Independent Science Panel
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Review of "Statewide Strategy to Recover Salmon" Extinction is Not an Option"

INDEPENDENT SCIENCE PANEL

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Executive Summary

The November 1999, "*Statewide Strategy to Recover Salmon: Extinction is Not An Option*" (SSRS) strives to be a program based in science that overcomes faults associated with previous programs for restoring salmonids. The Independent Science Panel (ISP), created by the Washington Legislature in 1998 to provide scientific oversight and review of the State's salmonid recovery efforts, concludes that the document does a good job of identifying causes of salmonid declines, but that the actions proposed do not form an integrated, scientific strategy to effectively address the acknowledged causes. The proposed set of minor changes to existing programs and reliance on historically ineffective voluntary measures leaves an impression that tinkering with failures of the past will restore glories of the past. This approach is likely to result in false expectations and is not based in science. In contrast, a scientifically credible strategy should be based on identifying what is possible (scientifically and physically feasible in the long-term), attainable (socially feasible), and sustainable. Strategies to recover salmonids could include elements both from: (1) a program to attain specific recovery goals based on watershed-specific history, conditions, trends, and potential, and (2) actions to prevent further harm, based on the precautionary principle. The SSRS as proposed includes neither approach and instead opts for a disjointed collection of partial measures that may or may not reduce adverse impacts. In the opinion of the ISP, the present Strategy is not likely to reverse the ongoing declines in salmonid abundance. The ISP recommends that future versions of the Statewide Strategy to Recover Salmon include better description of the conceptual foundations and guiding principles for recovery, clear articulation of specific goals and objectives, and region-specific strategies that include actions to address acknowledged impacts on salmonids at appropriate scales as determined from region-specific assessments of the influence of habitat, hatcheries, hydropower, and harvest on salmonid stocks.

Introduction and Background

The Independent Science Panel (ISP) was created by the Washington Legislature in 1998 to provide scientific oversight and review of the State's salmonid recovery efforts. In November of 1999, Governor Gary Locke's Salmon Recovery Office asked the Independent Science Panel (ISP) to review the November 1999 *"Statewide Strategy to Recover Salmon: Extinction is Not An Option"* (SSRS) and provide an assessment of its scientific merit[1]. Scientific review of state recovery planning is part of the ISP role envisioned by the Salmon Recovery Planning Act (ESHB 2496). Incorporating this essential part of the scientific processes into public review can increase the level of credibility and public trust that Washington's salmonid strategy is based in science. In this spirit, the ISP provides the following review.

The ISP recognizes that involvement of multiple State agencies in a statewide effort to develop a strategy to recover salmonids is in itself a watershed event. We applaud this effort and believe that it must continue and grow. We also recognize and appreciate the considerable expertise, knowledge, and effort that went into this draft.

General Approach

No simple strategy exists for salmonid recovery. Because of competing social, cultural, economic, and biological concerns, a successful salmonid strategy will inevitably be complex and potentially confusing. We believe an explicit conceptual framework for organizing these complex issues is essential to judge whether science and policy are consistent and to help build public credibility and support.

The SSRS does not explicitly describe such a strategic framework. Scientifically credible strategies may have a variety of configurations, but all will build on the same foundation. It is essential that they describe a strategy for identifying what is ***possible*** (scientifically and physically feasible in the long-term), ***attainable*** (socially feasible), and ***sustainable***. As the SSRS is the strategy under which Washington's salmonid recovery efforts are to occur, our review focuses on the key scientific components that are necessary for the SSRS to meet these criteria. These include: (1) sound conceptual foundations, (2) guiding principles, (3) implementation of strategies to achieve watershed-specific recovery objectives or risk-averse alternatives, and (4) defensible methods for assessing success. One view of how these are related is illustrated in Figure 1. These key components give rise to five specific questions, which guided our review:

- Are the guiding principles consistent with a scientifically credible conceptual foundation?
- Does the strategy include clearly defined objectives?

[1] November 10, 1999 memo from Curt Smitch to the Independent Science Panel.

