Center for Independent Experts (CIE) Peer Review of "Draft Recovery Plan for the North Central California Coast Domain: Northern California Steelhead, California Coastal Chinook Salmon, and Central California Coast Steelhead" by the National Marine Fisheries Service

Thomas E. McMahon
Professor of Fisheries
Montana State University
Fish and Wildlife Ecology and Management Program

December 2011

1. Executive Summary

a. Impetus and Goals for the Review: The purpose of this independent peer review, as outlined in the NMFS Recovery Planning Guidance document, is to evaluate the use of the best available scientific information that forms the basis for California's North Central Coast Domain Draft Recovery Plan. The Plan describes the current status and threats to the three listed species in the region—Northern California steelhead, Central California Coast steelhead, and California Coastal Chinook salmon—and lays out a strategy and criteria for recovery with appropriate priorities, timelines, and costs for minimizing threats and restoring these at-risk populations. Reviewers were asked to address whether each part of the Plan is based upon the best available information and follows sound scientific methods and practices following the 'terms of reference' listed below.

Materials consulted in my review are listed in the Bibliography. Although not an explicit task in the terms of reference for reviewers, I also addressed in my review how effective the Plan is at communicating its scientific basis and rationale to the public and recovery biologists. Section 4.4 of the Recovery Planning Guidance document notes that successful recovery planning requires the Plan to effectively communicate its rationale in a clear and accessible format in order to enhance its understanding and acceptance by various stakeholders.

b. Main Conclusions and Recommendations: I found the overall scientific and technical basis of the recovery plan to be very thorough and based on the best available information, with relatively few exceptions. The lack of historical distribution, habitat condition, and population trend data necessitated the development of an 'intrinsic potential' model to estimate likely historical carrying capacity and spawner abundance. The authors made a good faith effort to explicitly address assumptions in the model, highlight uncertainties, and validate it with field data. The recovery plan provides scientifically credible, detailed assessment of current habitat conditions and stressors as well as an in-depth threats assessment. The plan represents a very commendable effort at translating conservation biology principles into real-world, measureable criteria for evaluating population viability and extinction risk. I found the rationale for delineation DPS/ESU and diversity strata to be quite sound and innovative. The description and rating system developed for stressors and threats was very complete and well documented, with an open discussion of assumptions and data quality. The recovery criteria list was quite extensive, and largely met the desired SMART requirements to be Specific, Measureable, Achievable, Realistic, and Time-referenced with a clear prioritization plan. The recovery plan included a very detailed monitoring plan to assess recovery, along with well identified and measureable recovery targets for assessing extinction risk. The implementation tables and stream summaries provide a valuable tool for documenting current information and communicating priorities among stakeholders. The recovery planning outlined in the report shows a great deal of foresight on the need for developing partnerships and for developing a common database. It provides an extensive and detailed listing of recovery actions and associated costs.

The main limitation of the report is in its presentation. Some parts of the report are very well written while others are uneven and difficult to follow. There is a fair bit of repetition and documentation/scientific citation is good for some parts but lacking in others. Some terms will not be very clear to the general reader, e.g., "threats taxonomy." The report would benefit from a

thorough editing to make it more 'user friendly' and to more effectively meet the goal of communication to, and hence enhance its acceptance by, the general public.

Recommendations:

- Include more specific examples of population trends (simple graphs if possible) and loss of historical distribution and life history diversity (summer steelhead and spring Chinook) to provide the reader a greater perspective of the extent of loss of the species in the region.

- Provide a list of key uncertainties in the plan and underlying models that require further research and monitoring.

- Increase emphasis on monitoring of juvenile distribution and abundance to fill in gaps in spatial structure, distribution, and productive capacity of the many unsampled streams, validate fish-habitat relationships, and provide an intermediate measure of recovery success in light of the long time frame and uncertainties involved with the obtaining spawner abundance data.

- To enhance implementation, develop a 5 year plan listing a set of intermediate goals for specific recovery plan targets.

- Include a climate adaptation plan for explicitly addressing threats due to climate change.

2. Introduction

a. Background- Three ESA-listed salmonid species occupy the North Central California Coast Domain covered in this recovery plan: the Central Coast Chinook salmon, Northern California steelhead, and the Central California Coast steelhead. NMFS biologists use a variety of information including historical data, habitat assessments, population trends, and modeling to develop the criteria needed to achieve recovery. The plan includes an in-depth assessment of what each population needs to meet 'viable population' status. As noted in the ESA (Section 4f1b) and NMFS (Section 1.1), the principal elements of the plan should include:

- A description of the species' biology, life history, and threats that are pertinent to its endangerment and recovery;
- a description of the actions necessary to achieve recovery 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 of species recovery.

As noted, the purpose of this review is to provide an independent assessment of how well the Plan meets those goals.

b. Terms of Reference: As outlined in the Statement of Work, the following questions or 'terms of reference' were to be addressed in the review:

1. Evaluate the adequacy, appropriateness and application of data used in the Report.

   1.1. In general, does the Report include and cite the best scientific and commercial information available on the species and its habitats, including threats to the species and to its habitat including large-scale perturbations such as climate change and ocean conditions?

   1.2. Where available, are opposing scientific studies or theories acknowledged and discussed?

   1.3. Are the scientific conclusions sound and derived logically from the results?

2. Evaluate the recommendations made in the Report.

   2.1. Does the plan meet the minimum standards for recovery plans outlined in the NMFS Interim Recovery Guidance and mandates described in section 4(f)(1)(b) of ESA to include site-specific management actions, objective measurable criteria (criteria that links to listing factors) and estimates of time and cost?

   2.2. Are the results in the Report supported by the information presented?

   2.3. Does the recovery strategy and overall recovery plan provide clear guidance for the public, restorationists, managers, regulators and others to act in a relevant manner over the next several decades to promulgate recovery of salmon and steelhead?

   2.4. Review the research and monitoring recommendations made in the Report and make any additional recommendations, if warranted.

c. Description of Activities in the Review:

The documents listed in the Bibliography were all read and reviewed to answer the questions listed in the statement of work.

3. Review of Information used in the Recovery Plan (as outlined in the table of contents in the Plan)

1.0 NMFS Recovery Planning: This section outlines the purposes of recovery plans under the ESA, provides an overview of salmonid recovery domains, and describes the overarching goals of the plan. I thought this section was clearly written and set an important tone at the start by stating that among the plan goals are to "provide the public an opportunity to learn more about salmon", "outline a transparent and adaptable strategy to achieve recovery" and "establish criteria to measure the achievement of recovery." (The quotes at the beginning of each section provide a nice 'framing' for each section).

