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An Independent Peer Review

of the draft

Recovery Plan for the Evolutionarily Significant Unit of the Southern Oregon Northern California Coast Coho Salmon

(*Oncorhynchus kisutch*)

Peer Review for the Center for Independent Experts

Prepared for NTVI

By

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Executive Summary

In this report, I present findings from an independent peer review of the draft Southern Oregon Northern California Coast (SONCC) Coho Salmon Recovery Plan (Plan – NMFS 2009). My findings are grouped into two general categories. First, I listed a number of primarily editorial items that should be helpful for the authors to refine the document so that it reads better. Second, the majority of the review was approached by answering the questions provided in the Scope of Work, Terms of Reference (ToR). Under each of those questions, I raised concerns or issues, where appropriate, that should help to meet the three objectives of the review, which were (1) The use of the best available scientific, technical and commercial data and information; (2) Interpretation and application of the National Marine Fisheries Services' Southwest Fisheries Science Center SONCC Technical Recovery Team's (TRT's) supporting technical recovery planning reports, and (3) Determination on whether processes developed for and methods employed provide adequate linkages between the SONCC TRT population and ESU recovery criteria, coho salmon life stage-specific biological stresses inferred from physical habitat-based threats assessment, and the recovery actions and strategies developed to reduce or abate those population threats. My comments under each of the ToR questions should be taken as my recommendations for improving the Plan.

The main review below contains a large number of specific comments. Here I summarize several major concerns about the approach and scientific basis of the Plan in supporting recovery of SONCC coho salmon.

Plan Preparation and Presentation
Overall, the plan is well written. In particular, starting from the basis of intrinsic potential, as illustrated in Plate 9 of Williams, et al. (2006), is extremely important for understanding what the possibilities are for SONCC recovery, and this made the overall Plan much more understandable.

As is always the case in large, complex documents, there are a number of relatively minor editorial corrections that can be made, and some of those are listed below. I noticed two patterns regarding citations: 1) a number of places in the text where statements should have been supported by a citation were lacking references to background reports or citations, and 2) many citations in the text are not found in the References list.

Also, at times, my impression was that the document was written by someone who was "too close" to the process, especially in Section 4. That is, the author(s) would be able to understand the writing, because they were familiar with the process, but they did not do a thorough job of adequately explaining the process to an uninformed reader. The best criterion for this kind of writing is to follow the concept of scientific writing: the paper should be sufficiently detailed so that the reader could repeat the steps followed in the experiment.

The description of the CAP process was found to be very weak in the Plan. A full description of the complete CAP process, from beginning to end, seems to be lacking from the Plan – e.g., in Section 4. Appendix A, referred to I Section 4, could not be found in the Plan. The summary threats and stresses tables in each watershed of Chapter 11 is apparently a summary of CAP results but, since there is no rigorous description of the CAP workbooks, it is difficult to tell how they were compiled or whether the process adequately addresses the extent of watershed-based insults to the coho populations. (Some of the pieces of the CAP process were supplied for review, but these would not be helpful for future readers of the Plan.) Overall, Section 4 is difficult to follow. Because the beginning of the section does not have a clear process outlined, it is difficult to understand the subsequent subsections and how the information presented in each of those subsections was used in the process. A step-by-step iteration of the CAP process will help to tie all the various indicators of section 4.2 together under the CAP process. Also, there was no indication of the level at which CAP indicators were applied: Reach, stream, basin, watershed, population?

The last broad Plan organizational recommendation is that the population profile sections of Chapter 11 should be re-arranged, by diversity strata and then by population ranking, rather than in alphabetical order.

Factor B: Overutilization

The Plan tends in general to state that the effects of fishing are negligible on SONCC coho salmon. However, as in described in more detail in the review, when all mortality sources are considered in the aggregate, with an estimated marine mortality of at least 3.3%, unknown but possible 12% in-river incidental hooking mortality, and 4.4% tribal harvest, the total mortality is approximately 20%. This does not include an unknown amount of illegal retention and poaching. Taken altogether, these fishery losses might be considered a major factor preventing recovery, at least for some populations.

Undervaluing Diverse Populations

The Plan implies in several places that the key to ESU recovery is recovery of all diversity strata and recovery of all populations within strata. For example, in the text under listing factor E (p. 6-17, lines 12-13) is the statement about the importance of "broadening the life-history and genetic diversity of all population to help maximize their capacity to respond to climate change." Yet ratings and recovery targets for non-core populations are set too low for them to appreciably serve as "back-up" populations if recovery of core populations fails, or to contribute meaningful strays to core or other populations where needed to maintain the array of populations throughout the ESU.
In particular, the decision to set non-core independent population abundance criteria at the depensation threshold, as listed in Table 6.1-4 of the Plan, definitely undervalues the importance of those important (i.e., second tier) populations. If the objective is truly to "have sufficient spawner densities to maintain connectivity within the stratum and continue to represent critical components of the evolutionary legacy of the ESU" (p.6-6, lines 6-7), then these populations should have stated targets (but perhaps not requirements). There is no way that these populations will "support ESU viability and help maintain the diversity, spatial structure, and connectivity of the stratum" if their

numbers are hovering around the depensation level because they will be too few to provide significant straying to neighboring streams, etc. Once these low depensation numbers are published in the Plan, they will become the de facto management targets for these streams – that is natural human tendency. Further comments on this, as well as on dependent and ephemeral populations, are made in the review below but, in summary, unless the wide array of populations, from the most robust to the smallest ephemeral ones, are given protection and specific recovery goals, objective 3 of Factor E likely will not be met under the current Plan.

Recovery Actions Prioritization
The recovery actions do not always seem to be prioritized in a manner consistent with identified threats. For example, in many watersheds, while threats might be rated as "very high" or "high" in the CAP summary table, the actions in the recovery actions summaries are mostly rated as priority 3. As one random example, the Mainstem Eel core population was determined to be "not viable". Its primary threats are roads (very high), timber harvest (high), and dams and diversions (high). However, in looking at the prioritized population-specific recovery actions in Table 10.5-6, the only action that is prioritized higher than a 3 is road alterations to reduce sediment input (Priority 2b). Why are not roads prioritized at 1, and dams/diversions and timber harvest prioritized at level 2, if they are the very high and high threats, respectively, for a core population?

Lack of Monitoring
The Plan draft does not contain a well-defined methodology for monitoring or adaptive management – Chapter 8 states that such a monitoring and adaptive management plan will be provided in the next version of the Plan. Therefore, I was unable to comment on this topic. However, there is a dire need for monitoring in most populations in freshwater, especially escapement counts and smolt emigration assessment. Additional attention should be focused in the monitoring plan about assessing mortality and exploitation rates in marine and freshwater. Without adequate monitoring, there is no way to adaptively manage the SONCC coho populations.

Background

"The goal of this recovery plan (Plan) is to identify actions necessary to recover the Southern Oregon Northern California Coast (SONCC) coho salmon Evolutionarily Significant Unit (ESU) to the point where it no longer needs the protections of the Endangered Species Act (ESA)" (NMFS 2009). The SONCC coho salmon ESU includes all populations of coho salmon in coastal streams from the Elk River near Cape Blanco, Oregon, through and including the Mattole River near Punta Gorda, California (62 FR 24588; May 6, 1997) (NMFS 2009). These include the major watersheds of the Rogue River in oregano and Klamath/Trinity and Eel Rivers in California. Once a species is listed, the ESA requires NMFS to develop and implement a recovery plan for its conservation and survival (NMFS 2009). The decision to list the SONCC coho salmon ESU was largely based on information on run sizes, the severe decline from historical run size, degraded habitat and associated reduction in carrying capacity, widespread hatchery

production using exotic stocks, and drought and ocean conditions. Based on this information, factors that were considered threats to naturally reproducing coho salmon were primarily the result of long-standing, human-induced actions (e.g. habitat degradation, harvest, water diversions, and artificial propagation) along with natural environmental variability from factors such as drought, floods, and poor ocean conditions (62 FR 24588)" (NMFS 2009).

I reviewed the status report for SONCC coho in Good et al. (2005) and concur with their findings of continued significant depletion. Good et al.'s (2005) comments about improving recent coho counts at Gold Ray Dam on the Rogue River are no longer applicable since the counts in recent years have dropped off again. Although they did not specify exactly which years they were referring to, it was probably 2000-2002, when the 3-year average was 31,822. In 2003-2007, the 5-year average was back down to 14,698 (see http://www.dfw.state.or.us/fish/fish_counts/goldray/2008/december.asp for dam counts). These counts include hatchery fish as well as wild spawners.

Description of the Individual Reviewer's Review Activities

The primary focus of my review was Chapters 1 through 9 of the Recovery Plan. Because the Chapter 10 individual population profiles were too voluminous to read all chapters word-for-word in the allotted time, I read several selected chapters, one each for a core, potentially independent, dependent, and ephemeral population.

In addition, I reviewed parts of many other documents. The list of documents below were supplied to me by the COTR. Because of limited time for the review, I reviewed the documents that are shown in bold, to the degree noted after each bolded reference in the list. In addition, I reviewed or referred to many other scientific reports and articles in support of comments in the review below. Those documents are listed in the Literature Reviewed Section at the end of this report.

My review activities culminated in the preparation of this report.

California Department of Fish and Game. 2004. Recovery strategy for California coho salmon. Report to the California Fish and Game Commission. California Department of Fish and Game, Native Anadromous Fish and Watershed Branch, 1416 9th Street, Sacramento, California 95814.

Good, T. P., R. S. Waples, and P. Adams. 2005. Updated status of Federally listed ESUs of West Coast salmon and steelhead. U. S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-66. (Read section on SONCC coho).

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily

significant units. U.S. Dept. Commer, NOAA Tech. Memo. NMFS-NWFSC-42, 156p. (previously familiar)

National Marine Fisheries Service and Kier and Associates. 2008. Updated guide to the reference values used in the Southern Oregon/Northern California Coast Coho Salmon Recovery Conservation Action Planning (CAP) workbooks. National Marine Fisheries Service and Kier and Associates. Arcata, Ca. (Not found in items supplied)

NMFS 1996. Factors for Decline – A Supplement to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act. August 1996.