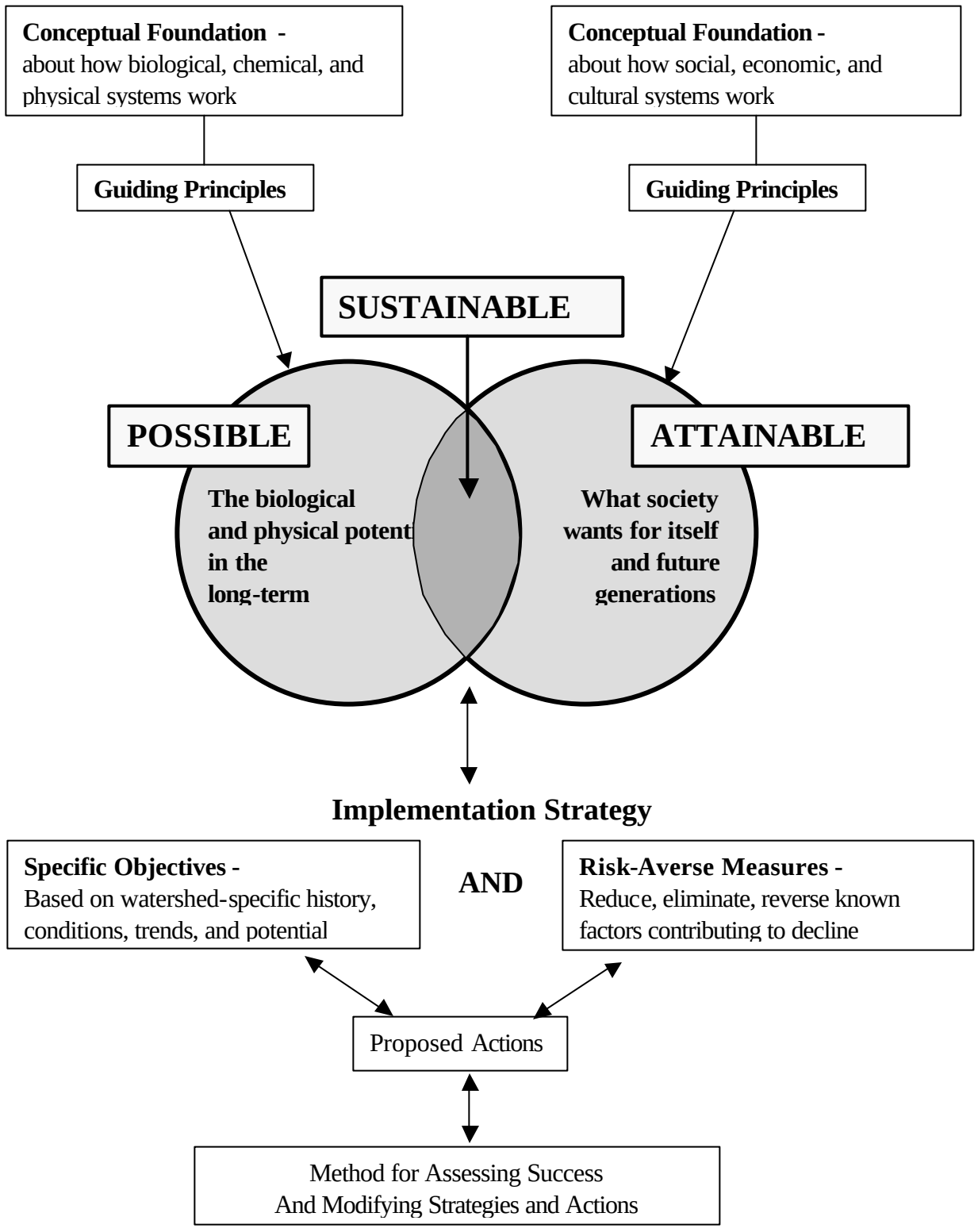

Figure 1. Key components of a strategy that guided this review.

- Are the actions proposed consistent with and likely to achieve the stated objectives?
- Are the proposed actions based on testable hypotheses for meeting the objectives?
- Does the strategy include credible methods for assessing progress?

The first section of the review describes our general conclusions as to how well the SSRS addresses these questions. The second section includes brief answers to a series of questions asked of the ISP by the Governor's Salmon Recovery Office. Readers interested in comments regarding specific sections of the SSRS should continue to the third section of the review.

General Conclusions

We found that the SSRS does a good job of identifying general causes of decline in salmonid abundance, distribution, and diversity, but it does not describe what is possible, attainable, and therefore sustainable. The actions proposed do not form an integrated strategy for how to address effectively the acknowledged causes of decline or how to determine what is sustainable except by default. Moreover, the SSRS does not describe a scientific process capable of determining whether proposed actions are adequately addressing these causes once they have been implemented. The SSRS should provide a compelling road map for preventing the option of extinction instead of simply making extinction somewhat less likely.

Guiding Principles and Conceptual Foundation

Conceptual foundations describe what we know and do not know about how biological or social systems work (Figure 1). Application of these conceptual foundations as guiding principles have a large effect on what is possible, attainable, and sustainable. They provide a standard for judging whether actions are consistent with recovery.

The SSRS does not explicitly describe its conceptual foundations for determining what is possible or attainable. The SSRS refers to examples of scientific conceptual foundations in Chapter 3 ("A Road Map To Recovery") but does not say whether it accepts these as its own. The guiding principles are consequently vague or inconsistently applied. Scientific guiding principles described in Chapter 3 have little substance. Principles described in Chapter 9 ("Adaptive Management and Monitoring"), while scientifically sound, do not appear to be the foundation of many of the actions described in the core elements.

The SSRS does not describe any conceptual foundation for how social, economic, or cultural systems work in recovery planning, despite their importance. Guiding principles in the SSRS that the State will "use collaborative, incentive-based approaches to recovery" as opposed to other approaches imply certain ideas about how socio-political systems work. We believe it would be useful to describe the conceptual foundation that

supports these principles explicitly. Otherwise, they can be judged only by how effective similar approaches have been in the past.

Failure to identify a single conceptual foundation for recovery may explain a key inconsistency in the SSRS. The SSRS intermingles two different ways of conceiving of a salmonid recovery strategy: (1) "Extinction is not an option", and (2) restoration efficiency. "Extinction is not an option" defines a different set of what is sustainable than the restoration efficiency approach. The former implies that all populations must be saved at all costs. The latter implies that resources are limited and suggests triage. It recognizes that some populations may become extinct, either because it is biologically or physically impossible to recover them or society is unwilling to pay the cost.

This inconsistency could lead to confusion among biologists, stakeholders, and the public. Given past habitat loss and degradation, excessive harvest of declining wild stocks, and future projected population growth of humans in the State, for example, many populations may never recover to produce an economically acceptable surplus for harvest.
The implication that it can happen via the actions proposed in the SSRS may mislead the public and has little scientific merit.

