



August 23, 2002

Judi Hertz, Executive Assistant  
Northwest Power Planning Council  
Response to ISRP  
851 SW Sixth Ave., Suite 1100  
Portland, OR 97204

Re: **Response to ISRP Comments**  
**Project #35033**  
*Collaborative Systemwide Monitoring and Evaluation Program*

Dear Ms. Hertz:

Please find attached our response to the Independent Scientific Review Panel and the Action Agencies research, monitoring, and evaluation comments on Project #35033, *Collaborative Systemwide Monitoring and Evaluation Program*.

Sincerely,

Jann Eckman  
Assistant Director

Encl.

cc: Rod Sando, CBFWA  
CBFWA Members

35033 response.doc

**PROJECT ID: 35033**

**Collaborative System wide Monitoring and Evaluation Program**

**Sponsor: CBFWA**

**Short description:** This project proposes an integrated effort of state, tribal and federal fisheries managers to catalogue, make available, critically assess and improve system wide monitoring and evaluation for fish and ecosystem status.

**ISRP Comments : Implementation Related Issues:**

**1. Independent oversight of the project is needed to track progress and identify potential problems before they get out of hand. The ISRP should rigorously review the progress of this project annually if it is funded. All major work products such as the Design Plans and Data Analysis Reports should be subject to independent peer review by reviewers and selected by the ISRP. The reports of the peer-review panels should be submitted to the ISRP and included in their annual review of the project. The sponsors should comprehensively respond to each concern raised in the ISRP's annual review. The ISRP's recommendations for future funding will be based in part on these annual reviews.**

**Response:** We agree entirely with the ISRP that the project needs independent oversight. We noted this generally on p.23 of the proposal, but we welcome the ISRP's input on how that oversight can be implemented. If funded, we will work closely with the ISRP to develop a peer-review plan to ensure that our work products are relevant and technically sound.

**2. To what extent does the proposed work overlap, duplicate, or complement other ongoing or planned monitoring and evaluation projects within the basin? IF this project is funded will it replace M&E components of other projects? If so, how will coordination be accomplished? How would this project affect the dedicated RME M&E protocols to conform to the recommendation of the basin wide program? Is there a firm commitment from state, federal and tribal entities to adopt monitoring protocols resulting from this project? The USFWS and the BLM are not listed as cooperators in the proposal, yet they have management responsibility for the bulk of federal lands in the basin. How will coordination with these agencies be achieved?**

**Response:** The relationship of this project to related ongoing and new proposals in the Mainstem/Systemwide Province is described in Attachment 1. In brief, this project provides an umbrella framework to 1) collaboratively develop systemwide M&E protocols and 2) coordinate data collection activities, protocols, and standards. The CSMEP project provides a coordinating mechanism for individual M&E projects rather than assuming all M&E activities into itself. This project is broader, both in scope and participation, than other M&E projects proposed in the systemwide province and, therefore, has a higher probability of success and should receive priority for immediate funding. We feel this coordinated but distributed approach to M&E has functional and operational benefits similar to those of the best distributed information systems.

Because this project is broadly collaborative, coordination with related projects and activities will occur in two ways. First, management agencies participating in this project will be expected to incorporate recommendations and products from this project, as applicable, into other projects

of which they are sponsors or participants. Second, because the CBFWA is the sponsor of this project, any recommendations from the project will become management criteria used to evaluate projects in the future and will be a basis for CBFWA funding recommendation to the NWPPC. Using this project's recommendations as criteria for future funding recommendations provides a very high probability that project recommendations will be implemented.

The CSMEP project provides the best environment for developing and coordinating common data collection protocols and standards. The inclusive and collaborative nature of the Oversight Committee and Inter-agency work groups provide a forum to address effectively the needs and constraints of the major data collectors and managers. The basinwide perspective of the CSMEP project allows M&E needs at all spatial scales to be addressed. This approach has a higher probability of success than any single, more narrowly focused, project.

We recognize the critical role of the federal land managers with respect to this project. While there was not time to fully coordinate their involvement prior to the proposal submittal deadline, we have subsequently contacted them seeking their participation. Linda Ulman, acting Columbia Basin Coordinator for the Forest Service, has expressed their strong desire for a coordinated and collaborative M&E program and has indicated a willingness to cooperate. Several logistical and institutional issues remain to be resolved, but we are optimistic these can be addressed by the end of this year.

