

Project ID: 35019

Title: Develop and Implement a Pilot Status and Trend Monitoring Program for Salmonids and their Habitat in the Wenatchee and Grande Ronde River Basins.

Response to ISRP Comments

A. This proposal may be premature and appears to duplicate some efforts in ongoing projects in other provinces. The proposal should more clearly explain its relationship to the ongoing projects and the overall RME planning activities in proposal #35033 of which the PI is a cooperating member. For example, do objectives 1 & 2 of this effort duplicate parts of #35033? This project proposal is also linked to others being submitted: 35016 (A Pilot Study to Test Links Between Land Use / Land Cover Tier 1 Monitoring Data and Tier 2 and 3 Monitoring, Feist); 35020 (Regional Project Effectiveness Monitoring Program for Columbia River Basin Listed Anadromous Salmonids); 35048 (NFWC Salmon Data Management, Analysis and Access for Research, Monitoring and Evaluation Programs). The relationship to these proposals should be more clearly specified, e.g., are any of these projects necessary for the success of this proposal? The proponent might consider combining this proposal with #35033 to provide pilot data in association with a systemwide monitoring and evaluation project.

A coordinated monitoring and evaluation program for anadromous salmonids in the Columbia River basin is long over due. This proposal seeks to fill this gap by implementing existing status monitoring guidelines on a pilot study basis. Parallel to the implementation of habitat and population status monitoring programs is the necessary assessment of the measurement, sampling and evaluation protocols called for in these guidelines. Only through implementation within an evaluative framework will efficient and effective monitoring programs emerge.

The genesis of this proposal was the development of habitat and population status monitoring guidelines for the Mainstem/Systemwide Province (Jordan et al. 2002) and similar efforts to define the status monitoring requirements of the 2000 NMFS FCRPS Biological Opinion (RPA 180, Tier 1 and Tier 2) and the Basinwide Salmon Recovery Strategy. While both of these suites of status monitoring protocols were developed by regional fisheries managers, the program as a whole has never been adequately tested in the Columbia River basin. As such, the proposed work herein is designed to move our current knowledge of status monitoring programs forward through field testing and on-the-ground evaluation. The status monitoring needs for anadromous salmonid populations and habitat are clear, as are the gaps in our existing status monitoring programs and data – what the region lacks is an implemented comprehensive habitat and population status monitoring program.

This proposal addresses issues of annual status and trend in anadromous salmonid population and habitat condition. A complete monitoring program would simultaneously assess long-term landscape scale components as well as project specific reach scale effectiveness monitoring. The guidelines for status monitoring developed for the Mainstem/Systemwide province and the NMFS FCRPS Biological Opinion call for a 3-tiered approach to monitoring; this proposal represents the status or tier 2 aspect of these guidelines. The work proposed is directly linked to proposals 35016 and 35020 as they propose to implement the tier 1 and 3, respectively, components of a comprehensive monitoring program. The proposals were developed independently, from the same set of guidelines, and are meant to be implemented separately, but when integrated via the regional data management system proposed in

35048 the four proposals together constitute pilot scale implementation of the comprehensive monitoring program called for by the region.

This proposal takes a forward looking approach to the design and implementation of a status monitoring program. The project proponents feel that further data analysis and needs assessments are redundant – active implementation of monitoring programs is the region’s next step. Many Columbia River basin fisheries management agencies strongly support retrospective analyses in the place of implementing a comprehensive monitoring program. While a certain degree of data mining and rehashing is always called for, excessive attention to the past distracts from the present and future and gives the false sense of accomplishment.

Proposal 35033 contains the necessary collaborative components to implement a comprehensive monitoring program basinwide. The ISRP offers a very good suggestion that proposals 35033 and 35019 (and by extension, 35016, 35020 and 35048) be somehow combined to provide a systemwide monitoring and evaluation project. The absolutely essential elements of 35033 that the other projects lack is the basinwide perspective, both in the collaborative representation of nearly all fisheries management agencies, as well as the inclusion of fishes other than anadromous salmonids. Ultimately, the most efficient manner for the Columbia River basin to approach a comprehensive monitoring program would be in the form of integrated aquatic ecosystem health assessment. Components of the above 5 projects, plus many ongoing monitoring programs, if coordinated within a single purpose, design, and data management and evaluation framework, could produce the ideal monitoring program for the basin’s aquatic natural resources.

B. The ISRP recommends that the proponent consider modifying the proposal to include pilot projects in each of the four states (e.g., pilot projects for resident bull trout in Montana, anadromous species in a tributary of the Salmon River in Idaho in cooperation with the ongoing Idaho production surveys, cooperation with the pilot M&E work in the John Day Basin of Oregon and perhaps the Wenatchee Basin in Washington). In particular it seems that the John Day Basin could be included to eliminate duplication of effort, where we understand that a pilot program is underway on many of the objectives of this proposal.