Objectives

The SSRS fails to identify clearly articulated objectives for what is biologically possible and socially attainable. Each chapter identifies important goals, but in nearly every case, the objectives are descriptions of processes or more specific statements of intent. These do not provide the reader with measures of how we will know if we have achieved the goal.

The SSRS does a good job of identifying problem sources by geographic regions, the available legal and legislative tools in the regulatory toolbox, the status of Water Resource Inventory Areas (WRIAs), funding and manpower limitations, and issues of agency and stakeholder coordination. These do not replace the need for objectives, however.

The SSRS should include projections of what is needed in all elements (habitat, harvest, hatcheries, and hydropower) to attain the goals, and among the possible alternatives, which is most likely to be successful. Absent a clear strategy for each evolutionarily significant unit (ESU) or distinct population segment (DPS), or a program to generate such guidance, almost anything could occur under the SSRS. Absent specification of what habitat characteristics are needed to produce a significant and demonstrated contribution to the goal, for example, no basis exists for precluding habitat restoration efforts from devolving into trivial pursuits and random acts of kindness.

Consistency of Proposed Actions and Likelihood of Achieving Objectives

Much of the strategy in the SSRS relies on a combination of voluntary actions coupled with more stringent enforcement of existing laws or regulations; actions that have been called for repeatedly since the last century. This appears to be tinkering with existing policy, regulations, and relationships in the hope that stakeholder engagement and better enforcement of historically unenforced laws will together not only slow, but also reverse the ongoing decline of wild salmonid populations. Although there may have been good reasons for choosing this strategy, the SSRS does not explain why this strategy was chosen over others or its likelihood of success. Based on history of such approaches, the ISP considers these to have little chance for success.

Methods for Assessing Progress

A scientifically credible strategy must be both *evaluatable* and have a reasonable probability of achieving its stated objectives. The SSRS should include criteria for evaluating success, specific objectives to provide concrete guidance, and an independent consideration of what arrangements would be necessary to achieve a clear set of objectives. Although the SSRS does describe a monitoring program, it is vague about how the program will be supported—an issue that is central to evaluating the potential for achieving whatever objectives are defined.

Specific Questions Addressed to the ISP

The ISP was asked to respond to five general questions regarding the SSRS. Based on our review, we provide specific brief responses to each question and elaborate on the basis for our responses in the remainder of the report.

Question 1. *From a scientific perspective what is your opinion of the mission, goals, guiding principles, objectives, elements, and approaches outlined in the Statewide Strategy to Recover Salmon? Are they the most efficient and effective for state agencies to undertake to begin the process of recovery?*

Answer: The mission is clearly stated to recover salmonid populations to levels that will prevent their extinction and to support fisheries. Clarity of purpose, however, does not extend to the goals, objectives, and strategies. The SSRS identifies three questions (page III.44) that it would need to address to overcome deficiencies identified with other failed recovery programs:

- "Where are we going?"
- "How will we know when we get there?"
- "Who is in charge?"

The SSRS does not effectively answer any of these questions. Therefore, by the SSRS's own standards, it is unlikely to be "the most efficient and effective" strategy for addressing salmonid recovery.

The SSRS implies that restoration of viable ESUs/DPSs and abundant fish for harvest are realistic across the State. These presumably will result if sufficient monetary resources are forthcoming, if laws are strictly enforced, and if guidelines are followed voluntarily by people and industries having economic incentives not to do so. Consequently, the credibility of achieving the mission of the program rests on a series of conjectures, but the SSRS provides little empirical support that they are well founded. The ISP concludes both that restoration of harvestable surpluses is unlikely for some wild populations, and that the current proposed strategy has little chance of achieving its stated goal of precluding the "option" of further extinctions.

Where Are We Going? A scientific strategy would specify what is possible, what is attainable, and what is sustainable over time with projected expansion of human population. Identification of possible, attainable, and sustainable improvements provides a basis for judging goals and objectives (yet to be quantified) and provides a framework for establishing priorities. These elements provide the foundation for developing a strategy, but they are missing from the SSRS.

Their absence may mislead the public into believing that restoration is not only possible at all locations, but is likely under the proposed strategy. For example, the SSRS states, "The outcome of achieving these recovery objectives is not only healthy salmon runs that support fisheries, but also healthy streams and rivers we all depend on." None of the recovery objectives in Chapter 3 that this statement refers to necessarily lead to this outcome, even if they were accomplished. The first objective, which is to "develop and implement a coordinated and balanced statewide strategy that moves toward the goal while maintaining a healthy economy," comes closest, but clearly it only guarantees a *direction* and not an *outcome*.

How Will We Know When We Get There? The answer to this question requires: (1) quantifiable objectives, and (2) scientifically credible programs for measuring whether the objectives have been reached.

The SSRS lacks clearly articulated objectives. Each chapter identifies important goals, but in nearly every case, the objectives that relate to those goals are descriptions of processes or more specific statements of intent. Although these processes may be important, they do not provide managers or the public with measures of how they will know if they get to the goal.

Chapter 9 ("Adaptive Management and Monitoring") provides a good general strategy for adaptive management and monitoring that can be used to assess success. More detailed description of monitoring is lacking because of the lack of clearly articulated objectives.

As the chapter notes, "Before an effective and efficient monitoring program can be fully established it will be necessary to clarify what is known and not known and to develop specific management objectives and benchmarks associated with each component of the strategy." Funding is another critical component of successful monitoring programs that is not addressed well in the SSRS.