### **Project Organization Issues:**

**1. The key questions for each Tier should be explicitly related to general recovery goals and objectives for the basin and sub basins. For example, what are the basin-wide goals and objectives for salmonid recovery and how will addressing the key Tier 1 questions ensure progress toward meeting those goals? The same question could be asked for provinces, sub basins and ESU's.**

**Response:** The intent of the proposal is to explicitly relate fish population status and performance to the recovery goals and objectives for the basin and subbasins for all tiers as part of the focus on key questions that directly pertain to future decisions. Section c. of the proposal addressed rationale and significance to regional programs, specifically including evaluation of whether individual actions in the subbasins are achieving the objectives of the Fish and Wildlife Program and references to goals and objectives of the NMFS and USFWS Biological Opinions, Subbasin Plans, etc. For example, recovery goals for interior Columbia Basin listed salmon and steelhead have most recently been identified as interim abundance goals by NMFS (March 2002), while the Interior Columbia Basin Technical Recovery Team has been charged with developing recommendations for delisting criteria for viable salmonid populations (including abundance, productivity, spatial distribution and diversity). In combination, all three tiers of the M&E proposal pertain to addressing these goals, objectives and criteria. Specifically, tier 1 provides a broad-scale assessment of ecosystem and population status that will be particularly relevant (and explicitly related) to spatial distribution and diversity recovery criteria (as those criteria are identified). Tier 2 M&E relates directly to abundance and productivity criteria in both NMFS and USFWS Biological Opinions. Tier 3 M&E will help to assess the relative contributions of different actions towards survival improvements.

General recovery goals and objectives for the basin and subbasins exist in a variety of forms and contexts. For example, NMFS has identified interim abundances and productivity recovery objectives for individual salmon and steelhead populations and ESUs. These interim objectives are intended to assist managers and others in developing final objectives through subbasin planning and related efforts. Prior subbasin plans for several sub basins e.g. Umatilla, have well developed long-term abundance goals. Master planning and NEPA documentation for the most recent generation of artificial propagation measures contain important statements of management intent. Additional rebuilding goals are reflected in individual state and tribal anadromous fish management plans.

This project will build on these efforts by, among other things, identifying “common currencies” for refinement of final recovery objectives and methods for evaluation and making recommendations for modification to Tier 1 monitoring programs. Tasks 3.1 and 2.4 and 3.2 speak to specific data and analytical components that will assist coordination groups to harmonize management goals and data and analytical needs and availability

**2. The proposal focuses principally on development of a basin wide monitoring program but the evaluation of the data collected through monitoring is barely discussed. Evaluation is a critical component in the M&E process without which the key questions cannot be answered. The proposal needs to explicitly address how the evaluation component (i.e. analysis of the monitoring data) will be incorporated into the process. Specific methods for analysis are not required in the proposal but a general plan for the conduct of analyses is needed. Perhaps the proposal should be retitled “Collaborative System wide Monitoring Program with the monitoring data to be available to the region for evaluation?”**

**Response:** We agree entirely with the ISRP that evaluation is a critical component of the M&E process. We also agree with the ISRP that the proposal should have included more details on the evaluation of data after it is collected.

We would like to expand on some of the elements of our proposal, which dealt with evaluation. First, we briefly described in section **b** our intent to apply EPA’s Data Quality Objectives or DQO process (Table b1 on pg. 3 of the proposal), which has been used in the design of many EPA monitoring programs including EMAP. While we did not expand on the steps beyond the DQO process in the proposal, **Table 1** below shows the overall M&E process in a larger context, together with the entities we envision being responsible for each step. As this collaborative M&E program moves forward, it will indeed become more involved in the implementation of monitoring programs and the evaluation of data generated by such programs. Agencies with particular regulatory responsibilities (e.g. NMFS, USFWS) will have the primary responsibility for carrying out such evaluations, but we anticipate that they will work closely with scientists from other agencies involved in this collaborative monitoring and evaluation program.