One suggestion is with regards to the segue from DPS/ESU descriptions (p.2) to Recovery Domains. With the lay reader in mind, I think it would be helpful to briefly describe that

'species' under the ESA includes these other 'sub-species' delineations and why that is the case particularly for salmonids—i.e., high genetic diversity, development of unique stocks, etc. –thus the need for these other groupings below the species level. Nonbiologists, I believe, still grapple with the need of why such groupings are 1) distinctive from species, 2) why they warrant separate consideration/protection, and 3) how generally decisions about such groupings are made. This is particularly important as a lead-in to section 2 where steelhead in the domain are considered as two separate 'species' or DPS's. Finally, I believe some sort of road map here—similar to the Report Organization section of the Spence et al. (2008) report (p.12), would be a useful addition in orienting the reader to how the various parts of the Plan interact.

2.0 NCCC Domain Salmonids: Here, the life history and functional role of the Domain species are described, followed by more detailed descriptions of the taxonomy, life history, habitat requirements, and current status for each of the three species. I found the information about the biology of the species up to date but hard to follow in spots, and I didn't find this section to fully meet the first principal element of recovery plans (see Background above) to "describe the species' biology, life history, and threats that are pertinent to its endangerment and recovery." I believe it is imperative in this section to clearly describe <why> these species are imperiled. The information presented here does this to a certain degree but needs to be clarified and bolstered. The current organization follows as: taxonomy, species description, distribution, population trends, life history, habitat characteristics, and critical habitat designation. I think it would be easier to understand if the organization was altered to: taxonomy, (omit species descriptions or at least make it much shorter-unclear relevance here), distribution, life history, habitat requirements, current status and trends (in habitat, distribution, and population abundance, along with some discussion of major threats—dams, water diversion, harvest, etc). (For the threats portion, the discussion of threats and habitat loss described on p.8-9 of the Spence et al. (2008) report would be a good format to follow). I suggest omitting the critical habitat sections here- which merely lists the amount of 'available' stream kilometers or estuarine area designated as critical habitat - and suggest moving them to the next section on Protective Efforts.

Specific comments:

-In the introductory paragraphs, I think it would be useful to describe not only the ecological function of salmon as keystone species (p.2), but also their integral value to humans as commercial fisheries, recreational fisheries, culture, etc. In short, the loss of these once-abundant species across much of northern California represents a huge loss in many different aspects and this is worth stressing here to meet the plan's educational goal and to describe the potential return to society of these values by restoring these species.

-(p.3): 'primary constituent elements'= unclear wording/jargon

-For NC steelhead and CC Chinook, there is mention that some hatchery populations are included and some excluded and it would be helpful somewhere to briefly describe why this is so, i.e., what the criteria are for determining this. It was also unclear to me the relevance of including detail here on why Mad R hatchery specifically excluded here (p.4-5), seemed like detail better left for another section.

-For all 3 species, there is some information on population trends but I found it a bit vague and would be beneficial to bolster with some graphs and more specifics, e.g., "an estimated 90% decline in…." or e.g., "summer run steelhead were considered common among larger rivers in this region but recent surveys indicate they are now extremely rare." The significant/complete loss of two life history forms—summer steelhead and spring Chinook- is mentioned here but I think the importance of this could be emphasized more. I noticed that some of this information is provided in more detail in the next section (3.0) but would be useful to include in this section. In short, for all three species, there has been a very large contraction in distribution, what appears to be lots of local extirpations, loss of life history diversity, and numbers are a mere fraction of what they were historically. But I didn't find this story was compellingly told here.

-SF Bay section- unclear why this section here as it is placed under the CC Chinook section, but is south of the lower boundary of the distribution at the Russian River?

3.0 Federal Listing Factors and Protective Efforts: This section describes the history of actions since listing for each species relative to the 5 threats of: habitat, harvest, disease and predation, regulations, and other factors. I found this section to be complete and clearly written and was easy to follow the timeline and scope of projects and policy changes that have addressed each threat. There appears to be a host of ongoing innovative actions since listing that have/will greatly aid the recovery process (HCPs, involvement of counties and local watershed groups, new harvest and hatchery regulations, new monitoring implementation).

4.0 Population Structure and Viability: This section summarizes the criteria that NMFS proposes must be satisfied to achieve long term persistence, and thereby delisting, for all 3 NCC species. Material in this section was derived from much more detailed discussion of population viability criteria outlined in the reports "Analysis of Historical Population Structure..." by Bjorkstedt et al. (2005) and "Framework for Assessing Viability…" by Spence et al. (2009), both of which were read during this review.

As noted in this section, estimating historical distribution and abundance and determining important spatial structure of each DPS/ESU is vital part of the recovery process as it provides the yardstick for measuring all recovery efforts. The population viability and extinction risk of individual populations, diversity strata, and each DPS/ESU is assessed using the following steps, according to my reading of the reports. I describe the steps here so that others can evaluate if I have interpreted this rather complex process correctly. First, due to a lack of detailed population data, Bjorkstedt et al. (2005) rely on the concept of 'intrinsic potential' to estimate historical carrying capacity of NCC streams. In this approach, three easily derived habitat parameters from GIS mapping— gradient, valley width, and mean annual flow— are estimated for each stream reach, scored from 0-1 using suitability curves (from Angrawal et al. 2005), and the overall score for a reach derived from the geometric mean of individual parameter suitability scores times the reach length. Then, an overall habitat carrying capacity for each stream is estimated by summing up scores for all individual reaches to derive an "IP-km" or estimate of the total intrinsic potential in length of stream. The next step is to classify individual stream populations relative to their potential productive capacity and overall connectivity to other neighboring populations as Functionally Independent Populations (FIPs), Potentially Independent Populations (PIPs), dependent, or ephemeral. A minimum of 20 IP-km was set for Chinook salmon and 16 IP-km for

steelhead to be classified as FIPs, and 10% of these values (minimum viable population?) were designated as thresholds for classification as PIPs. Spatial structure of populations was then determined using a combination of geographical and genetic data to group individual streams into 4-5 'diversity strata' for each DPS/ESU. Finally, extinction risk was rated according to criteria related to current abundance, population trends, spatial structure, population diversity, and hatchery influence (Spence et al. report).

Overall, I found this section of the plan to be a good description of the viability ranking system, and the system itself to be based on sound, credible scientific information. In fact, I think both the Bjorkstedt et al. and Spence et al. reports are quite innovative in trying to translate largely theoretical information of conservation biology principles into real-world measureable criteria to evaluate viability and extinction risk. For both reports, I was impressed with the careful description of assumptions used in the modeling process; this is a rarity of models in my experience, and the authors made a commendable, good faith effort to incorporate the best science and to make explicit the assumptions used, alternative ways of approaching a problem, and the uncertainties involved in the process of developing and applying the viability criteria.