Nature Conservancy. 2005. Conservation Action Planning. Developing Strategies, Taking Action, and Measuring Success at Any Scale, *Overview of Basic Practices,* Version: 17 June 2005. (Scanned)

Oregon Administrative Rules , Oregon Department of Fish and Wildlife. 2007. Native Fish Conservation Policy. Pg.3 AR 635-007-0502 - Pg. 8 AR 635-007-0509. (previously familiar)

Spence, B. C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. NMFS Status Review of Coho Salmon from Washington, Oregon and California. NOAA Technical Memorandum NMFS-NWFSC-24, September 1995. (previously familiar)

Williams et al. 2006. Historical Population Structure of Coho Salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. U.S. Department of Commerce, NMFS, NOAA Fisheries SWFSC Santa Cruz, NOAA Technical Memorandum NMFS-SWFSC-390, June 2006. (Read relevant portions)

Williams et al. 2008. Framework for Assessing Viability of Threatened Coho Salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. U.S. Department of Commerce, NOAA Technical Memorandum NOAA Fisheries SWFSC Santa Cruz, NOAA Technical Memorandum NMFS-SWFSC-432, December 2008. (Read relevant portions)

NMFS SWFSC Technical Recovery Team reports and information. Available on the Internet at: http://swfsc.noaa.gov/textblock.aspx?Division=FED&id=2268 (scanned Agrawal et al.– other documents covered above)

Oregon Plan for Salmon and Watersheds. Available on the Internet at: http://www.oregon-plan.org/OPSW/ (scanned)

Summary of Findings for each ToR

I conducted the review by responding to the specific questions posed in the Statement of Work and my comments on technical content and coverage of the draft SONCC coho salmon Recovery Plan (Plan) are shown under each of the ToR reviewers' questions below. Under some of the ToR questions, extended answers and comments on particular topics were given subheadings to make the responses easier to read.

As I conducted my review, I also noted a number of editorial items that, when corrected, will help the SONCC coho salmon Recovery Plan to read more accurately. Those are provided here for the authors' convenience.

Editorial Comments:

1. In the discussion about Critical Habitats (NMFS 2009, p. 2-2, lines 15-22), there seems to be several misstatements. Should not the sentence in lines 17-18: "Areas 1 and 5 are often located in small headwater streams….", instead read "Areas 1 and 3….", because area 5 refers to growth and development to adulthood? Also, the phrase in lines 19-20: "Growth and development to adulthood (area 3)…." Should refer to area 5 instead, since area 5 is for growth and development to adulthood.
2. Also, in line 18, estuaries should be included as critical habitats for rearing juvenile coho salmon.
3. It is noted that the reference to NMFS (2007) on page 2-9 NMFS (2009), line 35, perhaps does not coincide with either of the two NMFS (2007) references in the literature cited sections. I wanted to check the background to the estimated 3.3% mortality rate mentioned on page 2-9, line 35, but neither of these references appears to be about that topic.
4. Similarly, the in-text citation for CDFG (2002c) on page 2-8, line 43, does not appear to be listed in the references, at least not under CDFG. Neither CDFG nor California Department of Fish and Game indicate three (i.e., c) listings for 2002.
5. It would be helpful if consistent nomenclature were used for citations and the reference list (e.g., in-text citation of CDFG 2002 matches reference CDFG (California Department of Fish and Game) 2002). Similar discrepancies for NMFS and National Marine Fisheries Service were noted as well.
6. A map of the coast, showing the demarcation landmarks, such as Cape Falcon, Humbug Mtn, Cape Blanco, would be very helpful.

7. The sentence beginning with “SONCC-origin coho salmon that migrate north of Cape Blanco….” (p 2-9, line 43) does not follow the previous sentence: “this fishery” refers to the previous sentence, which is about the in-river harvest. However the erroneous sentence is referring to a marine fishery.
8. None of the many citations to PFMC throughout the Plan are found in the References list.
9. The citation for Kostow (2009), on p. 2-11, line 18, is not in the References list.
10. It would be preferable if the References list were at the end of the entire document, as is customary.
11. Table 2.2-1 is rather incomplete. Is that due to a lack of data or is it not finished?
12. The discussion about the Klamath Coho Plan (NMFS 2009, p. 2-21, lines 27-31) should include a citation to that Plan, and an explanation of the relationship between the SONCC coho recovery plan and the Klamath Coho Plan.
13. Each regulatory document cited in Section 2.2.4, e.g., California’s Forest Practice Rules (p. 2-13, line 25) and Oregon’s Wild Fish Policy (p 2-22, line 32), etc., should have a citation or URL included so that readers could more easily find the regulations referred to.
14. Very few of the citations in Section 2.2 are found in the References list.
15. On page 2-27, line 32: “…poses a series threat to the viability…” should probably read “serious”.
16. The statement “….phytoplankton community due to the likely loss of most calcareous shell-forming species such as pteropods.” (p. 2-32, lines 9-10) is erroneous because pteropods are mollusks so are not phytoplankton.
17. The following two sentences seem to create a non-sequitur: “Tribal lands account for less than 1% of the SONCC coho salmon ESU. Because of this, the tribes play a major role in recovery.” (p. 2-33, lines 22-23).
18. What are “tailwater reductions”, mentioned on p. 2-35, line 37? Should that be “tailwater temperature reductions”?
19. Note that in the following phrase, there is a missing citation: “Studies using coded wire tags (CWT) by have shown that….” (p. 3-8, line 7).
20. There should be a citation for Williams et al. (2006) at the end of line 3 on page 3-14, directing the reader to a source of the preceding paragraph and especially the statement; “Populations with at least 34 IP-km were determined to be independent.”
21. The definitions starting on page 3-18, line 26, through page 3-19, line 7 could be deleted because they are essentially repeated in the subsequent sections devoted to each one of the four VSP criteria.
22. Appendix A, first referred to on page 4-1, and throughout the remainder of the Plan, does not appear to be included in the Plan.
23. The meaning of the parenthetical numbers in the Low Risk Spawner Abundance column of Table 5-1 on p. 5-2 is not clear. This should be specified in the table caption.
24. There is likely an erroneous reference to Section 0 on p. 6-3, line 38.
25. Why is Table 10.1-5 (p. 10.1-15) about the Mid-Rogue/Applegate when it’s in Chapter 11.1 about Bear River?
26. Several boxes in Table 10.3-3 appear to have the wrong coloring.

27. In table 10.5-1, there seems to be a word missing from the statement in the second line of the table: “Increase natural large wood recruitment by restricting riparian in inner gorges, unstable slopes and headwater swales”.
28. All the numbering in Chapter 11 needs to be updated to 10.
29. Recommend that the Chapter 11 subsections be ordered by strata, then by population, rather than alphabetically.
30. The following statement appears to have an error: “In Chapter 5, the Upper Rogue River, Illinois River, and possibly the Middle Rogue-Applegate River populations were identified as core populations for the northern coastal stratum” (P. 7-5, lines 35-37). The Upper Rogue, Illinois, etc. are shown in the Rogue Interior stratum in Chapter 5.
31. The following sentence needs to be re-written: “Adaptive management will only be successful only to the degree that that it is based upon accurate and credible monitoring.” (p. 8-2, lines 3-4).
32. This sentence, and perhaps the paragraph, section, chapter, etc. need to be completed: “NMFS plans to incorporate the principles of adaptive management into” (p. 8-2, line 7-8).
33. The following sentence from the Upper Klamath profile (p. 10-22-11, lines 12-14) should probably include barriers as an additional major stressor. “Coho salmon within the Upper Klamath River watershed suffer from many stresses, primarily impaired water quality and instream habitat conditions and altered hydrologic function.”
34. Table 10.1-5, about the Mid-Rogue/Applegate, appears in Chapter 11.1, about Bear River.

<u>Review Comments Organized by Reviewers’ ToR Questions:</u>

Fundamental Questions for the CIE Reviewers

1. Does the recovery plan delineate those aspects of the species biology, life history, and threats that are pertinent to its endangerment and recovery?

In most ways, the Plan delineates the species biology, life history, and threats that are pertinent to its endangerment and recovery. However, there are a number of cases where certain aspects have been overlooked, underemphasized, or misstated, as described below.

Habitat Issues:
The effects of timber harvest (pp 2-3 and 2-4) do not include the major influence of logging steep slopes in watersheds. The resultant destabilization and slope failures can cause both chronic and catastrophic effects on coho salmon habitat (e.g., Cederholm and Reid 1987). For example, Bisson et al. (1997) estimated that, due to anthropogenic changes (including logging), frequency of major floods was 2-10 times greater, debris flows and dam-break floods were 5-10 times more frequent, and slumps and earthflows were 2-10 times more frequent, than in natural, background conditions. This increase in

catastrophic events dramatically alters the habitat-building regime in which salmonids evolved by abnormally increasing the sediment load delivered to and carried by streams. The result is unstable streambeds for spawning, obliterated pool habitats, and damaged riparian areas.

I suggest adding to the section on roads (p 2-4, lines 15-34), the impacts from stormwater runoff carrying pollutants to streams. For example, Sandahl et al. (2007) have found that "motor vehicles are a major source of toxic contaminants such as copper, a metal that originates from vehicle exhaust and brake pad wear. Copper and other pollutants are deposited on roads and other impervious surfaces and then transported to aquatic habitats via stormwater runoff. In the western United States, exposure to non-point source pollutants such as copper is an emerging concern for many populations of threatened and endangered Pacific salmon (Oncorhynchus spp.) that spawn and rear in coastal watersheds and estuaries. ……The sensory physiology and predator avoidance behaviors of juvenile coho were both significantly impaired by copper at concentrations as low as 2 ug/L. Therefore, copper-containing stormwater runoff from urban [roaded] landscapes has the potential to cause chemosensory deprivation and increased predation mortality in exposed salmon."

In the discussion on agriculture (pages 2-4 and 2-5), I recommend adding a reference to the shortening of streams, hence lost habitat, through channelization and straightening (e.g., Saltzman 1977, Chapman and Knudsen 1980). Agricultural channelization was done historically to increase the tillable acres for farming and to force water into ditch-like, more manageable drainages, but resulted in much less, as well as degraded, coho salmon habitat.

The statement "In these areas, point source and nonpoint source pollution often occurs." (p. 2-5, line 37) seems to be too cursory. Point source pollution, for example, can be an important systemic problem. In addition to biological nutrient pollution, a number of toxics are loaded into streams from municipal waste treatment. One significant emerging example: currently there is very little control over the amounts or mixtures of pharmaceuticals, endocrine disruptors, and personal care products, which are not effectively removed in standard treatment processes, entering the aquatic environment (e.g., Sumpter and Johnson 2005). Studies have found sublethal changes and mortality in aquatic animals and plants resulting from exposures to pharmaceuticals (e.g. Flaherty and Dodson 2005) and endocrine disruptors (e.g., Crisp et al. 1998). See also http://www.nwfsc.noaa.gov/features/emerging_contaminants/index.html. This important topic should be recognized in the Plan.