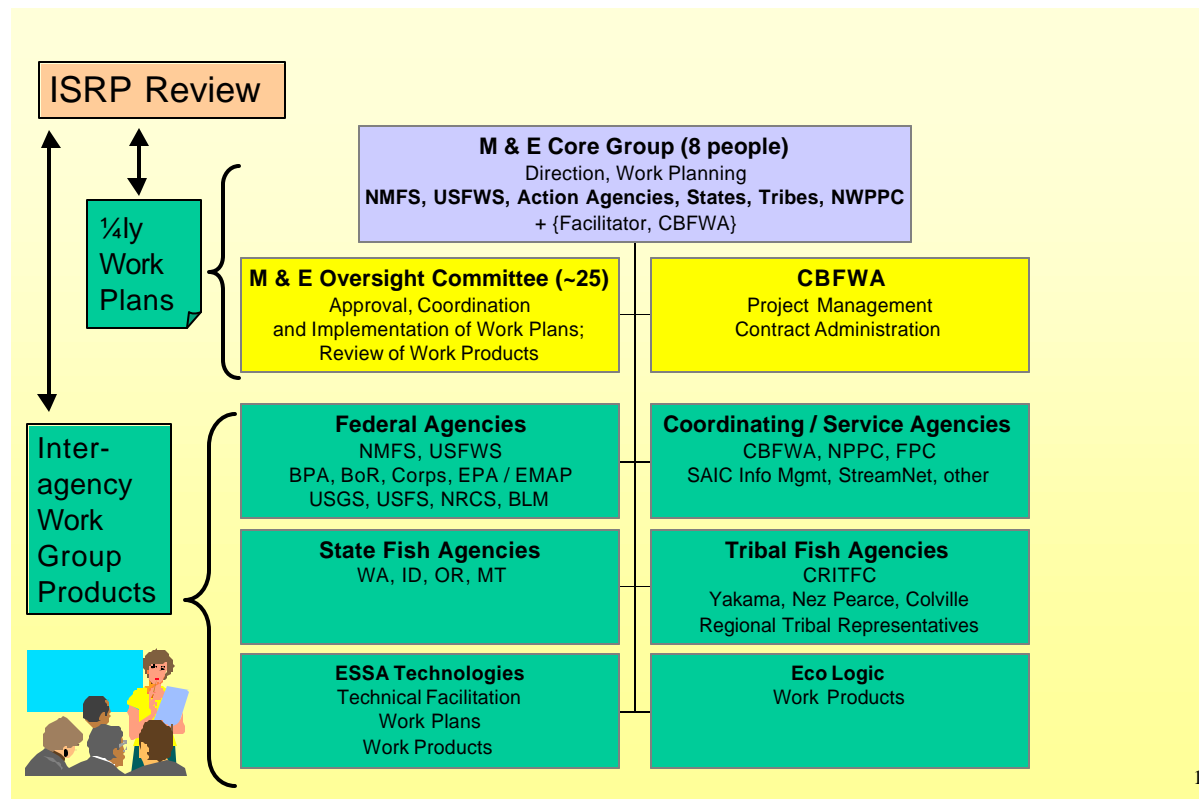
Our proposal outlined several tasks through which we will assess the ability of alternative monitoring designs and evaluation methods to answer critical questions, at each of the three Tiers (i.e. Tier 1 - Task 2.3 (pg. 26), Tier 2 - Task 3.3 (pg. 33-34), and Tier 3 -Task 4.3 (pg. 36)). These tasks fit into steps 8 and 9 of Table 1. Once the monitoring programs are implemented and the data collected (step 10 in Table 1), the pre-designed analytical methods can then be applied to the actual data to generate information relevant to decisions (step 11 of Table 1). Other

analytical methods may also be applied, but as long as some methods have been thoroughly pre-tested, users can be assured of reliable results for decision-making.

**Table 1.** Overall M&E process, and entities responsible. Evaluation steps are highlighted. Abbreviations: OC = Oversight Committee; IWG = Interagency Work Groups; CG = Core Group. See Figure 1 for description of project organization.

