Independent Multidisciplinary Science Team (IMST)

State of Oregon

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Dear Sue,

This letter comprises IMST's preliminary comments on the Oregon Department of Fish and Wildlife's (ODFW's) April 2009 draft document titled *Lower Columbia River Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead* (hereafter the Plan). The Team will prepare a more detailed review of the Plan by early November, 2009 that will contain specific examples supporting the general comments provided below. The following comments address whether the Plan's approach and analyses are credible and consistent with accepted scientific standards, whether Plan assumptions are supported by best available science, and whether uncertainties are characterized adequately. IMST approaches these issues from the perspectives of both the federal Endangered Species Act and ODFW's Native Fish Conservation Plan goals.

Presentation of Uncertainty

IMST recognizes that the Plan represents an enormous and highly professional effort by ODFW employees to address the difficult and complex issues posed by declining salmonid populations in the Lower-Columbia Recovery Domain. The Plan contains several improvements over conservation and recovery plans that IMST has reviewed in the past. However, it is also clear that the science and monitoring resources available to determine current status, desired status, and conservation gaps are at best incomplete and for many populations included in the Plan, almost entirely deficient.

In early chapters of the Plan (e.g., chapters 1–4) ODFW provides several explicit descriptions of how professional judgment is used, data limitations, uncertainty associated with model results, and the limitations of analyses based on insufficient data. However, recovery actions presented in later sections of the Plan appear to be overly reliant on analyses that are compromised by these well-documented data limitations. For example it is not clear whether modeled values presented in Chapter 6 are being used directly to inform the strategies and actions in Chapter 7.

As currently written it appears as though model results are used to base decisions about where to focus recovery efforts. In early chapters of the Plan it appears that ODFW's intent is for these models to provide a structure for future analyses when more data become available. This intent and caveats related to limitations of current model analyses and proposed actions should be consistently reiterated throughout the entire document, particularly sections that present extinction likelihoods for no-data populations or proposed recovery actions. Until data become available to sufficiently parameterize and validate models, the Plan would be strengthened if more low-tech assessments of current status, desired status, and conservation gaps were added for all populations. These need not be consistent across species or populations.

Areas where explicit descriptions of uncertainty would greatly strengthen the Plan include, but are not limited to:

- The likelihood that all critical factors limiting recovery have been identified and correctly ranked as key or secondary concerns.
- Current understanding about the interactive or cumulative nature of threats and limiting factors as they relate to population viability including the risk magnitude imposed by different threats or limiting factors.
- How proposed recovery actions are expected to perform given the uncertainty associated with current model scenarios and expert opinion.
- Compounding uncertainty resulting from multiple assumptions made at different stages during the determination of current status and during the development of desired status, conservation gaps, and recovery scenarios.
- Discussion of how the level of uncertainty in ranking the six threat categories (tributary habitat, estuary habitat, hydropower, harvest, predation, and hatcheries) compares to or is influenced by uncertainty in ranking threats imposed by ocean conditions, climate change and human population growth.
- The minimum amount and quality of quantitative data required to have confidence in inferences made from model results.

The effort ODFW made to cross check results of the CATAS model with the more heavily parameterized SLAM model are a quantitative strength of the Plan. However is not clear how well either of these models perform in predicting status of real populations. Have results from CATAS or SLAM models ever been validated using historical to current conditions with a reasonable start year and similar assumptions? Has anyone ever successfully used these models to recover an ESU, DPS, or population? Reliance on these models as recovery planning tools would be better justified if the Plan included some description how these models were validated against data from actual populations.

ODFW builds several analytical conservation buffers (pg. 3-7 of the Plan) into analyses presented in the Plan as a mechanism to compensate for varied sources of uncertainty that might lead to incorrect conclusions about when recovery goals have been met. Given the high level of uncertainty described in the Plan, IMST agrees with approaches that will result in conservative decisions about salmon and steelhead recovery in the Lower Columbia. However, it is unclear how or how much the analytical conservation buffers

outlined in the Plan change estimates of desired status and conservation gaps. It would be advisable to be run the models without the analytical conservation buffers to provide estimates of recovery that are based on what is currently known. These results will likely provide different estimates of extinction risk and conservation gaps and provide an informative baseline for comparison. It might also help to review recent approaches to incorporating uncertainty into forecasts of environmental change, such as those used in the Millennium Ecosystem Assessment (http://www.millenniumassessment.org).

