

**Independent Peer Review by the  
Center for Independent Experts (CIE)**

**Assessment of the Draft Recovery Plan for the  
Central California Coast Coho Salmon Evolutionarily Significant  
Unit**

by

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## **EXECUTIVE SUMMARY**

### **Purpose**

The purpose of this independent review is to evaluate and comment on the Draft Recovery Plan for the North Central California Coast Recovery Domain (NCCC Domain) and the Central California Coast coho salmon Evolutionarily Significant Unit (CCC coho salmon ESU) module. The scope of work focused on the principal elements required in a recovery plan as defined by the federal Endangered Species Act (ESA) and by the National Marine Fisheries Service (NMFS) Interim Recovery Planning Guidance.

### **Comments and Recommendations**

1. The Draft Recovery Plan meets the requirements of a recovery plan as defined in section 4(f)(1) of the ESA, and sections 1.1 and 1.2 of the NMFS Interim Recovery Planning Guidance (NMFS 2006).
2. The Draft Recovery Plan does not require major revision. The only revision that may be contemplated would be a brief discussion of the uncertainties associated with the use of Indicator Potential (IP)-based metrics of habitat quality and quantity, and of the consequences that these uncertainties may have to viability/recovery targets.
3. I recommend that the Draft Recovery Plan for the Central California Coast Coho Salmon ESU be accepted as a core contribution to the multi-species recovery plan for the North Central California Coast Recovery Domain.

# **REVIEWER REPORT**

## **I. BACKGROUND**

There are 10 Evolutionarily Significant Units/Distinct Population Segments (ESUs/DPSs) of salmon and steelhead in California listed as Federally endangered or threatened under the ESA. These are organized into four geographic recovery domains. Each recovery domain contains one or more salmon and steelhead ESU/DPS, and (1) a Science Center led Technical Recovery Team responsible for developing historical population structure and population viability goals for the recovery plan, and identifying research and monitoring needs; and (2) a recovery coordinator responsible for facilitating the development of a recovery plan for the domain.

The NCCC Domain recovery plan will be developed over several phases which will include one module for each ESU/DPS, with a final compilation and restructuring into a multi-species plan. The development of modules for each ESU/DPS will be in the following sequence: CCC coho Salmon ESU, Central California Coast steelhead DPS, California Coastal Chinook salmon ESU and Northern California steelhead DPS.

The final plan will be a multi-species recovery plan that will be a compendium of data and information that can be utilized on a watershed basis where species ranges overlap. The rationale for developing species specific modules was precipitated by research demonstrating that multi-species plans lacked the species-specific information needed for listing. Thus, individual species-specific information is being developed for compilation into the multi-species plan to ensure species needs are adequately addressed in terms of the viability criteria and habitat needs.

## **II. DESCRIPTION OF REVIEW ACTIVITIES**

I received the Recovery Plan and associated appendices by email at 9:00pm on Tuesday, 9 September 2008, from Charlotte Ambrose, NCCC Domain Recovery Coordinator, NOAA. I began my review of this material on 11 September 2008 and completed it on 17 September 2008. On Sunday, 14 September, I informed Ms. Ambrose that I had been unable to gain access to Appendices E through L via the web links. This lack of access was corrected on Monday 15 September 2008 by Ms. Ambrose and Charleen Gavette, NOAA. The report was submitted to the Center for Independent Experts (CIE) on Friday, 19 September 2008.

### III. Summary of Analyses and Comments in Accordance with the Terms of Reference

#### 1. Fundamental Questions for the CIE reviewers

1.1 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?

Section 4(f)(1)(b) of ESA states that “each plan must include, to the maximum extent practicable,

- a description of such site-specific management actions as may be necessary to achieve the plan’s goal for the conservation and survival of the species;
- objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list; and,
- estimates of the time required and the cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal.”

**Site-specific management plans:** Recovery strategies were developed for the Central California Coast (CCC) Coho Salmon Evolutionarily Significant Unit (ESU) by describing site-specific management actions for 4 of 5 Diversity Strata (Lost Coast, Navarro-Gualala Point, Coastal, Santa Cruz Mountains; San Francisco Bay is excluded) and for 23 focus watersheds (of the 76 thought to have historically contained CCC coho salmon).

The detail of the site-specific management actions is impressive. For each watershed, the recovery action plans begin with summaries of the (a) *Setting*, (b) *Population Status and Abundance Targets*, (c) *Immediate Restoration Priorities*, (d) *Areas for Immediate Restoration*, (e) *Threat Abatement Priorities*, and (f) *Priority Recovery Actions*. Thereafter follow extremely specific management actions for **Restoring Habitats** and **Threat Abatement Strategies**. For each watershed, the site-specific management actions are supported by an assessment (termed "Viability Results") of multiple features of coho salmon habitat, for each life-history stage, and by a detailed assessment of threats facing coho in each watershed. Presenting these assessment results in tabular form is extremely important from a communications perspective, given that the tables provide the reader with a means of rapidly examining, and evaluating, the empirical basis for the site-specific management actions. The Lagunitas Creek Watershed Characterization Report (Appendix E) and Recovery Implementation Schedule (Appendix G) provide excellent examples of how detailed site-specific information can, and almost certainly will, inform site-specific management actions.