Who is in charge? The SSRS does not adequately address this question. The role of centralized authorities, such as State agencies versus local governments and watershed groups needs a better description. The objectives defined in Chapter 3 imply that the State sees its role only as providing technical assistance to local governments and watershed groups, who will ultimately define what is attainable. We believe this is different than the public perception of the State's authority and needs justification. Lack of an explicit conceptual framework in the SSRS contributes to this confusion.

Question 2. *Are some essential components missing or inadequately addressed? If so, please explain.*

Answer: 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.

Different approaches are necessary for different geographical scales. Large substantive measures should drive regional strategies, whereas site-specific management can accommodate tinkering or tactical approaches. The two cannot be interchanged across geographic scales.

Different approaches or mixes of approaches are also necessary depending on the uncertainty attached to what is possible (Figure 1). A credible strategy to recover salmonids includes two elements: (1) development of a program to attain specific recovery goals based on watershed-specific history, conditions, trends, and potential; and (2) exercise of the precautionary principle[2] (e.g., do no further harm). This means erring on the side of caution in the face of uncertainty. The first element requires more detailed knowledge of the biological, physical, and chemical processes determining salmonid potential in a watershed. It should identify viability criteria for each population and ESU/DPS. These criteria include: (1) abundance, (2) distribution (3) productivity, and (4) genetic and phenotypic diversity. The second element is risk-averse and should be taken when scientific uncertainty is great.

Integration of habitat, harvest, hatcheries, and hydropower efforts into a coordinated recovery strategy is vital. Incremental approaches to regional management experiments will make monitoring and policy feedback difficult because measurements of the true responses will be clouded by noise from unrelated or confounding events. Conflicting management tactics may

[2] (see Noss, R. F., M. A. O' Connell, and D. P. Murphy. 1997. The Science of Conservation Planning. Island Press. Washington D.C.)

mask the ability to understand how systems respond and function, which will inhibit the ability to make good decisions for salmonid recovery and increase its costs.

The SSRS conspicuously fails to address the estuarine environment, an essential component for many salmonids. This is a major flaw. Salmonid habitat, species interactions, and human activities in the estuarine environment occur in "state waters." The discussion on the Shoreline Management Act, while important, does not address all the estuarine issues involved in salmonid production and mortality. This element deserves its own chapter in the SSRS.

Question 3. *Are some components unneeded or inappropriate? If so, please explain.*

Answer: It is not clear that any components are unneeded or specifically inappropriate. We expect, however, that some components may be much more important for some ESUs/DPSs than for others. The effects of habitat degradation as well as harvest, hatcheries, and hydroelectric development vary throughout the State. The SSRS does a good job of identifying causes for the decline of salmonids. The ISP's concern is that the actions proposed do not form an integrated strategy to effectively address the acknowledged causes. The absence in the SSRS both of numerical objectives and assessments of the contribution that each component can make to these objectives, however, makes it difficult to judge the relative importance of each component and where some may be unneeded or inappropriate.

The SSRS proposes to do many things including better enforcement of existing regulations, developing new guidelines for agriculture and forestry, preventing harmful use of hatcheries, better management of storm runoff, and harvest regulation. It calls for a substantial amount of action, some of which may not be effective. The SSRS is comparable to making a visit to the drugstore when you are ill and purchasing as much of everything in stock as you can afford, taking it in as great a dose as you can get, and hoping for the best. A scientific strategy is to develop alternative hypotheses for explaining the malady, choose the most likely option, determine an appropriate drug and dosage for treatment to regain normal "health," monitor symptoms to determine whether the choice was correct, and modify the prescription if it proves less effective than desired.

Question 4. *In general, what are your recommendations to improve the Statewide Strategy to Recover Salmon?*

Answer: The SSRS needs to describe an integrated, coordinated strategy to define what is possible, attainable, and therefore sustainable. We recommend further development in these areas:

- Explicit description of the scientific and socio-political conceptual foundations that form the basis of this effort.
- Guiding principles derived from those conceptual foundations.

- Explicit description of how the two different implementation elements - actions to achieve watershed-specific recovery objectives, and risk-averse actions, will be implemented.

- Identification of regional and watershed-specific recovery objectives that provide quantifiable measures of whether we are achieving success. These include objectives specifying the diversity, distribution, and abundance needed for each population or ESU/DPS to meet the overall goal of the SSRS.

- Identification of objectives for each element or chapter in the SSRS that if accomplished would lead to recovery.

- An element or chapter devoted to estuarine environments and problems.

- Quantitative assessments of how changes in management of the four Hs would meet or exceed ESA viability requirements and provide a desirable and sustainable harvest.

- Criteria for establishing priorities and ensuring scientific credibility within an identified budget.

- Greater development of detailed criteria, testable hypotheses, and strategies for implementing a monitoring program and ensuring the success of adaptive management.

Question 5. *What advice can you offer at this time regarding development of an Implementation Plan for the Statewide Strategy to Recover Salmon?*

Answer: Most important is a description of an appropriate combination of actions to achieve: (1) watershed-specific recovery objectives, and (2) risk-averse actions. We believe that ultimately the development of numerical objectives based on clear definition of how changes in the four Hs (habitat, hydropower, harvest, and hatcheries) will achieve the recovery goals is critically important. Other than implementing the proposals for better enforcement of existing rules, guidelines, and law, there is little guidance in the current SSRS for what is to be implemented.