In the statement on page 2-5, line 30-32: "In large developed areas, water infiltration is reduced due to an increase in impervious surfaces. As a result, runoff from the watershed is flashier, with increased flood hazard". The statement would be more accurate if it read: "Wherever natural vegetative ground cover is removed and/or replaced by impervious surfaces, water infiltration is reduced and runoff from the watershed is flashier, with increased flood hazard". This is because the problem is not only restricted to highly

urbanized areas, but occurs in rural areas with homes, farms, and roads, and even in logged landscapes.

In the discussion of mining and gravel extraction, the statement "Hydraulic mining (placer and suction dredging) can degrade habitat through the disturbance and alteration of streambed substrate." (p 2-8, lines 2-3) raises the question of whether such mining is allowed anywhere in the ESU geography. Are these practices still allowed at all in salmon-bearing stream reaches? Perhaps the temporal context of these effects should be clarified in the paragraph. Is this mainly a historical issue?

Effects of Fishing:
In regard to current losses of coho salmon in commercial and recreational fisheries, as described on pages 2-8 and 2-9, several issues have been overlooked. One is that some illegal, unreported retention of coho salmon likely occurs in marine and freshwater recreational fisheries.

Another is the underestimated losses in ongoing fisheries. First, marine fisheries: "These prohibitions continue to prohibit direct sport and commercial harvest of coho salmon off the California and Southern Oregon coast, the lone exception being a mark selective recreational coho salmon fishery that has taken place in recent years in Oregon waters. NMFS (2007) estimated that 3.3% of Rogue/Klamath coho salmon accidentally caught in this mark-selective fishery would die on release." (from p 2-8, lines 33-36). No source for the 3.3% could be found. If the NMFS (2007) citation in the Plan text is the same as the National Marine Fisheries Service (2007) citation in the References list (p. 10-22), i.e., the MSRA Klamath Recovery Plan (NMFS 2007), neither the 3.3% mortality value nor its derivation were cited therein. Adding further uncertainty to the effects of marine fisheries is this quote from Good et al (2005, p. 362, 2nd P): "SONCC-origin coho salmon that migrate north of Cape Blanco experience incidental morality due to hooking and handling in this fishery; however, total incidental mortality from this fishery and Chinook-directed fisheries north of Humbug Mountain has been estimated to be less than 7% of the total mortality of RK hatchery coho salmon since 1999".

These concerns about managing the effects of incidental harvest were also raised by Good et al. (2005, p. 342, top P): "… another concern was that the harvest plan might have been seriously weakened when it was reevaluated in 2000 as well as concern about our ability to effectively monitor nontarget harvest mortality and control overall harvest impacts."

Regarding freshwater fishing mortality, the statement that "Only marked hatchery coho salmon are allowed to be harvested in the Rogue and Klamath Rivers" (p. 2-9, lines 7-8) does not recognize that catch and release of unmarked, wild spawners can have deleterious effects on listed coho salmon. For example, Lindsay et al. (2004) estimated hooking mortality rates of 12.2% for wild Chinook salmon caught and released in the Willamette River sport fishery targeting hatchery fish. Such a loss may not be acceptable on a listed run, such as SONCC coho salmon, which has already suffered a fishery–induced loss in the incidental marine fisheries.

The incidental harvest of coho salmon in the tribal Chinook fisheries is described on p 2-9, lines 12-19, as having an average harvest rate of 4.4% and is characterized as not being a major factor for decline. However, when all fishery mortality is considered in aggregate, with the estimated marine mortality of 3.3%, unknown but possible 12% in-river incidental hooking mortality, and 4.4% tribal harvest, this amounts to approximately 20% mortality, not including an unknown amount of illegal retention and poaching. Taken altogether, these fishery losses might be considered a major factor preventing recovery, at least for some populations. Furthermore, the fact that PFMC has set the bycatch limit of coho salmon to 13% in the Chinook salmon ocean fisheries (p 2-21, lines 25-28), while noted elsewhere that the current by-catch is not that high, raises concerns that, if that level were realized, then total mortality might approach 30%.

Ocean Conditions and Climate:
In the section on Ocean Migration (p. 3-9), a stronger emphasis should be placed on the importance to survival of early ocean life history, migration timing, and food availability, which have been shown in several recent studies to be critical to the ultimate number of returning adults (e.g., Holtby et al. 1990; Van Doornik et al. 2007).

The following phrase is questionable and perhaps should be reconsidered: "Although salmon evolved in this variable environment and are well suited to withstand climactic changes…." (p. 3-11, lines 14-15). While the rest of the sentence is reasonable, some research has shown that salmon may have actually adapted to a rather small range of ideal ocean temperatures (Welch et al. 1998 a,b) which is why Washington and Oregon marine survival is higher but Alaska survival is lower in cool years, and vice versa (Hare et al. 1999). The main point is that coho salmon may not actually be "well suited to withstand climactic changes", at least not in the ocean portion of their life history.

The discussion regarding the possible outcomes of coho life history adaptation to climate change (page 2-28, 2nd and 3rd paragraphs) should also include consideration of whether evolution can keep pace with the rate of climate change. If climate changes are sufficiently rapid to severely reduce populations before they can adapt, then the populations' long-term ability to adapt is moot. This makes anthropogenic changes increasingly relevant because there are some actions that can slow the onset of the effects of climate change, such as maintaining or increasing riparian vegetation for shade, which may extend the time for adaptation.

Loss of Diversity:
The primary factors listed in the Plan for low SONCC coho diversity are the influence of hatcheries and out-of-basin introductions (p. 3-22, lines 3-4). However, other factors may also contribute to low diversity, such as:

1. past differential fishing effort on some portion of the population (e.g., early or late timing, large vs. small fish, etc.) (Hamon et al. 2000, Hard et al. 2008);
2. differential loss of certain habitat types like beaver ponds and other off-channel rearing areas (e.g., Cederholm and Reid 1987); and

3. systematic changes in seasonal flow regimes (e.g., Nickelson et al. 1992).

In section 3.3.5, the statement "The cause of the decline is likely from the widespread degradation of habitat …" (p. 3-22, lines 17-18) is somewhat misleading because habitat is not the only cause of the serious declines. Chronic overfishing, hatchery operations, and natural variation have also been important contributions to the declines. Likewise, in section 6, a statement reads: "At the core of our approach to recovery is the premise that many objectives can be achieved through improvement of habitat and reduction of stresses. Because most of the stresses and threats currently impacting SONCC coho are habitat-related, we believe that improvement and expansion of habitat will be critical to the long-term sustainability of the ESU." (P. 6-1, lines19-23). While this is no doubt true, there are still threats from continued fishing impacts (as noted above), and from hatchery operations in some basins. These effects should also be emphasized.

The same comment applies to the statement: "Stresses are impaired habitat conditions of coho salmon that result directly or indirectly from human activities…." (p. 4-1, lines 5-6). What about hatcheries, the remaining fishing, and natural variation?

Effects of Hatchery Operations:
I noticed a discrepancy regarding inclusion of hatchery fish in the ESU. In the guidance Terms of Reference (ToR), it states: "The Southern Oregon/Northern California Coast (SONCC) Coho Salmon Evolutionarily Significant Unit (ESU) includes all naturally spawning coho salmon from the Elk River near Cape Blanco in southern Oregon south through the Mattole River near Punta Gorda in Northern California." However, in the Plan it states: "The listing includes all hatchery coho salmon in the ESU (June 28, 2005, 70 FR 37160)" (NMFS 2009, p. 2-1, line 11). Whether hatchery fish are included in the ESU is a critical distinction because hatchery fish are well-known to have negative impacts on wild fish, and have the potential to be sufficiently genetically different that they could constitute a separate Distinct Population Segment (DPS). I based my comments below on the assumption that hatchery fish can be detrimental to wild fish, regardless of the listing status of the hatchery fish.

The list of potential problems to coho salmon emanating from hatcheries (p. 2-32, line 42 to p. 2-33, lines 1-5) should include the impact of losses to abundance of wild populations in mixed-stock fisheries (NRC 1996, Knudsen 2000). For example, regulations applied broadly to large stock aggregates have eliminated salmon populations too small to withstand harvest rates set for the most productive stocks, especially hatchery stocks (Hilborn 1992, Wright 1993). Also important are the physical effects of hatchery operations such as dams for water withdrawals and altered downstream water quality (e.g., Michael 2003). Some hatchery operational plans and/or physical designs block access of wild fish to upstream areas.

There are also impacts on SONCC coho salmon from genetic swamping of hatchery fish into the wild population. From the draft Plan (p. 2-33, lines 9-12): "Iron Gate, Trinity River, and Cole Rivers hatcheries release roughly 14,215,000 hatchery salmonids into SONCC coho salmon ESU rivers annually. Annual coho salmon production goals at

these hatcheries are 75,000, 500,000, and 320,000, respectively." The concerns about the impacts of these releases are echoed by Good et al. (2005, p 356). Also, Good et al (2005, pp. 358-359) discuss the results from smolt trapping below the confluence of the Klamath and Trinity rivers and in the Trinity only that showed almost all downstream migrating in coho the Trinity are of hatchery origin and about half in the Klamath are from the hatchery in that system. The Plan (p 2-33, lines 18-21) states: "two significant genetic concerns remain: 1) the potential for domestication selection in hatchery populations such as Trinity River, where there is little or no infusion of wild genes, and 2) out-of-basin straying by large numbers of hatchery coho salmon." These relative numbers of hatchery and wild production should be carefully considered in the context of how the straying of hatchery fish into the wild populations can reduce the survival rates of the offspring (e.g., Araki et al. 2007). The use of a model such as AHA to appropriately plan the integration of wild and hatchery spawners is recommended and discussed further below (HSRG 2009, Appendix C).

Marine-derived Nutrients:
Marine-derived nutrients are not mentioned anywhere in the Plan, except in one section of the Humboldt Bay Tributaries profile. The lack of these nutrients, due to decreases in salmon carcasses being delivered to the watersheds, could certainly be contributing to reduced productivity of SONCC coho salmon smolts (e.g., Cederholm et al. 1999, Wipfli et al. 1998). This issue should be listed as a Threat in Chapters 2, 4, and 7 and should be addressed throughout the population profiles.

2. *Is the recovery plan grounded in a clearly articulated and biologically meaningful conceptual framework?*

Overall, the Plan is grounded in clearly articulated and biologically meaningful conceptual frameworks, with the following exceptions. Some of the comments below actually refer to the TRT background documents, since they serve as the basis for much of the Plan.

In terms of which habitats were judged as coho habitat by Williams et al, (2006,), what is the basis for their statement in the caption of Table 1 that: "Basins with integrated IP < 3.4 km with temperature mask were excluded from analyses."? This is critical for understanding how streams were included or not in a stream's ability to support coho salmon. Also, the use of the temperature mask is not explained in the Plan and probably should be.