**Objective, measurable criteria:** The Recovery Plan identifies 2 Recovery Goals and 4 Recovery Objectives. The Recovery Goals are: (a) to prevent the

extinction of the few remaining CCC coho salmon populations in the wild, and (b) to recover them to a viable state in a demographic and spatial configuration where their long-term persistence is ensured. These recovery goals represent the broad, over-arching objectives of the Recovery Plan and are appropriate as long-term objectives.

To achieve the Recovery Goals, the Plan identifies four Recovery Objectives that are more specific in nature:

1. Protect habitat currently occupied by coho salmon by ameliorating existing and future threats and improving current conditions in Core Areas within identified focus populations (Core Areas are defined as subwatersheds that contain persisting populations of coho salmon within each of the 23 focus watersheds).

2. Re-establish viable populations within each Diversity Stratum by protecting and restoring functional habitat conditions, and controlling and abating existing and future threats.

3. Downlist and subsequently delist coho salmon by re-establishing the 23 focus populations to a viable state.

4. Implement standardized monitoring of coho salmon populations and their habitats across the ESU.

Thus, the intent is to (a) protect and improve habitat, (b) ameliorate threats, (c) re-establish viable populations, (d) downlist and eventually delist the ESU, and (e) establish programs to monitor temporal and spatial changes in coho habitat and population status.

**Recovery Criteria:** The Recovery Plan identifies 3 Recovery Criteria: Demographic Criteria (including ESU level criteria and population-level criteria); Listing Factor Criteria (subdivided by each of the 5 listing factors); and Habitat-Improvement and Threat-Abatement Criteria (partitioned into (i) recovery criteria for habitat indicators, (ii) Freshwater threat-abatement criteria; and (iii) Marine threat-abatement criteria).

From the perspective of being able to eventually downlist or delist this ESU, the most objectively measured and readily quantifiable of the Recovery Criteria may be the 'population level criteria'. These relate to the attainment of recovery targets (detailed in Table 11), specific for each of the 23 watersheds within the 4 Diversity Strata (San Francisco excluded) for which recovery has been deemed feasible.

Thus, amongst the Recovery Criteria, it will ultimately be the Demographic Criteria on which decisions to downlist or delist will be made. This is a good

thing because the recovery targets are biologically defensible and based on sound scientific principles associated with conservation biology and salmon population dynamics. In my opinion, the remaining Recovery Criteria specify the actions that must be achieved before the population-based recovery targets for viability and recovery will be met. I agree entirely with the Recovery Plan's assertion that "the most important metric for [the] population viability criteria is spawner abundance" (p. 495).

The target values are those thought to expose the populations to a low risk of extinction, the characteristics of which include **either** (a) a less than 5% probability of extinction within 100 years (as estimated from a population viability analysis), **or** (b) effective/total population sizes per generation to exceed 500/2500, **and** (c) no population or catastrophic decline apparent or probable, **and** (d) number of spawners per unit area exceeds the Minimum Required Spawner Density for each river **and** (e) no evidence of adverse effects of hatchery fish on wild populations (Table 4).

**Estimated time to, and cost of, recovery:** In Chapter 8 (p. 77), it is estimated that measurable increases in population abundance as a result of recovery actions can be expected between 3 and 4 generations. Although this would mean a 9- to 12-year time frame (based on the 3-year generational time scale identified in the Recovery Plan), Chapter 8 specifies a 12- to 15-year time frame.

Chapter 14 makes note of a 50- to 100-year time frame estimated by NMFS for the full recovery of CCC coho salmon. The Recovery Plan appropriately draws attention to the high level of uncertainty associated with any estimates of the costs associated with such recovery actions. In this regard, NMFS suggests that it is appropriate to focus on the first 10 to 15 years of implementation which, as indicated above, is predicted to be the time frame during which measurable increases in population abundance should be realized.

Although these cost projections are not included in the Recovery Plan, estimates are provided for the costs of recovery actions in the Lagunitas Creek Watershed in the Coastal Diversity Stratum. During the first 5 years of recovery action, the sum total of recovery costs is estimated to be \$11,463,373; during the first 50 years, the total costs of recovery actions for the Lagunitas Creek Watershed are estimated to be \$444,348,733 (based on the data provided in Table 13).

However, as a comparative tool for estimating recovery costs in other watersheds, these watershed-based estimates of recovery for Lagunitas Creek might be considered under-estimates, and perhaps significant under-estimates, given that: (a) Lagunitas Creek appears to have good numbers of adult salmon returning to it; (b) many of threats that CCC coho face elsewhere are not evident, or not as serious, in the Lagunitas Creek watershed; and (c) the Creek could potentially satisfy the low extinction risk criteria in the future, if current conditions persist (pp 62-63).

Appendix K of the Recovery Plan provides estimates of habitat restoration costs for coho salmon recovery in California. The State of California has estimate the total cost of recovering CCC coho salmon to be \$3,258,692,443.

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

The recovery plan has delineated those aspects of the biology, life history and threats pertinent to the endangerment and recovery of CCC coho salmon. The species is an anadromous fish, meaning that it breeds and spends its early life in fresh water before undertaking a feeding migration to the ocean and returning thereafter to fresh water to spawn. The CCC coho salmon exhibits, thus, a complex life cycle, and the recovery plan appropriately considers all elements of the biology and life history associated with this complexity in assessing the threats faced by the ESU.

