One of the requirements for scoring low concern in factor 1.1 is: "More than 70% of major SMUs encountered in the fishery are healthy and exceed appropriate target reference points over 60% of the last 15 years." If escapement goals do not exist for more than 30% of major SMUs, this requirement cannot be met.



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Regarding escapement goals at the population level, in some cases these do exist and should be used for management. As discussed previously, the capability to establish and monitor population-level goals is not currently possible for most salmonid management agencies.

One of the requirements in the proposed standard for scoring low concern in factor 1.2 is: “The majority (>70%) of major SMUs caught in the fishery demonstrate: 1. Probable (>50% chance) that fishing mortality from all sources (including ghost fishing, if applicable) is at or below a sustainable level that will allow population to maintain current level or rebuild if depleted and to fulfill its role in the ecosystem, e.g. either Fmsy or for species with an exceptional role in the ecosystem, a reference point that is appropriate for the species.” Without recent data on at least 70% of SMUs caught, a fishery could not meet this requirement. SFW evaluates whether SMUs are meeting escapement goals under factor 1.1 (abundance) rather than factor 1.2 (fishing mortality). Additionally, the availability and use of stock identification methods will be evaluated under factor 3.3 (Scientific Data Collection and Analysis).

Seafood Watch agrees that maintaining historical age distribution and sex ratios within the range of natural variability is ideal for salmon populations. Because historical information prior to widespread harvest and hatchery production is very rare across all fisheries this would be very difficult to evaluate in most cases. For this reason, SFW does not propose to add this requirement to the standard for salmonid fisheries, although we support the idea wherever feasible.

Most salmon fisheries encounter multiple stocks, including wild populations that may or may not be meeting population-level goals (where they exist). It is likely not possible for even selective fisheries to avoid any impact on wild stocks ability to meet escapement goals, unless runs are well above escapement goals each year. SFW has incorporated principles into the proposed standard for factors 1.1 and 1.2 that are designed to evaluate the health of major harvested SMUs, and each fishery’s impacts on those SMUs. The health of minor SMUs harvested in the fishery and the fishery’s impact on these fish are evaluated in factors 2.1 and 2.2. Therefore, the proposed standard evaluates impacts by each fishery to all harvested salmonid populations.

SFW suggests that determining the least productive population in a given SMU will be challenging and that determining reference points for a SMU based on this one population often may not be the best approach to ensuring sustainable harvest of the SMU.

Criterion 2

Determining Main Species

A comment was received regarding the relevance of identifying main species within a salmon fishery. The issue presented was that typical salmon fisheries are not able to retain other species, and rarely interact with non-salmonids, implying that assessment of these impacts may not be necessary.

In the proposed standard, SFW has included a ‘decision tree’ to more clearly describe how main species are identified. Many salmonid fisheries catch multiple species of salmonids that can be retained, all of which would be evaluated under either Criterion 1 or Criterion 2 based on the decision tree. Some salmon fisheries also catch non-salmon species, some of which can be retained. For example, gillnet fisheries in the Columbia River targeting salmon can also retain (and sell) sturgeon during open seasons.



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In this case, the decision tree would be used to determine if sturgeon should be included as a main species for evaluation under Criterion 2. Additionally, some SMUs for a given salmonid species retained by the fishery would be considered major (if >5% of species harvest) and assessed under Criterion 1, while minor SMUs would be assessed under Criterion 2.

Bait Use

It was noted that bait is rarely used in salmonid fisheries, with minimal application in troll fisheries where artificial lures are typically preferred as they are more economical. It was suggested that this factor be eliminated from the standard and replaced with a statement regarding bait use.

Bait is used only in some salmon fisheries, but for these cases SFW must include guidance for analysts within the standard. This is consistent with SFW assessments of non-salmonid fisheries. We would need more justification to eliminate bait analysis for assessments of salmonids and not for non-salmonids. We cannot pre-suppose the amounts of bait used and the impacts of this on bait species for salmon fisheries. At this time, SFW proposes to retain the bait analysis for salmonid assessments.

Criterion 3

Specificity to Salmonid Fisheries

Concerns were raised regarding the broad language of the standard, particularly for criterion 3, where the language reflected general fishery management issues rather than challenges specific to salmonid fisheries. It was suggested that this section would benefit from being written specifically for application to salmonid fisheries.