The project proponents agree completely with the ISRP on this matter. At a minimum, pilot status monitoring programs for the entire Columbia River basin should be as representative of the diversity of ecoregions within the basin as possible. The two subbasins chosen for this proposal, Wenatchee and Grande Ronde, certainly do not represent the entire Columbia River basin. Perhaps now in the growing spirit of cooperation and attention to large scale monitoring programs, a number of other subbasins can be identified for inclusion in the pilot phase of implementation. In particular, the ISRP’s suggestion of a resident fish monitoring pilot project in Montana would be a critical addition to increase the representation of the basin’s ecoregions in this program. The proponents of this project strongly support the idea of expanding the project to additional subbasins, especially where considerable ongoing monitoring efforts already exist that can easily be incorporated into a basinwide perspective of monitoring and evaluation (e.g., Salmon River basin, John Day basin). The best way to achieve such broad scale implementation would be through the cooperative combination of ongoing and proposed monitoring programs as discussed above.

C. The proponents should discuss the relationship of the habitat and riparian survey protocols selected for use and the protocols recommended in “Inventory and Monitoring of Salmon Habitat in the

Northwest: Directory and Synthesis of Protocols for Management/Research and Volunteers in Washington, Oregon, Idaho, Montana and British Columbia” (Johnson, et., al. 2001).

The habitat and riparian survey protocols selected for use in this project were initially developed by the USEPA for their “wadeable streams” monitoring program. These protocols have been modified slightly for salmonid specific characteristics by ODFW and ODEQ as part of their aquatic assessment programs. The same protocols are used by USFS for the Northwest Forest Plan’s AREMP and Washington Department of Ecology’s aquatic monitoring program. All of these protocols are cataloged in the Johnson et al. document, and are recommended for use in Northwest streams.

D. Other points that need clarification are:

1) Is there a probabilistic sampling procedure for habitat surveys in Subtask 2.1.1. -- Test habitat assessment methods?

Yes. All habitat survey locations will be determined using a spatially balanced random sampling site selection process with the sampling universe determined by the spatial extent of the fish species of interest. The project proponents propose to use the USEPA’s EMAP site selection algorithms. The advantage to using these well developed site selection algorithms is the additional supporting work that has been done on refining the estimators of the sample data (most importantly, the variance terms). Alternative sampling schemes would be possible, but the long history of development, refinement and implementation of, and statistical support (provided by the USEPA’s western research lab, Corvallis, OR) for, EMAP makes this approach the most sensible.

2) Discuss the ongoing census based surveys that will act as the ‘truth’ in Subtask 2.1.2. – Test adult population assessment methods. Are there no sources of error?

Certainly there is sampling and measurement error associated with ongoing “census” work for adult population assessments in the Wenatchee and Grande Ronde River basins. However, due to the extensive nature of the spawning ground surveys (weekly counts with all redds identified and flagged) and the potential for total adult counts in a number of watersheds (dam counts and hatchery weirs), good estimates of accuracy and precision of these counts can be developed. The idea being to have a population estimate of known characteristic against which to test sampling methods. Ideally, the sampling methods could return data of known accuracy and precision that is sufficient for management decisions, but is less labor intensive (i.e., costly) to generate. In particular, if range expansion is anticipated to accompany extensive habitat restoration, then an alternative status monitoring program that can capture an increasing scale of interest without the concomitant increase in cost would be a very valuable and attractive tool for resource managers.

3) How are data collected on juveniles in pools < 6 m² in surface area or < 40 cm deep or in other pools where snorkeling is not feasible?

In the current application of these methods by ODFW and others to coho salmon juveniles, the small pools and non-pool habitat are not sampled. If the habitat use characteristics of over-summering juveniles is known (as it is in this case for coho salmon), then the validity of counting in pools only can be assessed. Part of the process will be to assess this approach for other salmonid species at summer low flows. Alternative sampling approaches are used for other species and life history variants, and as

such, can be assessed, tested and if appropriate, incorporated. The intent is not to impose a suite of protocols on a sampling scheme, but rather to assess their ability to generate data of known accuracy and precision that meets the resource management needs of the local and regional co-managers.

4) In Subtask 2.1.3 -- Test juvenile population/productivity assessment methods, it is unclear if abundance of juveniles is estimated or just presence/absence. How are abundance or presence/absence estimated if not all pools or other parts of the reach are not assessed?

The primary goal of juvenile sampling will be to develop an index of juvenile population size and productivity. The data generated will be an index for the reasons identified by the ISRP – only pools are sampled. Similar to the response in D.3, the “pool-only” approach only works when this habitat type contains the majority of the summer low-flow juveniles. In the worst case sampling scenarios (e.g., poor visibility), presence/absence data only will be developed to assess the cumulative distribution of pool use by juveniles. The cdf of pool use has been shown to index the productivity of coho salmon juveniles when it is not possible to develop sufficiently precise counts.

5) What exactly is to be tested in Subtask 2.1.4 -- Test probabilistic sampling based approaches?