The Conservation Action Planning (CAP) protocol was used to assess current habitat conditions and future threats that affect the viability of the CCC coho salmon ESU and to develop recovery strategies that address these conditions and threats. This protocol involved the assessment of site-specific watershed conditions for multiple life stages (e.g., adults, eggs, juveniles) and for different seasons (summer and winter rearing conditions) in fresh water, and for subadults and adults in the ocean. I could discern no deficiencies in the biological or life-historical knowledge base on which the threat assessments were undertaken.

Across the ESU, the primary threats to CCC coho salmon have been attributed to the following threat categories: Roads and Railroads (22 of the 23 focal watersheds), Droughts (22 of 23 watersheds), and Logging and Wood Harvesting (17 of 23 watersheds). Channel Modification was identified as a high or very high threat in 10 of the 23 watersheds. An additional 12 threats, of varying levels of threat magnitude, were assessed as affecting one or more of the 23 focal watersheds within the ESU. The threats identified for the CCC coho salmon are not dissimilar to those affecting Salmonidae at risk through the family's geographical range.

**1.3 Does the plan have a logical strategy to achieve recovery that is relevant to habitats, life stages, populations, diversity groups and the overall ESU?**

The plan does have a logical strategy for achieving recovery that is relevant to habitats, life stages, populations, diversity groups and the overall ESU. Recovery actions are detailed in Chapter 10 of the recovery plan. Initially, and extremely helpfully, the plan prioritizes recovery actions at the ESU level before providing detailed descriptions of recovery actions within each of the 23 focal watersheds. The recovery strategy is very comprehensive, detailed and, in many

respects, exhaustive in the details provided. It is an extremely impressive document.

**1.4 Is the recovery plan grounded in a clearly articulated and biologically meaningful conceptual framework? Does the plan use best available scientific information? If better data or analyses are available, please identify.**

To the best of my knowledge, the recovery plan uses the best available scientific information in what I deem to be a clearly articulated and biologically meaningful conceptual framework. In particular, the plan makes reference to, and relies considerably upon, the analysis of historical population/ESU structure by Bjorkstedt et al. (2005) and Spence et al.'s (2008) framework for assessing the viability of threatened and endangered salmon in the North-Central California Coast Recovery Domain. Appendix C of the Recovery Plan describes the process for the threats assessment analysis and the basis for recovery strategy development.

**1.5 Is the plan suitable for serving as an outreach tool and does it invite public participation in the process?**

The plan can serve as a very important outreach tool and I think that this is one of its considerable strengths. Indeed, one of the stated goals of the recovery plan is to "provide a framework for outreach, funding, and collaboration for recovery" (p. 15; see also page 97). One of the recovery actions in addressing Listing Factor B (Over-Utilization) is to "conduct outreach and education for commercial and recreational anglers to reduce injury or mortality associated with incidental catch" (p. 82).

The recovery plan details the necessity of conducting outreach (to government agencies, municipal planners, private landowners, general public) regarding: (a) the adverse effects of roads and best management practices; (b) community reliance to storms and flooding; (c) means of offsetting the effects of climate change; and (d) control erosion, protection riparian vegetation, retain large woody debris, and minimize interactions with domestic animals. The importance of outreach is made clear in the introductory paragraph of Chapter 12 of the recovery plan in which "outreach and education" are prominently identified as prerequisites for recovery (p. 498).

The recovery plan, by unambiguously identifying the necessity of outreach, serves as a clear invitation to the public to participate in the recovery process.

## **2. Question Regarding Use and Application of the Technical Recovery Team Reports**

### **2.1 Are the outputs from the historical population structure and population viability criteria described, and applied, appropriately?**

The recovery plan makes use of the outputs from two NOAA Technical Memoranda that were prepared by the North-Central California Coast Technical Recovery Team. These memoranda (i.e., the 'Technical Recovery Team [TRT] Reports') dealt with historical population structure (Bjorkstedt et al. 2005) and biological viability (Spence et al. 2008). Based on my examination of these two Technical Memoranda, the recovery plan is consistent with the TRT reports.

A critical element of the analysis resulting from the TRT Reports is the estimation of the geographical extent of all stream reaches that likely supported summer rearing across the historic habitat defined by the TRT. This is called the Intrinsic Potential (IP) which is meant to provide an estimate of the linear extent of potential spawning and rearing habitat in each watershed. This modeling approach, described by Bjorkstedt et al. (2005), involves a subjective estimation of 'suitability scores' for various types of habitat. These scores are obtained by mapping the values of each of three habitat characteristics onto species- and life-history-stage-specific suitability curves which are, in turn, based on functional relationships between the value of various habitat characteristics and their marginal influence on the likelihood that suitable habitat will occur.

There is precedence for the use of IP-based metrics of population and habitat capacity. However, it is not clear to me that the Recovery Plan sufficiently articulates the uncertainties associated with IP estimates of habitat. Given the reliance of the viability estimates on the IP-based metrics, it would strike me as important that these uncertainties be discussed to allow the validity of these metrics to be appropriately evaluated. I should note that I am not against the use of such metrics – indeed, I think they are fully justified and necessary – but the uncertainties associated with these estimates, especially given that they appear to be based, to some degree, on subjective judgment need to be fully discussed.