Specific comments:
Since the Bjorkstedt et al. and Spence et al. reports form the foundation of the viability criteria, I'll first comment on these separately, followed by comments on the viability section of the recovery plan.

Bjorkstedt et al .report: This is an exceptionally well written and comprehensive report particularly given the complex nature of trying to estimate historical abundances of the species based on very little information. The report does a good job of explaining the rationale for the need to define a range of populations based on their contribution to the overall abundance and diversity within an ESU. There is some development of new terminology which takes a while to digest—i.e., 'self recruitment' and 'viability in isolation' which, unfortunately, are not directly obvious by their name, but I have to admit I don't have any better alternatives, and both terms seem to have been accepted by the salmonid recovery community. Both terms were invented to apply theoretical concepts of how population size/abundance and connectivity among populations affects population dynamics and persistence in the real world. I found their delineation of populations into four categories (FIPs, PIPs, etc.) was well reasoned and applied the best available scientific knowledge about these concepts. I found the incorporation of 'fidelity' as a measure of connectivity to be interesting and innovative and logically sound, and their incorporation of dispersal distance into the model to be quite creative as well. I also found the rationale for determining the thresholds for assigning stream populations (e.g., their Fig 3.4) to be a well reasoned and objective way of classifying populations into the respective categories.

The authors are explicit in their recognition of some of the limitations of the IP-km concept but there is a good faith attempt to validate the chosen thresholds by comparing them to field data. They clearly note that further validation of this relationship is needed, but at this stage, and in lieu of very little abundance data from which to draw upon, it does seem to be the best approach available. They did a good job describing the steps at determining the IP-km and assumptions used (p.101). They also add some refinements (thermal mask, precipitation differences) to account for different environmental conditions in the NCC region. I did consult the Agrawal et

al. report to see the suitability curves for juvenile steelhead, and the assumptions used (e.g., coho and steelhead almost equivalent in habitat use and capacity) appear to be sound given the data. One question I did have is that the IP-km is based on juvenile curves only, but the IP-km is considered a measure of adult spawners; in short, it was unclear if there are adult curves. There do appear to be such adult curves for Chinook and no juvenile ones, as described on p.89. Describing available spawning habitat for Chinook based solely on mean annual discharge seemed a bit simplistic, especially since there was no supporting information relating this parameter to availability of spawning gravels nor of some validation with spawner density. Also, the discharge data is used to generate a suitability map for Chinook (Plate12), but I couldn't find a specific suitability curve relating this variable to habitat quality.

I also found the logic and data used to delineate the various diversity strata for each species clear and based on sound scientific information. Their approach at using a variety of geographical and genetic information to cluster streams into strata was innovative and objective. The resulting list of streams and strata for the DPS/ESU for each species was based on a solid analysis and I don't have any suggestions for changing any of the categorizations. The careful documentation of existing information and assumptions used throughout the report will be very useful in refining and updating information as it becomes available.

Spence et al. report: This report explains the theoretical concepts used for selecting criteria to evaluate extinction risk and hence recovery of NCC species at the population, diversity strata, and ESU levels. It clearly states on p.7 what the species require to achieve recovery. The report is largely conceptual in that it provides the yardsticks for measuring extinction risk and recovery once abundance and trend data become available in the future. A good faith effort is made at providing real-world, measureable criteria to measure extinction risk in relation to maintenance of life history diversity, a representation of population diversity within strata and across the ESU, hatchery effects, and insuring 'resiliency' as standards of recovery. The report does a thorough job of trying to carefully provide quantitative measures of all these factors, and there is a careful listing of existing data and assumptions. I found the description of quantitative measures very clear and well reasoned and based on the best available scientific information. Of particular note is the fact that the models have some built in flexibility as they can be modified as new information comes in, as shown by the examples of modification in the appendices at the end of the report. My only concern is use of many of these parameters requires quite extensive long term data sets, and wonder if perhaps there can be some intermediate targets developed for measuring response to recovery actions.

Recovery plan: This section does a good job of describing the complex process of defining and ascribing viability/extinction risk to assess recovery. The process of categorizing populations into strata and rating them by extinction risk is pretty complicated and I had to read this section and both reports several times until I felt I understood the sequence. One suggestion would be to add a simple diagram that illustrates the main steps used to 1) determine historical potential; 2) classify into FIPs, PIPs, etc; 3) classify into diversity strata; and 4) estimate extinction risk.

-p.64 Helpful to add definition for ephemeral populations.

-p.70 Statement, paragraph 2, on "These criteria do not include abundance of dependent populations nor do they provide context…." The relevance of this statement was unclear and suggest omitting.
-p.72-75 This is quite a large summary of risks of minimum/small populations. This section seemed out of place. A mention of the risks of small populations, and that many of the existing NCC populations fall into this category, is important to discuss, but this subsection seemed out of context as quite theoretical and much longer than other subsections and not really tied directly back into extinction risk for NCC species. Which of the figures are applicable to this specific species group? Do many of them now exhibit the 'small dynamics' of Fig 12?
-p.77 Focus populations. There seems to be this subset of 'focus' populations but the rationale and criteria (and need) for their selection was not at all clear.
-Fig 15, couldn't find it cited in text.

5.0 Climate and Marine Conditions: Here, the potential threats of climate change to Pacific salmon and steelhead are outlined in terms of threats to freshwater and marine habitat and survival. Overall, I found this section of the recovery plan uneven and somewhat confusing. I don't question at all the data on how large a threat climate change presents to salmon and steelhead-and the section summarizes many of these threats well- but I kept wondering how this relates to restoration given that later sections don't really address climate change directly as part of some sort of climate adaptation plan. While it could be argued implicitly that the riparian restoration and improvement in water management resulting from recovery plan actions would certainly help to offset anticipated climate increases in temperature and declines in water availability, this wasn't really addressed in this section (nor in later sections of the plan either as far as I could tell). Moreover, specific climate adaptation actions that have been proposed to proactively deal with climate change, such as species translocations and identification of core protected refuge areas, also are not addressed in the recovery plan very explicitly, though there is some mention of "creating salmon refuges" (p.146). So I don't really understand the purpose of this separate section. It certainly rightly identifies climate change as a threat, but I would suggest it be better addressed as part of the following section 6.0 Habitat Conditions and Threats, and that it be addressed more explicitly with specific recovery actions directed towards ameliorating its effects, following the statement of the stated need (p.80) for "developing strategies for adapting to those (climate change) impacts."