I also wonder about the statement (Williams et al 2006, p.13): "Second, the IP model had a gradient threshold that excluded any reach that exceeded 7% gradient and all stream reaches upstream of that reach." It is possible that some stream could have a high gradient, but passable, reach, above which the gradient was flatter and provides good coho habitat.

What is the implication of eliminating 14 small creeks from any consideration in the Plan? See Table 1 in Williams et al. (2008), as compared to Table 3.2-1 in the Plan. The

Plan apparently does not make any accommodations for their role in recovery and for the protection of their habitat. It may be preferable to keep those streams listed in the Plan as ephemeral populations so that they can contribute to the SONCC coho diversity.

3. *Does the recovery plan provide a useful and meaningful "road map" to recovery and have a logical strategy to achieve recovery that is relevant to habitats, life stages, populations, diversity groups and the overall ESU?*

The Plan provides a good "road map" for recovery, although several key components are missing or weak, as described here and in other parts of this review.

For example, the degree to which the combined effects of incidental harvest, direct mortality, hooking and release mortality, and poaching have on SONCC coho salmon, as described under Factor B, p. 6-13, is likely understated. The background for this conclusion is described more fully under ToR Question 1 above. Because "overutilization" was deemed to be negligible, there are insufficient plans for controlling the incidental harvest of SONCC coho salmon in commercial and recreational marine fisheries throughout their migration range. Likewise, because the total fishing mortality, including incidental harvest and poaching, is difficult to assess, it is still important to list as a Threat and to include strategies to reduce fishing effects. In many ways, the effects of poaching and incidental harvest are threats that can be ameliorated, especially through educational programs and increased enforcement. The criteria for recovery should be to bring all sources of fishing mortality as close to zero as possible.

The array of habitat-related regulatory mechanisms described on pages 2-12 to 2-21, while helpful to salmon recovery, are still notably insufficient. Especially challenging are the cumulative effects of individual, local activities emanating from urban, suburban, and rural development, logging, roads, and water withdrawals, many of which are under local county and municipal control. There is a pervasive lack of local regulatory measures and enforcement that incrementally could make a significant difference. This problem should be addressed in the Plan.

The section on instream flow protection (p. 2-20, lines 12-23) does not allude at all to instream flow water rights and the effects of individual uses of instream water. In some of the later population profiles (Chapter 11), illegal water withdrawals are cited as a significant problem, especially in the Eel River. The regulatory framework for addressing this issue should be presented.

In the Regulatory Mechanisms section, the subsections on mining regulation and instream flow control (p. 2-20, lines 5-23) make no mention of any pertinent regulations in Oregon.

It is unclear whether the issue of the VSP attribute of spatial structure is adequately addressed. From p 3-21 "In summary, recent information for SONCC coho salmon indicates that their distribution within the ESU has been reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which they are

now absent (NMFS 2001). However, existing populations can still be found in all major river basins within the ESU (June 28, 2005, 70 FR 37160).” Are there criteria that say what should be done about refilling empty habitats? As noted above, the Plan is relatively weak on ensuring that all available habitats are adequately filled with coho salmon.

In the section on Threats Assessment, it would be highly preferable if each one of the categories in Table 4.3-1 that were assessed by professional judgment were also discussed in the subsequent text, as were the four threats that could be numerically assessed. For example, questions arise as to how professional judgment was applied to the threats from dams and diversions, since that category includes a number of issues. How was the blockage of upstream habitat treated relative to the effects of reduced flows downstream of a dam, relative to juvenile mortalities during downstream migration through a dam or diversion, relative to the effects of altered temperatures, etc.?

In the section on selection of core populations, the description of how the core populations were selected is very weak (p. 5-1, lines 16-18). There is no way to tell how the candidate populations were actually considered by NMFS. For just one example, what is “recoverability” and how was it assessed?

There is an apparent contradiction between the statement in Section 5 that “at least fifty percent of historically independent populations (functionally independent and potentially independent populations) should be demonstrated to be at low risk of extinction (ie., viable)” (p. 5-1, lines 9-11) and the statement “All core populations are at low risk of extinction based on spawner abundance” (p. 6-1, line 37). Readers of Section 5 may experience less confusion if it were stated there that the fifty percent requirement would be represented by the designated core populations.

The list of stress sources under Altered Hydrologic Function, p.6-11, lines 7-9 should include forest harvest activities which can have a significant impact on hydrologic function, by altering flow patterns from sloes where vegetation has been removed.

The criteria for barriers on p. 6-12, line 26 is somewhat contradictory with the preceding description in lines 15-23, and the following descriptions in lines 22-34, which, if met would create a low stress (as it should be). The criteria should be: “no greater than low stress”.

Determining whether the Plan’s “road map” for recovery is complete was made difficult by the fact that “… in subsequent versions of this draft plan we will provide information on methods for achieving these objectives. These methods will be integrated into our larger recovery strategy.” (p. 7-5, lines 24-27). What is the larger recovery strategy?

There is no mention in Chapter 7 of the possible use of conservation hatchery techniques to bolster the extremely low numbers of coho salmon in some of the most depressed populations (The use of conservation hatcheries was mentioned in restoration of some Eel River populations, but not in Chapter 7 as a possible general approach).

Potential Undervaluing of Populations:
It is interesting to note the different approaches among salmon recovery plans with respect to the strategy for ensuring recovery. In the SONCC coho Plan, all of the selected core populations must be recovered to viability thresholds, as listed in Table 6.1-3. Alternatively, in the Lower Columbia Salmon Recovery Plan (LCFRB 2004), it is noted that any two of the primary populations (analogous to the independent and potentially independent populations of this Plan) could be restored for a stratum to achieve viability. Several benefits to the LCFRB approach, wherein the populations to attain viability are not rigidly designated, is that it allows for flexibility in the outcome (increasing likelihood of achieving viability), and it keeps the pressure on all agencies and landowners to work on recovery of all the primary populations.

Furthermore, the strong emphasis on the core populations in this Plan raises concerns that less attention will be paid to the other important populations. For example, the following statement seems to put much of the recovery weight on the core populations, with implications for less attention paid the other populations: "The core populations have been chosen such that if they meet these thresholds, the aggregate population abundance within the stratum will meet the criteria for total stratum abundance" (p. 6-5, lines 5-8).

Further evidence of this relegation of other independent populations to much lower status than core populations is the decision to set their abundance criteria at the depensation threshold, as listed in Table 6.1-4, and described on p. 6-6, lines 11-13. If the objective is truly to "have sufficient spawner densities to maintain connectivity within the stratum and continue to represent critical components of the evolutionary legacy of the ESU" (p.6-6, lines 6-7), then these populations should have targets similar to the core populations. There is no way that these populations will "support ESU viability and will help maintain the diversity, spatial structure, and connectivity of the stratum" if their numbers are hovering around the depensation level because they will be too few to provide significant straying to neighboring streams, etc. Once these low depensation numbers are published, they will become the management targets for these streams – that is natural human tendency. I strongly encourage that table 6.1-4 include another column of the low risk spawner abundances shown in Table 5-1 and that the criteria for non-core populations be revised to target the low risk spawner numbers, but not less than the depensation numbers. Also Table 6.1-2 should reflect those recovery targets as well, instead of the vague language that is presently listed under "objectives". It should also be pointed out that the numbers in Table 6.1-4 are just barely above the values for effective population size (N_e) that qualify for high risk of extinction in Williams et al (2008, Table ES1).

Similarly, it seems important that the objectives for dependent populations be elevated from their presently proposed level. To say that they should "have sufficient habitat to support natal and non-natal spawning and rearing and are still functioning as extant populations within the ESU" (p. 6-7 lines 7-9) represents very weak populations and can be taken to mean that these populations do not need to be recovered. I recommend that dependent populations be given at least some measurable objectives, such as no less than their population depensation levels.

Ephemeral populations are not even mentioned in section 6.1.3. That is, there are no recovery objectives for them. They should at least be recognized as important to the overall spatial and biological diversity of the ESU. To say there are no objectives for ephemeral populations is condoning the further loss of their habitats. I recommend an objective being listed in Table 6.1-2, such as "Maintain habitat to support spawning and rearing whenever spawners are available to seed the habitat".

The comments in the foregoing paragraphs regarding the weak ratings for non-core, dependent, and ephemeral populations also affect the recovery strategy laid out in Chapter 7. In particular, the values for the column referred to as "Amount of functional habitat needed" in Table 7.2-1 should be elevated. This will in turn affect the values in Table 7.2-2.

In a related issue, I have concerns about the criteria of 0.5 km of functional habitat required for dependent and ephemeral populations, as designated in Table 7.2-1 and described on p. 7.2 of the Plan. The rationale used is that, since there are no numeric targets for these populations, there is no other minimum amount of functional habitat defined. However, there is no biological basis for the arbitrary selection of 0.5 km. Furthermore, there is no actual definition of functional habitat apparent in the Plan. The linear designation of 0.5 km is also questionable because, of course, the translation of functional habitat into numbers of fish also depends on the width (therefore volume) of habitat, or the capacity to produce fish.

To sum this up, it will be impossible to meet the objective of "Broadening the life-history and genetic diversity of all populations to help maximize their capacity to respond to climate change.", as stated as one of the objectors under listing factor E, on p. 6-17, lines 12-13, unless the wide array of populations, from the most robust to the smallest ephemeral ones, are given protection and specific recovery goals. Objective 3, Factor E, likely will not be met under the current Plan.

Hatchery Planning:
Part of the criteria for meeting the hatchery objectives under Factor D, is somewhat questionable in the statement, from p. 6-16, lines1-5, that: "The criteria that will be used to determine that the proportion of natural-origin fish spawning in the wild, and being used as hatchery broodstock is maximized will be that those coho salmon populations that contain hatcheries (Upper Trinity, Upper Klamath, and Upper Rogue populations) have an annual PNI = pNOB/(pHOS+pNOB) ≥ 5 0.67, pHOS < 0.30." The concern is that the values of PNI > 0.67, and pHOS < 0.30 was taken out of the general recommendations by HSRG (2009) for integrated populations (This source of these values should be cited in the Plan – I had to search for it). The actual estimation of pHOS, and thus PNI, needs to come from on-site studies that account for the effects of mixing of wild and hatchery fish (see Araki et al. 2007b and HSRG 2009 for examples of how proportions are calculated). The studies should be conducted in each of the SONCC coho hatchery systems. The general guidelines applied from HSRG also assume that the hatchery program is carefully integrated with the wild populations. The results of an

evaluation at each SONCC coho hatchery, such as those completed by HSRG on the Columbia River, will determine the actual recommended values for PNI, pHOS, etc.