### **2.2 Is the plan clear about the differences between viability criteria and recovery criteria?**

The recovery plan identifies spawner abundance over three to four generations to be the most important metric of population viability criteria. But, in addition to abundance, the plan also identifies several other viability criteria (p. 42; Table 4), based on work undertaken by the TRT. These viability criteria have a sound scientific basis and are widely recognized as such in the primary scientific literature. In this regard, although the 'spawner density' criterion is based on the IP measure discussed above, and thus may be open to interpretation, the importance of including a viability criterion based on estimates of spawner density thresholds is not in question.

The biological viability criteria are meant to identify sets of conditions or rules that would suggest that the ESU is at a low risk of extinction (Spence et al. 2008). In this sense, the plan is clear about the differences between viability and recovery criteria, noting (p. 46) that "viability criteria are not synonymous with recovery criteria, but simply provide the theoretical foundation and practical basis for recovery planners to select populations for the recovery scenario". For example, based on density targets 40-42 spawners per IP kilometer, population recovery targets were calculated as the product of this spawner density target and the number of IP kilometers in each watershed (pp 47, 59). The distinctions between viability and recovery criteria are also made clear in Chapter 9.

### **3. Question regarding the Threats Assessment Process**

#### **3.1 Is there an explicit analysis of threats discussed in terms of the five listing factors (e.g., threats)? Does the plan provide continuity between new threats and changes to threats identified in the listing rule since publication?**

Chapter 3 of the recovery plan provides an explicit analysis of the threats facing the CCC coho salmon ESU at the time of listing. Details are provided in terms of each of the five listing factors. These are discussed in terms of the magnitude of the threats at the time of listing and within the context of how/whether these threats have changed since listing. Thus, the plan does provide continuity between new threats and changes to threats identified in the listing rule since publication. Appendix L of the Recovery Plan details the CCC coho salmon recovery outline by threat category.

#### **3.2 Does the plan contain a fair assessment, and prioritization, of conditions, stresses and sources of stresses? Are other factors considered for each threat and its' source such as scope, severity, frequency, magnitude, etc. as suggested in the Recovery Guidance? Is the threats assessment objective and are all realistic threats identified (even if it may not be feasible to address it in the recovery plan)? Does the plan explicitly identify threats and track, through objective measurable criteria, how each threat will be reduced or ameliorated, through site-specific management actions? Are these final threats linked to the five listing factors for this ESU?**

The plan clearly prioritizes the stresses faced by the ESU, identifies the sources of stresses in detail, and fairly assesses the importance of each to the probability of persistence of CCC coho salmon. In addition to identifying the source of each threat, other factors, such as the scope, severity, frequency and magnitude of each threat, are discussed in the recovery plan. It would appear that all realistic threats have been identified in the recovery plan. There is nothing in the discussion of threat identification or threat abatement to suggest that the assessment of threats faced by this ESU was not objective.

Using objective measurable criteria, the plan details how threats will be ameliorated for each watershed in Chapter 10: Recovery Actions. The detail provided here is exceedingly impressive. The required site-specific management actions are clearly identified. The threats are clearly linked to the five listing factors for this ESU. Appendix B of the Recovery Plan details the current status of threats faced by CCC coho salmon by listing factor.

### **3.3 Is the Threats Assessment protocol/methodology employed for assessing salmonid threats effective?**

- **Do the scoring and rankings in the matrices link logically to your understanding of the species and the systems they live in?**
- **Are the habitat types as defined in the matrices sufficient?**
- **Are the linkages between habitat types and life stages correct and complete?**
- **Does the protocol for threats assessment have a high likelihood of correctly identifying the dominant stressors for each population?**

Noting that there is some redundancy in the nature of the questions being asked of the reviewer, these questions have been addressed previously to greater or lesser degrees, and my responses here to each of these four questions is, "yes".

### **3.4 Does the recovery plan adequately address potential uncertainties related to threats assessment?**

Chapter 11 makes reference to an adaptive management and monitoring component that will address the uncertainty associated with specific restoration and threat abatement actions. While the plan acknowledges potential uncertainties related to threats assessment, these uncertainties do not appear to have been made explicit. Having said that, the primary threats have almost certainly been correctly identified for this ESU and the significance of these threats has been appropriately assessed. Thus, although perhaps not explicitly identified, any potential uncertainties related to threats assessment are likely to be few.

## **4. Question regarding the Conservation Assessment Process**

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

The recovery plan details the degree to which conservation efforts since listing have been helpful in procuring the recovery of CCC coho salmon. The effectiveness, or lack thereof, of conservation actions to date, and the extent to which these were in place at the time of listing, are described in Chapters 3 and 4. Importantly, the recovery plan acknowledges the conservation efforts that have been made over the years by various agencies, groups, and individuals. The recovery plan includes an analysis of conservation efforts ranging in scope

from regional conservation strategies to local watershed initiatives. Appendix B of the Recovery Plan details CCC coho salmon conservation efforts since listing. Appendix H of the Recovery Plan provides a bibliography database of recovery strategies.

With respect to Factor A (Habitat Destruction Modification), there do not appear to have been any substantive conservation efforts in place at the time of listing and there have been no significant changes to this threat since the time of listing.