More specifically, some of the cited scientific underpinnings of anticipated salmonid responses stated in this section are suspect. In the temperature and precipitation section (p.81), the Thomas et al. (2009) article "Extinction risk from climate change" is repeatedly given as the primary evidence in support of various responses of Chinook salmon and steelhead to changing environmental conditions resulting from climate change. The article (from 2004 rather than 2009) estimates species' loss worldwide by various taxa, but does not have fish as one of those categories nor does it mention salmon or steelhead. Also, a somewhat minor point, but the statement (p.81) that "warmer water causes eggs to hatch earlier in the year, resulting in young that are smaller and more vulnerable to predators" (no citation)— it has been shown that warmer winter water temperatures will accelerate hatching and emergence and earlier seaward migrations in salmon (e.g., Holtby et al. 1989 as one example), but egg size is rather fixed in salmonids (though can vary by stock), so I don't know of any evidence that eggs/alevins will be smaller

with warmer winters. In short, I believe the citations need to be updated and double-checked for accuracy.

6.0 Habitat Conditions and Threats: This section describes the methods used to assess current habitat conditions, stresses that have created current conditions, and future threats to achieving recovery; in short, it provides the essential framework for guiding recovery actions. The section is based on four reports that describes the process and summarize best available information on habitat conditions and threats in detail: Appendix B ('Attribute Protocol Report), Appendix C ('Threats Taxonomy'), Appendix D ('SF Bay Threats and Stressors'), and Appendix E ('Stream Summary Report'). NMFS used CAP, conservation action planning, to develop 'score cards' that display data and evaluation of site specific criteria by population for each NCC species. The CAP system of organizing information by tables for viability, key attributes/habitat conditions, threats, and stressors seems fairly complicated but it appears to be an excellent tool for displaying data, tracking progress, and importantly, to facilitate communication among biologists. Overall, with a few exceptions, I found the list of habitat criteria, stressors, and threats to be very comprehensive, appropriate, and with solid scientific documentation of data sources and assumptions. The table development represents an impressive amount of work to achieve a high level of detailed information for each population.

I found this section to be well written overall, though the listing of similar threats for each domain and then again for each species was a bit repetitive and became hard to follow. Also, there was a curious statement on p.99 that "ocean conditions affect all strata and were rated as inadequate…" but I could find no such ocean variables listed on table 7 or 8. The description of main limiting habitat conditions for each species and strata was informative, particularly where there is inclusion of some population trend information. I did note that the CCC steelhead section was much more detailed and lengthy than the other two.

Data sources and database development are listed at the end of this section, but would seem to be better suited at the start of the section. Some of the specific information about where the data came from and development of the database seemed to be quite a bit more detailed than needed.

Specific comments-
Viability table: this table assesses current instream habitat and watershed conditions for 'conservation targets', chiefly salmonid life stages. Organizing and rating habitat quality by life stages is an effective way to identify both potentially limiting life stages and limiting habitat conditions which can then be targeted for recovery actions. Overall, I found the list of variables and ratings to be quite comprehensive and based on solid scientific information, which is well documented for most variables, along with a clear description of measurement methods. The list of habitat indicators is quite large with some variables like pools, LWD, and cover having multiple input variables. It is valuable to be able to identify that, for example, there are many pools but many are too shallow, or don't offer much shelter. My main concern, of which there has been abundant discussion in the fisheries literature, is if with so many 'subjective-type' variables it becomes difficult to standardize and measure without a considerable amount of training of field crews. To their credit, the authors openly acknowledge the many different ways that LWD and other variables could be or have been measured, and the accompanying issues that raises with standardization. The profusion of variables to be measured, as well as the level

of effort required to measure some of them (e.g., riparian forest variables requiring dbh measurements etc.,) will likely slow down the gathering of stream habitat quality data, which seems to be quite sparse.

The only variables that were questionable in my view dealt with some of the watershed indicators, chiefly the urbanization indicator. I agree that large scale watershed processes have important influences on salmonid habitat but in this case, the underlying science seemed a bit suspect as one of the chief references in support of this variable, that of Wang et al., dealt with chiefly nonsalmonids in the Great Lakes area. Also, this indicator seemed to me more of a 'threat' than a measure of current habitat conditions. In fact, both road density and urbanization are included both as a threat and as a measure of current habitat conditions. Additionally, inclusion of this variable and its rating would seem to preclude salmonid recovery in already heavily urbanized areas—would you be able to increase ranking from Poor to Good in any of these watersheds?

Another question was about Table 2 vs. 3 for steelhead habitat ratings. It was curious to me that some of the variables were different between the two; for example, having food quality variables for NCC steelhead but not for CCC Chinook. Also, there is quite a detailed listing of habitat variables and rankings for estuarine and lagoon habitat (attachment C), which seemed very complete, but no narrative explanation of data sources and explanation of criteria as in the main stream section.

Threats table: The 14 listed threats seemed very complete and I can't think of any additional threats that were missed. The rationale for the context and ranking of threats I thought was quite well written and documented, though it was curious that some threats had scientific citations and others didn't (e.g., hatcheries). The threats assessment for SF Bay was also very complete and well researched with appropriate inclusion and ranking of variables; the honest assessment of assumptions is commendable.

7.0 Strategy for Recovery: In this section, the strategy for recovery is outlined as for the entire NCC area as well as for specific 'focus' populations. I found the overall strategy (p.131) very inclusive and well stated—i.e., emphasis on diverse habitats, diverse life history, genetic diversity, and especially, the need for long term monitoring to evaluate progress. I believe the strategy is effective in achieving the goal of recovery plans (NMFS 2010: 5.1-11) to "enable the reader to grasp the species' current situation and the logic of the recommended approach to its recovery." I thought it was particularly effective that the strategy openly recognizes that maintenance of the status quo is insufficient but that recovery <is> attainable with implementation of innovative and far-reaching recovery actions.

The strategic framework for recovery was clear and explained well (p.132). However, the purpose of the 'Applied Framework' section that describes corrections to IP km was a bit unclear to me given that how IP was calculated for each population had been described previously; in fact, much of the p.132-133 discussion seemed to be repetitive. The new concept here is the inclusion of 'focus' populations. As noted above, the special category was first mentioned on p. 77 but not fully described as to how they were selected and their purpose. The

criteria for selection of 'focus' populations were not clear. Are recovery actions to be focused in these populations? It would be helpful to specify this.