M & E Steps	Activities and Entities Responsible
1. State the problem 2. Identify the decision 3. Identify inputs to the decision 4. Review existing relevant data <b>(Tasks 2.1, 3.1, 4.1)</b>	Each agency identifies decisions for which they have authority (e.g. NMFS, USFWS, State and Tribal fish agencies, Action Agencies), alternative actions, and information required to resolve choices amongst these alternatives. Inventory conducted by IWGs, building on existing inventories.
5. Define the boundaries for different studies, including overlaps.	Joint discussion of spatial bounds, possible stratification and temporal boundaries for different decisions, economies of scale to serve multiple objectives. [IWG, CG; review by OC]
6. Develop “if-then” decision rules 7. Specify limits on decision errors (both directions)	Specify decision rules for alternative actions, including statistical parameters, scale of decision-making, and tolerable limits on decision errors. Interactive discussion between policy advisors [in agencies, OC] and monitoring and evaluation specialists [IWG, CG]. See EndNote 1.
8. <b>Evaluate alternative designs</b> using existing data, simulated data, and alternative methods of data analysis <b>(Tasks 2.3, 3.3, 4.3)</b> .  9. Optimize the design for obtaining data needed to fill gaps in existing data and provide information for decisions <b>(Tasks 2.4, 3.4, 4.4)</b> .	Explore alternative M&E designs through a collaborative process, considering different levels of observation error, levels of natural spatial and temporal variability, future trends, and types of analytical methods to estimate parameters of interest. “Test drive” analytical methods. Select the most cost effective M&E design with well integrated monitoring and data analysis methods [IWG and CG; review by OC and ISRP].
10. Implement pilot monitoring, or large scale monitoring if M&E design is already well established. <b>(New Tasks 2.5, 3.5, 4.5)</b> .	Agencies responsible for implementing monitoring (e.g. NMFS, USFS, BLM, Action Agencies, States, Tribes, FPC).
11. <b>Evaluate results. Apply analytical methods. (New Tasks 2.6, 3.6, 4.6)</b>	Assess ability to meet performance standards for data, adequacy of original design and ability to make decisions with sufficient levels of certainty. [Agency scientists apply analytical methods of interest; IWG and CG work with agencies to review adequacy of M&E methods; review by OC and ISRP].
1. If necessary, revise monitoring and evaluation methods to improve ability to make decisions (i.e. return to step 8 to revise designs, or to step 1 for different decisions}.	[IWG and CG work to revise M&E methods, working with policy advisors and agency scientists; review of recommended changes by OC].

**Figure 1.** Proposed project team organization. Revised from presentation to ISRP on July 16<sup>th</sup>, 2002 to include ISRP review cycle, and other entities likely to be involved in Inter-agency workgroups (e.g. BLM, StreamNet).



**Examples of Methods of Evaluation for Different Tiers**

Tier 1

Tier 1 monitoring represents the broadest scale assessments of populations and habitat. Specifically, Tier 1 monitoring captures on a 5-10 year period, the landscape condition as indicated by Land Use Land Cover and the geographic extent of populations as indicated by presence/absence census data. The analysis of Tier 1 data generates long-term trends in landscape scale characteristics such as changes in LULC distributions across an ecoregion. The analytical methods of long-term trend detection are straightforward, given several decades of data. Given that data collection is sparse in time, the best evaluation approaches for status and trend detection are based on generating cumulative distribution functions (cdf) and tracking the shape change of the cdf over time rather than assessing point estimates of the mean and generating a trend in the estimate over time. Association models of landscape scale characteristics and population data will be correlative, such as simultaneous multiple-linear-regression approaches to LULC data and species presence/absence data.

## Tier 2

Tier 2 monitoring is statistically based sampling on an annual basis to determine, given trade-offs between cost, precision and accuracy, the status of fish populations and their habitat. The assessment of alternative monitoring designs and evaluation methods for Tier 2 Status Evaluations involves ‘test driving’ various evaluation methods with existing and simulated future data. A key part of this is estimating population status parameters from these data that relate to policy decisions (i.e. trends in, and levels of, fish survival and abundance). For many decisions, overall life cycle survival and spawner abundance will be of primary interest, as well the probability of survival and probability of recovery. For other decisions (e.g. the relative contributions of different actions), the trends in life stage survival (e.g. egg to smolt survival, hydro system passage survival) will be important.