With respect to Factor B (Overutilization), conservation efforts at the time of listing would have been encompassed by the fisheries management plans instituted by NMFS and by the State of California. Evidently, these were insufficient to prevent the decline of the ESU (insofar as overutilization *ceteris paribus* was a contributing factor to the decline). Since listing, anglers have not been permitted to retain CCC coho salmon and there is no commercial harvest in California waters. Other than these, no significant changes to this factor appear to have been experienced since the time of listing.

Other potential conservation efforts appear to have been hampered by inadequate regulatory mechanisms and a failure to implement the mechanisms that do exist (p. 26).

## **5. Question regarding the Recovery Strategy**

### **5.1 If the species (ESU) met all the recovery criteria, does it seem feasible that this species would likely persist for the foreseeable future?**

Based on the information provided in the recovery plan, and based on my knowledge of salmonid ecology, behavior, and life history, it is my opinion that the species (ESU) would likely persist in the foreseeable future if the ESU met all of the recovery criteria, subject to the uncertainty associated with the potential effects of climate change on CCC coho salmon habitat quality and quantity.

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

The recovery strategy and recovery criteria adequately consider large-scale environmental perturbations. Climate change was ranked as a high or very high threat in 8 of the 23 focal watersheds, most notably in the southern part of the ESU's range. The threat of climate change is detailed throughout Chapter 10. Among other considerations, the recovery plan notes the importance of public outreach and education on the effects of climate change, and of the need to expand research and monitoring to better predict the effects of climate change on salmonid recovery. The recovery plan also notes the importance of having the public and various regulatory agencies become familiar with and implement the lifestyle and policy changes that have been recommended by the Intergovernmental Panel on Climate Change (IPCC). The effects of ocean

variability have been discussed with context of how recent (past 10-15 years) changes to the marine environment may have affected the survival and productivity of CCC coho salmon.

**5.3 Are the links between human activities, effects on habitat, effects on individual fish, and expected responses of populations clearly described? Does the recovery plan contain a logical framework for prioritizing recovery efforts at multiple spatial scales? i.e.,**

- **For each of these populations, have the primary stressors been identified? Given the prioritized stressors, do the recovery actions have a high likelihood of achieving measurable results? Is there a logical link between stressors, populations and prioritized recovery actions such that they will have the highest likelihood for success?**

**Do the proposed recovery actions link logically to threats identified in the threats assessment?**

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

Notwithstanding the considerable redundancy in these questions (the answers having been provided implicitly or explicitly previously in this document), the answers to these questions are all, "yes". The recovery plan prioritizes recovery actions; it links human activities (e.g., logging, road construction) with the effects on salmonid habitat and the population consequences resulting therefrom; it identifies the primary stressors in each of the 23 focal watersheds; and it identifies recovery actions that are linked logically to the identified threats in the threats assessment and does so in a consistent manner.

## **6. Question regarding Monitoring and Adaptive Management**

**6.1 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?**

- **Does the plan include monitoring that will allow for (a) assessment of progress toward recovery goals, and (b) ongoing evaluation of the recovery strategy in the adaptive management framework**

The recovery plan makes mention in several places of the absence of a state-wide long-term monitoring program that is clearly of vital importance to the systematic monitoring of temporal trends in adult CCC coho abundance and, thus, to the ability to monitor the results of the recovery plan.

Chapter 11, in particular, underscores the necessity of having an adaptive management and monitoring component in order for the recovery plan to be implemented appropriately and for the uncertainties associated with specific restoration and threat abatement actions to be identified and addressed. A

monitoring framework for adaptive management is apparently part of a MOU between NMFS and 5 northern California counties.

However, while the recovery plan is very clear about the benefit of adaptive management, the need for it, and of the necessity of implementing appropriate monitoring programs that would allow for adaptive management, it is not clear to me that the recovery plan contains a 'well-defined methodology for adaptive management'. To be fair though, it is not entirely clear what such a 'well-defined methodology' would be comprised of, other than underscoring the necessity of implementing monitoring programs of sufficient breadth that would permit adaptive management and associated mid-term changes in the recovery plan. And this is something that the recovery plan has done.

#### **IV. CONCLUSIONS AND RECOMMENDATIONS**

1. The Draft Recovery Plan meets the requirements of a recovery plan as defined in section 4(f)(1) of the ESA, and sections 1.1 and 1.2 of the NMFS Interim Recovery Planning Guidance (NMFS 2006).
2. The Draft Recovery Plan does not require major revision. The only revision that may be contemplated would be a brief discussion of the uncertainties associated with the use of Indicator Potential (IP)-based metrics of habitat quality and quantity, and of the consequences that these uncertainties may have to viability/recovery targets.
3. I recommend that the Draft Recovery Plan for the Central California Coast Coho Salmon ESU be accepted as a core contribution to the multi-species recovery plan for the North Central California Coast Recovery Domain.