Scientific Unknowns

ODFW's assessment of research needed to facilitate development of future recovery actions (Chapter 8 of the Plan) is clearly articulated and thorough. IMST appreciates the effort ODFW plans to put into addressing science unknowns and the time required to develop the necessary research plans. However, IMST's ability to assess not only the scientific adequacy but also the biological feasibility of the Plan is hampered by the fact that the success of the Plan hinges heavily on future research that must be correctly targeted to fill critical information needs. This aspect of the Plan could be strengthened if more detailed discussion of specific research activities and timelines for proposal development and research implementation were included for each research element identified in the Plan. As currently written, this aspect of the Plan reads as more of a research 'strategy' rather than a research 'plan'.

Fundamental Assumptions

One of the strengths of the Plan is the explicit documentation of fundamental assumptions that will affect delisting decisions at the population, strata, and ESU/DPS levels. Notable in this regard is ODFW's discussion of uncertainty related to the boundaries of strata and independent populations in Appendix 6-D. The numbers of populations and strata identified in the Plan obviously have strong influence over both the listing and delisting decisions. IMST agrees with ODFW's identified need to reconsider the structure of independent populations, particularly within the Gorge stratum. However, as with the modeling uncertainty discussed above, there is also general uncertainty in the designations of populations and ESUs/DPSs/SMUs. It would be useful to explicitly indicate in the Plan the existing life history and genetic data that support each of those boundaries.

The Plan's scientific rigor would be strengthened if ODFW also included some discussion of the consequences of applying listing criteria, current status assessments, and recovery scenarios to populations comprised of both resident rainbow trout and anadromous steelhead forms of *O. mykiss*. IMST raised this issue in its review of ODFW's recovery plan for Mid-Columbia steelhead and those comments also apply to the recovery plan for the Lower-Columbia Recovery Domain. This is particularly relevant in the Lower-Columbia Recovery Domain where spring and fall run life history variants of Chinook salmon are pooled into a single ESU (pg. 2-6 of the Plan) but resident and migratory life-history variants of steelhead are managed as if they are

demographically independent. Such inconsistency in how life history variants within taxa are considered creates a scientific shortcoming in the Plan.

Future Threats

Chapter 7 (Strategies and Actions) is well written and comprehensive. It remains however firmly in the 4-H (hydropower, harvest, hatchery, and habitat) approach to freshwater salmonid management without questioning whether or not this paradigm remains valid in the light of emerging information about the risks associated with future threats such as ocean conditions, climate change and human population growth. In order to strengthen scientific credibility, it is important for ODFW to demonstrate a solid grasp of emerging threats that will likely influence the outcomes of its recovery plans. The current Plan contains overview information on the likely effects of a changing climate and human population growth on Pacific Northwest salmonids and watershed health. This is a significant improvement over recovery and conservation plans IMST has reviewed in the past. However, it is unclear how the 20% adjustment to the conservation gap mean abundances will compensate for the future effects of both population growth and climate change. Why is this adjustment applied equally across all populations when it is clear that some may be disproportionately affected by either or both of these threats? Why can threats imposed by the six threat categories be ranked in the face of limited or no data when threats imposed by climate change and human population growth cannot be ranked? The level of guidance provided by the Plan would be enhanced by an examination of the limiting factors in Chapter 5 and how each might change (and in general become more limiting) under the most commonly agreed scenarios both of climate change and of human population increase. For example, ODFW might extend the discussion of threats posed by climate change and human population growth to individual lower Columbia salmonid populations by identifying salmonid populations that may be particularly vulnerable to either or both of these threats, hypothesizing how key or secondary threats identified for these salmonid populations might change in the future, and discussing how recovery actions might be prioritized or implemented differently (e.g., type, amount, location, timing, intensity) under a changing climate and growing human population. Some of the discussion points would be speculative, but IMST believes that there is sufficient information from which to construct narrative analyses for each population. This process and discussion would greatly aid collection and interpretation of appropriate monitoring data and also lead to the development of criteria for reconsidering key and secondary threats within the context of climate/ocean changes and population growth.