Also of vital importance to implementation is how decisions will be made. We are concerned that the present state of management tools will not reduce the uncertainty concerning salmonid recovery. How will the program identify and address high, medium and low risk of extinction and how will this drive recovery agendas? Who sets policy? Who follows policy? Are funding agencies implementing an agreed upon salmonid strategy or setting out on strategies of their own? For instance, who will make decisions if an at-risk population exists in degraded habitat where salmonid recovery is uncertain regardless of financial investment for corrective action? In this case, will extinction become not only an option but simply a delayed certainty?

Comments by Section

I. A Sense of Urgency

This section identifies "fully functioning riparian corridors with large woody debris in the stream channel (I.1)" as a "basic need" for salmon. The SSRS does not, however, address how to achieve this in urban, suburban, and agricultural lands.

Future population growth of almost 40 percent over the next two decades is projected to "expand the geographical extent and intensity of habitat loss" (I.3). The SSRS should address how to minimize the impact of future development, and how to reverse the stated problem that "continually shrinking freshwater habitat presents very serious risks."

II. Background: Setting the Context

The specific effects of many human actions on salmonids and salmonid habitat are identified in this section of the SSRS, but the rest of the document is not oriented around addressing the rather specific points that are brought up here. The SSRS could outline specific steps to be taken to ensure that each of the identified actions will be either prevented from occurring or modified such that important impacts on salmonids and their habitat not only do not lead to further degradation but instead reverse historic trends. If our present uncorrected trajectory is extinction, then we must reverse, not just slow down, the trends in salmonid abundance.

Examples of this point include the discussion of the dairy industry's effects on stream channels, which are termed "well documented" (II.19). The SSRS, however, does not address further any of the specific impacts noted in this section other than to commit to a process of engagement similar to that which led to the negotiated Forests and Fish Report (see additional comments below).

The SSRS identified that the accumulated effects of many small actions has brought us to the point where "incremental damage has resulted in a wide-scale disturbance of the natural landscape and degradation of the environment, and insufficient or diminished habitat quality for salmon" (II.21). Cumulative effects, as an acknowledged primary driving process that has resulted in the present degradation of salmonid habitat should receive much greater attention in the SSRS.

Excessive harvest, or overfishing, also is identified as a long recognized cause of salmonid declines (II.25) but no new policy directive concerning levels of appropriate harvest are set forth. The proposals in the SSRS call only for tinkering with present methods of allocation. As in other sections, the likelihood that an incremental approach will succeed in achieving the goals needs to be assessed and included in the SSRS.

Although the SSRS recognizes that a strategy that relies on future voluntary actions will not preclude an Endangered Species Act (ESA) listing (II.33, 34), the SSRS remains focused on voluntary actions and regulatory programs negotiated with the regulated.

III. A Road Map to Recovery

At the start of this section it is recognized that "our existing regulatory framework and implementing agencies have been unable to protect salmon populations and their ecosystems" (III.37). Given that the State has long had the mandate to protect the integrity of the public fisheries, the SSRS should include concrete proposals for actions that will now be taken to implement that trust.

The SSRS aims to use the "best available science ... to inform related public policy decisions" (III.42), but to our knowledge no independent scientific input or evaluation was solicited on the negotiation of the Forests and Fish Report, which by reference forms a major component of the proposed strategy.

The "Building Blocks of Salmon Recovery" illustrated in Figure 2 (III.45) should be linked, or integrated, in a logical flow of planning and actions from a broad foundation to "healthy populations and watersheds." The overall framework illustrated implies a "bottom up" development of a strategy from the accumulated tactics that pass from each level up the ladder. The tactics listed do not coalesce naturally to form a strategy, but only a default set of independent actions that together are considered to form a strategy. Take, for example, the Forests and Fish Report, shown as part of the foundation for the overall effort. It consists of a series of prescriptive actions that are agreed upon up front as adequate not to recover salmonids, but to constitute an adequate attempt to do so. In addition, enforcement actions do not themselves constitute a strategy; they need to derive direction from one. In other words, the actions listed at higher levels of the pyramid need to provide context and direction for actions at the base of the pyramid. There must be a component of top-down planning in order for the illustration to describe a scientifically credible attempt at defining a strategy for addressing salmonid recovery.

The SSRS recognizes that the National Marine Fisheries Service (NMFS) has identified three elements necessary for a successful restoration strategy in their "Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast" (III.46). These are:

- Substantive protective and conservation elements;
- A high level of certainty that the strategy will be reliably implemented; and,
- A comprehensive monitoring program.

These have not been well addressed by the SSRS. For example, an important component of the first of these elements, refugia or protected areas, is not discussed. In addition, the guiding principles of the SSRS stress two approaches: (1) use of collaborative, incentive-based approaches, and (2) enforcement of existing authorities (III.47), neither of which appear to satisfy the first or second of NMFS concerns repeated above. The third element is yet to be developed, although the conceptual outline for a monitoring program is one of the strong points of the SSRS, as discussed below.

The SSRS calls itself the "state vision of what needs to be done to recover salmon" (III.46). The SSRS should also provide a road map on how to implement that vision.

The SSRS states that the approach to achieving compliance with the Endangered Species Act is to "avoid doing further harm to listed species" (III.48), but there is no clear statement that harmful actions actually will be prevented. Indeed, many appear to remain permitted. For example, further habitat degradation will not be explicitly precluded, even while an expensive program of restoration is being pursued. Unless the root causes of ongoing habitat degradation and loss are addressed, the actions undertaken by the Salmon Recovery Funding Board (Board) (III.49) will serve as a band aid and not a long-term strategy for a solution to ESA listing, as the Board cannot address the causes contributing to ongoing habitat degradation in the State.