## **APPENDIX A: BIBLIOGRAPHY OF MATERIALS REVIEWED**

Bjorkstedt, E.P., Spence, B.P., Garza, J.C., Hankin, D.G., Fuller, D., Jones, W.E., Smith, J.J., and R. Macedo (2005) An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the north-central California coast recovery domain. NOAA-TM-NMFS-SWFSC-382. 210p

NMFS (2008) Taxonomy, population trends, life history, habitat needs, and critical habitat designation; NCCC domain setting description; Overview of threats. Appendix A. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) Spreadsheets from federal register analysis of threats and conservation actions. Appendix B. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) Conservation action planning viability table report part 1: structure and methods, draft September 2008. Appendix C. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) Lagunitas Creek Watershed Characterization Report. Appendix E. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) NMFS Threat Taxonomy. Appendix F. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) Recovery Implementation Schedule for Lagunitas Creek. Appendix G. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) Strategies Database Bibliography. Appendix H. Draft Recovery Plan for the Evolutionarily Significant Unit of CCC Coho Salmon.

NMFS (2008) Protected Resources Division Strategic Plan 2007-2011. Appendix J. Draft Recovery Plan for the Evolutionarily Significant Unit of Central CCC Coho Salmon.

NMFS (2008) Habitat restoration cost references for salmon recovery planning; coho salmon recovery in California: a summary of recent economic evidence. Appendix K. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

NMFS (2008) CCC coho salmon recovery outline by threat category. Appendix L. Draft Recovery Plan for the Evolutionarily Significant Unit of Central California Coast Coho Salmon.

Sonoma Ecology Center (2008) Final report May 2008. Appendix D. Draft Recovery Plan for the Evolutionarily Significant Unit of CCC Coho Salmon.

Spence, B., Bjorkstedt, E.P., Garza, J.C., Smith, J.J., Hankin, D.G., Fuller, D., Jones, W.E., Macedo, R., Williams, T.H., and E. Mora (2008) A framework for assessing the viability of threatened and endangered salmon and steelhead in North-Central California Coast Recovery Domain. NOAA-TM-NMFS-SWFSC-423.

## **APPENDIX B: STATEMENT OF WORK**

### **Statement of Work for Dr. Jeffrey Hutchings**

#### **Independent Peer Review by the Center for Independent Experts (CIE)**

#### **Assessment of the Draft Recovery Plan for the Central California Coast Coho Salmon Evolutionarily Significant Unit**

##### **Introduction**

The purpose of this independent review is to evaluate and comment on the Draft Recovery Plan for the North Central California Coast Recovery Domain (NCCC Domain) and the Central California Coast coho salmon Evolutionarily Significant Unit (CCC coho salmon ESU) module. The scope of work should focus on the principal elements required in a recovery plan. These principal elements have been defined in section 4(f)(1) of the federal Endangered Species Act (ESA) and sections 1.1 and 1.2 of the National Marine Fisheries Service Interim Recovery Planning Guidance (NMFS 2006)

Section 4(f)(1)(b) of ESA states that “each plan must include, to the maximum extent practicable,

- a description of such site-specific management actions as may be necessary to achieve the plan’s goal for the conservation and survival of the species;
- objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list; and,
- estimates of the time required and the cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal.”

From section 1.1, a recovery plan should:

- “Delineate those aspects of the species’ biology, life history, and threats that are pertinent to its endangerment and recovery;
- Outline and justify a strategy to achieve recovery;
- Identify the actions necessary to achieve recovery of the species; and
- Identify goals and criteria by which to measure the species’ achievement of recovery.”

##### **Background**

There are 10 Evolutionarily Significant Units/Distinct Population Segments (ESUs/DPSs) of salmon and steelhead in California listed as Federally endangered or threatened under the ESA. They are organized into four geographic recovery domains. Each recovery domain contains one or more salmon and steelhead ESU/DPS, and (1) a Science Center led Technical Recovery Team responsible for developing historical population structure and population viability goals for the recovery plan, and identifying research and

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The NCCC Domain recovery plan will be developed over several phases which will include one module for each ESU/DPS, with a final compilation and restructuring into a multi-species plan. The development of modules for each ESU/DPS will be in the following sequence: CCC coho Salmon ESU, Central California Coast steelhead DPS, California Coastal Chinook salmon ESU and Northern California steelhead DPS.

The final plan will be a multi-species recovery plan that will be a compendium of data and information that can be utilized on a watershed basis where species ranges overlap. The rationale for developing species specific modules was precipitated by research demonstrating that multi-species plans lacked the species-specific information needed for listing. Thus, individual species-specific information is being developed for compilation into the multi-species plan to ensure species needs are adequately addressed in terms of the viability criteria and habitat needs.

The NCCC Domain recovery plan builds from the NMFS Southwest Fisheries Science Center Technical Recovery Team (TRT) ESU/DPS reports and a conservation assessment and strategy methodology. The TRT reports outline the historical population structure and draft viability criteria to be considered in recovery planning. These reports can be found at the following website (as they are too large to transmit via email): <http://swfsc.noaa.gov/textblock.aspx?Division=FED&id=2266>. The conservation planning process, called the Conservation Action Planning (CAP) workbook, was developed by The Nature Conservancy and others and is endorsed in our National Recovery Planning Guidance.

Extensive information on the CAP process can be found at: <http://conserveonline.org/workspaces/cbdgateway/cap>.

### **CIE Peer Review Process:**

The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract for obtaining external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of stock assessments and various scientific research projects. The primary objective of the CIE peer review is to provide an impartial review, evaluation, and recommendations in accordance to the Statement of Work (SoW), including the Terms of Reference (ToR) herein, to ensure the best available science is utilized for the NMFS management decisions.