The following statement, from p.6-16 lines 8-10, should be re-written to remove the open-ended caveat: "First, the number of juveniles released from hatcheries should be reduced, where possible." A better phrasing would be: "First, the number of juveniles released from hatcheries should be reduced to the point where they do not have impacts on wild coho salmon, as outlined in the following points."

4. *Does the plan use and incorporate the best available scientific, technical and commercial data and information?*

What is the relationship between the Plan and the Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan (NMFS 2007)? I could not find an explanation of how the two relate to each other anywhere in either Plan.

It is unclear in the discussion of indicators assessment at the bottom of page 4-1 and top of 4-2, the scale at which the indicators, as listed in Table 4.2-1, are applied. At the reach scale, the stream scale, the watershed scale? This issue has important implications. Indicators such as those listed in the table are usually applied at the reach or smaller scale. If they were applied at a broader scale, they become somewhat meaningless because most streams have a variety of conditions throughout their length. Furthermore, larger (wider) streams can have low indicators for certain attributes overall (such as canopy) but still have good conditions for coho salmon in subunits of the overall habitat, (for example in terms of canopy, along margins where the canopy is good). More explanation of the CAP indicator methods is needed.

The criteria for "very good" pool depth in Table 4.2-1 may not always be correctly applied because the biological value of relative pool depth depends on the size (width) of the stream. For example 3.3 feet is not a very deep pool in a larger stream and might be rated only fair. Pool depth should be scaled to the stream size.

The Plan could have used better data for estimating the total area of timber harvest. For example, the statement: "Data for coastal watersheds in California cover only private lands, so timber harvests are currently not estimated in California for areas with USFS ownership." (p. 4-12, lines 13-14) raises concerns about how the timber harvest Threats Assessments was conducted on the lands for which no data was available. Furthermore, it may be possible to actually do the complete timber threats assessment with access to and evaluation of remote sensing (satellite or aerial) data.

The general position of the Plan with regard to mainstem dams may not place sufficient emphasis on fully contributing to the recovery of SONCC coho salmon. First, there apparently is a general position taken that dams may or may not be laddered or removed, as exemplified by the fact that recovery numbers are shown both with and without habitat upstream of dams in Table 6.1.3. As another example, the Plan states "Consideration

should be given to the removal of Dwinell Dam, as suggested by the National Academy of Sciences (2003)" (p. 10.38-22, lines 2-3). A stronger emphasis than "consideration" might be warranted to make this a reality. There are no specific approaches for addressing major dams in Chapter 7, except mention that the Klamath River Pacificorp Dams will be removed. Otherwise, large mainstem dams are addressed in each population profile where they occur.

Further, installing effective dam passage facilities is often technically problematic. Any consideration of retrofitting dams with upstream passage (ladders, etc.) should also include downstream migration passage as well. Chapter 6 should also include more specific strategies for including passage at dams whether through passage facility installation or dam removal. Also, that chapter should mention the effects of dams and impoundments on downstream movement and mortality and account for remediating downstream passage where appropriate. There are numerous cases where, regardless of adult passage conditions, juveniles suffer unacceptable mortalities or delays at impoundments or dams of the approximate size as in the SONCC region (e.g., Wunderlich et al. 1994).

In Section 6.2.1, which describes objectives and criteria for Factor A, there is statement that is unclear: "….and areas we believe could become fully functional habitats for non-core populations." (p. 6-9, lines 25-26). How will NMFS decide which areas have the potential to become functional? There is no explanation of the process for such a determination.

5. *Does the plan meet the minimum standards described in section 4(f)(1)(b) of ESA by including site-specific management actions, objective measurable criteria and estimates of time and cost?*

Site-specific management actions are clearly and thoroughly described in the population profile subsections, with a few noted exceptions.

Objective measurable criteria for recovery actions are shown in the "Prioritized population-specific recovery actions" tables in each population profile. However, some of those recommended recovery actions are vague and/or generalized so are not amenable to measurement.

Chapter 9, on implementation and costs, is very incomplete so no comments can be made on that issue.

6. *Does the plan incorporate general recovery tenants for coho salmon in the Klamath-Trinity River basin previously identified by the National Research Council in their final 2004 report?*

A number of questions arise as to whether the following specific recommendations of the NRC (2004) report have been fully covered by the current Recovery Plan. The following recommendations **do not** appear to be addressed in the Recovery Plan.

<u>NRC Recommendation 1</u>

- Inventory all governmental, tribal, and private actions that are causing unauthorized take of endangered suckers and threatened coho salmon in the Klamath basin and seek either to authorize this take with appropriate mitigative measures or to eliminate it.

- NMFS and USFWS should consult not only with USBR, but also with other federal agencies (e.g., U.S. Forest Service) under Section 7(a)(1); the federal agencies collectively should show a will to fulfill the interagency agreements that were made in 1994.

- NMFS and USFWS should more aggressively pursue opportunities for non-regulatory stimulation of recovery actions through the creation of demonstration projects, technical guidance, and extension activities that are intended to encourage and maximize the effectiveness of non-governmental recovery efforts.

<u>NRC Recommendation 2</u>

- Research and monitoring programs for coho should be guided by a master plan for collection of information in direct support of the recovery plan;
- A recovery team for coho salmon should administer research and monitoring on the listed species. The recovery team should use an adaptive management framework that serves as a direct link between research and remediation by testing the effectiveness and feasibility of specific remediation strategies.
- Research and monitoring should be reviewed comprehensively by an external panel of experts every 3 years.
- Scientists participating in research should be required to publish key findings in peer reviewed journals or in synthesis volumes subjected to external review; administrators should allow researchers sufficient time to do this important aspect of their work.
- Separately or jointly for the upper and lower basins, a broadly based, diverse committee of cooperators should be established for the purpose of pursuing ecosystem-based environmental improvements throughout the basin for the benefit of all fish species as a means of preventing future listings while also preserving economically beneficial uses of water that are compatible with high environmental quality. Where possible, existing federal and state legislation should be used as a framework for organization of this effort.

The NRC (2004) Klamath River report also lists extensive information needs for coho salmon, none of which are iterated in the draft Recovery Plan, other than in very general terms.

The sections of the NRC (2004) report that describe habitat remediation are generally reflected in the recommendations of the Recovery Plan.

7. *Is the plan suitable for serving as an outreach tool to co-managers, stakeholders and other interested individuals or organizations and does it invite public participation in the recovery process?*

The Plan will serve as a good tool for outreach once its various weaknesses, as identified in the report and those of other reviewers, have been upgraded.

Questions Regarding Use and Application of the SONCC Technical Recovery Team Reports

8. *Are the products developed by the SONCC TRT from the SONCC Historical Population Structure and SONCC Population Viability Criteria reports described and applied appropriately within the recovery plan?*

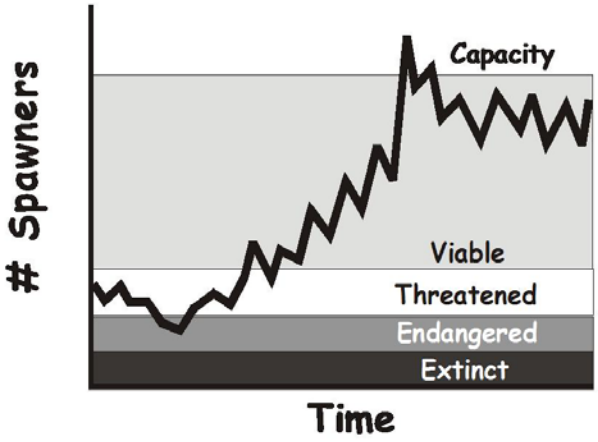
In general the TRT products could be described more accurately in the Plan, or at least cited more thoroughly (e.g., Plan should show TRT citation and page number in a number of places). This is particularly important since the Plan heavily relies on the findings in the two TRT documents and does not repeat the background explanations provided in them.

The statement found in the Plan (p. 3-13 lines 9-10 and also in Williams et al. 2006, p. 7) that "Small watersheds (e.g., < 4 km of stream) probably did not historically support viable populations" may not be accurate. There is little reason to believe that certain small streams having sufficient habitat might not have contained independent, self-perpetuating populations prior to chronic overuse and/or habitat alterations. A decision to not include such streams should be considered a policy decision rather than a biologically supportable decision.

Section 3.3 of the Plan would be much more straightforward if it included both the viability criteria and the target spawner thresholds that are shown in tables 3 and 4, respectively, of Williams et al. (2008), or at least directly referenced those tables. Chapter 3 should show a list of every extant SONCC coho population and the viability criteria rating that would be assigned according to the criteria in table 3 of Williams et al (2008).

The paragraph at the top of 3-20 could be strengthened by including or citing work similar to Williams et al. (2008) Table 5. The main issue of concern for SONCC coho populations are: 1) what were historical population sizes? 2) what are current run sizes?

and 3) what are the threshold viability spawner targets and how do they compare to the past and where we are now (i.e., how much change in abundance is needed to even achieve viability?). One thing that is likely to be unclear to many readers is the notion of shifting baselines (Pauley 1995). The concept is illustrated in the figure below (from LCSRB 2004). A recovery Plan is about ensuring the ESU meets the viability line but, ideally, all parties would be well-informed to know where the full capacity line is for each population and ultimately strive for that.



It is surprising that information from Brown and Moyle (1991) was not used in the Williams et al. (2006) historical population structure analysis. Good et al (2005) stated: "Staff at the CDFG North Coast Region attempted to gather all published and unpublished data collected for 392 streams identified by Brown and Moyle (1991) as historical coho salmon streams. Sources of data included field notes, planting records, and fish surveys from federal" Brown and Moyle's (1991) work was, however, cited in some of the population profiles in the Plan.

The second paragraph on page 3-20 of the Plan could be strengthened by describing or citing exactly where in Williams et al. (2008) the information upon which the estimate of 323,000 SONCC historic coho spawners was derived. This was difficult to find in Williams et al. (2008).

In Williams et al. (2008, p.46), Table 4, caption in part reads: "Percent lost IP km represents the amount of habitat currently located upstream of dams." However, there is no such column in the table.

Table 4 (Williams et al 2008) also lacks an indication of why only some streams are included (31) out of all the streams shown in Table 1 (57).

Additionally, regarding hatchery influence, I notice discrepancies in Table ES1 in Williams et al. (2008). Why are columns high and medium not completed although column low is? As it stands, there's no accounting for the influence of hatchery fish on

viability. That table needs at least to be clarified for how to "score" hatchery influence, relative to the other criteria.

9. *Is the SONCC recovery plan clear regarding the differences between biological population viability and threats abatement recovery criteria?*

The viability criteria are clear in the Plan. Identifying the threats abatement criteria is less clear. Section 6.2 has a list of criteria that address abatement but it never refers to them as threats abatement criteria. As noted elsewhere, Chapter 6 needs some additional clarification and reorganization.