The section on Regional Recovery Responses (III.50) identifies a number of key actions for "regionalizing" salmonid recovery efforts. These actions consist of "improved efficiency" of State agency actions and regional councils, funding of such regional councils and getting federal agencies to review regional response plans. Although these are all fine things to do, none will actually prevent ongoing actions detrimental to salmonids. Strategies for regional recovery should identify the relative proportion of the proposed solution to be addressed through habitat protection and restoration and through addressing the other Hs.

The SSRS recognizes that "We must make tough choices" (III.51) and that "We are not going to save salmon by talking about it. We must make changes in the way we conduct our lives in our communities and watersheds." This is one of the clearest statements in the SSRS about the need for fundamental changes in water, land, and resource use. Unfortunately, this is also the last point in the SSRS where such issues are treated. The SSRS needs to grapple with the issues raised here.

IV. Core Elements

Agricultural Strategy

The agricultural strategy states that "despite forty years of effort" the current program of "voluntary, incentive-based programs" has led to an increasing number of "water bodies not meeting water quality standards in agricultural areas" (IV.55). The core of the approach

presented in the SSRS is based, however, on providing "agriculture with the opportunity to voluntarily enhance resource protection..." (IV.57). Other than a commitment to "fully implement the Conservation Reserve Enhancement Program" there are no concrete steps identified beyond voluntary revision of farm plans. Information is needed here to explain how this approach will differ from the failed experiments of the past. What aspect of the proposed program is enforceable?

Forests and Fish

The SSRS is intended to be based on "best available science" (III.42). Confirming that the best available science has been identified depends, in part, on independent scientific review. To our knowledge, the Forests and Fish Report was a negotiated accommodation that does not explicitly incorporate or solicit scientific review. This is apparent in guidelines for addressing forestry-related impacts to potentially unstable slopes. The report allows for landowners to propose mitigation for "reducing threats and potential for failure" without specifying how reviews are themselves to be evaluated and without acknowledging that no such measures have been demonstrated to be successful. Failure to provide the basis for determining what will constitute acceptable risk implies that operations under the agreement could allow high-risk activities on high-risk slopes.

Another curious aspect highlighted by the summary of the Forests and Fish Report presented in the SSRS is that "the new protection strategy prescriptions for riparian areas will supercede existing watershed analysis prescriptions" (IV.81). Hence, any site-specific recommendations tailored to the landscape through previous watershed analyses will be superceded by blanket prescriptions with no concern as to which provided the most conservative resource protection. In addition, the Forests and Fish Report allows that the "mass wasting module can be eliminated if the state mapping of geologic hazards has been completed" (IV.81). However, statewide identification of potentially hazardous ground must inherently be generalized, whereas development of site-specific prescriptions requires knowledge of local processes and history that cannot be generated in a coarse-scale screening analysis. Hence, the very real possibility exists that adoption of the Forests and Fish Report will decrease resource protection for steep, potentially unstable ground.

How will the "Science-based program … to monitor the relationship between forest practices and forest conditions" (IV.83) actually be set up? The adaptive management program of the agreement calls for industry consensus on the scientific focus and findings considered in the process— such control of the process by groups with a vested interest in the outcome has the potential to jeopardize the integrity of the scientific process. Finally, the provision that "no additional regulations or restrictions for aquatic resources will be imposed" if land use is "conducted in accordance with the prescriptions recommended in the Forests and Fish Report" is inconsistent with the stated intent to use adaptive management as a cornerstone of the Forests and Fish Report and the SSRS.

Linking Land Use Decisions and Salmon Recovery

This section recognizes that "growth must be handled in ways that are friendly to salmon" (IV.85). Actions in this section rely on a program of "better implementation of the existing laws," the non-binding recommendation that it is best "to protect the best remaining habitat by preserving it from future development," offers of technical assistance in the form of "guidelines," and a vague intention to use State authority to allocate funding to influence local decisions (IV.95). The empirical evidence that this could be successful needs to be included.

The approach to addressing the impacts of land use on salmonids relies on application of the State Environmental Policy Act (SEPA) (which has proved rather ineffective for such efforts in the past), adoption of "land use restrictions" (without specifying what such restrictions would entail, or who would impose them), "acquisition of state, federal, local and private funding" (a speculative effort), tax incentive programs to "encourage landowners to preserve their lands," and support for "local community groups' restoration and enhancement efforts" (not a strategic goal) (IV.97).

In total, the actions proposed under the land use section may very well reduce the net future impact of further development on salmonids by making actions taken more salmonid-friendly. But the approach will not address the fundamental issues of expanding urbanization and forest conversion that help drive the impact of land use on salmonid populations. It is not known at present how to build-out rural areas in a manner that impacts to salmonids are mitigated, let alone prevented. Hence, the proposed program of more of the same, just better, may slow but likely will not reverse the ongoing regional trends in salmonid habitat degradation.

One concrete area of change mentioned in the SSRS is to "revise floodplain management planning" (IV.105). The ideas put forth in this section could significantly influence salmonid recovery efforts, but the SSRS notes that "legislative changes are needed to modify floodplain management laws." Hence, there is no way to assess how effective such efforts may be, as they rely on speculation that the legislature may pass a bill on the subject, and further speculation as to what that bill may entail.

The actions that the SSRS states the Salmon Recovery Funding Board is to take to encourage local governments in their habitat restoration efforts are not, to our knowledge, being implemented (IV.109).

No details are offered as to how the State will "strive to bring all counties and cities into compliance with the requirements of Growth Management Act and Shorelines Management Act" (IV.109). The State has not been successful in such efforts in the past, nor has it aggressively pursued compliance.

