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TO: William Ruckelshaus and Curt Smitch, Co-chairs
Monitoring Oversight Committee

FROM: Kenneth Currens, Chair

SUBJECT: Comments on the Comprehensive Monitoring Strategy (3/29/02)

Thank you for the opportunity to review the Comprehensive Monitoring Strategy (CMS, draft 3/29/02). Under the definition adopted by the Monitoring Oversight Committee (MOC), the intent of the CMS is to "identify what, where, when, how, and who will monitor salmon recovery and watershed health." In our assessment, the most recent draft of the CMS provides a scientifically credible framework for monitoring salmon recovery and watershed health. We cannot say whether the CMS is likely to produce the desired results, however, without more details. We hope that the necessary details on the "what, where, when, how, and who" will soon be forthcoming.

Our review suggests that the biggest changes in this draft focus on policy issues. Many of these are part of a strategy to balance the need for scientific certainty, management accountability, and expense. These changes are: (1) a reorganization to be more consistent with the *Statewide Strategy to Recover Salmon*, (2) a decision that the health of salmon populations will be evaluated by population (river or watershed) whereas salmon habitat and watershed health will be evaluated by salmon recovery region (e.g., Puget Sound, Lower Columbia River, Upper Columbia River, etc.), and (3) a proposal to prioritize and phase-in different kinds of monitoring. These will affect the level of scientific certainty that monitoring can provide. In addition, they raise an important scientific and policy question identified in this draft about whether there is a difference between "comprehensive"monitoring, which is called for in SSB5637, and "adequate" monitoring.

We hope that our comments on the scientific implications of these changes will help inform your decisions. As has been our custom in the past, we here also provide more technical comments on the draft for use by the project management team.

Reorganization

We support the reorganization of the CMS to be more consistent with the *Statewide Strategy to Recover Salmon* (SSRS). We hope that linking the CMS and SSRS will provide synergistic

benefits for both. As we noted in our review of the SSRS[1], the SSRS does a good job of identifying the causes of decline of salmon populations and watersheds. It makes sense to us that monitoring should address the causes of decline as well as the trends in salmon recovery and watershed health. We also noted, however, that "the biggest failure of the SSRS is the lack of a coordinated strategy to integrate efforts to address the four major causes of decline (habitat, harvest, hatcheries, and hydropower) into adaptive management programs for each of the management regions." The CMS could provide that coordinated strategy.

Population versus Regional Scales of Monitoring

We are encouraged that CMS has chosen to monitor abundance, productivity, distribution, and diversity of individual salmon populations. In our opinion, this is essential information for evaluating management success and it is consistent with the approach used by the federal technical recovery teams, who are developing recovery goals for threatened and endangered salmon. We understand that logistics, expense, and scientific uncertainty about the distribution of resident trout and char populations make a comparable strategy difficult for resident populations, but we are concerned that the proposed approach may not provide meaningful management information as the identity and distribution of resident populations become better known. Likewise, we presume that similar considerations led to the proposed sampling design for habitat and water quality where evaluations of status and trends would be focused at the level of salmon recovery regions and the whole state. This raises the question of whether it is really addressing "watershed" health. Although this draft concludes this is a "workable alternative" to more local monitoring, we wonder whether this decision reflects agreement with watershed managers, who need and rely on more watershed specific information. Will this replace watershed level monitoring? If not, how will watershed level monitoring be captured in the statewide comprehensive monitoring design?

Prioritization and Phasing

We encourage the MOC and project monitoring team to continue developing a comprehensive monitoring strategy. We understand that for logistical, political, and economic reasons, it may be necessary to prioritize monitoring. Phasing different monitoring elements may be a practical way to implement these decisions. This is implied in the operating principles adopted by the MOC. We generally agree with the criteria for prioritization proposed in the CMS. As we understand the difference between the CMS and the Monitoring Action Plan described by the MOC operating principles, however, decisions about how to prioritize and phase-in monitoring will be developed as part of the Monitoring Action Plan after the development of a comprehensive monitoring strategy. We have previously distinguished what is scientifically possible from what is socially feasible, recognizing that any sustainable program must be both.[1] This draft of the CMS concludes that a "comprehensive monitoring strategy likely is not feasible" before describing what a comprehensive monitoring strategy is. This seems to be out of sequence.

Comprehensive versus Adequate

In our report to the legislature on monitoring[2], we concluded that a "comprehensive statewide monitoring program" was fundamental to salmon recovery. Because of the questions raised in this draft of the CMS, we wish to reiterate our criteria for a comprehensive monitoring program.

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[1] Independent Science Panel. 2000. Review of "Statewide Strategy to Recover Salmon: Extinction is Not an Option."

[2] Independent Science Panel. 2001. Recommendations for Monitoring Salmonid Recovery in Washington State.

- A comprehensive monitoring program is capable of answering the questions needed to make decisions by reducing uncertainty and detecting progress towards recovery goals and watershed health. Some of these goals are already exist (e.g., in policy or statute), but others are currently being developed by the co-managers, stakeholder forums, and technical recovery teams. Lack of these goals has confounded development of a comprehensive strategy.
- A comprehensive monitoring strategy must be capable of: (1) confirming that management decisions were implemented, (2) making accurate status assessment of the resource to determine whether management goals and objectives are being achieved, and (3) improving understanding of salmon and their environments so as to determine to what extent the changes in status were the result of management actions.
- A comprehensive monitoring strategy must have clearly articulated goals, objectives, and questions that address the more general goals for salmon recovery and watershed health.
- A comprehensive monitoring strategy will have: (1) appropriate statistical designs, (2) appropriate indicators and variables, (3) standardized protocols, (4) quality assurance and quality control of data, (5) accessible data, and (6) adequate funding to be able to make accurate assessments and improve understanding.
- A comprehensive monitoring strategy will include decision support mechanisms for integrating scientific information into decision-making in a timely manner.