The strategy also appears to involve using IP ratings for each focus stream to rank and map the overall quality of each (stream? reach?) into one of three rankings (<0.35, 0.35-0.7, and >0.7), with those streams identified as >0.7 as targeted for instream restoration actions. However, this strategy appears inconsistent with the statement on p.143 that the "strategy for recovery is to improve Poor conditions."

The subsequent sections provided a good outline of current conditions for all 3 NCC salmonids. This is good information but it seemed to be more of a summary of current status/conditions rather than as part of 'strategy for recovery' for each specific species.

P.143 is a good description of the values of recovery.

8.0 Recovery Actions and Costs: Here, the specific recovery actions and priorities for the NCC domain and for individual populations are described. The first part lays out a comprehensive list of 4 needs for recovery actions to be effective (p.144). I suggest adding "implementing a research and monitoring to address key uncertainties and to measure recovery" to further emphasize the need for better information on the rather large data deficiencies on species' distribution, life history, and abundance, and to test key assumptions used in the recovery plan (e.g., relation between IP km and abundance, relation between MAP, spawning gravels and Chinook abundance), as well as for measuring effectiveness of recovery actions.

I found the listing of restoration and threat abatement recommendations for the domain scale (p.146) to be comprehensive and well developed with an appropriate focus on the most limiting conditions (water) and habitats (winter, estuarine). The list of agency actions (p.147) were appropriate and comprehensive as well, though it was unclear if the list was in order of priority (if not, a statement to this effect at the start would be helpful). With regards to protective regulations, I did consult the fishing regulation recommendations (Appendix F) aimed at reducing bycatch mortality, and found them clearly stated and well aimed at angler education and protective of the species during critical vulnerable periods (e.g., low flow closures).

The research and monitoring recommendations (p.149) were rather brief, and I wondered why this was here given that there is an entire section (10.0) devoted to monitoring. Given the paucity of field data on all species, I certainly support the statement that "funding for implementation should be considered a top priority." As noted above, research to address a list of key uncertainties in the fish data and in the IP km models, etc. I believe should be included as part of the recommendations. For the water quality recommendation, I suggest including the initiation of some large scale temperature monitoring programs as described by Isaak (2011) which can be done at relatively low cost. Finally, I didn't understand the last recommendation "utilize existing models to improve accuracy of ecological forecasting… climate change" as I didn't see how this would directly aid recovery. In short, this is an important section that needs further development and refinement either here or in section 10.0.

For the diversity strata, it was unclear how some of these recommendations meshed with threats. Also, some recommendations seemed well developed and quite specific and extensive for some strata (e.g., the NCC steelhead and the SF Bay), whereas others had only a few, fairly general recommendations (e.g., for Chinook and NC steelhead).

For individual populations (p. 158), the recovery actions and costs are described in Vol. II 'Stream Summaries' and the associated implementation tables. I was very impressed with the quantity and quality of the information provided in the individual stream summaries. The summaries provide very detailed information on historical fish abundance and distribution, history of land use, list of stresses and threats, and a general recovery strategy with each action having a priority ranking, estimated costs, and recovery partners (in implementation table). The narrative background information provides an invaluable historical perspective and provides the critical benchmark from which to assess recovery. I found the summaries well written and well referenced and summarize existing information in the viability, stress, and threats tables quite well. The summaries and tables show a great deal of careful thought and preparation.

The "Benefits of Recovery" section provided a very nice overview of the long term benefits accrued to society from restoring these valuable species, and a solid justification for the costs involved.

9.0 Recovery Goals, Objectives, and Criteria: Here, six main recovery goals are listed along with specific criteria that need to be met to achieve recovery (delisting) at the population and ESU scales. The list covers a full range of population goals relative to abundance and spatial structure as well as goals relative to monitoring and public/partner participation. Listed goals sufficiently addressed the targets and processes needed for recovery, though I did find that the list was very similar to the five recovery criteria listed in section 7.0 (p.131), so some clarification as to the difference between the two (or the need for two lists) is needed. The specific criteria for populations (abundance, productivity, spatial structure, and diversity) met the requirements for being measureable and objective and to maintain genetic and population diversity, though the measures of abundance, trends, and productivity require a level of data on spawners well beyond what is currently available, so will require, as noted in the document, an unprecedented commitment to establishment of a region-wide monitoring network to meet the 'achievable' criterion for 'SMART' (specific, measureable, achievable, realistic and time-referenced) recovery criteria..

The population abundance targets for each species (Tables 19-21), based on the IP km estimations, yield some pretty high target levels, ranging from 42,700 to 89,900 spawners for each species, particularly given the very low numbers of spawners in most streams at present. However, recent detailed examination of the Russian River Chinook salmon (Chase et al. 2007) suggests that the planned expansion of monitoring may find some populations more robust than thought, and that the productive capacity of some of these systems can still be quite high if limiting factors can be alleviated.

For the DPS level, criteria were scientifically credible and realistic though I didn't understand the criterion for occupancy (p.173) wherein "remaining populations… must exhibit occupancy patterns consistent with those expected under sufficient immigration subsidy…" Unclear what

this means— their distribution is similar to historical distribution?—nor how you would measure it.

The criteria for watershed and habitat condition, and threats seemed like reasonable criteria to meet recovery goals, but, it seems questionable, given the extent of poor habitat quality across the NCC range, to achieve the habitat standard of "key habitat attributes rated as Poor or Fair increase to Good in 75% of streams.."

Delisting criteria for all listing factors were well justified, quite comprehensive, and with a good list of specific recovery actions to achieve each delisting objective.

10.0 Monitoring to Inform Delisting Criteria: This section, and the background report *Guidance for Monitoring Recovery* by Crawford and Rumsey (2009), provide an honest assessment of the inadequacy of the existing survey information and of the critical need for much more expansive monitoring efforts. Moreover, it provides some very specific objectives for monitoring each of the viability goals and listing factors. I found this section and the *Guidance* report to be very well written and conceived. The opening paragraph correctly notes that "there are many uncertainties regarding the effectiveness of management prescriptions for improving production…and reducing threats", and my only comment here, related to the next section, is that it would be useful to add a list of these key uncertainties so that research and monitoring can especially target these unknowns.