The NMFS Office of Science and Technology serves as the liaison between the NMFS Project Contact and CIE to establish the SoW which includes the expertise requirements, ToR, statement of tasks for the CIE reviewers, and description of deliverable milestones with dates. The CIE, comprised of a Coordination Team and Steering Committee, reviews the SoW to ensure it meets the CIE standards and selects the most qualified CIE reviewers according to the expertise requirements in the SoW.

The CIE selection process also requires that CIE reviewers can conduct an impartial and unbiased peer review without the influence from government managers, the fishing industry, or any other interest group resulting in conflict of interest concerns. Each CIE reviewer is required by the CIE selection process to complete a Lack of Conflict of Interest Statement ensuring no advocacy or funding concerns exist that may adversely affect the perception of impartiality of the CIE peer review. The CIE reviewers conduct the peer review in accordance with the ToR producing a CIE independent peer review report as a deliverable. The Office of Science and Technology serves as the COTR for the CIE contract with the responsibilities to review and approve the deliverables for compliance with the SoW and ToR. When the deliverables are approved by the COTR, the NMFS Office of Science and Technology distributes the CIE reports to the NMFS Project Contact.

**Requirements for CIE Reviewers:**

The CIE shall provide three CIE reviewers with the required expertise in anadromous salmonid biology and ecology, preferably with experience in California's watersheds, data limitations and salmonid populations to complete an independent peer review and produce the deliverables in accordance with the SoW and ToR herein. No consensus opinion among the CIE reviewers is sought. The activities required under this Statement of Work shall be conducted electronically, so no travel is needed. Three CIE reviewers are required to conduct a desk peer review of the Assessment of the Draft Recovery Plan for the Central California Coast Coho Salmon Evolutionarily Significant Unit, and each reviewer's duties shall occupy a maximum of 7 days to review material, conduct the peer review and produce a CIE independent peer review report expertise necessary

**Statement of Tasks for CIE Reviewers:**

The CIE reviewers shall conduct an independent peer review of the Assessment of the Draft Recovery Plan for the Central California Coast Coho Salmon Evolutionarily Significant Unit to determine whether the best possible assessment is implemented. The CIE reviewers shall conduct preparations prior to the peer review, conduct the peer review, and complete the deliverables in accordance with the ToR and deliverable dates as specified. The CIE reviewers shall evaluate the Assessment of the Draft Recovery Plan for the Central California Coast Coho Salmon Evolutionarily Significant Unit. Their primary responsibility is to conduct an impartial peer review to ensure that results and conclusions are based on sound science, and the CIE reviewers shall not comment on management decisions. The CIE peer review shall explicitly address the following Terms of Reference.

Prior to the Peer Review: The CIE shall provide the CIE reviewers contact information (name, affiliation, address, email, and phone) to the Office of Science and Technology COTR no later than the date as specified in the SoW, and this information will be forwarded to the Project Contact.

Pre-review Documents: Approximately two weeks before the peer review, the Project Contact will send the CIE reviewers the necessary documents for the peer review, including supplementary documents for background information. The CIE reviewers shall read the pre-review documents in preparation for the peer review.

Any delays in submission of pre-review documents for the CIE peer review will result in delays with the CIE peer review process. Furthermore, the CIE reviewers are responsible for only the pre-review documents that are delivered to them in accordance to the SoW scheduled deadlines specified herein.

CIE reviewers shall be familiar with the following which are supporting information to the Draft NCCC Recovery Plan and CCC coho salmon module:

- Technical Recovery Team Reports: Historical Structure and Draft Population Viability (<http://swfsc.noaa.gov/textblock.aspx?Division=FED&id=2266>)
- 2006 Interim Recovery Planning Guidance (<http://www.nmfs.noaa.gov/pr/recovery/>)
- Endangered Species Act (<http://www.nmfs.noaa.gov/pr/pdfs/laws/esa.pdf>)

The itemized tasks of each reviewer consist of the following.

1. Read and conduct peer review of the draft NCCC Domain Recovery Plan and CCC coho salmon ESU component in accordance with the Terms of Reference herein.
2. Review and consider background documents and additional scientific information as necessary.
3. Each CIE reviewer shall submit an independent peer-review report addressing each Term of Reference in this Statement of Work in accordance with the Schedule of Milestones and Deliverables as specified herein to the CIE lead coordinator, Manoj Shivlani, at [shivlanim@bellsouth.net](mailto:shivlanim@bellsouth.net), and CIE regional coordinator, Dr. David Die, at [ddie@rsmas.miami.edu](mailto:ddie@rsmas.miami.edu). Each report is to be based on the individual reviewer's findings, and no consensus report shall be required.

### **Terms of Reference:**

A review of the partial draft of the NCCC Recovery Plan and CCC coho salmon ESU component is being requested. Reviews and comments are to focus upon: (1) the use of the best available scientific and commercial information; (2) interpretation and application of the National Marine Fisheries Service Southwest Fisheries Science Center Technical Recovery Team (TRT) recovery planning supporting documents and (3) determination on whether methods employed provide adequate linkages between TRT criteria, habitat-based threats and recovery actions and strategies. 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**

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?

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

Does the plan have a logical strategy to achieve recovery that is relevant to habitats, life stages, populations, diversity groups and the overall ESU?