While the project proponents have decided to adopt the EMAP sampling design, there are a number of aspects of its implementation that can be explicitly assessed. These assessments will be used to refine the implementation of the sampling scheme. Two aspects of EMAP implementation will be assessed: the non-uniform site selection/weighting criteria, and the rotating panel approach to fixing some sites through time, and adding new sites over time. These two aspects of EMAP implementation are being used in other EMAP based monitoring programs, and have been developed through the statistical design work of the EPA; however, there may aspects specific to subbasins across the Columbia River basin that necessitate local adaptation of the sampling design.

Sites are selected in a spatially balanced random fashion – sample site selection is random, but with an enforced dispersion to prevent site clustering as is common with simple random samples across space. However, because sample sites are selected from EPA reach files, the number of reaches on smaller streams is much larger than those of larger streams per unit area. To force the representation of larger streams the site selection process is biased to increase the probability of larger streams being sampled. The weighting functions for increasing the representation of a stream order in the sample relative to the fraction of actual stream miles of that order are not functions of local conditions. Therefore, the proposal will test the assumptions that underlie the weighting functions such that, if needed, subbasin specific weighting functions will be developed.

To balance the potentially conflicting design constraints for status and trend monitoring, current implementations of the EMAP sample site selection algorithms employ a rotating panel of sites across time. The idea here is to fix a fraction of the sites in space – these sites are selected once and sampled each year – and vary a fraction of the sites – these sites are either randomly drawn each year, or are fixed in space, but only revisited on a longer period. The rotating panel strategy is essentially a bet-hedge against the distribution of indicator variance over space and time. The best estimator of status is thought to be from random sites fixed through time (drawn once, resampled annually), while the best estimator of trend captures both the spatial and temporal variance components and their interactions (drawn randomly each year). Since we have an incomplete understanding of the spatio-temporal variance structure (first and higher order terms), a rotating panel approach is a good compromise. One goal of this project will be to explicitly sample for the spatial, temporal and interaction variance

components (as recently outlined by Larsen et al. 2001, *BioScience* 51(12):1069). Armed with a more complete picture of indicator variance the most efficient implementation scheme for site selection over space and time can be developed. Again, the motivation is to increase the information content of the monitoring data collected for the effort expended.

6) *What do you mean by “Since stream network geometry is a strong function of gradient, geology and precipitation, the weighting of streams in the sampling scheme should be tested for each major subbasin.”?*

See the response for D.5.

7) *Develop a monitoring and evaluation plan. It is not appropriate for one of the most quantitative proposal to not have a quantitative monitoring and evaluation plan for itself.*

It is not clear to the project proponents what the ISRP means by this comment. The whole intent of the project is to implement an existing, quantitative monitoring and evaluation plan. The sampling protocols are to be implemented and tested to assess their ability to capture status and trend aspects of anadromous salmonid habitat and populations with known measurement error. The individual protocols are implemented within a statistically rigorous sampling scheme such that the data generated is of known spatial representation, with known accuracy and precision. The status and trend evaluations arise directly from the sampling scheme, as the estimators of the first and second moments of the data are given by the sample weights and distributions in time and space. The proposal does not address how these data may be used in a management context, but that is beyond the scope of a monitoring and evaluation program. Through the implementation of this project, the status and trend of salmonid populations and habitat will be unambiguously monitored and evaluated in a very quantitative manner.

Action Agency/NMFS RME Group Comments:

E. The objective is to develop and implement a basinwide hierarchical monitoring program, focusing on population and environmental status. This proposal is in direct response to that need. The approach is to initiate two pilot efforts in different subbasins to establish a foundation of suitable sampling protocols and estimation procedures. Our work group sees merit in this approach. Good thinking has gone into this product. However the proposal could be improved somewhat by providing more details on a few key issues. Those issues are specified as guidelines for implementing status monitoring, in a draft RME framework document that has had limited circulation (RME Framework for the 2000 Biological Opinion – NMFS and Action Agencies). Those guidelines are useful in proposal develop, as well as implementation. Clearly this proposal has adopted some of the guidelines. But we recommend the full complement of guidelines be considered.

It is the intent of this project to fully implement the status and trend monitoring guidelines for adult, juvenile and habitat monitoring as specified by the Mainstem/Systemwide Stock Status Program Summary (Jordan et al. 2002), and the Status Monitoring sections of the RME Framework for the 2000 NMFS FCRPS Biological Opinion (Jordan et al.2002). The project proponent played an active role in the development of these guidelines, and fully supports their implementation as part of this project. The basic thrust of the guidelines, as reproduced in the ISRP report, is to support the collection of

quantitatively rigorous status indicators of adult populations, juvenile productivity and habitat characteristics. The quantitative rigor is imposed through data quality standards (accuracy and precision) and meta-data standards (reporting of questions, methods, expansions, etc.). This proposed work adopts, test, and refines these processes as pilot studies for implementation of a basin-wide status and trend monitoring program.