A good example of Tier 2 data evaluation is the work by Paul Wilson of the USFWS to evaluate alternative monitoring designs for detecting trends in bull trout abundance (Appendix C, ESSA Technologies Ltd. 2002a). Mr. Wilson estimated how long it will take to reliably detect increasing or decreasing trends in bull trout abundance in the Flathead Lake Core Area under various assumptions (e.g. observation error, natural variability) and various evaluation methods, using both historical and simulated future data. The evaluation methods ranged from simple regressions with or without pooling of different stocks, to the Dennis et al. (1991) model, to a stochastic simulation model that considers straying from one population to another. This type of analysis allows for the development of coherent, integrated methods of monitoring and evaluation **prior** to actually collecting the data. Once the data are collected, these analytical methods can then be applied to the actual data to generate information relevant to decisions. Other analytical methods may also be applied to the data (e.g. Dr. Danny Lee of the USFS has developed a different population viability model for bull trout). Ultimately, the regulatory agencies responsible for decisions must apply various analytical methods to make their conclusions.

## Tier 3

### *Improving Existing Studies of Tributary Habitat Effectiveness Monitoring*

Existing habitat restoration projects have been implemented independently rather than as part of a rigorous multi-watershed design. Many of these projects have not had adequate spatial or temporal controls, and have had difficulty in maintaining long term monitoring of habitat and population indicators. Project proposal 34008 to the Innovative Proposals fund (positively reviewed by the ISRP and CBFWA, and recommended by the NWPPC) will provide an inventory of existing restoration projects and a retrospective evaluation of selected habitat restoration hypotheses for a pilot set of watersheds. This will provide a foundation for the development of improved Tier 3 monitoring protocols and experimental designs, choosing appropriately from the available toolbox. As outlined in the CBFWA proposal for project 35033 (pg. 20-21), these two projects are complimentary.

### *New Studies of Tributary Habitat Effectiveness Monitoring*

Assessing the biological benefit of habitat restoration actions is generally accepted to be quite difficult due to the challenges of establishing actions in an experimental framework and the inherent spatio-temporal variability of habitat and fish population indicators (Paulsen et al 2002; ISRP 2002). However, recent statistical design work has demonstrated the value of incorporating knowledge of indicator variance structure into the design of action effectiveness monitoring programs in order to best detect trends in indicator values over time (Larsen et al 2001). New restoration projects should build on the lessons learned from retrospective studies of past projects as well as recent methodological advances. New analytical / evaluation methods should be applied both in the pre-implementation design phase (i.e. steps 8 and 9 in Table 1) and the post-implementation evaluation phase (step 11 in Table 1).

### *Hydrosystem Actions*

There is a hierarchy of effectiveness evaluations of hydrosystem actions, from actions at individual projects (e.g. alterations in turbines, bypass systems, spillways, passage systems) to evaluations of flow augmentation and spill, to evaluations of the cumulative effects of hydrosystem experience on stock life stage and overall life cycle survival. In general, the more project-specific evaluations are likely to be carried out by the Action Agencies, with review by other entities. Larger scale evaluations will require a collaborative effort by NMFS, the Fish Passage Center, Action Agencies, and State and Tribal fish agencies. These evaluations could logically be undertaken by Interagency Work Groups, with review by the Oversight Committee and ISRP. The agencies responsible for regulatory decisions (e.g. NMFS, USFWS) will need to take ultimate responsibility for such evaluations in their decision documents.

### *Harvest Actions*

There are number of harvest management actions currently in place, and others under development. These include such fishery management strategies as weak stock management, mark-selective fisheries, abundance-based management, harvest rate and escapement goal management, and efforts to reduce incidental mortality. Various analytical tools are currently used to evaluate the effectiveness of different harvest management actions, both before and after their implementation. This includes tools developed by the Pacific Fisheries Management Council, the Technical Advisory Committee to *U.S. v. Oregon*, the Pacific Salmon Commission (and subcommittees such as the Chinook Technical Committee), and others. These entities will continue to be the primary analysts of data to evaluate harvest management actions. However, CBFWA's collaborative M&E program will provide a forum, framework and process for improving the quality of data used by these entities, and a means of incorporating their objectives into the design of marking programs that serve multiple objectives.