Questions Regarding Factors for Decline and New Threats Assessment Methodology

10. *Does the recovery plan provide an evaluation of threats discussed in terms of the five ESA listing factors identified under ESA section 4(a)(1) (e.g., the present or threatened destruction, modification, or curtailment of its habitat or range) at the time of listing?*

Yes, the five listing factors are clearly presented. There are some issues, however, with the coverage of topics under certain factors, as noted elsewhere in this report.

11. *Does the plan explicitly identify measurable threats and track, through objective measurable criteria, how each threat will be reduced or ameliorated, through specific management actions?*

The Plan explicitly identifies habitat threats and presents approaches for ameliorating those habitat threats. However, several other threats are not treated as well, including overutilization, hatcheries, and climate change. These issues are described more thoroughly under other questions.

12. *Is the modified Nature Conservancy's Conservation Action Planning (CAP) Threats Assessment protocol/methodology employed for assessing anadromous salmonid threats effective?*
    a. *Does the plan contain a fair assessment of current population and habitat conditions, and the identification of the biological stresses to coho salmon life stages and sources of stresses (i.e., threats)?*

One factor that seems to be overlooked in the Threats Assessment is the potential cumulative effects of the various threats categories. While the threat tables for each watershed give a visual overview of the cumulative effects of each category, they do not quantify the interrelated nature of all the threats taken together. For example, in the first four (quantifiable) threats in Table 4.3-1, note how, if all four categories were rated at the upper end of the "high" category, there would be no one threat ranking of "very high"

even though the summation of all the categories would exceed the values of any one category as very high. Say that agriculture occurred in 9% of the watershed, timber harvest in 34%, and urban TIA covered 24% of the watershed. In that case, none of those categories would be rated as "very high", yet the total area of the cumulative effects on the watershed would be 65%, which far exceeds the value for "very high" under any one of the three threat categories.

b. *Is the threats assessment methodology developed objective and transparent for this species and have all realistic threats been identified?*

The threats assessment methodology appears to be mostly objective, except that many of the categories are rated subjectively, so some bias may enter the process. It appears that all realistic habitat threats have been identified, but not all harvest, hatchery, or climate threats.

The threats assessment is not, however, very transparent, as described in detail under question i below.

c. *Are other limiting factors considered for each threat (e.g., its' scope, severity, frequency, magnitude, etc.) as suggested in the Recovery Guidance?*

The threats (limiting factors) are prioritized for each population, so in that sense the scope, severity, frequency, and magnitude are considered. However, the degree or extent to which a given threat may be widespread throughout a given watershed is only particularly accounted for. For one of many examples, the problem of filing septic systems may be pervasive in a given area, but the degree to which this is a problem is unassessed, so the magnitude of the remedies is also unknown.

d. *Do the scoring and rankings in the matrices link logically to your understanding of the species and the systems they live in?*

Not in all cases. For one example, the threats rating for hatchery adults in the Upper Klamath is rated as only medium, while the threat is rated as high for fry, juveniles, and smolts (Table 10.21-5). While it is clear why threats to fry, juveniles, and smolts would be rated as high, the rating as medium for adults does not coincide with the high threat of large number of hatchery strays into the adult spawning population which results in poor survival offspring (e.g., Araki et al. 2007). The extent of the hatchery strays into the wild population is discussed on pages 10.21-14 and -15, and supports a rating of "high" for adults. This was just one quick example, so there may be numerous other situations where the scorings would be debatable.

e. *Are the habitat types as defined in the matrices sufficient?*

I am unclear of the meaning of “habitat types” in this context. That terminology is not used in the Plan matrices. As discussed below, the entire CAP process needs to more clearly described.

f. Are the linkages between habitat types and life stages correct and complete?

I am unclear of the meaning of “habitat types” in this context. That terminology is not used in the Plan matrices. As discussed below, the entire CAP process needs to more clearly described.

g. Does the protocol for threats assessment have a high likelihood of correctly identifying the dominant stressors for each population?

For the most part, yes, but only for habitat threats.

h. Does the threats assessment adequately focus and discuss the biological stresses to coho salmon as a result of the physical processes that have been affected (i.e., threats)? Are there others that should be considered?

The description of the Threats Assessment in Section 4.3, p. 4-10, lines 7-20, should specify the level of application of each threats assessment. Was it at the reach, stream, sub-basin, watershed, or population level?

i. Are the metrics developed and utilized to describe physical conditions of coho habitats adequate for the species, repeatable and measureable as described in the Recovery Planning Guidance?

A full description of the complete CAP process, from beginning to end, seems to be lacking from the Plan – e.g., in Section 4. Appendix A could not be found in the Plan or as an attachment.

The summary threats and stresses tables in each watershed of Chapter 11 is apparently a summary of CAP results, but, since there is no rigorous description of the watershed (population) CAP workbooks, it is difficult to tell whether the process adequately addresses the extent of watershed-based insults to the coho populations. Overall, Section 4 is difficult to follow. Because the beginning of the section does not have a clear process outlined, it is difficult to understand the subsequent subsections and how the information presented in each of those subsections was used in the process. A step-by-step iteration of the CAP process will help to tie all the various indicators of section 4.2 together under the CAP process.

The first three pages of section 4 are confusing. There seems to be a missing subheading for “Habitat Indicators” in the beginning of section 4.2 because Table 4.2-1 is directly under section 4.2 “Stress Rankings Methods”, but the table is only about habitat indicators. Yet subsequent subheadings are about hatchery-related impacts, impaired

water quality, etc. Then later in the section, there are specific subheadings that address some, but not all, of the indicators in Table 4.2-1.

The statement "Final SONCC CAP references were fit to the frequency distribution of the data" (p. 4-4. lines 32-33) is too vague. Further explanation is needed to described whether the pH data fit to the frequency distribution were annual data from one location in a given stream (where available), or spot-check data, etc.

The following statement also raises concerns: "As in the case of pH, the selection of minimum values for DO gave a wrong impression of ill health at some locations known to be unimpaired" (p. 4-5, lines 8-9). First, it is unclear whether the "selected" values referred to in this statement are the same values listed in Table 4.2-1 – if so, a citation of the table would be helpful. Assuming this is the case, it is risky to assume there are times when low D.O. can be ignored because the stream is otherwise "unimpaired". D.O. is a threshold variable that can result in sublethal effects if chronically depressed, and can result in die-offs, once it goes below the minimum threshold (e.g., Carter 2005). D.O. is also strongly related to temperature: as water temperature rises, the amount of dissolved oxygen decreases. The values in Table 4.2-1 appear to be appropriate and should be adhered to in rating the streams.

13. *Does the recovery plan adequately address potential uncertainties related to threats assessment?*

No. In particular, the reliance on pre-designated core populations as the primary way to recover the ESU does not allow for the uncertainty associated with the outcomes of the Plan. Further, there is no formal accounting for uncertainty (i.e., probabilities) of the outcomes.

14. *Are the color coded CAP Threats Assessment summary pages which display population/watershed stresses and stressors useful for conveying to the public, agencies, stakeholders, what is needed to restore coho salmon and their critical habitats and why?*

Yes, together with the non-color-coded recovery action tables, but only for habitat threats.

Questions Regarding the Conservation Assessment Process

15. *Does the plan adequately assess the effectiveness of conservation actions to date including, if the action was in place before listing and the reasons why the efforts were considered insufficient?*

Only generally.

16. *Is it clear what threats are being addressed through conservation efforts and what threats remain unaddressed?*

Some of the broad threats being addressed are described under Factor D, the existing Regulatory Mechanisms section of Chapter 2 (2.2.6). More specifically, each population profile contains a description of programs already underway for restoration and recovery. However, these descriptions are general and not quantitative about the progress made to date.

Questions Regarding the Recovery Strategy

17. If the species (ESU) met all the biological and physical threats abatement recovery criteria, is it plausible that this species would likely persist for the foreseeable future?

It is plausible, but only IF the ESU met all the biological and physical threats abatement recovery criteria. However, there are myriad unknowns and uncertainties in the future application of the Plan. For example, a question arises about the likelihood of success when the Plan is couched in terms like: "Implementation of the Plan will allow limited resources to be applied to the highest priority recovery actions." (NMFS 2009, p. 1-1, lines 20-21) and then followed up with a strategy for only recovering core populations and, even then, only highly prioritizing certain actions for those core populations. Because there is no way to accurately predict the outcome of recovery action attempts, it is possible that some of the core populations may not be successfully restored. Therefore, it is also important that non-core populations also be emphasized, as back-ups, or insurance against possible failure of recovery on core populations. Overall, the Plan may be too conservative in its estimates of how many core populations are required, and/or too conservative in the prioritization of recovery actions in both core and non-core populations.

The likelihood of all anticipated recovery actions in the Plan being successful is very low. As just one of many examples, the description of planned retrofitting of Klamath River dams with passage facilities is politically and bureaucratically ambitious as well as biologically questionable (p. 10.21-4, lines 17-33). Most large dams are very difficult and expensive to retrofit. There are extensive questions about design of proposed facilities. Often, there are problems with passage of upstream and downstream migrants. Of course, dam removal is the best option for fish to access the upstream areas, but short of that, it is difficult to envision successful, mortality-free passage past 4 mainstem dams.

If a concerted, well-funded effort is made to remedy all threats identified, the ESU has a good likelihood of persisting.

18. Are the Population Profiles contained within the plan adequate in summarizing the technical information assimilated for each historic coho salmon population and in conveying what is needed to recover/reduce the threats affecting the population?

The population profiles are generally adequate, although there are weaknesses in some of the details. For just one example, in the Upper Klamath profile, the description of hatchery influences (p. 10.21-11, lines 1-9), while rated as a major problem for coho,

does not even mention whether any attempts are being made to integrate wild spawners with hatchery spawners, as was prescribed on p. 6-16.

The profiles provide an excellent starting point or guide to parties interested in recovery. However, additional details on many of the action items will need to be developed to actually implement the changes proposed in the profiles.

19. Do the recovery strategy and recovery criteria adequately consider large-scale environmental perturbations such as climate change and ocean variability?

The answer to this question is mixed because climate change is such a diverse and broad-scale effect, with unknown outcomes. The approach proposed in the Plan is to increase the resilience of the ESU by applying "a strategy which involves the following objectives:

1. Reducing the stresses and threats affecting coho salmon.
2. Re-establishing natural physical and biological processes that support coho salmon habitat.
3. Broadening the life-history and genetic diversity of all population to help maximize their capacity to respond to climate change.

