A System for Prioritizing Water Resource Inventory Areas in Western Washington for Protection and Restoration of Wild Salmonids

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Report to the Washington State Joint Natural Resources Cabinet

from the Interagency Science Advisory Team

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Executive summary

In January 1999, Governor Locke released a draft of Washington's Statewide Salmon Recovery Strategy (SSRS) that was developed by the Joint Natural Resources Cabinet (Joint Cabinet). The purpose of the SSRS is to protect and restore wild salmonids and their habitats. Accomplishing the goals of the SSRS will require effective approaches to identify and prioritize recovery activities. The draft SSRS described the need for prioritization and allocation of resources that would effectively contribute to salmonid recovery. To that end, the draft SSRS outlined an initial procedure, analysis, and list of priority WRIAs (Water Resource Inventory Areas - the fundamental, watershed oriented geographic units used in the draft SSRS) for distribution of new funding for habitat protection and restoration efforts across the state.

The Interagency Science Advisory Team (ISAT) was created by the Joint Cabinet to provide science support in development of the SSRS. In the context of a longer term, more comprehensive statewide need to address all limiting factors statewide, the Joint Cabinet directed ISAT to extend the prioritization system to address the following short term objective: **develop and refine the scientific principles for determining which WRIAs are the highest priorities for use of new funding for salmonid habitat protection and restoration in western Washington**. This document addresses the short term objective only.

An similar effort could be extended to WRIAs in eastern Washington.

It is important to emphasize several points about this report. First, the system described here for prioritizing WRIAs for habitat protection and restoration is intended to provide a reasonable, scientifically based coarse-scale approach to prioritization needs, making use of available information. It proposes and illustrates an option for possible use by decision-makers in their efforts to determine where protection and restoration actions might produce the most effective and efficient outcomes in general for the state's salmon, steelhead, trout, and char. This system was not intended to represent the only approach to prioritization issues. Policy overlays or alternative technical approaches may also be appropriate.

Second, it is important to emphasize that this system is not intended to provide a direct approach to all needs and conservation responses to listings and/or proposed listings under the Endangered Species Act (ESA). An attempt to more directly address priorities to address ESA issues would be most effective once recovery goals for salmonid populations and ESUs and related habitats are available. Technical and policy guidance associated with recovery goals was not available for ISAT's use in development of this system.

Finally, the framework is not intended to provide a risk assessment, or to represent an analysis of critical high risk fish or information categories. There may indeed be circumstances that call for emergency efforts, but they should not be expected to be identified through this system.

Considerable scientific and policy guidance for developing a ranking system for WRIAs in western Washington was drawn from the draft SSRS. The draft SSRS recognized that protection of higher quality salmonid and/or habitat conditions that are at risk of degradation will generally be more effective and less costly than restoring or rehabilitating conditions after they are degraded. ISAT's approach was built on this foundation.

ISAT's prioritization methodology used two categories of information: salmonid population components, and salmonid ecosystem components. To be used in the prioritization system, information components had to meet the several conditions:

1. represent general measures or indices of salmonid or ecosystem conditions,
2. be available for essentially all WRIAs in western Washington,
3. be available from existing databases or scientific studies, and
4. be of sufficient and consistent quality for all WRIAs.

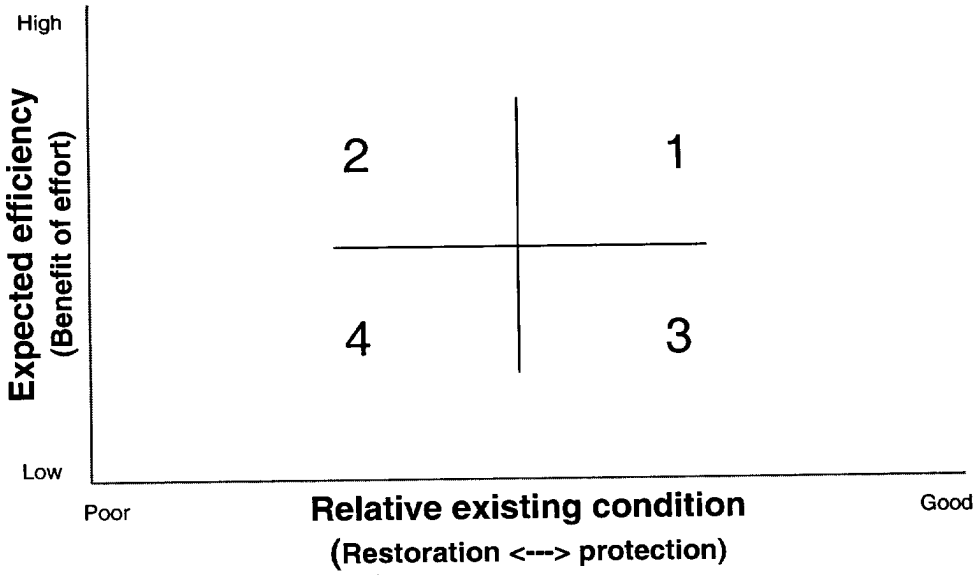
Consistent with these conditions, a scoring system was developed and applied to each information component. Scores (unweighted) were assigned according to the extent to which values were favorable for wild salmonids and/or their ecosystems. Total scores were then developed for each WRIA.