The plan outlines some excellent goals, several of which were particularly noteworthy in my view, including: implementing a coastwide monitoring program, especially for spawner abundance; establishment of intensive whole-watershed fish and habitat sampling streams with the goal of at least two LCM sites within each diversity stratum; implementing more extensive genetic baseline monitoring to inform hatchery management planning; and assessing life history and assumptions related to straying/fidelity among populations. The plan also includes some high standards for accuracy of the fish monitoring data, which will greatly enhance the scientific credibility of monitoring data. One comment here, repeated below, is that there are no time frames to these objectives, and suggest including such a list within a 5-year plan to insure the implementation of as many of these monitoring objectives is achieved as soon as possible. Also, I understand the need for focus on monitoring adult spawner abundance, but given the sometimes high uncertainty of these estimates, the long lag time for responses, and the variability in ocean survival, I suggest more expansive juvenile monitoring is warranted. As noted in the report, this life stage is the most easily monitored. Juvenile monitoring is referred to as part of LCM sites, and objective 2 under Spatial Distribution mention the implementation of a GRTS-type juvenile sampling program (but no time frame given). More extensive juvenile sampling may not suffice in terms of directly assessing recovery via adult productivity, but it could help fill in gaps in spatial structure, distribution, and productive capacity of the many as yet unsampled streams, as well as help validate fish-habitat associations if habitat is measured concurrently.

The monitoring plans for the listing factors were also well designed and complete. Requiring all habitat restoration to have both implementation and effectiveness monitoring components is an excellent goal, though progress towards meeting this goal has been problematic in the past as

so many restoration monies tend to exclude funds for accomplishing effectiveness and validation monitoring. The inclusion of BACI designs to evaluate restoration actions would be especially valuable (p.185), as this is largely missing from most restoration evaluation programs. The objective for developing a randomized sampling program to test whether permits are in compliance was quite creative. Finally, the plan offers some very worthy plans to ensure coordination of databases.

11.0 Restoration: This section lays the conceptual foundation for the prioritization, coordination, and monitoring of watershed restoration projects which forms the primary mechanism for achieving recovery. I found this section very well written, with a commendable open discussion of the uncertainties involved in implementing restoration projects for which effectiveness is not well understood (p. 200). The section provides a nice overview of funding mechanisms, the importance of partnerships, and a detailed listing of programs that provide funding or technical assistance for restoration projects.

12.0 Implementation by NMFS: This section outlines the actions NMFS needs to do to promote and implement recovery planning. The section sets an important tone that the extent of the decline in species and habitat quality within the region "will require fundamental changes in long-standing policies and practices" and "refocus its priorities from a project-by-project approach." (p.205) I found the discussion and listing of needed actions quite comprehensive and innovative, for example, the creation of 'conservation banks' for mitigation. I have two comments with regards to implementation. First, there is discussion of the use of experimental populations as a tool in recovery (p.216), but I didn't see this as a priority in any implementation plan. Given the very restricted distribution and local extirpation of the species throughout the region, some testing of reintroductions would seem to be a worthy goal as a way to jump start populations that are not likely to be refounded in the near future.

My second comment concerns the lack of a specific time frame for specific actions. There are quite a few administrative-type actions listed in this section, plus a large number of priority-1 recovery actions listed in the implementation tables. Given the large number of possible recovery actions and long time frame envisioned for recovery, it seems that it will be easy to fall back into the 'project-by-project' implementation that the recovery team is trying to avoid. It seems some shorter term, intermediate goals could be specified with a 5-year time frame to mesh with the 5-year listing reviews. For example, specifying certain recovery plan targets that will be met over the next five years, i.e., 'spawning monitoring surveys will be instituted on at least three new streams in each domain"; 'at least one stream in each strata will be restored from Poor to Good habitat status in the next five years'.

13.0 5-Year Reviews and Post-Delisting: This section outlines the procedures for reviewing the status of the NCC species every five years to assess recovery. Following the comment in the previous section, I believe it would beneficial to also assess how well NMFS is meeting its targets outlined in a 5-year plan.

4. Review of the Findings made in the Recovery Plan

a. **DPS/ESU Considerations in the Recovery Plan:** I found the logic and data used to delineate the various diversity strata for each species clear and based on sound scientific information. Their approach at using a variety of geographical and genetic information to cluster streams into strata was innovative and objective. The resulting list of streams and strata for the DPS/ESU for each species was based on a solid analysis and I don't have any suggestions for changing any of the categorizations. The careful documentation of existing information and assumptions used throughout the report will be very useful in refining and updating information as it becomes available.

b. **Extinction Risk Analysis and Recovery Criteria:** The Spence et al. report explains the theoretical concepts used for selecting criteria to evaluate extinction risk and hence recovery of NCC species at the population, diversity strata, and ESU levels. A good faith effort is made at providing real-world, measureable criteria to measure extinction risk in relation to maintenance of life history diversity, a representation of population diversity within strata and across the ESU, hatchery effects, and insuring 'resiliency' as standards of recovery. The report does a thorough job of trying to carefully provide quantitative measures of all these factors, and there is a careful listing of existing data and assumptions. I found the description of quantitative measures very clear and well reasoned and based on the best available scientific information. Of particular note is the fact that the models have some built-in flexibility as they can be modified as new information comes in, as shown by the examples of modification in the appendices at the end of the report.

c. **Evaluation of Regulatory and Non-regulatory Recovery Actions:** The recovery plan covers an extensive list of population goals relative to abundance and spatial structure as well as goals relative to monitoring and public/partner participation. Listed goals sufficiently addressed the targets and processes needed for recovery. The specific criteria for populations (abundance, productivity, spatial structure, and diversity) met the requirements for being measureable and objective and to maintain genetic and population diversity, though the measures of abundance, trends, and productivity require a level of data on spawners well beyond what is currently available, so will require, as noted in the document, an unprecedented commitment to establishment of a region-wide monitoring network.

d. **Research and Monitoring Recommendations:** The monitoring plan provides an extensive list of specific objectives for monitoring each of the viability goals and listing factors. Of particular note are the implementation of a coastwide monitoring program; establishment of intensive whole-watershed fish and habitat sampling streams with the goal of at least two LCM sites within each diversity stratum; implementing more extensive genetic baseline monitoring to inform hatchery management planning; and assessing life history and assumptions related to straying/fidelity among populations. The plan also includes some high standards for accuracy of the fish monitoring data, which will greatly enhance the scientific credibility of monitoring data. The monitoring plans for the listing factors were also well designed and complete. Requiring all habitat restoration to have both implementation and effectiveness monitoring components is an excellent goal, and the

inclusion of BACI designs to evaluate restoration actions will provide especially valuable information. Of special note are plans to ensure coordination of databases.

5. Summary of findings- see part 1 "Main conclusions and recommendations"

6. Conclusions and Recommendations based on Terms of Reference Questions

Evaluate the adequacy, appropriateness and application of data used in the Report.(1.0)

- ***In general, does the Report include and cite the best scientific and commercial information available on the species and its habitats, including threats to the species and to its habitat including large-scale perturbations such as climate change and ocean conditions?(1.1)***

The Report includes and cites the best scientific information available on NCC species, habitat conditions, and threats, including specific assessment of the threat posed by climate change. Importantly, the supporting documents lay out assumptions and uncertainties throughout the development of recovery plan, including development of the viability criteria, historical distribution and abundance, and the threats assessment.