Managing Urban Stormwater to Protect Streams

The SSRS acknowledges that current approaches to storm water management (e.g., detention basins) "are insufficient to prevent significant degradation of the resource" (IV.114), yet the strategy relies on the historically ineffective use of local "planning tools to control where and to what extent development is allowed," the encouragement to adopt "stormwater management programs" (acknowledged earlier as insufficient), and research on new ways to prevent "urban stormwater impacts on salmon" (IV.117). There is nothing concrete in this section that can be identified as sufficient to address this problem for new development—most of the potential actions are vague or remain to be developed.

Ensuring Adequate Water in Streams for Fish

The SSRS notes that "flow management is one [of] the more well-established state authorities that can be brought to bear on the myriad causes of poor fish stock health" (IV.126), but the SSRS does not develop scientifically based instream flow allocations. Instead, the SSRS seeks to set such requirements with local stakeholders — who presumably have additional interests other than protection of fish. Will the resulting agreements be adequate to sustain healthy populations of salmonids? Since this cannot be answered in advance, if the decision making process is one of negotiation among competing priorities, then one cannot have a high degree of confidence that the outcome of the process will result in conservative measures to protect the resource.

The default actions that the Department of Ecology (DOE) *could* take (IV.159) would be positive steps toward achieving higher confidence in the outcome of the process, but as written it is not clear that such actions would be taken (or even under what circumstances such actions would be seriously contemplated). Hence, they provide little additional assurance that the relevant issues will be adequately addressed.

This issue is one of the major factors affecting salmonid habitats in Washington streams, especially in certain areas. Streamflows create and maintain habitat quantity and quality (both in-channel and riparian) and thus, streams that are heavily regulated often have no or little instream flow protection; many of these systems are overappropriated already and therefore chances for improving instream flow conditions under existing laws are limited. Surprisingly, many of Washington's streams still do not have any instream flow recommendations or water rights developed or established that are directed toward habitat protection and maintenance. Although it is noted in the SSRS that State agencies often work collaboratively and with the tribes in setting instream flows, there is no mention of the actual number of adjudicated instream flows that exist for the State's waters. Waiting to address instream flow needs in concert with hydropower and irrigation projects will only result in the further depletion of an already dwindling resource. Moreover, such delays will render the instream flow rights for fish as junior to those that precede them—time is of the essence in this regard. Although this will require a

substantial allocation of resources, the benefits of habitat improvement and protection are tremendous. A goal that would support salmonid recovery efforts would be development and adjudication of instream flow rights for all of Washington's streams that support salmonids.

Clean Water for Fish: Integrating Key Tools

The proposed strategy relies on the use of revised Best Management Practices (BMPs) to address water quality issues. A BMP usually assumes that if one follows the BMP, then there is no impact (or at least no liability for impact). How will the reliance on the BMP approach to environmental regulation be modified to fit within an adaptive management framework (where such assumptions are intended to be tested rather than blindly accepted)? The SSRS also will rely "primarily on existing regulatory and voluntary programs" and it is unclear why these programs will, from here on, become effective when they have not proven so in the past. While this section of the SSRS claims that "the no surprises policy and HCP (Habitat Conservation Plan) have a common element of adaptive management," it is important to remember that in many HCPs (and the Forests and Fish Report) the adaptive part of adaptive management is precluded from triggering more restrictive conditions than those in the HCP.

Much of what is presented in this section appears to be programs and policies that were already in the works, prior to ESA listings. Although they represent valuable steps toward water quality protection and remediation (e.g., total maximum daily loads, or TMDLs), new classification of water bodies, and revision of standards), nothing really stands out as being directly focused on the issue at hand — recovery of listed salmonids. State agencies probably already know where the major problems in water quality are located. Strategists should identify all such areas that involve water quality related problems that impact salmonids (target waters containing listed species first), type of problem (what is the pollutant?), magnitude of problem, reason for the problem, and then develop programs that systematically (based on prioritization criteria) addresses each problem under a specified timeline.

Water quality is a fundamental requisite of salmonid habitat and Figure 4 on page IV.165 suggests that agencies have not been successful in their resource management and protection roles. This section should include an outline of programs to ensure that this trend will not continue in the future.

Fish Passage Barriers: Providing Access to Habitat

Seven action items and a monitoring program are proposed to overcome fish passage problems. As with the remainder of the SSRS, however, decision-makers and the public have to accept the strategist's view that the proposed actions will result in significant progress toward population viability and fish-for-harvest goals. If enough information exists to identify fish passage as a significant limiting factor, there should also be enough information to show the magnitude of expected gains.

Standardized fish passage designs are critical, but equally critical is the ability of agencies to ensure that experienced, independent professionals with sufficient training and expertise are used by developers, agencies, and jurisdictions when developing such designs. This issue is a vitally important aspect of channel restoration work. Methods for prioritization of projects involving some type of cost:benefit analysis are needed unless there is an unlimited source of funds.

Harvest

"All kinds of planning can occur, restoration activities can proceed, management actions can be implemented, and parameters can be measured, but if the number of wild spawners returning to spawning grounds does not improve, recovery will not have occurred" (IV.211). We can only add to this by asking how many are needed to meet the goals, and what is the probability that what is proposed will meet that need? There is some discussion in this section that numerical goals are being prepared for at least some systems. The SSRS should include an assessment of the relative contributions to goal attainment expected from management changes in habitat, hydropower, hatcheries, and harvest.