These objectives will be met through stress and threat abatement across the ESU" (p. 6-17, lines 8-14). However, the specific methods for addressing climate change will be addressed in subsequent versions of the Plan (p. 7-5, line 25). So, as it stands, the Plan relies primarily on abating habitat stressors, so that the populations will be better to withstand the impending changes due to climate variation. Whether this is sufficient is uncertain and needs to be clarified further.

One aspect that may help in developing a future SONCC coho strategy for climate change, as well as the effects of variable ocean conditions, is to determine how, when, and where managers' responses fit in. The basic concept is to increase the research on the relationships between environmental variability and coho survival that then supports more accurate management decisions (Knudsen and Doyle (2006). Then, once managers better understand the relationship between ocean conditions and survival, they might for example manage escapements (hence smolt production) differently to take advantage of various conditions.

One advantage for SONCC coho is that "Compared with other coho salmon populations, the SONCC coho salmon ESU has a comparatively small marine distribution" (p. 3-8, lines 10-12). This means they are subject to a somewhat simplified ocean-condition/survival relationship.

20. Are the links between human activities, effects on habitat, effects on individual fish, and expected responses of populations clearly described?

The links between human activities, effects on habitat, and expected responses of populations are clearly described, but not the effects on individual fish. As described elsewhere in this report, the links between overutilization and, to a lesser extent, hatcheries are not very well developed in the Plan.

21. Does the recovery plan contain a logical framework for prioritizing recovery efforts at multiple spatial scales? Such as:

a. For each of these populations, have the primary stressors been identified?

Yes, the population profiles generally portray the primary stressors very well.

b. Given the prioritized stressors, do the recovery actions have a high likelihood of achieving measurable results?

They do except that some priorities might be elevated, or the language describing the action might be strengthened, to increase the likelihood of achieving results.

c. Is there a logical link between stressors, populations and prioritized recovery actions such that they will have the highest likelihood for success?

For the most part, there is a logical link between stressors, populations and prioritized recovery actions for the highest likelihood for success. The primary question that remains is whether the huge undertaking that is represented by the Plan will actually be implemented bureaucratically and financially. Successful implementation also depends on state, local, tribal, and private corporate participation. As stated in the Plan, p. 2-3: "It is important to note that there are many measures not listed here that are still important for the overall conservation of coho salmon. Many additional local conservation efforts are recognized and described in the population profiles (Chapter 11)."

22. Do the proposed recovery actions link logically to the threats identified in the CAP Threats Assessment?

a. Do proposed recovery actions target the primary stresses/stressors for each population?

Yes, except that some threats, such as overutilization and the effects of hatcheries, have not been fully accounted for in the stresses/stressors lists.

b. Are recovery actions prioritized in a manner consistent with identified threats?

The recovery actions do not always seem to be prioritized in a manner consistent with identified threats. For example, in many watersheds, while threats might be rated as "very

high” or “high” in the CAP summary table, the actions in the recovery actions summary, are mostly rated as priority 3. As one random example, the Mainstem Eel core population was determined to be “not viable”. Its primary threats are roads (very high), timber harvest (high), and dams an diversions (high) (Table . However, in looking at the prioritized population-specific recovery actions in Table 10.5-6, the only action that is prioritized higher than a 3 is road alterations to reduce sediment input (Priority 2b). Why are not roads prioritized at 1, and dams/diversions and timber harvest prioritized at level 2, if they are the very high and high threats, respectively, for a core population?

Question Regarding Monitoring and Adaptive Management

23. Does the plan have a well-defined methodology for adaptive management to evaluate whether recovery measures are producing the intended effects and, if not, for informing mid-course corrections in the recovery plan and its implementation?

The Plan draft does not contain a well-defined methodology for monitoring or adaptive management – Chapter 8 states that such a monitoring and adaptive management plan will be provided in the next version of the Plan. Therefore, I was unable to comment on this topic. However, there is a dire need for monitoring in most populations in freshwater, especially escapement counts and smolt emigration assessment. These two fundamental metrics can be used for assessing the status of the populations as well as the relative marine and freshwater survival rates. Such data can be used to determine the effectiveness of restoration activities over time, as well as for assessing the effects of climate variability on survival. Once such data gradually becomes available, managers can adjust activities that might affect production accordingly. Without this basic monitoring data, managers are working in the dark and it will be impossible to determine whether remedial actions are having any effects. Additional attention should be focused in the monitoring plan about assessing mortality and exploitation rates in marine and freshwater fisheries (e.g., see comment on lack of exploitation rates; p. 2-21, line 36). Without adequate monitoring, there is no way to adaptively manage the SONCC coho populations.

Conclusions and Recommendations in accordance with the ToRs

In this report, I present findings from an independent peer review of the draft Southern Oregon Northern California Coast (SONCC) Coho Salmon Recovery Plan (Plan – NMFS 2009). My comments under each of the ToR questions should be taken as my recommendations for improving the Plan. The review contains a large number of specific comments. Here I list major concerns and recommendations about the approach and scientific basis of the Plan in supporting recovery of SONCC coho salmon.

- Citations need to be improved throughout the Plan: 1) a number of places in the text where statements should have been supported by a citation were lacking references to background reports or citations, 2) many citations in the text are not found in the References list, 3) the TRT reports need to be thoroughly cited in the first 7 chapters, since they are the basis for much of the Plan.
- The writing in some parts of the first 7 chapters needs to be more explicit, as described above.
- The description of the CAP process was found to be very weak in the Plan and should be upgraded. A full description of the complete CAP process, from beginning to end, would help tremendously.
- The population profile sections of Chapter 11 should be re-arranged, by diversity strata and then by population ranking, rather than in alphabetical order.

- The Plan tends in general to state that the effects of fishing are negligible on SONCC coho salmon but, as described in detail above, overutilization by all sources of legal and illegal fishing should be better accounted for as a Threat to SONCC coho recovery.
- Ratings and recovery targets for the non-core populations may be set too low for them to appreciably serve as "back-up" populations if recovery of core populations fails, or to contribute meaningful strays to core or other populations where needed to maintain the array of populations throughout the ESU. Recovery targets should be elevated for all non-core populations.
- The prioritization of recovery actions do not always seem to be consistent with identified threats. It is recommended that many actions in the recovery actions summaries be elevated in priority to coincide with their threat levels.
- The effects of hatcheries on SONCC recovery is underrated in the Plan. I recommend that more emphasis be placed on hatchery planning particularly to integrate hatcheries into wild population management.
- The Plan could be improved with a better description of how the effects of climate change will be accommodated in SONCC coho recovery
- The Plan draft does not contain a well-defined methodology for monitoring or adaptive management, so I was unable to comment on this topic. However, there is a dire need for monitoring in most populations in freshwater, especially escapement counts and smolt emigration assessment. Additional attention should be focused in the monitoring plan about assessing mortality and exploitation rates in marine and freshwater. Without adequate monitoring, there is no way to adaptively manage the SONCC coho populations.

In general, I recommend that the Plan authors go through all the findings throughout this review and modify the Plan as recommended. In so doing, the Plan should be greatly improved and ready serve as a complete roadmap for the recovery SONC coho salmon.

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Oregon Plan for Salmon and Watersheds. Available on the Internet at: http://www.oregon-plan.org/OPSW/

Appendix 2: CIE Statement of Work

Statement of Work for Dr. Eric Knudsen

External Independent Peer Review by the Center for Independent Experts

Southern Oregon/Northern California Coast Coho Salmon Draft Recovery Plan

Scope of Work and CIE Process: NOAA's National Marine Fisheries Service's (NMFS) Office of Science and Technology manages a contract through the Center for Independent Experts (CIE) to conduct impartial and independent peer reviews of NMFS scientific projects. This Statement of Work (SoW) described herein was established by the NMFS Contracting Officer's Technical Representative (COTR) based on the peer review requirements submitted by NMFS Project Contact. CIE reviewers will be selected by the CIE Coordination Team and Steering Committee to conduct the external peer review of NMFS science with project specific Terms of Reference (ToRs). Each CIE reviewer shall produce a CIE independent peer review report with specific format and content requirements (**Annex 1**). This SoW describes the work tasks and deliverables for conducting the CIE peer review of the following NMFS project.

Project Description: The Endangered Species Act (ESA) requires NMFS to develop and implement recovery plans for the conservation of threatened and endangered species. The Southern Oregon/Northern California Coast (SONCC) Coho Salmon Evolutionarily Significant Unit (ESU) includes all naturally spawning coho salmon from the Elk River near Cape Blanco in southern Oregon south through the Mattole River near Punta Gorda in Northern California. This ESU contains three large river basins, including the Rogue River in Oregon and the Klamath-Trinity and Eel Rivers in California that extend inland considerable distances. The draft recovery plan serves as a guideline for achieving recovery goals by describing the steps that must be taken to improve the status of the species and their habitats. Although the recovery plan itself is not a regulatory document, its primary purpose is to provide a conservation "road map" for Federal and state agencies, local and Tribal governments, non-governmental entities, private businesses, and stakeholders. Development of this recovery plan is a challenge as the geographical range of the species crosses the Oregon/California border. In addition, the recovery plan will adapt portions of the "Recovery Strategy for California's Coho Salmon, recently listed under California's ESA (CESA) in 2005" and conservation, recovery efforts and strategies developed for southern Oregon coho salmon populations under the State of Oregon's Native Fish Conservation Policy.

The NMFS Recovery Plan for the SONCC Coho is expected to generate substantial interest from outside parties because it: (1) will contain recommendations involving water supplies for a variety of industrial, commercial, agricultural and urban users and municipalities; (2) will prioritize targeted restoration and recovery actions for coho

salmon populations and watersheds throughout southern Oregon and northern California; (3) could influence local and regional environmental planning efforts and decisions involving land development patterns; and (4) may advise federal, state, tribal, local and regional governments on actions necessary to reduce the threats causing biological stresses to coho salmon populations and their critical habitats. The draft recovery plan will include a large geographic area in Southern Oregon and Northern California and has the potential for wide-ranging implications. The threats assessment process used in the draft plan represents a new approach for anadromous salmonid ESA protected species and has been completed by NOAA Fisheries in full cooperation and coordination with state, federal, local, and regional governments and agencies. Stakeholder interest will be high and likely lead to inquiries from elected representatives at the state and Federal levels. The Terms of Reference (ToRs) of the CIE peer review are specified in **Annex 2**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. Each CIE reviewer's duties shall not exceed a maximum of 10 days to complete all work tasks of the peer review described herein. CIE reviewers shall have the expertise, background, and experience to complete an independent peer review in accordance with the SoW and ToRs herein. The CIE reviewers shall have expertise with strong credentials in salmon management, salmon conservation biology, salmon restoration practices, salmon/water management, and salmon conservation under the Endangered Species Act.

Location of Peer Review: The CIE reviewers shall conduct the external peer review of the report as a desk review, in which no travel is required.