Also, how might a warming and acidifying ocean and the increase in, or northward movement of, additional piscivores affect anadromous salmonids? There is some ODFW evidence that different salmonid populations and species respond differently to ocean conditions because of differing life histories and ocean rearing locations. This suggests some inherent dangers in treating the ocean in the same way for all salmonid populations and species.

Spatial Structure and Diversity Criteria

Combining abundance and productivity measures into an integrated variable (rather than two independent variables) is in line with comments made in the IMST's 2006 review of the coastal coho conservation plan. However, spatial structure and diversity measures play equally important roles in recovery, particularly in areas where habitat fragmentation is likely to increase as a result of land use, climate change, or both. IMST is concerned that spatial structure and diversity measures may not receive adequate weighting in delisting criteria currently characterized in the Plan. Downplaying spatial structure and diversity criteria during the development of recovery scenarios underestimates the importance of location in protecting populations that may be more vulnerable to threats imposed by climate change, resource extraction or human population growth.

Extinction Risk Categories

The vulnerability thresholds used to define extinction risk categories and to make viability determinations is a non-trivial matter, especially as it is used to prioritize management efforts. The definitions of extinction categories presented in the Plan are non-linear (e.g., Table 4-1) i.e., the low risk category ranges from a 1 in 100 to a 1 in 20 risk of extinction, the moderate risk category ranges from a 1 in 20 to a 1 in 4 risk of extinction, while the high risk category ranges from a 1 in 4 to a better than even risk of extinction. The sense of urgency that underlies recovery efforts is very different for a population with a 1:20 chance of extinction compared to a population with a 1:4 chance, yet both are considered to be at moderate risk under ODFW's current system of aggregating risk. IMST suggests that aggregating risk extinction as a first step in the analysis of current status, desired status and conservation gap analyses greatly decreases transparency in these analyses. For example, the figures depicting current and desired status for populations give the appearance that the steps between risk categories are linear when they are not. These figures would more clearly portray the range of variability in extinction risk within and among populations if the y-axis represented the continuous probability of extinction rather than extinction risk categories. Also, presenting the change in probability of extinction risk (as a range) required to meet desired status in summary table form would better reflect the magnitude of effort required to recover individual populations, as well as the uncertainty involved in doing so.

Mortality Rate Estimates

ODFW estimates current rates of mortality as a result of human actions in six threat categories: tributary and estuary habitats, hydropower, harvest, hatchery, and estuary predation. Among these categories, estimations of mortality and the capacity for threat reductions appear disproportionately attributed to tributary habitat. Improving freshwater capacity will have a positive effect only to the degree that the ocean is not limiting and the hatchery/harvest mortality does not preclude full seeding of tributaries. It is difficult to determine whether or how or where ocean mortality was factored into these analyses. If variable ocean mortalities were not adequately integrated into cumulative mortality estimates tributary mortality was most likely significantly overestimated. If the scientific

basis of this approach were better explained in the Plan, it would be easier to understand why management action effectiveness models and other aspects of the Plan are heavily focused on tributary habitat actions.

Assessment of Limiting Factors and Interactions among Limiting Factors

The description of limiting factors (e.g. Table 5-2) appears abbreviated or incomplete particularly with respect to water quality factors that occur along urbanized streams in the Lower Columbia and its tributaries. Also effects of land use change, particularly urbanization, on habitat are not fully reviewed with respect to limiting factors. Further, it is not readily apparent whether or how the potential for synergistic, antagonistic, or cumulative effects among limiting factors is considered in the Plan. Such interdependent effects could produce steep population declines when poor conditions that affect several limiting factors occur simultaneously. Some secondary factors are interrelated and may cumulatively equal a key factor. (e.g., cumulative effects of sediment trapped behind dams and not moving through the Columbia River system and aggregate mining and dredging occurring in the main channel). What explicit criteria define key and secondary factors and are they applied consistently across populations where experts with varying backgrounds are sources of expert opinion? Given that all of Oregon's LC tributaries are listed on ODEQ's 303(d) list for exceeding temperature criteria for spawning, rearing, passage or all three, why is water quality typically a secondary concern – especially when linked with poor riparian and sediment conditions? Why is the role of toxins not given more weight, particularly when combined with lower base flow conditions that might be made more extreme by the "urban stream syndrome" in cities? The interactions between excessive harvest, excessive hatchery production, and the intergenerational carry-over effects of both in terms of decreased tributary productivity and decreased reproductive fitness, respectively appears underestimated. Continuing declines in these species within the realm of traditional fisheries management practices suggest that such practices are unsuccessful. When do cumulative effects of secondary concerns equal primary concerns and what is ODFW's plan for addressing cumulative effects of secondary concerns? IMST urges that recovery planners consider estimating the risk reduction potential and costs of classes of actions for individual populations/species.