SFW will remove references to non-salmonid fisheries or gears in Criterion 3 prior to finalizing, wherever they are not applicable to evaluations of salmon fisheries. SFW attempted to maintain similar wording between the fisheries and salmon standards wherever reasonable to ensure consistency in evaluations across all fisheries, but non-relevant text can be removed if it does not impact consistency.

No response required

One comment received supported the proposed title changes under factor 3.3 (Scientific Data Collection and Analysis). No response was necessary in this case.

Criterion 4

Impact on Substrate and Habitats

A comment was received that suggested that the impact of fisheries on substrate or habitat was not necessary as salmonid fisheries rarely interact with the seabed, thus reducing the need for the implementation of any mitigation measures. It was recommended that this be removed from the standards and replaced with a statement regarding the minimal risk from salmonid fisheries in this area.



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SFW agrees that most existing salmon fishing gears will have little impact on the substrate, although there are examples where impacts are possible (e.g. river fisheries). Regardless, SFW's goal is to make the salmonid assessments as comparable as possible to non-salmonid fishery assessments. Impacts on the substrate are one component of evaluating sustainable fisheries (salmonid or non-salmonid). If salmon fisheries have little or no impacts on the substrate, scores for these fisheries will be better than if this impact was not evaluated within the SFW standard.

Criterion 5

Clarification on Assessment Timeframe

There was a request for clarification on the guidance "Analysts are instructed to assess current hatchery production, rather than the production of the fish that are being harvested (broodyear(s))."

This quote is from the text in the yellow highlighted section within the proposed standard, which was provided for the public review period only and will not be retained when the standard is finalized. The guidance within the proposed standard currently reads: "When determining the risk to wild salmon populations, analysts should consider current hatchery production data (rather than the hatchery practices when the harvested fish were released)." To clarify this statement, SFW proposes the following language be included in the standard guidance: "Juvenile salmon released from hatcheries may be available for harvest 1-5 years later, based on variable age-at-maturity among and within species. In the time between release and harvest, hatchery practices may change. Therefore, to be most relevant when determining the risk to wild salmon populations, analysts should consider current hatchery production data (rather than the hatchery practices when the harvested fish were released)."

Proportion of Hatchery Origin Spawners (pHOS)

A comment was received which recommended that the scoring criteria for pHOS, as outlined in Table 5.2.1, be more conservative. The rationale for this suggestion was that the Hatchery Scientific Review Group (HSRG) had updated its recommendations in 2015 (further supported by additional studies). The comment suggested the 2015 HSRG document showed that even highly integrated hatchery programs are likely to have significant harmful effects on fitness of affected wild populations and that segregated hatchery programs with effective pHOS values of 2% may have harmful impacts on wild salmonid populations. Recommendations were made that segregated programs should have a pHOS value of no more than 2%, and that any fishery that is targeting salmon from a hatchery program with documented census pHOS values of greater than 5% should be scored red.

Below is a summary of the standards recommended by HSRG (2015) for broodstock management:

- HSRG criteria for hatchery influence on Primary populations

- *pHOS_{eff} should be less than 5% for populations where segregated hatchery program fish are mixing with wild fish on the spawning grounds.*



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- *For integrated populations, pNOB should exceed pHOS_{eff} by at least a factor of two, corresponding to a PNI value of 0.67 or greater. HSRG recommends that census pHOS, be less than 0.30.*

- HSRG criteria for hatchery influence on Contributing populations

- *pHOS_{eff} should be less than 10% for populations where segregated hatchery program fish are mixing with wild fish on the spawning grounds.*
- *For integrated populations, pNOB should exceed pHOS_{eff}, corresponding to a PNI value of 0.50 or greater. HSRG recommends that census pHOS, be less than 0.30.*

- HSRG criteria for hatchery influence on Stabilizing populations. The current operating conditions were considered adequate to meet conservation goals for hatchery influence on Stabilizing populations. No criteria were developed for pHOS_{eff} or PNI.