Scores were compiled to characterize the relative existing conditions for salmonids and their habitats, and to characterize the relative expected efficiency and benefits of recovery efforts to wild salmonids. Existing conditions were estimated based on 12 information components related to the status and various features of salmonids and their environments in each WRIA, including spawner numbers, and components of habitat such as: water quality and quantity, and the amount of late seral stage forested land. Expected efficiency for each WRIA was estimated based on 12 information components such as: the number of healthy stocks, the ability to distinguish hatchery from wild stocks, and the extent of urban development. The idea here was that expending effort (and/or spending money) in WRIAs, for example, with many healthy stocks or those in which means to distinguish hatchery from wild stocks, would be more efficient and beneficial than spending equal effort in WRIAs having fewer healthy stocks, or where there were more mixed hatchery and wild stocks.

This prioritization system assumes that the information components as used lead to reliable characterizations of existing conditions, and provide reasonable expectations of relative efficiencies and benefits between WRIAs. Not surprisingly, these measures are correlated (albeit imperfectly); WRIAs with good existing conditions also tend to rank high in terms of efficiencies and benefits. ISAT's prioritization system suggests that expending effort or money on the WRIAs with the best habitat and salmonid conditions is also the most efficient expenditure all else being equal.

Importantly, this prioritization system was also designed to help identify WRIAs in which recovery efforts might best emphasize protection vs. restoration. This should not be taken to imply that restoration will not work but rather that there is more uncertainty and thus greater risk inherent in restoration activities compared to protection.

The conceptual diagram below illustrates the framework within which WRIAs were viewed relative to one another, considering the expected efficiency and benefit of conservation efforts, and the relative existing conditions pertaining to the need for restoration and/or protection.



Placement of the partitions between the four quadrants or zones would ultimately be based on policy goals, species/ESU recovery goals, implementation strategies, and other considerations. For this report, partitions were placed at the mid-points among the spread of WRIA point along the vertical and horizontal axes. In general, the zones represent:

- **Zone 1** would tend to include WRIAs that would have much to gain in terms of efficiency and benefit from conservation efforts, and in comparison to zone 2 would tend to favor protection activities.
- **Zone 2** would also have much to gain in terms of efficiency and benefit but since the starting conditions are poorer, those activities would be expected to entail more emphasis on restoration than protection.
- **Zone 3** would include WRIAs that are in relatively good condition initially, but relative to zones 1 and 2, efficiencies of activities would not be as high as in zones 1 and 2.
- **Zone 4** would contain WRIAs where efficiency is relatively low and initial conditions suggest that restoration is more likely to be more necessary and effective than protection.

When information from each WRIAs is viewed in terms of the above conceptual diagram, the following generalizations about expected efficiencies, effectiveness, and types of efforts that might be undertaken in western Washington were found:

- Recovery efforts directed at WRIAs of the Coastal region (19-24), and Stillaguamish (5) WRIAs would generally be expected to produce the greatest efficiency and benefits to wild salmonids.

- In contrast, the efficiency and benefit of recovery efforts directed at WRIAs 9 (Green-Duwamish), 8 (Cedar-Sammamish), 10 (Puyallup), 26 (Cowlitz) would be expected to be lowest.

- There are few WRIAs with relatively good existing conditions, whose benefits from recovery efforts would be expected to accrue from a primary emphasis on protection. These few include WRIA 4 (Upper Skagit), 16 (Hood Canal), 19 (Lyre-Hoko), and 21 (Queets-Quinault).

- In contrast, there are many WRIAs with poorer conditions in which the most beneficial results from recovery efforts would accrue from an emphasis on restoration. Importantly however, in less than half of these WRIAs would efficiency and benefits be expected to be high relative to other WRIAs. WRIAs in which efficiencies and benefits from an emphasis on restoration would be expected to be highest include WRIA 3 (Lower Skagit-Samish), 11 (Nisqually), 7 (Snohomish), 1 (Nooksack), and 14 (Kennedy-Goldsborough).

These results should not be interpreted as proof that some WRIAs are more important than others. This prioritization can provide guidance to help direct recovery efforts between and within WRIAs. In general, ISAT concludes that the majority of WRIAs in western Washington would benefit most from restoration and that the relatively few WRIAs that would benefit from an overarching emphasis on protection are associated with the Olympic Peninsula and northern Washington coast.

This prioritization framework should be regarded as a work in progress, subject to revision as new scientific information and/or approaches are identified. To that end, ISAT identified several technical needs for future improvements, including:

- As available, include specific recovery goals for salmonid populations and ESUs, and habitat conditions at appropriate scales in space and time, toward which priorities could be targeted.
- Develop and use GIS and/or other information management technology to manage information and perform and display quantitative analyses.
- Add high priority new and refine existing information and data sets.
- More explicitly incorporate means to address capacity for salmonid and habitat improvement.
- Consider alternative approaches to weighting factors, and include a sensitivity analysis.
- Address finer scales of spatial resolution.