FINAL

Response to Public Comments Received regarding the Proposed ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead

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Prepared by
National Marine Fisheries Service
Northwest Region

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Introduction

The *ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead* is the product of a multi-year collaborative process involving federal, state, tribal, and local entities and a wide variety of stakeholders. We, the National Marine Fisheries Service (NMFS) developed this recovery plan by drawing on the best available scientific information provided by three regional, locally developed recovery plans; two related recovery plan modules; technical documents prepared by the Willamette-Lower Columbia Technical Recovery Team (WLC TRT); and technical experts from NMFS, the states of Washington and Oregon, the Yakama Nation, and regional planning groups. The resulting plan addresses recovery of the Lower Columbia River Chinook and coho salmon evolutionarily significant units (ESUs), the Columbia River chum salmon ESU, and the Lower Columbia River steelhead distinct population segment (DPS).[1] These salmon ESUs and the steelhead DPS all spawn and rear in the lower Columbia River or its tributaries in Oregon and Washington.

Preliminary drafts of the recovery plan went through multiple reviews and revisions in response to comments from both technical reviewers and members of the Lower Columbia Recovery Plan Steering Committee. This steering committee includes representatives from the states of Oregon and Washington, tribal governments, Klickitat County, the Lower Columbia Fish Recovery Board, the Lower Columbia Estuary Partnership, and NMFS. Between May 16 and July 16, 2012, NMFS made the proposed recovery plan—including the three locally developed regional plans and two recovery plan modules, which were included as appendixes—available for public review (77 FR 28855; May 16, 2012). In response to a stakeholder request, the public comment period was reopened between September 7 and October 9, 2012 (77 FR 55191; September 7, 2012).

We received a total of 17 comment letters by mail, fax, or email on the proposed recovery plan from a variety of sources, including local, state, and federal entities, tribal governments, nonprofit organizations, and interested individuals. Comments dealt with the proposed recovery plan and the management unit plan for the White Salmon subbasin (NMFS 2013).

We reviewed all comments for substantive issues and new information and have addressed them in the following summary. We have revised the recovery plan and White Salmon management unit plan as appropriate. For readers' convenience, we have organized comments by major issue categories, addressed similar comments with common responses where possible, and, in some cases, edited comments for brevity and clarity. Detailed editorial comments or minor corrections are not summarized here but were considered and incorporated into the recovery plan as appropriate.

Salmon and steelhead are important to the people, culture, economy, and ecosystems of the Pacific Northwest, and we recognize that public participation is essential to the task of protecting this precious natural resource. The recovery plan is the product of much

[1] For an explanation of the difference between an ESU and DPS, see Section 1.4.4 of the recovery plan.

work by numerous individuals and entities, and we similarly welcome the participation of all interested parties as we work collaboratively to implement it.

We approve the recovery plan with the incorporated revisions as the final plan; the *ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead* is available at the following website:

> http://www.nwr.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/lower_columbia_river/lower_columbia_river_recovery_plan_for_salmon_steelhead.html

Comments Pertaining to the Recovery Plan

Comments on Recovery Goals

1. **Comment**: The recovery plan should focus on populations that clearly are extant. A number of Gorge populations targeted for recovery should not be addressed in the plan, or they should be designated as extirpated or experimental, because it is uncertain whether they were present historically or were present in numbers significant enough to contribute to the viability of the ESU. This is true of the Gorge populations of chum, coho, and spring Chinook. These populations are not recoverable.

   Response: In general, the recovery plan assigns high recovery targets for the strongest populations and those where improvements are most realistic. For populations with a low chance of surviving or whose historical significance is questionable, we have not typically required a high probability of persistence unless the population represents unique genetic or life history characteristics, it is critical to achieving a viable ESU, or special circumstances create a potential for substantial restoration.

   With regard to the Gorge populations, the recovery plan highlights uncertainties about whether independent populations existed there historically, and whether long-term persistence of the ESU depends on having persistent populations there for the respective ESUs (see Section 3.1.3 of the recovery plan). As explained in Section 3.2.1 of the recovery plan, we agree that the historical role of the Gorge populations and strata merits further examination. In addition, the species chapters identify the historical role of the Gorge coho, spring (and fall) Chinook, and chum salmon populations as a critical uncertainty. Although there is a question about whether these populations functioned as independent populations historically and whether the Gorge strata functioned as strata (as defined in the recovery plan; see Section 2.1.2), we believe that fish in the Gorge ecozone played a role in overall ESU persistence and it is important to continue recovery efforts there. We do not want the recovery plan to eliminate the exploration of long-term recovery options while key uncertainties about the Gorge populations and strata are addressed.

   The recovery plan identifies two populations as extirpated: White Salmon spring Chinook and Hood River spring Chinook. It is often difficult to distinguish a population that is truly extirpated[2] from one that is not entirely extirpated but is at significant near-term risk. In the recovery plan, the baseline[3] status of such populations is described as very low persistence probability, and in some cases

[2] As a point of clarification, the recovery plan uses the term "extirpated" rather than "extinct" when referring to populations. The term "extinction" has a more global meaning and is reserved for the loss of an entire species, ESU, or DPS. Extirpation occurs at a smaller scale than extinction and suggests the possibility for recolonization, whereas species-level extinction is permanent.

[3] Both Oregon and Washington management unit recovery planners established a baseline period from which to assess population status, limiting factors, and threat impacts. For more discussion, see Sections 5.1 and 5.5 of the recovery plan.

the populations are considered "extirpated or nearly so." The Willamette-Lower Columbia Technical Recovery Team (WLC TRT) did not dismiss such populations as unrecoverable. Rather, based on its review of information on the historical and present-day presence of populations in each ESU, the WLC TRT determined that it was reasonable to establish recovery goals for every historical natural-origin population even if the population was considered extirpated or "extirpated or nearly so." The WLC TRT reached this conclusion based on the concept that, if historical populations may have contributed to viability at the stratum and ESU levels, we should not foreclose the future potential that habitat may be restored and natural self-sustaining populations may be recolonized or reintroduced. Within the Gorge strata, the WLC TRT ascertained that there are still conditions in the Gorge ecozone that might allow for successful recolonization by adults originating from other production areas associated with the native Chinook, coho, and chum salmon ESUs.

As initial steps toward recovery, the plan calls for (1) evaluating the production potential of tributary habitats given current habitat conditions for these populations, (2) identifying the potential for increasing juvenile production through tributary habitat actions, and (3) evaluating alternative strategies for reintroducing or restoring natural production (e.g., through natural colonization or a conservation hatchery program, including the potential need to reduce or control exogenous hatchery strays). In addition, as part of its viability criteria, the WLC TRT advised that opportunities to pursue high levels of recovery be preserved in more populations than the minimum number recommended for stratum-level (see Section 2.4.3.2 of the recovery plan). This guideline recognizes that not all recovery efforts will be successful and emphasizes the uncertainties inherent in the recovery process.

We believe that the array of populations we are trying to recover is reasonable based on available data. We will revise the delineation of populations and strata and adjust recovery goals in the future based on new information, as appropriate.

2. **Comment**: The recovery plan targets Hood River fall Chinook and coho salmon populations for large improvements in population status (to high persistence probability or better, from a baseline status of very low). Habitat and population information suggests that it would be very difficult to elevate these two populations to the target status given the spatial and temporal constraints on the Hood River system. Although these populations' status could be improved with appropriate habitat actions (such as restoring stream flows for late summer and fall spawning and rearing, and restoring channel connectivity in the lower river), such improvement would fall short of restoring the populations to a high probability of persistence.

   Response: We endorse the recovery scenarios and population-level goals in the management unit plans as one of multiple possible scenarios consistent with delisting (see Section 3.2.1 of the recovery plan). The recovery plan acknowledges that Oregon recovery planners consider the feasibility of achieving the target status for the Upper Gorge/Hood River coho salmon population and the Hood

River fall Chinook population to be low (see Sections 6.3 and 7.3 of the recovery plan). Constraints to recovery for these populations include the small amount of historical and current habitat (and thus the limited options for restoration) and anthropogenic impacts that are unlikely to change in the near future (e.g., inundation by Bonneville Reservoir and roads that restrict access to habitat). We recognize that there is high uncertainty in the data and analyses, particularly for small populations.[4] Oregon recovery planners view most of these issues as related to the population designation and have suggested a reevaluation of the Gorge stratum population structure for all species (ODFW 2010). As discussed in Section 3.2.1 of the recovery plan, we agree that such an evaluation is needed. We expect to adjust recovery goals in the future, as appropriate, based on further examination of the historical role of the Gorge populations, or as new information becomes available. In addition, as a way of mitigating for risk in the Gorge strata, the recovery scenarios exceed the WLC TRT criteria in the Cascade fall Chinook, Cascade spring Chinook, and Cascade chum strata.

3. **Comment**: The states have not set instream flows for all rivers. The word "some" needs to be added to the sentence about instream flows in the Threats Criteria portion of Chapter 3 (Section 3.2.2).

   Response: The "Threats Criteria" section of Chapter 3 (Section 3.2.2) identifies the listing factor criteria we will use in determining whether an ESU or DPS has recovered to the point that it no longer requires the protections of the Endangered Species Act (ESA). With respect to the "inadequacy of existing regulatory mechanisms," we list one of the criteria for delisting as, "states have established and protected instream flow levels in a manner consistent with achieving and maintaining the desired status for the ESU/DPS and its constituent populations as defined by the biological criteria in this recovery plan." Here we are saying that states should establish instream flow levels, not that states have set instream flows for all rivers at the current time.

4. **Comment**: The abundance goals for some populations (e.g., Sandy River spring Chinook) are too low and give the false impression that we are at or near the levels needed for recovery. The abundance goals are far below historical levels of abundance. For these populations, many issues remain to be addressed, such as the high proportions of hatchery spawners. The abundance goals create misleading expectations for delisting that are biologically unsupportable.

   Response: The target abundance levels in the recovery plan are taken from the management unit plans and are based on analyses that were reviewed by NMFS and are consistent with the work of the Willamette-Lower Columbia Technical Recovery Team. In addition to targets for abundance, the recovery plan includes targets for productivity, diversity, and spatial structure within individual populations and the ESUs and DPS as a whole. In instances where there is a high

[4] In the method used by the WLC TRT and management unit recovery planners to establish abundance goals, target abundance is based to some extent on the gap between current and historical abundance. If the historical abundance of Gorge stratum Chinook salmon populations has been significantly overestimated, then the abundance needed to achieve target status may also be overestimated (ODFW 2010).

proportion of hatchery spawners, the diversity criteria may require a reduction in the proportion of hatchery-origin fish before the targets for all four viability criteria can be met, depending on the target status of the population. In addition, the management unit plans include targets for hatchery spawner proportions and actions to achieve those proportions; these actions are being implemented.

The delisting criteria in the recovery plan are geared toward meeting ESA delisting requirements, not restoring populations to historical levels, achieving the maximum estimated carrying capacity under optimal conditions, or achieving other cultural or societal goals beyond ESA delisting. If new information indicates that the targets need to be reconsidered to meet the delisting criteria, the recovery plan may be updated.

5. **Comment**: The recovery plan states that Salmon Creek fall Chinook will not be restored because of the highly urbanized nature of the subbasin. Is harvest expected to take reductions to support this decision?