- ***Where available, are opposing scientific studies or theories acknowledged and discussed?(1.2)***

The background documents on population structure and viability were quite transparent, with an honest discussion of assumptions and uncertainties throughout.

- ***Are the scientific conclusions sound and derived logically from the results? (1.3)***

Generally, I found the recovery plan to be a good faith effort to draw together the best available information to develop historical population structure and for development of criteria to evaluate current and future viability and extinction risk of the NCC species.

Evaluate the recommendations made in the Report. (2.0*)*

- ***Does the plan meet the minimum standards for recovery plans outlined in the NMFS Interim Recovery Guidance and mandates described in section 4(f)(1)(b) of ESA to include site-specific management actions, objective measurable criteria (criteria that links to listing factors) and estimates of time and cost? (2.1)***

Yes, I found the threats assessment and recovery criteria provided very site-specific recovery actions with priority rankings. The list of recovery goals and actions was very extensive and complete. The implementation table and accompanying information provided detailed, site- and time-specific information on recovery priorities and costs for each specific recovery action.

- ***Are the results in the Report supported by the information presented? (2.2)***

Overall, the recovery plan rests on a very thorough compilation of the existing information for each population (stream) in the recovery domain. The underlying rationale and data for the viability, stressor, and threats assessments provide good support for the extensive list of recovery goals and actions detailed in the plan.

- ***Does the recovery strategy and overall recovery plan provide clear guidance for the public, restorationists, managers, regulators and others to act in a relevant manner over the next several decades to promulgate recovery of salmon and steelhead? (2.3)***

Generally, the recovery strategy and plan provides a clear road map to recovery actions needed to recover the NCC species. The plan provides some very clear guidance for all aspects of recovery planning, including needed recovery actions, monitoring, agency coordination, regulations, and database management. As noted above, careful editing of the plan to increase clarity and flow will improve its understanding and acceptance by stakeholders.

- ***Review the research and monitoring recommendations made in the Report and make any additional recommendations, if warranted. (2.4)***

Monitoring and research recommendations are listed in sections 1a and 4d of this review.

7. Appendices:

a) Bibliography of Materials Referenced in the Review and Background Material

Agrawal, A. and 7 coauthors. 2005. Predicting the Potential for Historical Coho, Chinook, and Steelhead Habitat in Northern California. NOAA Technical Memorandum NMFS-SWFSC-379.

Appendix B. (Attribute Protocol Report) NCCC Recovery Domain: Conservation Action Planning Attribute Table Report.

Appendix C. NCCC Recovery Domain: Threats Taxonomy.

Appendix D. NMFS Application of the TNC's Conservation Action Planning for Salmonid Recovery in San Francisco Bay.

Appendix E. Stream Summary Report.

Appendix F. NMFS NCCC Domain Fishing Regulation Recommendations.

Appendix G. Economic Methodology and Spreadsheet.

Bjorkstedt, E.P., and 7 coauthors. 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 Technical Memorandum NMFS-SWFSC-382.

Chase, S.D., D.J. Manning, D.G. Cook, and S.K. White. 2007. Historic accounts, recent abundance, and current distribution of threatened Chinook salmon in the Russian River, California. California Fish and Game 93:130-148.

Crawford, R.A., and S. Rumsey. 2009. Guidance for Monitoring Recovery of Salmon and Steelhead Listed under the Federal Endangered Species Act (Idaho, Oregon, and Washington). NOAA Fisheries Service-Northwest Region.

Gallagher S.P., and D.W. Wright. 2009. Coastal Mendocino County Salmonid Life Cycle and Regional Monitoring: Monitoring Status and Trends. Final Report to California Department of Fish and Game, Fortuna, California.

Gallagher, S.P., et al. 2010. A Regional Approach for Monitoring Salmonid Status and Trends: Results from a Pilot Study in Coastal Mendocino County, California. North American Journal of Fisheries Management 30:1075-1085.

Holtby, L.B., T.E. McMahon, and J.C. Scrivener. 1989. Stream Temperatures and Inter-Annual Variability in the Emigration Timing of Coho Salmon (*Oncorhynchus kisutch*) Smolts and Fry and Chum Salmon (*O. keta*) Fry from Carnation Creek, British Columbia. Canadian Journal of Fisheries and Aquatic Sciences 46:1396-1405.

Isaak, D.J. 2011. Stream temperature monitoring and modeling: recent advances and new tools for managers. USFS Rocky Mountain Research Station Stream Notes. (available: http://www.treesearch.fs.fed.us/pubs/38693)

National Marine Fisheries Service. 2011. Recovery Plan for the North Central California Coast Domain (Sept 29, 2011 draft to CIE Panel)

National Marine Fisheries Service. 2010. Interim Endangered and Threatened Species Recovery Planning Guidance, version 1.3.

National Marine Fisheries Service. (undated) Stream Profiles and Tables for Individual NCCC Watersheds. (Vol II CIE Multispecies Plan)

Spence, B.C., and 9 coauthors. 2008. (Appendix A) A Framework for Assessing the Viability of Threatened and Endangered Salmon and Steelhead in the North-Central California Coast Recovery Domain. NOAA Technical Memorandum NMFS-SWFSC-423.

b) Statement of Work for Dr. Thomas McMahon

California's North Central Coast Domain Draft Recovery Plan

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Background: The Endangered Species Act (ESA) requires NOAA's National Marine Fisheries Service (NMFS) develop and implement recovery plans for the conservation of threatened and endangered species. The North Central Coast Draft Recovery Plan will include three ESA-listed populations: (1) Northern California steelhead (threatened); (2) California Coastal Chinook salmon (threatened); (3) Central California Coast steelhead (threatened). 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 governments, non-governmental entities, private businesses, and stakeholders. The NMFS Recovery Plan for the North Central Coast is expected to generate substantial interest from outside parties because it: (1) will contain recommendations involving water supplies for a variety of municipalities (including the greater San Francisco area) and agricultural users; (2) will prioritize watersheds for targeted restoration actions; (3) could influence local and regional planning efforts and decisions involving land development patterns such as county policies and forest practices; and (4) may advise state agencies and local governments on other actions necessary for recovery. The draft recovery plan will include a large geographic area in central California and has the potential for wide-ranging implications. Stakeholder interest will be high and likely lead to inquiries from elected representatives at the state and Federal levels.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. The CIE reviewers shall conduct the peer review as a 'desk' review (i.e., the review and report writing can be accomplished from their primary locations, therefore no travel is required). Each reviewer's duties shall not exceed a maximum of ten work days.
CIE reviewers shall have expertise in salmon management, salmon conservation biology, salmon restoration practices, and salmon/water management, and it is desirable that reviewers have

experience in salmon conservation under the ESA and strong credentials in west coast salmon management activities. The CIE reviewers shall have the requested expertise necessary to complete an impartial peer review and produce the deliverables in accordance with the SoW and the ToRs as stated herein (refer to the ToR in Annex 1).