Statement of Tasks: Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, CIE shall provide the CIE reviewer information (name, affiliation, and contact details) to the COTR, which will be sent to the NMFS Project Contact no later the date specified in the Schedule of Milestones. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents and reports to be peer reviewed. Changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Background Documents: At the commencement of the peer review, the NMFS Project Contact will send by electronic mail, or make available at an FTP site, the CIE reviewers all necessary background information and the report for the peer review. If the documents need to be mailed to the reviewer, the NMFS Project Contact will consult with the CIE on where to send the documents.

A tentative list of background documents and the report is provided in Annex 3, and an updated list will be provided up to two weeks before the peer review. Any delays in submission of review documents for the CIE peer review will result in delays with the

CIE peer review process, including a SoW modification to the schedule of milestones and deliverables. Furthermore, the CIE reviewers are responsible only for the documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein.

Desk Peer Review: Each CIE reviewers shall conduct the independent peer review in accordance with the SoW and ToRs. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.**

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review report according to the format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review;
2) Conduct an independent peer review in accordance with the SoW and ToRs (Annex 2);
3) No later than 29 June 2009, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent via email to Manoj Shivlani, CIE Lead Coordinator shivlanim@bellsouth.net, and CIE Regional Coordinator, David Die ddie@rsmas.miami.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in Annex 2;
4) CIE reviewers shall address changes as required by the CIE review in accordance with the schedule of milestones and deliverables.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

1 June 2009	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
15 June 2009	NMFS Project Contact sends the CIE Reviewers the report and background documents for the peer review no later than this date.
15-29 June 2009	Each reviewer conducts a desk (requiring no travel) peer review

29 June 2009	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
12 July 2009	CIE submits CIE independent peer review reports to the COTR
26 July 2009	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: Requests to modify this SoW must be made through the Contracting Officer's Technical Representative (COTR) who submits the modification for approval to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the CIE within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and Terms of Reference (ToR) of the SoW as long as the role and ability of the CIE reviewers to complete the SoW deliverable in accordance with the ToRs and deliverable schedule are not adversely impacted. The SoW and ToRs cannot be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (the CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards: (1) each CIE report shall have the format and content in accordance with Annex 1, (2) each CIE report shall address each ToR as specified in Annex 2, and (3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon notification of acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the approved CIE reports to the NMFS Project Contact and regional Center Director.

Key Personnel:

William Michaels, Contracting Officer's Technical Representative (COTR)
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NMFS Southern Oregon/Northern California Coast Domain Recovery Coordinator
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Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Review Activities, Summary of Findings for each ToR, and Conclusions and Recommendations in accordance with the ToRs.

3. The reviewer report shall include as separate appendices as follows:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work

Annex 2: Terms of Reference for the Peer Review

Southern Oregon/Northern California Coast Coho Draft Recovery Plan

A review of the draft Southern Oregon/Northern California Coast (SONCC) Coho Salmon ESU Recovery Plan is being requested. Reviews and comments are to focus upon: (1) The use of the best available scientific, technical and commercial data and information; (2) Interpretation and application of the National Marine Fisheries Services' Southwest Fisheries Science Center SONCC Technical Recovery Team's (TRT's) supporting technical recovery planning reports and (3) Determination on whether processes developed for and methods employed provide adequate linkages between the SONCC TRT population and ESU recovery criteria, coho salmon life stage specific biological stresses inferred from physical habitat-based threats assessment, and the recovery actions and strategies developed to reduce or abate those population threats. Reviewers are not expected to evaluate or comment upon the TRT documents or the Threats Assessment template. The CIE reviewer's peer review shall address each of the following questions.

Fundamental Questions for the CIE Reviewers

1. Does the recovery plan delineate those aspects of the species biology, life history, and threats that are pertinent to its endangerment and recovery?

2. Is the recovery plan grounded in a clearly articulated and biologically meaningful conceptual framework?

3. Does the recovery plan provide a useful and meaningful "road map" to recovery and have a logical strategy to achieve recovery that is relevant to habitats, life stages, populations, diversity groups and the overall ESU?

4. Does the plan use and incorporate the best available scientific, technical and commercial data and information?

5. Does the plan meet the minimum standards described in section 4(f)(1)(b) of ESA by including site-specific management actions, objective measurable criteria and estimates of time and cost?

6. Does the plan incorporate general recovery tenants for coho salmon in the Klamath-Trinity River basin previously identified by the National Research Council in their final 2004 report?

7. Is the plan suitable for serving as an outreach tool to co-managers, stakeholders and other interested individuals or organizations and does it invite public participation in the recovery process?

Questions Regarding Use and Application of the SONCC Technical Recovery Team Reports

8. Are the products developed by the SONCC TRT from the SONCC Historical Population Structure and SONCC Population Viability Criteria reports described and applied appropriately within the recovery plan?

9. Is the SONCC recovery plan clear regarding the differences between biological population viability and threats abatement recovery criteria?

Questions Regarding Factors for Decline and New Threats Assessment Methodology

10. Does the recovery plan provide an evaluation of threats discussed in terms of the five ESA listing factors identified under ESA section 4(a)(1) (e.g., the present or threatened destruction, modification, or curtailment of its habitat or range) at the time of listing?

11. Does the plan explicitly identify measurable threats and track, through objective measurable criteria, how each threat will be reduced or ameliorated, through specific management actions?

12. Is the modified Nature Conservancy's Conservation Action Planning (CAP) Threats Assessment protocol/methodology employed for assessing anadromous salmonid threats effective?

24. Does the plan contain a fair assessment of current population and habitat conditions, and the identification of the biological stresses to coho salmon life stages and sources of stresses (i.e., threats)?
25. Is the threats assessment methodology developed objective and transparent for this species and have all realistic threats been identified?
26. Are other limiting factors considered for each threat (e.g., its' scope, severity, frequency, magnitude, etc.) as suggested in the Recovery Guidance?
27. Do the scoring and rankings in the matrices link logically to your understanding of the species and the systems they live in?
28. Are the habitat types as defined in the matrices sufficient?
29. Are the linkages between habitat types and life stages correct and complete?
30. Does the protocol for threats assessment have a high likelihood of correctly identifying the dominant stressors for each population?

31. Does the threats assessment adequately focus and discuss the biological stresses to coho salmon as a result of the physical processes that have been affected (i.e., threats)? Are there others that should be considered?

32. Are the metrics developed and utilized to describe physical conditions of coho habitats adequate for the species, repeatable and measureable as described in the Recovery Planning Guidance?

13. Does the recovery plan adequately address potential uncertainties related to threats assessment?

14. Are the color coded CAP Threats Assessment summary pages which display population/watershed stresses and stressors useful for conveying to the public, agencies, stakeholders, what is needed to restore coho salmon and their critical habitats and why?

Questions Regarding the Conservation Assessment Process

15. Does the plan adequately assess the effectiveness of conservation actions to date including, if the action was in place before listing and the reasons why the efforts were considered insufficient?

16. Is it clear what threats are being addressed through conservation efforts and what threats remain unaddressed?

Questions Regarding the Recovery Strategy

17. If the species (ESU) met all the biological and physical threats abatement recovery criteria, is it plausible that this species would likely persist for the foreseeable future?

18. Are the Population Profiles contained within the plan adequate in summarizing the technical information assimilated for each historic coho salmon population and in conveying what is needed to recover/reduce the threats affecting the population?

19. Do the recovery strategy and recovery criteria adequately consider large-scale environmental perturbations such as climate change and ocean variability?

20. Are the links between human activities, effects on habitat, effects on individual fish, and expected responses of populations clearly described?

21. Does the recovery plan contain a logical framework for prioritizing recovery efforts at multiple spatial scales? Such as:

    33. For each of these populations, have the primary stressors been identified?

34. Given the prioritized stressors, do the recovery actions have a high likelihood of achieving measurable results?
35. Is there a logical link between stressors, populations and prioritized recovery actions such that they will have the highest likelihood for success?

22. Do the proposed recovery actions link logically to the threats identified in the CAP Threats Assessment?

    36. Do proposed recovery actions target the primary stresses/stressors for each population?
    37. Are recovery actions prioritized in a manner consistent with identified threats?

Question Regarding Monitoring and Adaptive Management

23. Does the plan have a well-defined methodology for adaptive management to evaluate whether recovery measures are producing the intended effects and, if not, for informing mid-course corrections in the recovery plan and its implementation?

Annex 3: Tentative list of pre-review documents for CIE reviewers

California Department of Fish and Game. 2004. Recovery strategy for California coho salmon. Report to the California Fish and Game Commission. California Department of
Fish and Game, Native Anadromous Fish and Watershed Branch, 1416 9th Street, Sacramento, California 95814.

Good, T. P., R. S. Waples, and P. Adams. 2005. Updated status of Federally listed ESUs of
West Coast salmon and steelhead. U. S. Department of Commerce, NOAA Technical
Memorandum NMFS-NWFSC-66.

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. Commer, NOAA Tech. Memo. NMFS-NWFSC-42, 156p.

National Marine Fisheries Service and Kier and Associates. 2008. Updated guide to the reference values used in the Southern Oregon/Northern California Coast Coho Salmon Recovery Conservation Action Planning (CAP) workbooks. National Marine Fisheries Service and Kier and Associates. Arcata, Ca.

NMFS 1996. Factors for Decline – A Supplement to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act. August 1996.

National Research Council. 2004. Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery. NRC of the National Academics. The National Academies Press, Washington, D.C. 334 p. Available on the Internet at: http://www.nap.edu

Oregon Administrative Rules , Oregon Department of Fish and Wildlife. 2007. Native Fish Conservation Policy. Pg.3 AR 635-007-0502 - Pg. 8 AR 635-007-0509.

Spence, B. C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. NMFS Status Review of Coho Salmon from Washington, Oregon and California. NOAA Technical Memorandum NMFS-NWFSC-24, September 1995.

Williams et al. 2006. Historical Population Structure of Coho Salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. U.S. Department of Commerce, NMFS, NOAA Fisheries SWFSC Santa Cruz, NOAA Technical Memorandum NMFS-SWFSC-390, June 2006.

Williams et al. 2008. Framework for Assessing Viability of Threatened Coho Salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. U.S. Department of Commerce, NOAA Technical Memorandum NOAA Fisheries SWFSC Santa Cruz, NOAA Technical Memorandum NMFS-SWFSC-432, December 2008.

NMFS SWFSC Technical Recovery Team reports and information.
Available on the Internet at:
http://swfsc.noaa.gov/textblock.aspx?Division=FED&id=2268

Oregon Plan for Salmon and Watersheds.
Available on the Internet at: http://www.oregon-plan.org/OPSW/