SFW included a modified version of this within the proposed standard. SFW supports designations of populations similar to those in the Columbia River (Primary, Contributing, Stabilizing), however, most are not designated in this way. Therefore, HSRG recommendations listed above for Primary populations were adapted by SFW as part of the description of 'low concern' under factor 5.1, along with additional requirements that pHOS be below 1% in the majority of the populations within an SMU (see table 5.1.2). The HSRG 2015 recommendations for Contributing populations were in turn adapted by SFW for part of the description of 'moderate concern' under factor 5.1, along with additional requirements that pHOS be below 5% in the majority of the populations within an SMU (see table 5.1.2). To meet criteria for 'very low concern' for 5.1, the SFW standard requires: "Evidence to demonstrate that there are no negative impacts of hatcheries associated with the fishery on local naturally spawning populations." Because these criteria match the HSRG recommendations (and add additional requirements), SFW is satisfied the standard is sufficiently conservative for factor 5.1.

SFW agrees with limiting pHOS as much as possible, with the exception of conservation hatchery programs used to reestablish extirpated salmon populations. However, the recommendation to score a fishery red if that fishery catches hatchery fish derived from areas where pHOS is above 5% would result in nearly every salmon fishery being scored red, including selective fisheries where hatchery fish are harvested and wild fish are released in good condition. SFW suggests that reducing (or maintaining) pHOS at recommended levels will require multiple strategies including reducing hatchery production in some cases, harvest of hatchery fish (including selective fisheries where possible), and use of weirs in river systems to remove hatchery fish where practical. SFW adapted HSRG recommendations wherever possible within the proposed standard, as a conservative and balanced approach for evaluating the impact of hatcheries on SMUs caught in the fishery.

Other General Comments

A number of comments were received that spoke to the broader concept of hatchery production and how it may, or may not, fit within the sustainable seafood landscape, and how the context within which



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the Seafood Watch standards for Salmonid Fisheries should be framed. These comments, while not specific to any particular factor, are summarized below along with relevant responses.

Purpose of Hatchery Production

A comment was made disagreeing with the notion that hatchery production existed to mitigate the loss of salmonid spawning habitat, rather that the use of hatchery production supported fisheries without the need to protect habitat (leading to habitat loss). The reliance upon hatchery production increased with the development of coastal marine mixed-stock fisheries.

SFW acknowledges this statement may not fully capture the reasons for the initiation of salmon hatcheries. However, lost habitat was clearly one of the reasons for declines in salmon. Although the history of hatcheries is complicated, in many cases they were a partial solution to preventing extinction of salmonid runs by preserving genetics, and allowing for continued fishing of hatchery produced salmonids, while a more permanent strategy to recover salmonid populations was in development. Salmon fishing is a source of profit and/or recreation for some, but a way of life for others (including indigenous peoples in the U.S. and Canada).

There are two places where the phrasing mentioned in the comment is used within the proposed standard: 1) within the yellow highlighted text at start of Criterion 5X, and (2) within Appendix 8 under the definition of EBM. The first reference will not be in the final standard, as all the text in the yellow highlighted sections is removed prior to finalization. For the reference within Appendix 8, SFW proposes to change the wording to: "Salmon hatcheries were initially intended to mitigate for lost habitat and harvest opportunity, due to dam construction, overharvest and habitat destruction."

Need for Habitat Restoration and Protection

A comment was made regarding the need for increased efforts in habitat recovery and protection. This comment suggested that to sustain resilient and adaptive salmon populations, funding for hatchery production should be redirected toward habitat recovery efforts, and monitoring of wild populations.

SFW agrees that funding for habitat protection and improvement, as well as monitoring, has been and will continue to be critical to support and understand salmonid recovery where salmonid populations are impaired. Most available literature on the subject suggests that in some areas, reductions in hatchery production may be needed to help ensure salmon recovery due to impacts from hatchery fish on wild populations. Hatchery production has already been reduced in many places; for example, releases of salmon and steelhead from Washington hatcheries were reduced by approximately 40% from 1985 to 2018 (RMIS 2019). Over the past several decades, hundreds of millions of dollars have been spent on hatcheries, habitat restoration/protection and monitoring from several sources, including: federal, state and local governments, utilities, native American tribes, and non-profit organizations. The goals of these funding sources in salmonid recovery are often different, and may include: reestablishing natural processes, fulfilling legal obligations, improving fishing, or restoring a way of life that was lost. Much of this funding is granted for specific purposes (e.g. hatcheries, habitat or monitoring), and cannot be re-appropriated for other purposes. SFW believes that funding alone will not resolve many of the issues



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preventing salmon recovery. Many of the land use changes and dam construction that have limited recovery of salmonids, will require political negotiations to resolve.