   Response: The recovery plan identifies harvest restrictions to support recovery goals for fall Chinook salmon throughout the ESU. Harvest-related actions are not population specific. Reductions in harvest impacts are aimed at improving the viability of populations targeted for substantial improvements, but are also expected to help maintain populations such as Salmon Creek that are designated as stabilizing.

   The Salmon Creek fall Chinook salmon population was designated to remain at a very low persistence probability in part because the population's historical production was relatively small and urban development in the subbasin has severely degraded habitat there. In addition, the recovery analysis indicated that the ESU could be recovered without improvement in the status of the Salmon Creek population. Given this information, the recovery plan—consistent with the management unit plans—prioritized other populations that have a higher benefit-to-cost ratio for significant improvement (see p. 6-15 of LCFRB 2010a).

   Some level of recovery effort will be needed even for populations that are not targeted for significant improvement, such as Salmon Creek fall Chinook, to avoid future deterioration. For example, the Washington management unit plan calls for habitat protection and restoration actions in the Salmon Creek subbasin to improve watershed processes and habitat conditions over time.

Comments on Limiting Factors and Threats

6. **Comment:** The recovery plan overstates the geographic breadth of habitat degradation as a limiting factor (in Sections 4.1.1, 6.4.1, and 6.6.2.3). The plan should indicate when tributary habitat conditions in the White Salmon subbasin differ from conditions described as affecting the Gorge strata or Upper Gorge populations as a whole. For example, dam removal has left the subbasin with a lakebed that has conditions that are not typical of the rest of the ESU.

Response: We have reviewed the relevant sections of the recovery plan and made changes to the text when appropriate. The recovery plan characterizes limiting factors and threats at broader geographic scales than do the management unit plans (i.e., at the stratum and ESU levels, rather than the population level). Thus, some specificity—such as conditions within a single subbasin or portion of a subbasin—may not be included in these higher level summaries. (In some cases, including such specificity is not feasible.) We based the stratum- and ESU-level descriptions of limiting factors and threats on population-specific information in the management unit plans. Briefly, this process involved (1) correlating limiting factors and threats identified in the three management unit plans with standardized terminology developed by the NMFS Northwest Fisheries Science Center, (2) organizing the population-specific limiting factors and threats into a "crosswalk" table for each stratum, (3) identifying in the crosswalk tables those limiting factors and threats that are prevalent at the stratum and ESU scales, and (4) expressing that information in written summaries. (For a more detailed description of this process, including how limiting factors were designated as primary and secondary, see Appendix H and Sections 5.3, 5.4, and 6.4 of the recovery plan.) The recovery plan refers the reader to the management unit plans for detailed information on limiting factors and threats, including their magnitude, spatial scale, and relative impact. As implementation proceeds, we will continue to refine our understanding of local conditions and the appropriate location and scale of recovery actions (in part through additional habitat assessments in the White Salmon subbasin, now that Condit Dam has been removed).

7. **Comment:** One commenter felt that the recovery plan misapplies the concept of limiting factors. The commenter noted that a limiting factor is a "bottleneck" that creates a limit on the size of a population, and that in most cases the limiting factor is unknown. The commenter advised that text in Chapter 4 and the Limiting Factors portions of the species chapters be modified to refer to "possible limiting factors." The commenter also suggested that Chapter 4 be rewritten to clearly distinguish among limiting factors, processes of effect, and threats.

   Response: The recovery plan defines limiting factors as physical, biological, or chemical conditions and associated ecological processes that limit a species' viability, as measured by the viable salmonid population (VSP) parameters of abundance, productivity, spatial structure, and diversity. As explained in Section 4 of the recovery plan, we use the term "limiting factors" to indicate the full range of factors that are believed to be affecting the viability of salmon and steelhead, not the single factor that is most limiting. This interpretation of limiting factors is one accepted definition of the term and is consistent with the usage of the term in other recovery plans for the Columbia Basin, and with regional planning activities such as the Northwest Power and Conservation Council's subbasin planning.

   Terminology about limiting factors is evolving. For example, a recent publication by the NMFS Northwest Fisheries Science Center (Hamm 2012) recognizes that the common usage of the term "limiting factor" has strayed from its original definition and suggests that the term "ecological concern" be used to refer to

potential limiting factors that have not yet been confirmed through focused research and monitoring. Some NMFS scientists are now using the term "ecological concerns" instead of "limiting factors" to connote the full range of factors affecting viability, in acknowledgment of the fact that all factors that reduce productivity or survival at some stage of the life cycle act in aggregate to limit population size and viability. In practice, "limiting factor" is a term of art that recovery implementers commonly use to refer to the full range of possible factors affecting viability. During implementation, additional assessments may be needed to refine our understanding of the factors limiting Lower Columbia River salmon and steelhead. Research, monitoring, evaluation, and adaptive management will be key in this process.

The commenter is correct that the recovery plan often discusses threats to salmonids together with limiting factors, without necessarily distinguishing between the two or explaining the mechanisms of effect (see Chapter 4 and the Limiting Factor portions of Chapters 6, 7, 8, and 9). This is for the sake of brevity. The purpose of these sections is to provide the reader with relevant, summary-level information that is helpful in understanding the rationale for the recovery strategies, without overwhelming the reader with lengthy descriptions. For additional specificity about limiting factors, threats, the interrelationships between them, and what is known or has been confirmed empirically through research and monitoring, the recovery plan frequently refers the reader to the management unit plans.

8. **Comment**: The recovery plan overstates the extent of limiting factors and fails to cite sources.

Response: In summarizing limiting factors, Chapter 4 and the species chapters present the limiting factors that the management unit plans cite as affecting one or more populations within their management unit. These sections are overviews that are intended to provide relevant, summary-level information that is helpful in understanding the rationale for the recovery strategies. The recovery plan repeatedly refers the reader to the management unit plans for additional detail. Management unit plans quantify the baseline impact of specific limiting factors and document the analytical methods used to do so. (For specific information on how management unit recovery planners[5] quantified baseline impacts, see Section 5.5 of the recovery plan, Chapter 5 of ODFW 2010, Section 5.4 and Appendix H of LCFRB 2010a, and Section 5 of NMFS 2013). As implementation proceeds, we will continue to refine the geographic specificity and scale of recovery actions and the specific limiting factors they are intended to address.

The introduction to the recovery plan (i.e., Chapter 1 of the plan) explains that we developed the plan by synthesizing material from the three management unit plans, related recovery plan modules, and additional analyses as appropriate. Because it is generally apparent when we are summarizing from the

[5] "Management unit recovery planners" refers, collectively, to the organizations that led development of the three management unit plans (i.e., the Lower Columbia Fish Recovery Board, Oregon Department of Fish and Wildlife, and NOAA Fisheries) and their partners in the recovery planning process.

management unit plans, we did not cite those plans every time we synthesized or summarized them. Where we rely on other sources, we have included citations.

9. **Comment**: The recovery plan does not clearly identify what is and is not an assumption or take into consideration how incorrect assumptions could affect the recovery analyses.

   Response: The management unit plans document the basis for their threat impact assessments, and Chapter 5 of the recovery plan, "Overall Approach to Species Recovery Analyses," summarizes the management unit recovery planners' analytical approaches to species recovery. Where appropriate, Chapter 5 notes the limitations of the methodologies or available data. For example, Section 5.3 explains that, because we have limited data linking limiting factors to specific effects on population risk status, the management unit plans present limiting factors as hypotheses to be tested through research, monitoring, and evaluation of the effectiveness of restoration actions. Section 5.5 notes that our estimates of the impacts of threats during the baseline period (and thus the associated threat reduction targets) are highly uncertain, and that in many cases the quantifications of threat impacts should be considered working hypotheses that are testable as part of recovery plan implementation; this information is repeated in each species chapter. Similarly, Section 5.7 of the recovery plan points out that there is a high degree of uncertainty about the biological response to proposed recovery actions and, therefore, how much of any action will be needed to achieve the desired benefits. For this reason, the management unit plans consider proposed actions to some extent as hypotheses that will need to be tested in terms of their sufficiency and level of effort.

   Despite these uncertainties, it is the expert judgment of NMFS and management unit scientists, based on the best available information at this time, that the estimates of baseline threat impacts provide a reasonable estimate of the relative magnitude of likely limiting factors and threats, and serve as an adequate basis for designing initial recovery actions. As implementation proceeds and more and better information is collected, it will be applied to recovery efforts in an adaptive management framework, to aid planners and managers in guiding and refining recovery strategies and actions. Research, monitoring, evaluation, and adaptive management will help refine scientific understanding of the impact of limiting factors on population persistence and of the extent to which management actions are reducing the threats that are causing the limiting factors.

10. **Comment**: The recovery plan does not fairly represent the role of all sectors in the decline of stocks. NMFS should strengthen the recovery and implementation plans so that there is a proportionate impact reduction across all sectors.

    Response: The recovery plan represents the role of all six sectors—tributary and estuary habitat, hydropower, harvest, hatcheries, and ecological interactions— in the decline of populations and offers strategies for reducing impacts from each of them. This is consistent with the analyses in the management unit plans, which

determined that recovery would require reductions of impacts in all threat categories (i.e., that recovery could not be achieved by eliminating impacts from one or just a few of the threat categories). The recovery plan does not rely unduly on reductions in any one sector, such as harvest or habitat, to achieve the target status for each population.

11. **Comment**: The recovery plan seems weak in its commitment to the goal of providing harvest opportunities and an economic return to society from restored salmonid populations. For example, the recovery plan frequently alludes to future harvest reductions and reduced hatchery production for spring Chinook salmon, but harvest was not the major cause of loss of spring Chinook (hydropower dams were), and we will not achieve recovery by reducing harvest to nothing. We would like to see more robust language throughout in support of harvest.

    Response: ESA recovery plans are intended to present site-specific management actions, objective and measurable criteria for delisting, and estimates of the time and cost to achieve recovery. The ESA does not require recovery plans to identify actions and costs necessary to achieve broader goals, such as ensuring harvest opportunities. When we invited states, tribes, and other stakeholders to develop recovery plans, we recognized that they might wish to include "broad sense" recovery goals that would go beyond what is needed for ESA delisting, to achieve other social goals.

    The management unit plans do include such broad sense recovery goals. Specifically, the Washington management unit plan sets a goal of ultimately returning ESA listed salmon and steelhead to "healthy, harvestable levels," the Oregon management unit plan describes a goal of having naturally produced populations that provide significant economic benefits, and the White Salmon management unit plan incorporates a general broad sense recovery goal of achieving a status beyond ESA delisting that incorporates local and traditional uses of salmon, including those associated with rural and Native American values.[6] (See Sections 1.1 of LCFRB 2010a, 10.1 of ODFW 2010, 3.1 of NMFS 2013, and 3.1.1 of the recovery plan.) In addition, the management unit plans prioritize ESA recovery strategies that allow for continued harvest opportunities while working toward recovery, and these strategies have been incorporated into the recovery plan.

    The recovery plan repeatedly states our support for the management unit plans' goal of providing continued harvest opportunities on hatchery-origin fish while working toward recovery and delisting of the Lower Columbia River salmon ESUs and steelhead DPS. (See, for example, the executive summary, Section 4.5.2, and Sections 6.3, 7.3, 8.3, and 9.3, which describe how local recovery planners and NMFS took into consideration the desire to maintain harvest opportunities when they decided on the target status for each population.)

[6] To be clear, the target status designations and associated abundance and productivity goals in the recovery plan are geared toward meeting ESA delisting requirements, not achieving the management unit plans' broad sense goals.