Is the recovery plan grounded in a clearly articulated and biologically meaningful conceptual framework? Does the plan use best available scientific information? If better data or analyses are available, please identify.

Is the plan suitable for serving as an outreach tool and does it invite public participation in the process?

## **Question Regarding Use and Application of the Technical Recovery Team Reports**

Are the outputs from the historical population structure and population viability criteria described, and applied, appropriately?

Is the plan clear about the differences between viability criteria and recovery criteria?

## **Question regarding the Threats Assessment Process**

Is there an explicit analysis of threats discussed in terms of the five listing factors (e.g., threats)? Does the plan provide continuity between new threats and changes to threats identified in the listing rule since publication?

Does the plan contain a fair assessment, and prioritization, of conditions, stresses and sources of stresses?

Are other factors considered for each threat and its' source such as scope, severity, frequency, magnitude, etc. as suggested in the Recovery Guidance?

Is the threats assessment objective and are all realistic threats identified (even if it may not be feasible to address it in the recovery plan)?

Does the plan explicitly identify threats and track, through objective measurable criteria, how each threat will be reduced or ameliorated, through site-specific management actions? Are these final threats linked to the five listing factors for this ESU?

Is the Threats Assessment protocol/methodology employed for assessing salmonid threats effective?

- Do the scoring and rankings in the matrices link logically to your understanding of the species and the systems they live in?
- Are the habitat types as defined in the matrices sufficient?
- Are the linkages between habitat types and life stages correct and complete?
- Does the protocol for threats assessment have a high likelihood of correctly identifying the dominant stressors for each population?

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

### **Question regarding the Conservation Assessment Process**

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?

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

### **Question regarding the Recovery Strategy**

If the species (ESU) met all the recovery criteria, does it seem feasible that this species would likely persist for the foreseeable future?

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

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

Does the recovery plan contain a logical framework for prioritizing recovery efforts at multiple spatial scales? i.e.,

- For each of these populations, have the primary stressors been identified? Given the prioritized stressors, do the recovery actions have a high likelihood of achieving measurable results? Is there a logical link between stressors, populations and prioritized recovery actions such that they will have the highest likelihood for success?

Do the proposed recovery actions link logically to threats identified in the threats assessment?

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

### Question regarding Monitoring and Adaptive Management

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?

- o Does the plan include monitoring that will allow for (a) assessment of progress toward recovery goals, and (b) ongoing evaluation of the recovery strategy in the adaptive management framework

### Schedule of Milestones and Deliverables:

August 25, 2008	CIE shall provide the COTR with the CIE reviewer contact information, which will then be sent to the Project Contact
September 5, 2008	The Project Contact shall send the CIE Reviewers the pre-review documents and report
September 8-19, 2008	Each CIE reviewer shall conduct the independent peer review
September 19, 2008	Each CIE reviewer shall submit an independent peer review report to the CIE
October 3, 2008	CIE Steering Committee shall review and accept reports, and the reports shall be sent to the COTRs
October 8, 2008	COTRs will review reports for compliance, and CIE shall submit final CIE independent peer review reports to the COTRs
October 15, 2008	The COTRs shall distribute the final CIE reports to the Project Contact

### Submission and Acceptance of CIE Reports:

Each CIE reviewer shall complete and submit an independent CIE peer review report in accordance with the ToR, which shall be formatted as specified in Annex 1, and the report shall be sent via email to Manoj Shrivani, CIE lead coordinator, at [shivlanim@bellsouth.net](mailto:shivlanim@bellsouth.net) and Dr. David Die, CIE regional coordinator, at [ddie@rsmas.miami.edu](mailto:ddie@rsmas.miami.edu). Upon review and acceptance of the CIE reports by the CIE Coordination and Steering Committees, CIE shall send via e-mail the CIE reports to the COTRs (William Michaels [William.Michaels@noaa.gov](mailto:William.Michaels@noaa.gov) and Stephen K. Brown [Stephen.K.Brown@noaa.gov](mailto:Stephen.K.Brown@noaa.gov)) at the NMFS Office of Science and Technology by the date in the Schedule of Deliverables. The COTRs will review the CIE reports to ensure compliance with the SoW and ToR herein, and have the responsibility of approval and acceptance of the deliverables. Upon notification of acceptance, CIE shall send via e-mail the final CIE report in \*.PDF format to the COTRs. The COTRs at the Office of

Science and Technology have the responsibility for the distribution of the final CIE reports to the Project Contacts.

**Request for Changes:**

Requests for changes shall be submitted to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the Contractor within 10 working days after receipt of all required information of the decision on substitutions. The contract will be modified to reflect approved changes. The Terms of Reference (ToR) and list of pre-review documents herein may be updated without contract modification as long as the role and ability of the CIE reviewers to complete the SoW deliverable in accordance with the ToR are not adversely impacted.

**Key Personnel:**

Contracting Officer's Technical Representative (COTR):

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NMFS Project Contacts:

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## **ANNEX I:**

### **REPORT GENERATION AND PROCEDURAL ITEMS**

1. Each reviewer's report shall be prefaced with an executive summary of findings, comments and recommendations.
2. The main body of the report shall consist of a background, description of review activities, summary of analyses and comments in accordance with the ToR, and conclusions/recommendations.
3. The CIE reviewer's report shall also include as separate appendices the bibliography of materials reviewed and a copy of the statement of work.