The CIE reviewers shall conduct a 'desk' peer review of the California's North Central Coast Domain Draft Recovery Plan Report to ensure that its contents can be factually supported and that the methodology and conclusions are scientifically valid. The area under consideration will be the lands and waterways in Northern and Central California. Each reviewer shall conduct the peer review and develop a detailed report addressing each of the ToRs as specified in Annex 1.

Statement of Tasks for CIE Reviewers: The CIE reviewers shall conduct necessary preparations prior to the peer review, conduct the peer review, and complete the deliverables in accordance with the ToR and milestone dates as specified in the Schedule section.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. 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, reports, and other pertinent information. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Desk Peer Review: Each CIE reviewer shall conduct the independent peer review from their primary locations as a "desk" review in accordance with the SoW and ToRs to ensure the best available science is utilized for the National Marine Fisheries Service (NMFS) management decisions (refer to the ToR in Annex 1). 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. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements.

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 according to required 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 ToRs (**Annex 2**).
3) No later than November 14, 2011, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to Dr. 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**.

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

.

28 October 2011	CIE shall provide the COTR with the CIE reviewer contact information, which will then be sent to the Project Contact
28 October 2011	The Project Contact will send the CIE Reviewers the report and background documents
31 October – 14 November 2011	Each reviewer shall conduct an independent peer review
14 November	Each reviewer shall submit an independent peer review report to the CIE
28 November 2011	CIE shall submit draft CIE independent peer review reports to the COTRs
5 December 2011	The COTRs will distribute the final CIE reports to the Project Contact

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not 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 and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send

via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not 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 and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Support Personnel:

William Michaels, Program Manager, COTR
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-427-8155

Manoj Shivlani, CIE Lead Coordinator
Northern Taiga Ventures, Inc.
10600 SW 131st Court, Miami, FL 33186
shivlanim@bellsouth.net Phone: 305-383-4229

Roger W. Peretti, Executive Vice President
Northern Taiga Ventures, Inc. (NTVI)
22375 Broderick Drive, Suite 215, Sterling, VA 20166
RPerretti@ntvifederal.com Phone: 571-223-7717

Key Personnel:

NMFS Project Contact:

Dick Butler
NMFS, Santa Rosa Area Office Supervisor
777 Sonoma Ave, Rm 325, Santa Rosa, CA 95404-6515
Dick.Butler@noaa.gov Phone: 707-575-6058

ANNEX 1:

Terms of References (ToRs)

CIE Peer Review of

California's North Central Coast Domain Draft Recovery Plan

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 of NMFS (2006), 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 Materials Required

There are two NMFS Science Center Technical Memoranda that form the biological framework for the recovery plan: historical population structure and viability criteria. These memoranda and other supporting information are critical to the review of the Draft NCCC Recovery Plan and include:

- Technical Recovery Team Reports: Historical Structure
  - http://swfsc.noaa.gov/publications/FED/00671.pdf
- Technical Recovery Team Framework for Assessing Viability
  - http://swfsc.noaa.gov/publications/FED/00885.pdf
- 2006 (2007 Updates) NMFS Interim Recovery Planning Guidance
  - http://www.nmfs.noaa.gov/pr/recovery/
- Endangered Species Act (http://www.nmfs.noaa.gov/pr/pdfs/laws/esa.pdf)

ANNEX 1 (continued):

Terms of References (ToRs)

CIE Peer Review of

California's North Central Coast Domain Draft Recovery Plan

1.0 Evaluate the adequacy, appropriateness and application of data used in the Report.

1.1 In general, does the Report include and cite the best scientific and commercial information available on the species and its habitats, including threats to the species and to its habitat including large-scale perturbations such as climate change and ocean conditions?

1.2 Where available, are opposing scientific studies or theories acknowledged and discussed?

1.3 Are the scientific conclusions sound and derived logically from the results?

2.0 Evaluate the recommendations made in the Report.

2.1 Does the plan meet the minimum standards for recovery plans outlined in the NMFS Interim Recovery Guidance and mandates described in section 4(f)(1)(b) of ESA to include site-specific management actions, objective measurable criteria (criteria that links to listing factors) and estimates of time and cost?

2.2 Are the results in the Report supported by the information presented?

2.3 Does the recovery strategy and overall recovery plan provide clear guidance for the public, restorationists, managers, regulators and others to act in a relevant manner over the next several decades to promulgate recovery of salmon and steelhead?

2.4 Review the research and monitoring recommendations made in the Report and make any additional recommendations, if warranted.

CIE reviewers are contracted with the qualifications to conduct a scientific peer review, and are not required to provide regulatory or management advice.

ANNEX 2

Format and Contents of CIE Independent Reports

The report should follow the outline given below. It should be prefaced with an Executive Summary that is a concise synopsis of goals for the peer review, findings, conclusions, and recommendations. The main body of the report should provide an introduction that includes a background on the purpose of the review, the terms of reference and a description of the activities the reviewer took while conducting the review. Next, the report should include a summary of findings made in the peer review followed by a section of conclusions and recommendations based on the terms of reference. Lastly the report should include appendices of information used in the review (see outline for more details).

1. Executive Summary
    a. Impetus and goals for the review
    b. Main conclusions and recommendations
    c. Interpretation of the findings with respect to conclusions and management advice

2. Introduction
    a. Background
    b. Terms of Reference
    c. Description of activities in the review

3. Review of Information used in the Status Review Report (as outlined in the table of contents in the Status Review Report)

4. Review of the Findings made in the Status Review Report
    a. DPS/ESU Considerations: Populations-Habitats-Threats
    b. Extinction Risk Analysis and Recovery Criteria
    c. Evaluation of Regulatory and Non-regulatory Recovery Actions
    d. Research and Monitoring Recommendations

5. Summary of findings made by the CIE peer reviewer

6. Conclusions and Recommendations (based on the Terms of Reference in Annex I)

7. Appendices
    a. Bibliography of all material provided
    b. Statement of Work
    c. Other