The primary purpose of the SFW standard for fisheries and salmonids is to evaluate the sustainability of fisheries, which includes scoring management of these fisheries. As such, factor 3.5 (Stakeholder Inclusion) is used by SFW to score the success of the management process at incorporating all user groups in decision making. Although priorities for salmonid management are quite diverse among user groups, SFW strongly supports management processes that listens to constructive advice from all these voices. SFW believes there are ways to incorporate hatcheries into sustainable management of salmonid populations.

Change in Capture Method

Accompanying the proposed shift away from hatchery production toward habitat recovery and place-based approaches to management of salmonid fisheries, there was a suggestion that the capture methods used and the characteristics of salmon fisheries need to change, with a shift away from non-selective gears (e.g. gillnet and purse seine) in coastal marine waters toward more selective gears (e.g. trap net) in terminal areas. The comment recommended fisheries targeting hatchery fish that encounter wild salmon from populations of concern must transition to fully selective gears that allow the release of non-target wild populations with a high probability of post-release survival.

SFW agrees a transition to selective fishing gears that can release salmonid stocks of concern in good condition is advisable in many situations. SFW also supports the use of post-release survival studies to better understand the impact of selective fishing gears on salmonids released from these gears. Some progress toward the use of selective salmonid fishing gears (e.g., purse seines, beach seines, tangle nets hook-and-line, and trap nets) has already occurred. However, selective gears are reliant on visual marks (e.g. adipose fin clips) to identify hatchery fish. Although many state, federal and tribal hatcheries currently mark hatchery fish in this manner, many hatchery fish are still not marked in any way for a variety of reasons. This makes reliance solely on marked hatchery fish a difficult economic proposition for selective salmonid fisheries and could result in unmarked hatchery fish being released from fisheries, potentially to reach spawning grounds. Additionally, many management systems currently allow salmonid fisheries a certain number of impacts (established by the federal government) to ESA listed populations. In this system, whether fisheries are selective or not, they can continue if the impact limits are not reached. Therefore, any type of fishery may result in the same number of impacts to ESA-listed populations. There are several places within the proposed SFW standard for salmon fisheries, where high post-release survival of released fish will benefit sustainability scores for the fisheries.

Terminology

A comment was received that requested the term ‘supplementation’ be reserved for hatchery production systems providing fish for conservation and recovery efforts. Those that provide fish for



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harvest should be termed 'augmentation' or 'subsidization' hatcheries as this better characterizes their purpose.

SFW agrees this term should be used in reference to conservation hatchery programs only. As such, SFW proposes the following wording within the standard where the term was used:

Removes term: "One of the major considerations within this set of criteria is the impacts of ~~supplementation from~~ artificial production which is widely used throughout salmonid fisheries across the globe." (p. 6)

*Removes term and adds less specific term: "This criterion (5X) is defined as an exceptional criterion that may not be relevant to all salmonid fisheries, yet can be a significant concern for those fisheries where ~~supplementation~~ **influence** from artificial production ~~does~~ exists." (p. 59)*

*No change needed, term is used in reference to conservation hatchery programs: "In some instances, hatchery supplementation is used as part of a rebuilding plan, particularly where individual stocks have become depleted to very low levels (and in some instances extirpated). Highly effective rebuilding strategies will seldom use hatchery supplementation to aid in recovery, and where they are used it is as a temporary conservation measure to preserve or restore wild diversity that has been threatened by human activities (including but not exclusive to fishing **and hydroelectric dams**). (p. 130)*

References

Concern was raised over the body of science used to support the creation of the standard, specifically those listed in support of Appendix 8. The list of references was considered short and outdated.

SFW's intention was to included references that broadly discuss potential impacts of hatcheries on wild salmon populations or make recommendations on best practices for hatcheries to reduce such impacts. SFW believes this was accomplished through the literature currently referenced in the standard. Analysts are expected to conduct literature reviews for each salmonid fishery to determine the level of impact for the particular fishery without making initial presumptions about these impacts. Relevant literature would be referenced in each SFW report on salmonid fisheries.