Broad Sense Recovery Criteria

As currently written the broad sense recovery criteria are vague and it is difficult to determine if meeting them is feasible. What criteria will be used to determine when populations have reached a point where they are capable of contributing ecological, social, cultural, and economic benefits beyond what already exist? What does it mean for salmonid species to "eventually achieve their historical role in their natural-cultural system in the Columbia Basin"? How will the contributions of salmonids to social, cultural, economic, and aesthetic benefits be quantified? Are these objectives constrained by the need to meet minimum levels of harvest and hydropower production? In addition, it is difficult to differentiate broad sense recovery goals and recovery objectives from ESA recovery goals. An explicit description of how and when ODFW will know when

broad sense recovery goals, versus ESA recovery goals, have been met would increase the transparency of the Plan.

Document Organization

A few changes to the overall Plan organization would increase the readers' ability to track information and analyses throughout the Plan. Additional cross referencing between chapters and appendices, increased use of footnote summaries, and more detailed descriptions of tables and figures in their associated titles would allow individual chapters to be read as 'stand-alone' units. For example, cross referencing Appendix 6-D at first mention of differences between NOAA and Oregon's designation of populations and strata would be very helpful. While the recovery approach for chum salmon appears well reasoned its current presentation in Chapters 1–9 of the plan gives the impression that nothing will be done with chum because there are no data to use in model scenarios. But there also are limited or no data for a majority of the other salmonid populations. It would be beneficial to state early in the Plan that the approach for chum is completely different and explain what that approach is and why it differs from other data-poor species, rather than repeatedly stating that chum are excluded from analysis and discussion due to lack of data. Cross referencing Appendix 7-G at first mention of the approach for chum would also be very helpful.

Other Issues

With regard to sections on research, monitoring, and evaluation, and adaptive management the comments and recommendations IMST made during our review of the recovery plan for Middle-Columbia steelhead still apply. While the discussion of adaptive management elements is considerably improved over what was presented in past recovery and conservation plans reviewed by IMST, a more thorough description of the adaptive management process and a timeline for the development of an adaptive management plan would strengthen the current document. For example, including a graph for each ESU that plots status against time (e.g., expected numbers of spawners over the next 50–100 years) and also summarizes an implementation timeline for recovery actions would allow readers to visualize the type, timing, and sequence of actions ODFW believes will lead to recovery. With regard to status, plotting the lower prediction interval for the mean abundance/productivity measures (as opposed to the mean) would be most informative because it would show how often populations, strata, or ESU's drop below critical levels. The implementation timeline could be represented as the percentage of recovery actions implemented over time, possibly weighted by the importance of specific actions to recovery. The scientific adequacy of the Plan depends on the timeliness of recovery action implementation relative to changes in status of populations, strata, and ESU's. If various recovery actions are not implemented as desired or if the effectiveness of recovery actions is delayed, then priority recovery actions or information required to prioritize actions may change. Without information on how ODFW would address such situations (i.e., actual implementation and adaptive management), it is difficult for IMST to judge the biological feasibility of the Plan.

IMST compliments ODFW for the frank, honest discussion regarding many elements of the Plan. ODFW placed emphasis on pointing out areas of uncertainty, where assumptions needed to be made, the lack of critical data, and shortcomings with the models used in the Plan. The scientific rigor of a recovery plan is as much contingent on pointing out its weaknesses as well as its strengths, and IMST appreciates ODFW's approach in this regard. IMST also appreciates ODFW's consideration of comments and recommendations made by the Team during reviews of other recovery and conservation plans. More details on these positive aspects of the Plan will be included in our final review.

Lastly, IMST realizes that this draft of the Plan represents a 'work in progress' intended to function as a living document that ODFW will revise on a regular basis as new information and tools become available. IMST offers these constructive comments with the intent of aiding ODFW efforts to strengthen the scientific basis of the Plan during future revisions.

Sincerely,

Carl Schreck
IMST Co-Chair

cc :

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