The SSRS states, "Because suitable monitoring locations [for fish] are limited, they should be identified prior to the establishment of habitat monitoring and evaluation locations to ensure that changes in habitat parameters can be compared to changes in salmonid production." (IV.213). The ISP concurs.

Hatcheries

This section acknowledges that differences exist in habitat productivity for salmonids across the State. It also acknowledges that so-called "surpluses" for harvest are large for hatchery fish and small for populations in habitat of low productivity, facts that can result in overharvest of wild populations in mixed-stock fisheries. Although the SSRS identifies the important components of problems associated with use of hatchery fish, it provides strategies only for trying to reduce the magnitude of negative impacts rather than reverse the trend of impacts. A science-based approach to the program goal would be to first specify the distribution and abundance of fish needed to preclude extinction in each area and the number of fish needed to provide a realistic harvestable surplus from each population. Once numerical goals are established, projections can be made of wild fish escapements needed from the fisheries to meet these goals. Implementation planners can then proceed to develop methods for getting it done.

Hydropower

A science-based approach would ask how many fish does the dam kill and what is the significance of that number on the number of adults in the spawning population? If that is a significant impact, what hypotheses can be developed for gaining significant reduction in the shortfall? A strategy should include answers to these questions. The SSRS does not detail hydropower impacts on salmonids.

V. Adaptive Management and Monitoring

This section begins with the acknowledgment that "there is much we do not understand about fish and how they interact with their ecosystems" (VI.303) and yet there is nothing in the SSRS that addresses how we will be able to improve upon our currently incomplete understanding. Where is the mechanism by which we will learn more about these systems? It cannot happen simply through "adaptive management" because such management relies upon experiments designed (in the best of cases) to test the present state of knowledge, not to expand our knowledge of how the systems under consideration function.

Section III identifies several major "scientifically-based principles" for "protection and restoration of ecosystems in the Puget Sound region" (VI.307), which unfortunately are not addressed in the SSRS:

- Maintain and restore the freedom of rivers and streams to move and change, especially during floods.
- Design restoration actions "to work with natural processes".
- Restore the natural diversity of habitats.
- Support and foster interactions and connections between estuaries, rivers, streams, and uplands.
- Match the systems' potential and long-term human commitment to stewardship.
- Integrate the needs of human communities with the long-term dynamics of rivers and streams.

It is unfortunate that these principles appear only in the "adaptive management and monitoring" section of the SSRS, as they could provide the foundation for designing an active strategy for Washington to provide leadership on long-term salmonid recovery.

The summary of steps in the monitoring program (VI.309) is good. Most of the ideas, caveats, and recommendations in the monitoring section are scientifically sound and adequately lay the foundation for developing a reasonable monitoring program, with the key exception that no specific level of support (i.e., funding) is either identified or committed for the program. Consequently, it is impossible to evaluate the probability of the program presenting a credible approach to adaptive management of salmonid recovery.

Summary

Our major criticisms of the SSRS have focused on the scientific merits of the process proposed for recovering salmonids. To us this means using the scientific method to reduce uncertainty and to propose actions likely to be effective in achieving stated objectives, in efforts to recover salmonids in Washington. Doing this requires a broad, coordinated strategy or design. Such a strategy will be both evaluatable and based on a good probability of achieving success. With recovery objectives well defined, the SSRS could be much improved by describing why certain measures were chosen to recover salmonids based on their expected probability of success and how we will know if we are succeeding. Based on our assessment, the current approach appears to be a loose collection of tactics rather than a strategy. For the SSRS to be scientifically credible it must be based on what is *possible*, *attainable*, and *sustainable*. It must address and describe at appropriate scales the causes of salmonid declines identified in the document, an overall coordinated strategy and objectives, methods of evaluating success, and the expected likelihood of success given past performance. If it is to be scientifically credible, the SSRS could include elements from both: (1) a program to attain specific recovery goals based on watershed-specific history, conditions, trends, and potential, and (2) actions to prevent further harm, based on the precautionary principle.

The ISP has focused more detailed comments on identifying inconsistencies or weakness in the proposed strategies for managing habitat for salmonid recovery. This reflects the importance that the SSRS has placed on habitat improvement. As identified in the SSRS, however, habitat (including freshwater, estuarine, and marine environments), hydropower, harvest, and hatcheries all affect the health of salmonid populations. Our lack of detailed comments in these other areas reflects the lack of development of these areas in the SSRS. Future versions should describe in more detail the objectives, actions, and adaptive management for hydroelectric power developments, harvest, and artificial production.

"Without organized analysis, knowledge degenerates into advocacy"

Kai Lee, 1993
Compass and Gyroscope

The combination of changes in the four Hs needed to attain the structure and dynamics for sustaining viable, harvestable populations is likely to be different among areas and unattainable in some. A scientifically credible strategy to restore salmonids by altering habitat, reducing harvest, altering hydropower projects, or modifying hatchery management has to be based on formal assessments that show the proposed changes are needed for salmonid recovery in each area. The process for making these assessments and decisions needs to be included in the SSRS. Careful use of existing data and ecological modeling tools can provide estimates of potential gains and uncertainties expected from proposed actions.

Notwithstanding our comments and suggestions, the ISP considers the development of the SSRS as an extremely worthwhile and necessary first step toward formulating a comprehensive and cohesive strategic plan focused on salmonid recovery in Washington State. We believe it does a good job of outlining the major elements (with the exception of estuarine environments) that need to be addressed in the plan, and also serves to identify major problem areas that will require special attention.