12. **Comment:** The recovery plan should highlight more prominently the ways in which past hatchery practices, such as installation of weirs that prevented all fish passage in streams, have contributed substantially to the reduction in nutrients.

    Response: Nutrient limitation as a result of the extensive use of impassible weirs may historically have been a factor in the decline of salmon and steelhead populations, but hatcheries are addressing this by outplanting hatchery carcasses to supplement marine-derived nutrients above the hatcheries and in other parts of the lower Columbia region. We do not believe that the present-day use of weirs is a factor that currently prevents spawning fish from delivering marine nutrients to tributaries.

    The recovery plan describes hatchery structures as sometimes acting as a barrier to fish passage in tributaries (see Section 4.1.1) but also notes that, in the present day, fish weirs are generally not the main barriers in lower Columbia watersheds. The recovery plan does not identify fish weirs as a significant passage issue because the majority of weirs have been removed or altered to allow passage. Fish now pass above hatchery weirs to spawn naturally and use habitat that once was inaccessible. Dams are responsible for the greatest share of blocked habitat, while inadequate culverts make up the vast majority of all barriers (LCFRB 2010a). The Oregon and Washington management unit plans both call for restoring or improving passage at culverts and other barriers as a way of increasing access to tributary and off-channel estuarine habitat.

    There are proposals to install weirs in several lower Columbia tributaries, to monitor escapement and help reduce the numbers of hatchery fish on the spawning grounds. We are working with the states and tribes to ensure that existing and new weirs do not adversely affect naturally produced adults returning to their natal streams.

13. **Comment:** Major losses of mainstem spawners occurred with construction of dams, which inundated spawning grounds. This loss of habitat is at the heart of the downturn in salmon abundance in the Gorge strata and is omitted from the plan.

    Response: The recovery plan identifies habitat inundation from the hydropower system as a limiting factor for Upper Gorge populations in all the ESUs (see Sections 6.4.1, 7.4.1.1, 7.5.1.1, 8.4.1, and 9.4.1. It is possible that the impacts of habitat inundation have been significant, especially for mainstem spawners, but the extent to which Bonneville Reservoir inundated mainstem spawning habitats for these species is unknown. Washington management unit planners explicitly included habitat loss resulting from inundation in their estimates of hydropower impacts on significant Gorge populations occurring in Washington. For Gorge populations occurring in Oregon, management unit planners considered the impacts of habitat inundation as falling within the category of tributary habitat impacts. See Section 5.5 of the recovery plan. Other limiting factors are identified for these populations as well, including other tributary and estuarine habitat factors. (See Tables 6-5, 7-5, 7-7, 8-3, 9-5, and 9-6 and the accompanying text for a more general discussion.) The recovery plan notes that inundation is a condition that is unlikely to change, the exception to this being the inundation of tributary

spawning habitat on the White Salmon River upstream of Condit Dam, which was removed in September 2012. Continued habitat inundation in the Upper Gorge is one of the factors that NMFS and the management unit recovery planners considered in setting recovery targets for Gorge populations.

14. **Comment:** There is a need for research on mortality rates in recreational fisheries. Under "filling information needs" in Section 4.5.2, the recovery plan mentions only the need to determine harvest impact rates for coho salmon. Chinook salmon, chum salmon, and steelhead need to be included as well.

    Response: "Filling information needs" in Section 4.5.2 provides examples of topics where better information would lead to improved harvest management. The text of the bullet is not intended to be an exhaustive list. We agree that better information on mortality rates in recreational fisheries, as well as other fisheries, would also be useful, and this need for better information applies to all salmon and steelhead species. We have modified the subsection to clarify this general point.

15. **Comment:** Have reductions in harvest masked continued habitat degradation and other causes of salmonid decline? Reducing harvest without reducing other threats, such as habitat degradation and passage and flow issues, will not produce long-term recovery. We are not aware of any research that has correlated harvest reductions to increases in population abundance.

    Response: Significant harvest reductions have contributed to improvements in salmon and steelhead populations. However, we agree that harvest reductions alone cannot restore populations to high levels of viability. Other factors, including freshwater and marine habitat conditions, have also played a role in the decline of Lower Columbia River salmon and steelhead and must be addressed to achieve recovery. The recovery plan does not rely exclusively on harvest controls as a means of achieving recovery for any ESU. Instead, the recovery plan takes a robust approach of addressing all relevant impacts, including habitat, hydropower, harvest, and hatchery impacts, as well as ecological interactions such as predation.

    The harvest strategy incorporated into the plan is based on recommendations and analyses presented in the management unit plans and is intended to complement improvements to natural production gained from habitat, hatchery, and hydropower actions. Local recovery planners believe that for Lower Columbia River spring Chinook salmon, steelhead, and chum salmon, current harvest impacts are generally consistent with long-term recovery goals, at least in the near term. For these species the recovery plan recommends measures to ensure that harvest does not adversely affect future conservation and recovery. For Lower Columbia fall Chinook and coho salmon, efforts will focus on (1) refinements in harvest management (including abundance-based management) to reduce risk to naturally produced fish, and (2) continued review of overall harvest rates.

We recognize the value of having a direct assessment of trends in key habitat conditions in judging progress under the recovery plan. The recovery plan includes provisions to periodically review performance and new information on key assumptions, and update the strategies as necessary. As discussed in Section 10 of the recovery plan, "Adaptive Management and Research, Monitoring, and Evaluation," each of the management unit plans calls for regular monitoring of key habitat conditions across the tributary and estuarine reaches supporting each population. This monitoring effort should be able to detect declining trends in key habitat conditions and, ultimately, the effects of implementing habitat improvement strategies.

16. **Comment:** Habitat conditions, hatcheries, the presence of dams, and other factors should not be considered limiting factors for coho, spring Chinook, and chum populations that are extinct, such as those in the Gorge. In these cases the limiting factor is the lack of an extant population to recover. The recovery plan should acknowledge that many populations are extinct and the language should be changed to refer to "extant" populations and "potential" limiting factors. Habitat is only a limiting factor if a species is present. The recovery objectives cannot be achieved with implementation of a reintroduction plan to replace extirpated populations. The emphasis on habitat needs to be rethought.

    Response: The recovery plan identifies two populations as extirpated: White Salmon spring Chinook and Hood River spring Chinook. It is often difficult to distinguish a population that is truly extirpated[7] from one that is not entirely extirpated but is at significant near-term risk. In the recovery plan, the baseline status of such populations is described as very low persistence probability, and in some cases the populations are considered "extirpated or nearly so." The WLC TRT did not dismiss such populations as unrecoverable. Rather, based on its review of information on the historical and present-day presence of populations in each ESU, the WLC TRT determined that it was reasonable to establish recovery goals for every historical natural-origin population even if the population was considered extirpated or "extirpated or nearly so."

    The WLC TRT reached this conclusion based on the concept that, if historical populations may have contributed to viability at the stratum and ESU levels, we should not foreclose the future potential that habitat may be restored and natural self-sustaining populations may be recolonized or reintroduced. A recolonizing or reintroduced population would face the same limiting factors in a watershed (including habitat-related limiting factors) as would a population that is universally understood to be extant. Thus we believe that it is appropriate to identify limiting factors present in a watershed (such as habitat-related impacts) that might inhibit recolonization of an area.

[7] As a point of clarification, the recovery plan uses the term "extirpated" rather than "extinct" when referring to populations. The term "extinction" has a more global meaning and is reserved for the loss of an entire species, ESU, or DPS. Extirpation occurs at a smaller scale than extinction and suggests the possibility for recolonization, whereas species-level extinction is permanent.

17. **Comment:** There is no discernible genetic difference between hatchery-origin and naturally spawned coho salmon, so it does not make sense to say that the productivity of naturally spawning fish has been reduced because of hatchery fish (see Section 6.4.5). They are the same fish spawning on the spawning beds. Moreover, not long ago NMFS declared wild coho as extinct. This section needs to reconcile these discrepancies and provide a better rationale for the claim that the influence of hatchery-origin fish has reduced population productivity, abundance , and resilience.

    Response: When early NMFS status reviews (e.g., Johnson et al. 1991) were completed, there was little information available on naturally spawning salmon populations in the lower Columbia region, other than in the Clackamas River. In the late 1990s and early 2000, an effort to survey chum salmon in the lower Columbia River also identified a number of spawning populations of late-run coho salmon. More recent monitoring efforts have identified additional natural coho salmon populations (mostly late-run).

    Genetically, there is not much variability among coho salmon populations (even those less affected by hatchery populations). However, it is clear that the fish in the Lower Columbia River coho ESU were distinct from coastal stocks and had retained their genetic legacy. NMFS' 2001 review of LCR coho salmon, completed in response to a petition from Oregon Trout et al. (2000), resulted in a proposed listing recommendation (NMFS 2001), and Lower Columbia River coho salmon were listed in 2005 (70 FR 37160).

    We would normally expect a lack of discernible genetic differences (using standard genetic markers such as allozymes and microsatellites) between naturally produced and hatchery-origin coho salmon after years of interbreeding. Microsatellites and allozymes are good indicators of gene flow but not of change that is due to artificial selection. All that the lack of difference indicates is that there has been a large amount of interbreeding. It is reasonable to assume, on the basis of natural selection theory and data on fitness loss in cultured fish (see Berejikian and Ford 2004, or Araki et al. 2007), that fitness among naturally produced coho salmon has been reduced by interbreeding with hatchery-origin fish. For example, Araki et al. (2007) found that among steelhead in the Hood River, interbreeding could reduce fitness substantially in a single generation.

    This type of analysis has not yet been done in coho salmon, but Araki et al.'s results raise a concern. In addition, we expect that even though naturally produced coho salmon in some populations may be genetically indistinguishable from hatchery-origin coho right now, we may be able to see fine-scaled differences between hatchery-origin and naturally produced fish once more sensitive methods are applied (see Sauvage et al. 2010 for an example). Fishery management actions aimed at reducing the number of hatchery-origin coho returning to natural spawning locations are expected to allow the natural selection process to become more effective, resulting in natural-origin coho salmon that are better suited to the natural environment and genetically distinct from hatchery-origin coho salmon.

18. **Comment:** Why does the recovery plan conclude that harvest is a primary limiting factor for spring Chinook when the gene pool exists only in hatcheries, such as the Cowlitz? (See Section 7.4.1.4.) Harvest is now down to 20 percent, compared to 1999-2000, and should not be considered a limiting factor without any data to justify it. There is no evidence that this harvest reduction has benefited "wild" spring Chinook.

    Response: Harvest is one of several factors (including habitat degradation and lack of access to historical production areas upstream of dams) that has contributed to the decline of natural-origin spring Chinook salmon in the Cowlitz and Lewis subbasins. It is correct that harvest impacts today are significantly lower than in the 1990s, and that currently there are adequate fish returning in most years to sustain the hatchery populations. However, efforts to reintroduce spring Chinook salmon to the upper Cowlitz and Lewis River subbasins have begun, and we and the Lower Columbia Fish Recovery Board, which is the management unit lead for Southwest Washington populations, believe that control of harvest rates will be important in helping to restore natural-origin populations to sustainable levels. The reintroduction/recovery strategy in the Cowlitz and Lewis River subbasins requires improvements in passage conditions and adequate seeding of the habitat. Evaluating the impacts of harvest as natural production is reestablished—and adjusting harvest as needed to support the reintroduction program and eventual recovery of naturally spawning populations—is an essential component of the recovery effort.