In our view, anything less than this is not comprehensive and not scientifically adequate. In our last review (December 5, 2001 memo to the MOC), we identified areas where the CMS needed to be strengthened and these comments still hold.

<u>Other Comments</u>

1. Page 1 (types of monitoring)—The different kinds of monitoring described here are not clear. Both status and trend monitoring appear to overlap, as they are described here, when, in fact, they can be very different. Status is simply a snapshot of current conditions whereas trend monitoring requires determining whether or not a particular parameter of interest is changing. It is much more difficult to establish whether or not a trend exists and it can require entirely different methods of monitoring. In many cases, measurements at "regular, well-spaced intervals" are not the most effective way to detect trends. Different groups define effectiveness and validation monitoring differently, but here they appear to describe the same thing. To be able to determine whether management actions achieve the desired goal (effectiveness monitoring) you have to validate a model or understand cause-effect relationships (validation monitoring).
2. Page 2 (water quality)—The draft identifies the desire to monitor cumulative effects for water quality but the design is never described. It is also not obvious from this discussion why it is necessary to phase monitoring of water quality.
3. Page 3 (stream flows)—It is important to note that stream gages are installed for a variety of purposes at a variety of locations ranging from small stream diversions to the Columbia River. Thus only a fraction of the gages will be useful for analysis. Moreover, trends in peak flows may be relatively minor factors affecting recovery of salmon, and are almost impossible to evaluate even on carefully controlled experimental watersheds (Jones and Grant 1996, 2001; Thomas and Megahan 1998, 2001). Mean annual runoff may be more useful for assessing limits on salmon recovery, and other flow characteristics such as low flows might be even better.

Jones, J.A. and G.E. Grant. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research, 32(4): 959-974.

Jones, J.A. and G.E. Grant. 2001. Comment on "Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon: A second opinion" by R.B. Thomas and W.F. Megahan. Water Resources Research, 37(1): 177-180.

Thomas, R.B. and W.F. Megahan. 1998. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon: A second opinion. Water Resources Research, 34(12): 3393-3403.

Thomas, R.B. and W.F. Megahan. 2001. Reply. Water Resources Research, 37(1): 181-183.

4. Page 3 (Nearshore Marine)—We would like to see more explanation of these variables.
5. Page 3 (Freshwater Habitat)—EMAP provides a useful tool for selecting sampling locations. However, purely random sampling may not be the most effective approach for evaluating condition and trend of habitat. Stratified random sampling designed, for example, to characterize channel morphology or different types of problems typical of streams in large regions affected by the same putative set of limiting factors can be much more effective for assessing habitat conditions (Montgomery and MacDonald 2002). Also, the mention of resident fish in this section seems to come out of nowhere.

Montgomery, D. R. and L.H. MacDonald. 2002. Diagnostic approach to stream channel assessment and monitoring. Journal of the American Water Resources Association 38(1): 1-16.

6. Page 5 (geographical distribution)—We encourage the use of volunteers in monitoring, especially for implementation monitoring of habitat recovery projects. Use of volunteers to acquire scientific data such as geographic distribution can be challenging. Even professional biologists can have problems identifying different species of juvenile resident salmonids, life-history stages, and assessing presence and absence. Use of standardized protocols and quality control and assurance procedures will be essential if volunteers are to be used to this type of scientific data collection.
7. Page 5 (harvest)—Is current monitoring also adequate for resident species?
8. Page 6 (hydropower)—Why is monitoring of hydropower projects limited to just implementation monitoring (i.e., adoption of "salmon friendly operations")? This seems like a major oversight.
9. Page 6 (hatcheries)—We would think that the Washington Department of Fish and Wildlife would also want to evaluate the effectiveness of the hatcheries in producing quality fish to fisheries and contributing to salmon recovery through reintroductions and supplementation, as well as monitoring the impacts of hatchery practices on wild salmon.
10. Page 6 (Monitoring cause and effect)—We reiterate our suggestion to think carefully about what is meant by effectiveness and validation monitoring. Simply establishing correlations, as indicated here, is not validation monitoring as you defined it earlier.
11. Page 7 (Monitoring cause and effect)—It is important to prioritize these studies to what is most effective in restoring salmon and watershed health. Certainly it is appropriate to utilize monitoring data developed under the Forest and Fish agreement when problems are related to private forest lands. However, in many cases downstream factors are limiting to salmon and particularly to watershed health issues. A statement is needed to indicate that monitoring protocols must be developed for these issues similar to those developed for forest lands.
12. Page 7 (Integrating Data, using the same sampling locations)—This needs to be qualified perhaps with a starting phrase "To the extent possible" as it will not be practical or even possible in many situations. For example, water quality measurements could have very

limited benefit or meaning in areas where resident juvenile salmon abundance is an issue whereas it is extremely important at downstream locations.

13. Page 8 (Phasing)—We recommend you also include a scheme for how conflicts between the criteria will be resolved. For example, the elements that are most affordable probably do not have the greatest statistical utility. Also, we assume you meant "coefficient of variation?"
14. Page 11 (Table)—(a) You may want to consider tracking precipitation and ambient temperature; (b) Add implementation of BMPs where appropriate; (3) Road density is a poor indicator because road impacts vary with many things including road design and connectivity to the stream. Number or density of road-stream crossings stratified by road types is a much better indicator and is easily determined with GIS.