19. **Comment:** The recovery plan incorrectly characterizes green sturgeon bycatch in the salmon fishery as an interspecies interaction.

    Response: We agree that bycatch is not an interspecies interaction and have revised the text accordingly.

20. **Comment:** It is important to note that significant human population growth is not expected in all counties.

    Response: We have added text in the sections of the plan that discuss human population growth (the executive summary and Section 1.3.4) noting that the expected growth rate for the human population varies throughout the Columbia Basin, including the areas covered by this recovery plan.

21. **Comment:** The recovery plan does not adequately recognize the Forest Practices Habitat Conservation Plan (HCP) in Washington as meeting salmon conservation needs in the plan area. Changes in forestry and timber harvest practices begun 12 years ago should be recognized and supported in the recovery plan. Recovery efforts should be directed to areas and activities that have not yet met the environmental standards that private forest landowners have been meeting.

    The two references in the recovery plan to the NMFS determination that Forest Practices Rules for private forest land in Washington meet the conservation needs for salmon specifically identify the Forest Practices HCP. The Forest Practices HCP is

separate and distinct from the state land HCP and should be acknowledged in the recovery plan.

Response: Section 4.1.2 of the recovery plan assumes that forest practices habitat conservation plans (HCPs) in Washington will satisfy salmon conservation needs by stating that "NMFS has determined that Washington's habitat conservation plan for state-owned forest land and its Forest Practices Rules for private forest land meet conservation needs for salmon and steelhead." To clarify this issue, we have added text to Section 4.1.2 explaining that we are referring to two distinct HCPs: the State Trust Lands HCP, covering state lands in Washington (west of the Cascades crest), and the Forest Practices HCP, applied to forest practices on private commercial forestlands statewide.

Implementation of recovery plan actions related to forest practices in Washington will be directed toward areas and activities that are not covered by either HCP, that is, about 600,000 acres of forests managed by counties or cities, and 260,000 acres managed by tribes or federal agencies. For example, legacy sediment delivery problems continue to be an issue in the Kalama and Upper North Fork Lewis subbasins, as identified in the Washington management unit plan.

22. **Comment**: The recovery plan should note that the Forest Practices HCP includes an adaptive management component with a well-funded cooperative research program to ensure that advances in fish biology and scientific understanding of salmon and steelhead habitat are taken into consideration as forest practices rules evolve.

    Response: We agree that the adaptive management component of the Forest Practices HCP provides a valuable tool for helping to ensure that forest practices achieve the stated goals for protection of salmon and steelhead. However, the intent of the recovery plan is not to evaluate or comprehensively describe individual research efforts, but to synthesize analyses and other content described in the management unit plans.

23. **Comment**: The recovery plan should consider results from recent studies in the limiting factors discussion. For example, forest roads on private and state-managed land in Washington are now constructed and maintained so as to minimize the delivery of water and sediments to stream channels, and nearly 90 percent of road miles on private and state forestry lands in Washington meet new standards to avoid delivery of sediment to streams. Road density is not a good measure of delivery of fine sediment to streams. The recovery plan should remove forest roads on private forest land in Washington from the list of ongoing causes of sediment delivery to tributary streams.

    Response: We agree that future iterations of the recovery plan should consider results from recent studies on sediment delivery from forest roads. The recovery plan acknowledges that implementation of the Forest Practices and State Forest Trust Lands HCPs has played a key role in improving management of forest roads on these lands (see Section 4.1.2). Because these road management and abandonment plans (RMAPs) are being implemented (and will be entirely

implemented by 2021), NMFS agrees that adverse impacts of sediments delivered from forest roads will be ameliorated when each RMAP is completed.

In the absence of watershed-specific analyses, road density may still be a useful indicator of sediment delivery to streams, but it is not the sole indicator of these problems, and we have noted this in Sections 7.4.1.1. and 7.5.1.1. of the recovery plan. The Washington State watershed analysis process, which was initiated in the 1990s, has produced detailed data on the contribution of individual road segments to sediment delivery for many watersheds on commercial forest lands. This information advanced the state of knowledge by describing specific road segments that need to be treated to avoid road-related sediment delivery to streams and salmon habitats. Sediment delivery from sources such as roads on non-industrial private forest lands, legacy forest roads under various ownerships, and other types of land use, including agriculture and development, remains a threat to recovery.

As the results of HCP monitoring efforts are published, and management unit leaders show improvements regarding sedimentation and runoff in their plan areas, recovery plan implementers will be able to reevaluate and prioritize limiting factors as part of their adaptive management process. Management unit leads may identify specific watersheds in their plan areas where forest road conditions have reached the point where production of sediment is no longer a limiting factor.

24. **Comment**: The recovery plan incorrectly identifies water quality as a limiting factor for White Salmon spring Chinook salmon (see the fourth sentence of the third paragraph of Section 7.4.1.1), and the portion of the associated footnote regarding Rattlesnake Creek is inappropriate. The section of Rattlesnake Creek that is warm is upstream of expected natural passage barriers (i.e., waterfalls) to Chinook salmon. The sentence indicating that water quality is affecting Chinook habitat in the White Salmon should be removed.

    Response: The current White Salmon management unit plan is the authoritative document concerning limiting factors in that subbasin. Tables 5-2 and 5-3 of the White Salmon management unit plan (NMFS 2013) do not identify stream temperature as a primary limiting factor or an additional factor potentially limiting spring Chinook; however, Table 5-3 does identify stream temperature as a factor that may become limiting as salmon and steelhead populations grow. Based on this information, in the recovery plan we have removed stream temperature from the list of baseline limiting factors for White Salmon spring Chinook salmon and adjusted the text accordingly.

25. **Comment**: Table 7-7 (Baseline Limiting Factors and Threats Affecting LCR Fall Chinook Salmon: Stratum-Level Summary) should be revised to reflect the fact that, at this point in the dam removal process, sediment, channel conditions, and riparian habitats are primary situations affecting instream habitat for fall Chinook in the White Salmon. The rest are secondary, with the exception of water temperature. Water temperatures within the reaches of the White Salmon expected to be occupied

by Chinook are quite cold. Water temperature is not a problem for Chinook. Tributary dams are no longer primary (or secondary) issues in the White Salmon.

Response: Table 7-7 summarizes baseline limiting factors and threats as described in the management unit plans. The fact that the table summarizes baseline conditions is explained in the introductory text to the table (see Section 7.5.1 of the recovery plan) and reflected in the table title. We recognize that baseline conditions do not necessarily reflect current conditions and have noted in the text cases where conditions have changed significantly since the management unit plans' analyses of limiting factors and threats (such as when a dam has been removed). In the case of the White Salmon, the recovery plan repeatedly notes that with the removal of Condit Dam, additional habitat assessments are needed to refine our understanding of limiting factors in that subbasin. In the meantime, we consider the management unit plans' identification of baseline limiting factors helpful in evaluating progress toward recovery.

26. **Comment**: The recovery plan says that impaired side channel and wetland conditions, degraded floodplain habitat, and riparian conditions are not primary limiting factors for White Salmon fall Chinook (see the first paragraph of Section 7.5.1.1). Much of the potential Chinook habitat lies within the former lakebed, which currently is not in high-quality condition.

    Response: We agree that restoring the former lakebed will be an important part of habitat improvements in the White Salmon subbasin now that Condit Dam has been removed. However, as the recovery plan explains, additional habitat assessments are now needed in the White Salmon subbasin to help us refine our understanding of limiting factors that affect White Salmon populations. Once these assessments have been completed, the White Salmon management unit plan and the recovery plan can be revised accordingly.

27. **Comment**: Section 7.5.1.1 (the first sentence of the second paragraph) says that sediment conditions are not identified as a primary limiting factor for White Salmon fall Chinook. However, the majority of the Chinook habitat in the White Salmon lies within the footprint of the former dam and downstream of the dam, and since the dam was breached, sediment has been an issue. The reaches downstream of the dam may now have significant sediment deposits. (Upstream of the old lakebed, sediment is not an issue.)

    Response: We concur that sediment conditions merit designation as a primary factor for White Salmon fall Chinook, based on presumed high fine sediment loads delivered from the former lakebed to the lower river, and have changed the recovery plan accordingly. The White Salmon management unit plan notes that the net effect of the removal of Condit Dam will need to be assessed (see Table 5-2 of NMFS 2013). The recovery plan and the White Salmon management unit plan underscore the need for additional assessment(s) of habitat limiting factors to refine our understanding of limiting factors in the White Salmon subbasin now that Condit Dam has been removed.

28. **Comment**: The first bullet for the tributary habitat strategies section for Gorge fall Chinook salmon summarizes several tributary habitat issues, such as channel modification and floodplain alteration and disconnection. But the extent of estimated historical fall Chinook habitat in the White Salmon does not extend into the tributaries, so tributary habitats are not at issue in that subbasin.

    Response: The tributaries this bullet refers to are tributaries to the mainstem Columbia River, throughout the Gorge ecozone, not tributaries to the White Salmon River.

29. **Comment**: (12.7) Table 8-4 shows very high tributary habitat impacts on the Washington portion of the Upper Gorge chum salmon population. In the White Salmon there is and was no tributary habitat to impact. The number should be 0.

    Response: The estimated tributary habitat impacts for the Upper Gorge chum salmon population include impacts in the Columbia River mainstem and other upper Gorge tributaries besides the White Salmon subbasin. Section 8.4.1 of the recovery plan explains that impacts to this population include habitat degradation associated with the transportation corridor and habitat loss from inundation from Bonneville Reservoir. Consideration of these and other factors, across a broader geographical area than just the White Salmon subbasin, contributed to the estimates of tributary habitat impacts in Table 8-4 for the Upper Gorge chum salmon population.

Comments on Baseline Threat Impacts and Threat Reduction Targets

30. **Comment**: The equation listed in the footnote for the last column in Tables 6-6, 7-6, 7-8, and 8-4 provides an estimate of the percent change in population size needed, not the percent change in survival. The header needs to be changed from survival to population size.

    Response: Productivity, abundance, and survival are all linked, such that improvements in survival or population production generally also result in improvements in abundance. The terminology and equations in Tables 6-6, 7-6, 7-8, and 8-4 are an attempt to reconcile the slightly different approaches that Oregon and Washington recovery planners used in communicating the magnitude of improvement needed for each population. The Washington management unit plan emphasizes the close interrelationship of all four VSP parameters, especially abundance and productivity (see Section 4.3.2 of LCFRB 2010a). In fact, the Washington plan refers to the population-level survival improvement value as the "productivity improvement target," which it defines as the relative increase in population production or density-independent recruits per spawner required to reach the objective for the population. Although the Oregon management unit plan does not explicitly combine abundance and productivity into a single criterion, it does link all four of the VSP parameters in its final assessments.

Because Oregon recovery planners took a different analytical approach, that management unit plan does not present the same type of calculations of needed improvement. However, technical experts from the Oregon and Washington recovery planning teams discussed the terminology and equations in Tables 6-6, 7-6, 7-8, and 8-4 at length and agreed that the resulting language and equation are a fair representation of the content of the management unit plans and the needed survival improvements. Both management unit plans assume that there is a direct proportional relationship between the projected changes in cumulative survival values presented in the tables and the required changes in natural-origin spawner abundance and productivity.

For detailed explanations of how management unit recovery planners quantified population-specific conservation gaps in terms of the VSP parameters, see Section 4.2.1 of ODFW (2010) and Section 4.5.1 and Appendix E (p. 12-12) of LCFRB (2010a). For a general summary, see Section 5.2.2 of the recovery plan.

Comments on Recovery Strategies

Habitat Strategies

31. **Comment**: Actions to reduce habitat-related mortality are undervalued and minimized. More needs to be done with improvement of habitat, specifically juvenile rearing habitat in the mainstem and estuary.

    Response: We agree that habitat restoration is essential in achieving delisting; this is reflected in the limiting factor analysis and recovery strategies in the plan. We agree that habitat restoration must occur across life stages and must include improvements in headwater, mainstem, and estuarine habitats for both adults and juveniles. Sections 4.1 and 4.2 of the recovery plan summarize habitat-related limiting factors and strategies in tributary and estuarine environments, at the regional scale. Additionally, the *Columbia River Estuary Recovery Plan Module for Salmon and Steelhead* (NMFS 2011), which is included as Appendix D of the recovery plan, describes 23 broad actions that, if implemented, would increase the survival of salmon and steelhead in the lower Columbia River mainstem, estuary, and plume. These actions have been incorporated into the Oregon and Washington management unit plans (see Actions 64 through 85 in Table 7-3A of ODFW 2010 and Section 5.4.3 of LCFRB 2010a) and thus also into the recovery plan. The management unit plans, which also are incorporated into the recovery plan, include extensive treatments of habitat limitations and the improvements needed to substantially improve the status of Lower Columbia River salmon and steelhead.

    In addition, each species chapter of the recovery plan describes habitat-related limiting factors, threat reduction targets, and strategies that are specific to the ESU, stratum, or population. These chapters identify population-specific threat reductions related specifically to estuarine habitat, which includes the Columbia River mainstem and estuary and the mainstem Willamette River below

Willamette Falls. For some populations the identified estuarine habitat threat reductions are small relative to the reductions needed in other threat categories. However, the recovery strategy summaries (i.e., Sections 6.6.1, 7.4.3.1, 7.5.3.1, 8.6.1, and 9.6.1) emphasize that recovery will require improvements in every threat category, even those improvements that are relatively small. Without improvements in all of the threat categories, the benefits of actions in any individual sector are unlikely to be fully realized and the expected threat reductions—and thus recovery—will not be achieved.

32. **Comment**: The most recent information on Condit Dam should be incorporated into the plan. Revise sections (1) that do not acknowledge the removal of the dam, and (2) where uncertainties have been resolved by ongoing monitoring efforts.

    Response: At the time the proposed recovery plan was made available for public comment, Condit Dam had been breached but not completely removed. We have since updated the recovery plan to reflect the fact that the dam has been removed. The analyses in the recovery plan reflect baseline conditions, as described in the management unit plans. The recovery plan repeatedly notes that with the removal of Condit Dam, additional habitat assessments are needed to refine our understanding of limiting factors in the White Salmon subbasin. However, in the meantime, we consider the management unit plans' identification of baseline limiting factors helpful in evaluating progress toward recovery. As new scientific information becomes available regarding conditions that have changed since the removal of Condit Dam, management unit leads will incorporate that new information into their implementation plans and NMFS will incorporate it into future versions of the recovery plan.

33. **Comment**: The recovery plan incorrectly states that the White Salmon management unit plan did not distinguish between primary and secondary limiting factors (see Section 6.4, fourth paragraph, sixth line). The White Salmon management unit plan did make these distinctions.

    Response: The White Salmon management unit plan refers to some limiting factors as "primary" but does not use the term "secondary" to describe limiting factors. In an effort to use consistent language and terminology in the recovery plan, we inferred primary and secondary limiting factor designations for populations that historically spawned in the White Salmon subbasin based on the narratives in the Washington and White Salmon management unit plans (LCFRB 2010a, NMFS 2013). The recovery plan repeatedly refers the reader to the management unit plans for more detail on limiting factors and threats, including their magnitude, spatial scale, and relative impacts, and states that additional assessment of habitat limiting factors is needed in the White Salmon subbasin to refine our understanding of limiting factors now that Condit Dam has been removed from the White Salmon River.

34. **Comment**: Climate change is not incorporated consistently in the recovery plan, with appropriate adaptive management strategies.

Response: Recovery objectives and strategies effectively assume that any detrimental impacts of climate change will be addressed by additional reductions in other limiting factors, to offset the detrimental climate impacts. Because of the uncertain magnitude of future climate impacts on salmon status, it is difficult at this time to identify any specific quantitative target associated with those impacts. In their analyses, Oregon and Washington recovery planners took different approaches in accounting for the probable effects of climate change. Oregon recovery planners added in a numerical "buffer" when calculating needed abundance and productivity improvements, while Washington recovery planners did not explicitly include climate change but noted that they would do so in the future through adaptive management. (For more information on these methodologies, see Section 5.2.2 of the recovery plan, Section 5.9 of LCFRB 2010a, and Section 3.4 of ODFW 2010.)

It is premature at this point to identify site-specific recovery actions related to climate change because there are not yet enough site-specific data on the impacts of climate change in the lower Columbia region. However, as the results of downscaled climate models and monitoring become clear, specific restoration or mitigation strategies might be identified. Until that time, the effects of climate change will be addressed largely through monitoring and adaptive management, which are a critical part of the recovery plan. For more on how the recovery plan deals with the topic of climate change, see Section 4.7.

Harvest Strategies

35. **Comment**: In the recovery plan's regional harvest strategy (Section 4.5.2), the accountability for declines related to hatchery fish is incorrectly attributed to harvest. The plan states that "when harvest levels being evaluated are supported by hatchery production, the ecological, genetic, and other effects of hatchery production on both the juvenile and adult life stages also need to be considered as part of the harvest impact analysis." This statement overlooks the fact that many hatcheries are mitigation for habitat that has been degraded or destroyed by the hydroelectric system. The accountability rightfully belongs to those who impacted habitat in the first place, and who continue to do so.

    Response: The commenter is correct that many hatchery programs were implemented as mitigation for habitat and harvest opportunities lost as a result of mainstem dams. However, the section in question (Section 4.5.2) focuses on NMFS' approach for evaluating impacts to listed species when conducting ESA section 7 consultations. Because hatchery production levels influence harvest rates, this language is noting that the presence of hatchery fish plays a role in the setting of harvest rates and that in section 7 consultations on harvest management plans, we may consider the effects that hatchery fish have on natural populations as part of the effects analysis. The recovery plan acknowledges the importance of hatchery fish to the fishery and seeks to provide access to those fish within limits that are necessary to protect natural-origin fish that are central to the recovery of the species.

With regard to accountability for recovery, the recovery plan takes a long-term approach that calls for impact reductions in all sectors.

36. **Comment**: Harvest reductions already put into place are not being considered in the analysis. The draconian harvest reductions and hypothesis of management by mark-selective fisheries have never been subjected to effectiveness monitoring. Where is the science justifying mass marking and mark-selective fishing as contributors to recovery?

    Response: We agree that mark-selective fisheries are primarily a fishery management tool that provides greater harvest opportunity. Mass marking can provide some recovery benefit by helping reduce the proportion of naturally spawning hatchery fish in some areas. However, we recognize that mark-selective fisheries are rarely sufficient by themselves to control the proportion of naturally spawning hatchery fish to the degree desired, and successful recovery strategies will need to employ additional management tools.

    The recovery plan takes a long-term approach to recovery that calls for impact reductions in all sectors. We emphasize in the plan that harvest managers have implemented substantial reductions in harvest for Lower Columbia River Chinook salmon, coho salmon, chum salmon, and steelhead both before and since NMFS listed these species under the ESA (see Section 4.5.2, Regional Harvest Strategy). However, actions to address all limiting factors will be needed to provide the necessary survival improvements; this includes harvest reductions. Given the complexity and variability of limiting factors and ecological processes affecting listed populations, it is not possible to determine the specific level of harvest reduction that is necessary to achieve recovery. Local recovery planners believe that for spring Chinook salmon, steelhead, and chum salmon, current harvest impacts are generally consistent with long-term recovery goals, at least in the near term. NMFS recently completed a biological opinion that implemented an abundance-based management strategy for Lower Columbia River fall Chinook salmon that sets harvest limits for fall Chinook salmon populations for the foreseeable future. A similar abundance-based management framework is being developed for Lower Columbia River coho salmon, as called for by the recovery plan. Current harvest strategies are generally consistent with those proposed in the recovery plan, but we will need to continue to monitor and adaptively manage the impact of harvest rates on natural populations as they recover.

37. **Comment**: Section 4.8 of the recovery plan should mention the role of sustainable fisheries in feeding the growing human population in the Pacific Northwest during the coming decades.

    Response: We are supportive of the management unit plans' broad sense recovery goals, which include recovery of the ESUs to the point that they are naturally self-sustaining and provide significant and sustainable ecological, cultural, and economic benefits—including productive recreational, commercial, and tribal fisheries.

We agree that Lower Columbia River salmon and steelhead ESUs could play a role in feeding the growing human population in the Pacific Northwest during the coming decades. The focus of Section 4.8 is the impact of human population growth on our ability to recover stocks. For example, a larger human population in the region will increase the demand for freshwater and groundwater resources, presumably reducing streamflows and thus limiting the availability of salmon rearing and spawning habitat. If we are successful in implementing the strategies in the recovery plan and reducing the impacts of limiting factors, we will inherently be working toward creating a more sustainable fishery that could help to feed the future population of the region.

38. **Comment**: Continued reduction in harvest needs to take into account the economic cost of such measures and the economic viability of fishing businesses and infrastructure. Otherwise the reductions will collide with the Lower Columbia Fish Recovery Board's goal of recovering salmon and steelhead to healthy, harvestable levels that will sustain productive recreational, commercial, and tribal fisheries.

    Response: The commenter is correct in that the costs cited in the recovery plan reflect only the direct costs of implementing an action, and not the subsequent direct and indirect economic impacts to fishing businesses and infrastructure. Determining whether an action is economically and socially prudent is a separate question that will be addressed through recovery implementation with the states, tribes, fishing community, and other stakeholders through established fisheries management processes. The recovery plan does not preclude recovery actions or presume the outcome of such delicate socioeconomic considerations.

    We recognize that maintaining harvest opportunities is an important societal value that informs the selection of broader goals that exceed what is needed for ESA delisting alone. The management unit plans express this desire in "broad sense" recovery goals that describe viability levels that are more robust than the levels needed for ESA delisting; broad sense recovery goals are intended to fulfill desired cultural and societal values and activities other than delisting. (See Sections 1.1 of LCFRB 2010a, 10.1 of ODFW 2010, 3.1 of NMFS 2013, and 3.1.1 of the recovery plan.) The management unit plans prioritized ESA recovery strategies that allow for continued harvest opportunities while working toward recovery, and these strategies have been incorporated into the recovery plan.

Hatchery Strategies

39. **Comment**: The recovery plan does not adequately address mitigation obligations set in motion by the development of hydropower facilities.

    Response: The mitigation obligations the commenter is referring to include the development of hatcheries under the Mitchell Act (1938),[8] which were intended to mitigate for impacts from the building of dams and other land use practices

[8] The Mitchell Act was intended to provide for the conservation of the fishery resources of the Columbia River; the establishment, operation, and maintenance of hatcheries in Oregon, Washington, and Idaho; and investigations, surveys, stream improvements, and stocking operations for these purposes.

affecting salmon runs at the time. It is important to note that the Mitchell Act does not supersede the Endangered Species Act—Mitchell Act hatcheries must operate in a manner that is consistent with the ESA. NMFS has the primary federal authority for the ESA, Sustainable Fisheries Act, and Mitchell Act as they apply to salmon and steelhead. In our ESA role, we must ensure that all federal actions, including mitigation programs, are consistent with salmon recovery and are not in violation of the ESA or Sustainable Fisheries Act.

The primary objective of the recovery plan regarding hatcheries is to address the impact of hatcheries as limiting factors and to identify strategies for addressing those factors (see Section 4.4 of the recovery plan and the "Hatchery-Related Limiting Factors" and "Hatchery Strategy" sections of each of its species chapters).

40. **Comment**: We are concerned that the recovery plan frames artificial production of spring Chinook as an impediment to restoring natural-origin populations in the Hood River Basin. Reducing hatchery releases as described in the recovery plan is not consistent with current guiding plans and Hatchery and Genetics Management Plans and will have a direct impact on existing hatchery operations.

    Response: Although the Oregon management unit plan does call for a reduction in stray rates for spring Chinook salmon in the Hood River Basin (see Table 6-25 of ODFW 2010), it also calls for co-managers to evaluate the reintroduction component of the current hatchery program and explore alternative options if the current program is not achieving success in this regard (see 303-HD in Table 7-3C of ODFW 2010). In this context, stray rates primarily apply to harvest augmentation hatchery programs. Hatcheries may continue to play a role in the reintroduction of spring Chinook salmon in the Hood River Basin; details need to be worked out during implementation of the recovery plan.

41. **Comment**: The recovery plan is inconsistent with the 2008 Revised Hood River Master Plan developed with the state of Oregon and currently incorporated in the 2008-2017 U.S. v. Oregon Agreement. The recovery plan states that there is a "complete elimination of hatchery threats" for summer steelhead, as "summer steelhead will no longer be released in the Hood River subbasin" (page ES-36 of the recovery plan). The elimination of hatchery production of summer steelhead is contrary to actions currently planned under the U.S. v. Oregon Agreement.

    Response: The intent of the recovery plan is to lay out long-term goals for recovery of naturally self-sustaining populations in each ESU or DPS. The Oregon management unit plan identifies a long-term goal for summer steelhead in the Hood River Basin of minimizing hatchery impacts on existing natural populations. The commenter is correct that the current U.S. v. Oregon agreement (which is up for renegotiation in 2018) includes the production of hatchery steelhead in the Hood River subbasin. These production agreements can only be changed by agreement of the parties. In the future, renegotiation of agreements such as U.S. v. Oregon should take into account the long-term goals of the recovery plan. It is our expectation that co-managers such as the state of Oregon, the Confederated Tribes of the Warm Springs Reservation of Oregon, and NMFS

will work to develop interim steps for reaching this and other long-term recovery goals.

42. **Comment**: NMFS should adopt spawner escapement requirements for each natal watershed by species and stock. It is unlikely that the recovery criteria in the recovery plan can be achieved without formal conservation escapement requirements.

    Response: Escapement-based management is a common and useful strategy when and where it can be applied. In general, escapement-based management requires the ability to distinguish each stock or population in a fishery, sufficient data to forecast the escapement for each stock or population, and the implementation of monitoring programs adequate to assess escapement in real time. In the Lower Columbia region, escapement goal management is being used for North Fork Lewis late-fall Chinook salmon. However, population-specific escapement-based management is impractical for many other populations in the Lower Columbia region because of a lack of data. As an alternative, the region's spring Chinook salmon, chum salmon, and steelhead are managed subject to very low fixed exploitation rate limits, while fall Chinook and coho salmon are managed using abundance-based management frameworks that set variable exploitation rate limits, depending on the relative abundance of the species each year. Harvest management strategies need to be tailored to fit the available information and particular circumstance. Although escapement-based management is a useful strategy, it is not feasible in all cases.

43. **Comment**: Hatchery fish should not be released in areas used by wild salmon and steelhead for spawning, and naturally spawning hatchery fish should be excluded from areas where wild salmon and steelhead spawn. NMFS should restrict hatchery stray rates to less than 5 percent, to prevent interbreeding and competition among hatchery and wild fish. The proposed 10 percent hatchery stray rate lacks scientific justification and applies to whole basins rather than specific spawning areas. Hatchery stray rates are often higher than 10 percent in areas used by wild salmon and steelhead. NMFS should direct the action agencies to actively manage stray hatchery fish.

    Response: Several agencies and scientific groups (including the Hatchery Scientific Review Group, or HSRG) have developed guidelines for the percentage of hatchery fish on the spawning grounds that will result in an acceptable level of risk, based on their understanding of the scientific literature. However, available data and theory do not point to a single stray rate that results in a specific level of risk to naturally spawning populations. Management unit recovery planners used the best information available to develop (1) stray rate targets that they hypothesize are consistent with a population's target status, (2) actions to achieve these targets, and (3) adaptive management processes to revise actions or targets as necessary. Populations targeted for high persistence probabilities have low targets for hatchery-origin spawners. For example, populations targeted for high or very high persistence probability have targets of 10 percent or less for the proportion of hatchery-origin spawners (pHOS). We will continue to work with co-managers as they develop Hatchery and Genetics Management Plans to

ensure that strategies to reduce pHOS will be implemented to achieve these targets.

Actions identified in the recovery plan to achieve the stray rate targets include eliminating, reducing, or shifting overall production; changing production or release strategies; and physically removing hatchery-origin fish from natural spawning areas at weirs or other physical barriers.

The recovery plan includes a goal of ensuring that some populations have no in-subbasin hatchery releases and are isolated from stray out-of-subbasin hatchery fish. Large-scale changes in hatchery production and release locations have been or are in the process of being implemented in order to reduce the incidence of hatchery fish in important wild spawning areas. Such changes include establishment or continuation of wild fish refuges where no further hatchery releases will be made. Many populations that the recovery plan identifies as primary and contributing will benefit from incremental improvements resulting from reductions in hatchery influences.

As noted in the recovery plan, there are critical uncertainties associated with these approaches (see Section 4.4.2 of the recovery plan). Research and monitoring will be critical to assess the effectiveness of these management actions and to allow program adjustments as needed to achieve recovery targets.

On the issue of assessing stray rates over the entire subbasin rather than in concentrated spawning areas, there are situations in which this way of assessing stray rates can be misleading. However, in most cases any inaccuracy will cause overestimation of impacts, rather than underestimation, and will thus be more protective.

44. **Comment**: The recovery plan calls for elimination of hatchery fish that people can harvest in order to increase wild fish that people are generally not allowed to harvest. This could significantly reduce fishing.

    Response: The recovery plan does not call for eliminating hatchery production in the lower Columbia River, but it does acknowledge that hatchery production must be modified to achieve the ESA goal of recovering naturally spawning populations. Hatchery production has been reduced and will likely continue to be reduced in some cases to protect natural-origin fish. The ultimate goal of broad sense recovery is to achieve levels of natural production that provide for harvest (see Sections 1.1 of LCFRB 2010a, 10.1 of ODFW 2010, 3.1 of NMFS 2013, and 3.1.1 of the recovery plan.) In addition, the management unit plans prioritized ESA recovery strategies that allow for continued harvest opportunities while working toward recovery, and these strategies have been incorporated into the recovery plan.

45. **Comment**: The recovery plan cannot save genetically distinct, original, local native salmon, which is the purpose of ESA, because they have been genetically compromised. Nearly all original local runs have evolved into a mix by interbreeding with non-native hatchery fish and strays.

Response: Undoubtedly many salmon populations have been affected by interbreeding with hatchery-origin fish, which can cause changes in fitness and within-population diversity. The risk of genetic impacts from hatchery production was one of the factors contributing to the ESA listings. However, being influenced by hatchery interbreeding does not mean that diversity and fitness cannot be restored.

When the WLC TRT developed viability criteria for Lower Columbia River populations, it reviewed information on the historical and present-day presence of populations in each ESU and evaluated where conditions would allow for maintenance and recovery of natural-origin populations. The WLC TRT determined that there was some possibility of recovery for every historical population, even if the population was considered "extirpated or nearly so." Although it can be difficult to know with certainty whether all genetically distinct, locally adapted fish have been lost from a particular population, or the extent to which populations have been genetically compromised through interbreeding with hatchery fish, the WLC TRT did not dismiss the possibility of recovery of interbred populations—in part because diversity is such an important component of a viable ESU. The recovery plan is based on the implicit assumption that natural production can be restored to populations heavily influenced by hatchery-origin fish and that appropriate genetic diversity can be reestablished within the ESU. Previous TRTs also have concluded that, despite significant interbreeding with hatchery-origin fish, the extant populations are still representative of the evolutionary legacy of the ESU.

There are several possible avenues of recovery for populations that have been heavily influenced by hatchery-origin fish, depending on ESU and population. For example, for different populations, the recovery plan envisions recovery being achieved in part through natural colonization, supplementation with hatchery-origin stock (when the appropriate genetic material is represented in that stock), and/or restricting habitat use by hatchery-origin fish. These approaches will help avoid further interbreeding and will support a population's continued adaptation to local conditions within the watershed.

46. **Comment**: If we are going to provide food, recreation, and jobs from salmon, we need to maximize hatchery production, not wild fish.

    Response: The purpose of the ESA is to recover naturally self-sustaining populations in their natural habitat, not to maximize food, recreation, and jobs. Naturally self-sustaining salmon populations are the most reliable approach for achieving sustainable fisheries and satisfying other values over the long term.

47. **Comment**: Because the carrying capacity of streams is limited, it is more beneficial for people to have fewer wild salmon, so there is more room for hatchery fish. This will probably require less than harvestable levels of wild fish to sustain them and provide adequate broodstock for hatcheries. If the wild fish population is low, it can be supplemented with unclipped hatchery fish of the same stock to increase their population.

Response: The Oregon and Washington management unit plans have sustainable harvest as a long-term goal. In order to meet the requirements of the ESA, our focus is restoration of natural-origin populations in their natural habitats. Naturally spawning hatchery fish pose risks to the reproductive fitness of wild populations (see our response to Comment #45, above) and compromise the species' ability to adapt and respond to current and future environmental variability. Over the long term, healthy natural populations in their natural habitat are the most sustainable approach for satisfying broad sense goals, such as allowing sustainable harvest.

Strategies Related to Ecological Interactions

48. **Comment**: NMFS should examine current practices regarding dealing with invasive invertebrates and plants and nuisance birds, non-native fishes, and marine mammals. Time and money are currently being spent on problems that are out of control that could have been addressed more effectively in their beginning stages. Particular areas of concern are potential responses to zebra and quagga mussels, where a rapid response will make all the difference in the Columbia system.

    Response: We agree that preventing and responding promptly to infestations of invasive species is important for maintaining habitat quality for ESA-listed salmon and steelhead. The recovery plan characterizes non-native fish, introduced invertebrates (such as zebra and quagga mussels), and invasive plants as potentially altering the food web of the Columbia River mainstem, tributaries, estuary, and plume, thus contributing to habitat degradation in these areas. NMFS is a signatory to a rapid response plan for quagga and zebra mussels (Columbia River Basin Team, 100th Meridian Initiative, 2011) that outlines how agencies will cooperate in the Columbia Basin in the event of an invasion. In addition, NMFS is a party to the *Quagga-Zebra Mussel Action Plan for Western U.S. Waters* (Western Regional Panel on Aquatic Nuisance Species 2010), which outlines specific actions to be taken in the event one of these invasive species is discovered.

    In addition, the *Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead* (NMFS 2011), which is presented as Appendix D of the recovery plan and is incorporated into the plan by reference, identifies invasive species as a limiting factor in the Columbia River estuary and plume and includes a management action (CRE-19) to prevent new introductions of aquatic invertebrates and reduce the effects of existing infestations. To more explicitly acknowledge the risk posed by invasive species, we have added the following sentence to Section 4.2.2, "Regional Strategy for Estuary Habitat": "A host of additional actions, such as preventing new introductions of invasive species, also are expected to improve habitat conditions in the estuary, to a lesser degree."

    The recovery plan also includes strategies for reducing predation by fish, birds, and marine mammals during salmonid migration and residency in the lower Columbia River and estuary.

It is sometimes difficult to respond quickly to emerging threats because of statutory restrictions. Even when we recognize that a problem is developing and seek to respond rapidly, we must operate within congressionally mandated requirements. The management of species that may be harming salmon and steelhead survival sometimes falls under other regulatory protection, such as the Marine Mammal Protection Act and the Migratory Bird Treaty Act. This complicates management of competing species.

49. **Comment**: Avian predation has at least doubled since efforts were first initiated to reduce this impact in the estuary. An objective should be established to reduce avian predation in the estuary to the level at the time of listing.

    Response: The recovery plan calls for reducing avian predation on all Lower Columbia River salmon and steelhead populations by redistributing Caspian terns and cormorants (Section 4.6.2). The degree of reduction varies by salmonid population, based on the population-specific analyses in the management unit plans. Our analysis suggests the predation-related impact reduction targets are adequate to achieve recovery, as long as the impact reductions the recovery plan identifies for the other threat categories (i.e., tributary and estuary habitat, hydropower, harvest, and hatcheries) also are achieved. A U.S. Army Corps of Engineers plan to manage predation by terns has been in place since 2006, and work has begun to manage predation by cormorants. Preliminary research assessing the effectiveness of these actions also is under way. In addition, as new information becomes available on predation rates, we will modify recovery strategies accordingly.

50. **Comment**: The plan does not adequately address smelt and lamprey in management recommendations. Restoration of these species is vital to any plan for restoring Columbia River salmon. Rivers should be managed as ecosystems, and the interdependence of runs and non-target species should be assumed to be valid until disproved. The system as a whole must be healthy before any individual fish run will be healthy and sustainable.

    Response: We agree that smelt (i.e., eulachon) and lamprey are important species in the lower Columbia region. We are currently in the process of developing a recovery plan for eulachon. The recovery plan outline should be released in summer of 2013, followed by a draft recovery plan in 2014. We are also a party to the lamprey conservation strategy initiated by the U.S. Fish and Wildlife Service (USFWS). Lamprey are currently managed by USFWS, under the U.S. v. Oregon agreement. NMFS is a party to the management action plan but does not have jurisdiction.

    We do not have enough information at this time to draw firm conclusions about the relationship between Lower Columbia River salmon and steelhead populations and smelt and lamprey populations. All anadromous species have been affected by common habitat-related factors and freshwater conditions. Improvements implemented for salmon and steelhead may benefit lamprey and eulachon as well. As information on the interdependence of these species comes to light, it can be incorporated into the implementation plans for Lower

Columbia River salmon and steelhead populations and into future iterations of this recovery plan.

51. **Comment**: NMFS inappropriately allows the killing of sea lions.

    Response: The recovery plan, management unit plans, and *Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead* (NMFS 2011) all identify predation by sea lions as a threat to Lower Columbia River salmon and steelhead. For sea lion removal, individual nuisance animals are targeted; this does not affect the health of the sea lion population in any way.

    We cannot solve the salmon problem systematically unless we deal with all parts of the problem, including predation by sea lions. Although marine mammal predation may not be the main factor limiting Lower Columbia River salmon and steelhead populations, it is an emerging factor and must be addressed. We try to balance the needs of different species in our management prescriptions. We took public comments on the sea lion removal program into consideration when the program was first approved in 2008 and when it was renewed in 2012.

Comments on Costs and Implementation

52. **Comment**: The recovery plan covers a large geographic area and a large number of populations (72). It can contribute significantly to the future of multiple fisheries and the overall health and quality of life of the entire lower Columbia and California Current marine ecosystems. We are concerned about the funding issues for such a large undertaking, which will need to take place over many years. We also are concerned about how to maintain the momentum and commitment that are needed to complete such a long-term plan. Funding is a large concern, especially under the constraints of declining federal budgets.

    Response: We agree that funding will be a challenge. We are committed to working with our federal agency partners to look for resources to implement the recovery plan, and to working collaboratively with all implementing partners to identify efficiencies, creative sources of funding, and approaches to implementation. This is a long-term task, and we agree that we need to be attentive to maintaining momentum.

Comments Pertaining to the White Salmon Management Unit Plan

General Comments (White Salmon)

53. **Comment**: The process of the White Salmon working group appeared to be swayed by its make-up, by excluding local participation, sports fishermen, and commercial harvest interests.

    Response: The working group was representative of a wide variety of stakeholders. For example, commercial harvest in the White Salmon is limited to tribal harvest, and the Yakama Nation was represented as part of the White Salmon steering committee. In addition, we published a notice of intent to develop a plan, thus creating an opportunity for anyone wanting to participate in development of the management unit plan to let us know of their interest at that time. We also made a draft of the White Salmon management unit plan available for public review and comment between May 16 and July 16, 2012 (77 FR 28855; May 16, 2012). In addition, in response to a stakeholder request, the public comment period was reopened between September 7 and October 9, 2012 (77 FR 55191; September 7, 2012).

54. **Comment**: The White Salmon management unit plan is a predetermined result without a complete evaluation of all impacts on the regional resource or the public. No consideration was given to the plan's social impacts or its economic impacts on local business and commercial interests. No impacts on existing sport fishing opportunities were evaluated, or the opportunity to provide a sport fishery and contribute to the commercial harvest sector to offset restricted management in surrounding watersheds.

    Response: ESA recovery plans are intended to present site-specific management actions, objective and measurable criteria for delisting, and estimates of the time and cost needed to carry out the actions needed for recovery. The ESA does not require that a recovery plan address issues of economic or social impact. We understand that recreational, commercial, and tribal fisheries play an important economic and cultural role in the lower Columbia Basin. Maintaining recreational and commercial harvest opportunities created by hatchery fish is a societal value that informed the design and selection of recovery strategies to achieve ESA delisting goals. The management unit plans prioritized ESA recovery strategies that allow for continued harvest opportunities while working toward recovery. Recovery of the species may provide improved future opportunities for recreational and commercial fisheries.

55. **Comment**: Section 1.3 of the White Salmon management unit plan fails to indicate that White Salmon steelhead are addressed in the Mid-Columbia steelhead recovery plan and should therefore should not be mentioned in this plan for the Lower Columbia River ESUs.

Response: The *Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan* explains that the White Salmon subbasin, which historically supported a population of Middle Columbia River steelhead, is part of the Washington Gorge management unit for the steelhead DPS. The White Salmon River subbasin also includes three listed ESUs of salmon found in the lower Columbia Basin (i.e., Lower Columbia River Chinook and coho salmon and Columbia River chum salmon).

We decided to use an ecosystem approach to address all the listed salmonids that spawn in the White Salmon subbasin in one plan (i.e., the Lower Columbia recovery plan). However, the delisting criteria, actions, and costs that were developed for the White Salmon steelhead are included in the Middle Columbia plan in order to have all the information on the Middle Columbia steelhead DPS in one place. The White Salmon management unit plan will be an appendix to both the *Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan* and the Lower Columbia recovery plan.

56. **Comment**: NMFS must address each of the factors for decline evaluated in the "Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Populations Segments of West Coast Steelhead: Final Rule, 71 FR 834" (January 5, 2006) in the White Salmon management unit plan.

    Response: The final listing determination evaluated factors in the decline of all steelhead species on the West Coast, throughout their range, whereas this recovery plan evaluates factors specifically affecting the White Salmon population and watershed. Recovery planning is intended to provide the detailed assessment necessary to identify actions to address population-specific limiting factors.

    The limiting factor analysis that was part of the recovery planning process was comprehensive, site-specific, and based on the best available scientific information, including information developed or available since the assessments done for the 2006 ESA listing determinations.

57. **Comment**: The White Salmon management unit plan should apply the Policy for Evaluation of Conservation Effort (PECE) evaluation criteria to each of the federal, state, and local regulatory mechanisms listed in Appendix II of the White Salmon management unit plan, "Current Efforts and Regulations Addressing and Protecting Population Productivity in the White Salmon Watershed."

    Response: We use the "Policy for Evaluation of Conservation Efforts (PECE) When Making Listing Decisions" (68 FR 15100; March 28, 2003), and its evaluation criteria, when evaluating whether an ESA listing is warranted. Specifically, PECE describes our approach to evaluating those efforts being made by any state or foreign nation to protect the species (ESA section 4(b)(1)(A)). Systematic application of the PECE criteria are not required as a part of recovery planning. The PECE policy was developed to evaluate whether formalized conservation efforts that have yet to be implemented or to show effectiveness contribute to making listing a species as threatened or endangered unnecessary.

Although there is no requirement that the recovery plan conduct a stepwise analysis using the PECE policy, the considerations outlined in the PECE criteria did inform our evaluation of the types of regulatory mechanisms that will be needed to satisfy the threats criteria. As described in Section 3.2.2 of the recovery plan, both threats criteria and biological criteria must be met for a species to be delisted. (See also Section 3 of the White Salmon management unit plan.)

58. **Comment**: The White Salmon management unit plan should acknowledge that costs include actions that address not only the minimum to attain recovery, but also expected costs to attain broad sense recovery goals. (See the third paragraph of p. xxxi).

    Response: The only costs estimates that the ESA requires are those for the actions necessary to achieve ESA delisting (i.e., recovery goals). The White Salmon management unit plan included additional actions (i.e., broad sense goals) to achieve societal, cultural, and other goals in excess of ESA recovery. Including such actions is not an ESA requirement, nor is including estimates of their cost.

59. **Comment**: Additional references are needed in three areas: the paragraph on Lower Columbia River coho salmon in Section 2.1, Section 2.2, and the "Key Habitat during Different Life Stages" portion of Section 2.4.1.

    Response: We have added references to these areas of the White Salmon management unit plan, in response to this comment.

Comments on Biological Background (White Salmon)

60. **Comment**: Does the analysis of steelhead abundance in the White Salmon River consider EDT (Ecosystem Diagnosis and Treatment) estimates? (See Section 2.4.4 of NMFS 2013.)

    Response: The White Salmon management unit plan did take EDT analyses of historical habitat capacity into consideration, specifically in Chapter 2 (Biological Background) and Chapter 5 (Limiting Factors and Threats). The EDT model was not used exclusively, as several high-quality studies have been conducted in the basin since the EDT modeling effort was completed. The management unit plan used these recent studies extensively.

61. **Comment**: Section 2.2.3 of the White Salmon management unit plan should clarify that EDT modeling results are for upstream of the former lakebed only, not the entire mainstem White Salmon River.

    Response: We have added language to the White Salmon management unit plan clarifying that EDT modeling results were focused on areas upstream of the former lakebed, not the entire mainstem White Salmon River.

62. **Comment**: Section 2.3 of the White Salmon management unit plan needs to have a brief discussion about the cumulative impact of "exempt" domestic wells having a potential impact on groundwater/surface flows.

    Response: We agree that the cumulative impact of "exempt" domestic wells may have a potential impact on groundwater/surface flows. This is mentioned at the end of Section 2.3.1 of the White Salmon management unit plan.

Comments on Recovery Goals and Viability Criteria (White Salmon)

63. **Comment**: The threats criteria in the White Salmon management unit plan (Section 3.3) mention "agricultural practices, including grazing." Does this mean agricultural BMPs? The way it is worded would imply that agricultural practices such as grazing help to protect and restore riparian areas and floodplains. This is confusing wording. Instead, add "best management" between "agricultural" and "practices."

    Response: Threats criteria describe desirable outcomes under each of the listing factors. The recovery plan notes that threats to habitat must not contribute to the "present or threatened destruction, modification, or curtailment of its habitat or range" (Section 3.3). Bullet 4 in that section notes that, for an ESU or DPS to be considered recovered, agricultural practices must be implemented in a way that protects and restores riparian areas, floodplains, and stream channels and that protects water quality. Grazing is mentioned in the sentence as an example of an agricultural practice that must be implemented in a manner that protects habitat. Whether this protection is achieved through development and enforcement of best management practices or other mechanisms will be determined through the recovery implementation process.

Comments on Limiting Factors and Threats (White Salmon)

64. **Comment**: The executive summary of the White Salmon management unit plan describes threats to salmonids as "typically necessary human activities" that are not inherently undesirable. Although some activities may be deemed necessary to humans, this does not alter the fact that they are threats to fish populations. Threats should be seen from the fishes' perspective: a threat is something inherently undesirable to the fish, which is what this recovery plan is for.

    Response: We agree that it would be better to describe threats to salmonids without referring to the necessity of human actions. We have altered the language accordingly.

65. **Comment**: In Section 5.2.2 of the White Salmon management unit plan, it may be worth noting the recent changes in required road construction and maintenance specified in the Washington Forest Practices Rules. These newer rules may significantly reduce the effects of forest roads on commercial timberland.

Response: We have added text to the White Salmon management unit plan recognizing the Forest Practices HCP in Washington as meeting salmon and steelhead conservation needs by requiring that forest roads be hydrologically disconnected from streams. We agree that implementing this HCP should reduce the impacts of forest roads.

66. **Comment**: The Federal Columbia River Hydrosystem portion of the White Salmon management unit plan (in the executive summary and Section 5.5) refers to "warmer maximum summer temps," but it should read "cooler maximum summer temperatures."

    Response: We agree and have corrected the language in the White Salmon management unit plan.

Comments on Survival Improvement Targets (White Salmon)

67. **Comment**: The information in the White Salmon management unit plan on the historical steelhead population may be underestimating the potential population of steelhead that could be supported by the White Salmon subbasin. NMFS should consider adopting a range of target capacities for the White Salmon River, with population size corresponding to conditions post-dam removal.

    Response: The targets in the management unit plan are geared toward meeting ESA delisting requirements, and not necessarily achieving the maximum estimated carrying capacity under historically optimal or pristine conditions. Management unit recovery planners collaborated to reach agreement on a target status for each population based on the Interior Columbia Technical Recovery Team's (ICTRT) biological viability criteria, which take into account indices for all four VSP parameters and reflect stratum-level objectives. In setting the abundance target for each population, management unit recovery planners considered the population's potential for improvement, in view of available habitat and historical production. The resulting abundance targets should be considered minimum levels needed to satisfy ESA requirements, not necessarily the maximum carrying capacity of the subbasin.

    We encourage achievement of higher persistence probabilities than the target statuses presented in the recovery plan, if possible. The WLC TRT's biological viability criteria and the recovery scenarios in the recovery plan do not preclude setting higher objectives in the future. If appropriate, this can be done through an adaptive management process as new scientific data become available.

    As we learn more about changes to habitat in the White Salmon with the removal of Condit Dam, we can revisit the current recovery targets and reevaluate how recovering populations may be potential contributors to the viability of the ESU (or for steelhead, DPS). We feel that setting clear targets for recovery will be more helpful to implementers than providing a range of recovery targets.

Comments on Strategies and Actions (White Salmon)

68. **Comment**: The White Salmon management unit plan should address the adequacy of existing regulatory mechanisms and provide recommendations on specific programs.

    Response: The recovery plan recognizes that there may be alternative regulatory approaches that can contribute to achieving ESA recovery goals, and defers to local recovery plan implementers to identify the most desirable, efficient, and effective approach. Many federal, state, county, and tribal regulatory mechanisms are already in place to protect habitat in the White Salmon subbasin from current and future threats posed to listed species through habitat loss and degradation caused by human land uses and development. Each of these regulatory mechanisms has its own process for review, monitoring, and updates. For the benefit of the reader, Appendix II of the White Salmon management unit plan summarizes these existing efforts and regulations. The White Salmon management unit plan acknowledges the importance of existing regulatory processes and identifies protection of habitat through implementation of existing regulatory structures as a recovery action in the plan, along with non-regulatory habitat protection actions. (See Table ES-2 of Appendix IV of the White Salmon management unit plan).

    Implementation plans that focus on a 3- to 6-year period will follow release of the final recovery plan. These implementation plans will identify priorities for that particular time period and describe actions with more specificity. It will be the role of the management unit leads, in their implementation plans, to identify prescriptive strategies for improving the adequacy of regulations.

    In future status reviews, we will evaluate threats relative to the delisting criteria, including the adequacy of existing regulatory mechanisms, and make a determination whether a change in listing status is warranted.

69. **Comment**: The mainstem White Salmon River could benefit in places from large wood because historical wood removal, stream cleaning, and splash damming have removed wood that otherwise would be providing habitat.

    Response: We agree that the White Salmon River could benefit from the presence of large wood, for habitat enhancement. The White Salmon management unit plan notes that, in addition to historical wood removal, stream cleaning, and splash damming, the presence of Condit Dam has impaired watershed processes, such as the transportation of spawning gravels and large woody debris to areas downstream of the dam (Northwest Power and Conservation Council 2004). With the removal of the dam, normative flows are being restored in the lower mainstem, and transport of sediment and woody material transport is being re-established (see Section 5.2.1 of NMFS 2013).

    The White Salmon management unit plan cites woody debris abundance as a factor that may become limiting as populations grow (see Table 5-3 of NMFS 2013). Accordingly, Table 6-3 of the plan, which identifies management strategies

and actions to improve habitat in the White Salmon watershed, includes the following actions to address this issue: (1) restore natural riparian vegetative communities, and (2) place stable wood and other large organic debris in streambeds for all salmonid populations.

70. **Comment**: In Table ES-2 of the White Salmon management unit plan, is it really necessary to insert "in cooperation with landowners" or "with willing landowners" quite so often? Can't something be stated in the paragraph above to the effect that where restoration actions occur on private lands, it should be a cooperative effort and then remove all this redundancy?

    Response: Stakeholders in the White Salmon recovery planning process wanted to acknowledge that the recovery plan is voluntary, and that the willingness and cooperation of landowners are key to achieving recovery. Therefore, they felt that it was appropriate to continually reinforce the importance of landowner cooperation in the table.

71. **Comment**: Section 6.1.5 of the White Salmon management unit plan should note that a juvenile *O. mykiss* PIT-tagged in Buck Creek during a Yakama Nation/U.S. Geological Survey study in 2009 or 2010 was detected at a mainstem Columbia River PIT detection array (report in draft). In addition, Section 6.2.1 should include data on habitat quality and quantity from the draft Buck Creek fish habitat and population assessment report (Yakama Nation and U.S. Geological Survey; in review).

    Response: Because these draft reports are not publicly available, we have chosen not to cite them at this time. Once the reports are final and become public, White Salmon recovery planners may use the information and update the plan with the new information at some point in the future.

72. **Comment**: Section 6.2 of the White Salmon management unit plan should include a determination of the status, life histories, and genetic composition of fish in Jewett Creek.

    Response: We discuss Jewett Creek in Appendix III of the White Salmon management unit plan. Jewett Creek does not meet the minimum criteria necessary for consideration in the ICTRT's assessment of intrinsic habitat potential (Interior Columbia Technical Recovery Team 2008) and is not considered a major or minor spawning area for the Klickitat independent population of the Middle Columbia River steelhead DPS. The creek does not have sufficient habitat to support a viable population, and the population has not been identified as contributing to the viability of the Middle Columbia River steelhead DPS (Interior Columbia Technical Recovery Team 2004).

    The lower portion of the creek runs through roughly 100 yards of pipe located under an existing industrial plant. Bonneville Reservoir may back up water within the pipe. The creek daylights for approximately 0.9 mile between the railroad and Highway 14 and then passes under the highway. Another 0.8 mile of habitat is available upstream of the highway. The gradient of the creek becomes impassable at the Gorge bluffs, located at roughly River Mile 0.35. The

ICTRT determined that at least 9.3 miles of habitat is necessary to support a viable population of 500 fish (Interior Columbia Technical Recovery Team 2004). The entire Jewett Creek is approximately 4 miles long.

NMFS has excluded Jewett Creek from critical habitat designation because the economic impact of designating it outweighed the biological benefit of designating it. For more information, see the chart report at http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/2005-Biological-Teams-Report.cfm and the Critical Habitat Designation Report at http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/CH-Designation-Info.cfm.

Other Comments

73. **Comment**: The recovery plan does not meet the requirements of the Federal Data Quality Act, which sets scientific standards for scientific documents generated by federal agencies.

    Response: Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-544, which is also referred to as the "Data Quality Act") specifies three components that contribute to the quality of a scientific document: utility, integrity, and objectivity. We adhered to the relevant statutory requirements and agency procedures for certifying compliance with the Data Quality Act.

    - **Utility**. The recovery plan satisfies the utility requirement by fulfilling the statutory requirement to develop recovery plans for species listed under the Endangered Species Act. The plan represents the most current and comprehensive synthesis of information on factors affecting listed Lower Columbia River salmon and steelhead, the causes of those factors, and their impacts on population productivity, the extinction risk and target status of each independent population within each ESU or DPS, and the action needed to reach the target status.

      Information in the recovery plan is presented in a readable and understandable way. The formatting and naming of the document adhere to conventional standards for style. The level of background and detail in the recovery plan is commensurate with that necessary for general readers and potential implementers of actions identified in the recovery plan to understand the plan elements.

    - **Integrity**: The recovery plan satisfies the integrity criterion because it was completed in accordance with relevant information technology security policies and standards set out in Appendix III, "Security of Automated Information Resources," of the Office of Management and Budget's Circular A-130: *The Computer Security Act*, and also the Government Information Security Reform Act.

    - **Objectivity**: Finally, the plan satisfies the objectivity standard through adherence to the stipulated requirements of ESA recovery plans, inclusion of the best available information, proper referencing of all supporting material, and completion of pre-dissemination review pursuant to Section 515 of Public Law 106-554. The initial technical foundation for the plan was provided by the Willamette-Lower Columbia Technical Recovery Team, which defined the ESU/DPS population structure, recommended biological viability criteria, and provided scientific support to recovery planning efforts.

    In addition, other scientists completed additional analyses for the recovery plan, which were peer reviewed by NMFS scientists or other technical experts.

Components of the plan were made available for public and other agency review at several stages during development.

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