### **Methodological Issues:**

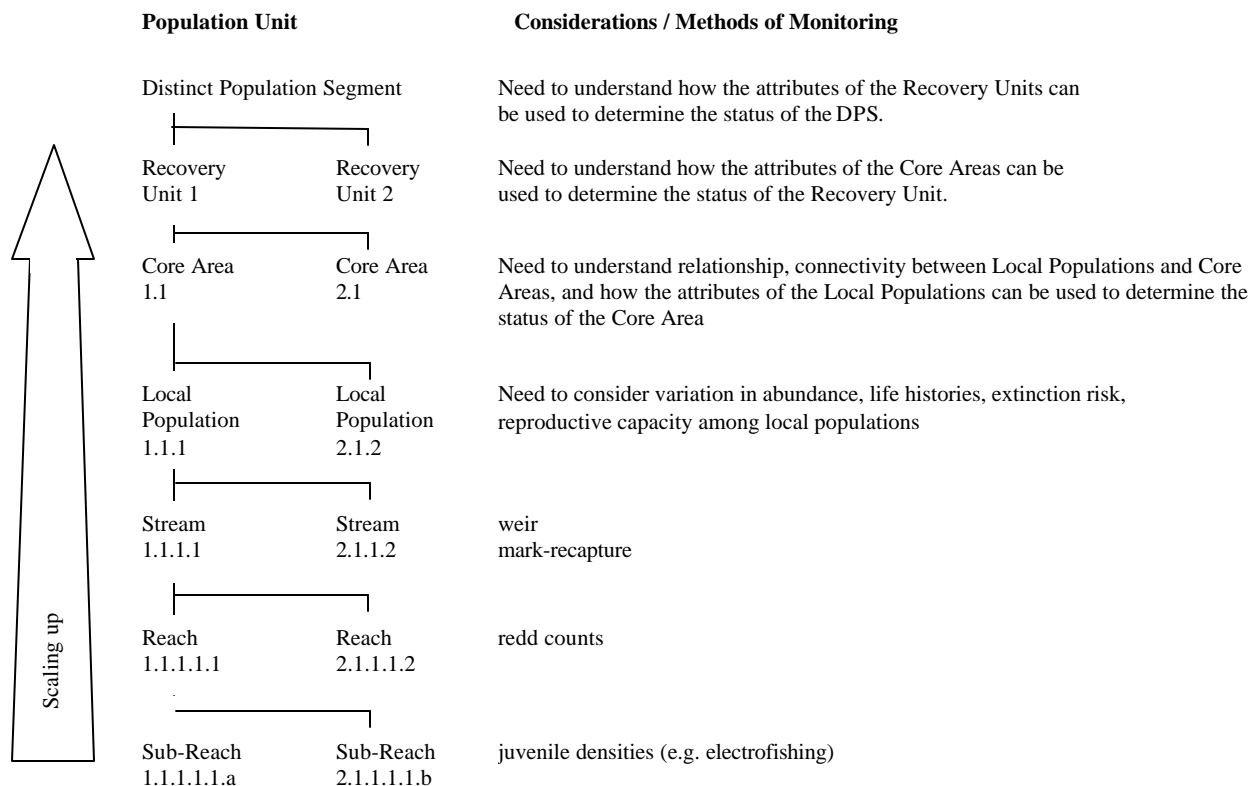
**1. The key questions mostly appear to address system state, for example, biological and physical habitat "condition". Physical (e.g. geomorphic and hydrologic) and biological (e.g. species interactions, habitat relationships) processes determine system state and are subject to modifications by human actions. Critical ecological elements such as habitat stability**



**and connectivity metapopulation dynamics, and genetic and life history diversity are barely touched upon, if at all. The key questions and in fact the entire protocol development should be more process-based, explicitly emphasizing ecological processes and functions as much as states.**

**Response:** The proposal focuses on measuring indicators related to system state because these are the indicators that are routinely measured in monitoring programs. We agree with the ISRP that these state indicators must be based on fundamental underlying ecological processes and functions, which will have to be considered when evaluating monitoring data and its ability to address key management questions. The work done to establish a scientific foundation for the Council’s Fish and Wildlife Program (ISG 1996), as well as other related publications (e.g. Stanford et al. 1996) are very valuable for guiding the selection of indicators, the spatial horizon of sampling programs and the interpretation of results.

Figure b1 in the proposal (reproduced below) shows how these considerations will be taken into account when determining how site-specific monitoring data relates to population-level questions (in this case relating to Bull Trout recovery). For example, variation in life history, reproductive capacity, and metapopulation connectivity must all be considered when scaling up from reaches and sub-reaches to higher population units.



**Figure b1:** Hierarchy of population units. For estimates of trends in spatial distribution and overall population abundance within a core area, it is important to know the relative representativeness of each index stream. Future probability-based sampling would provide this, but it is important to retain historical data to assess long term trends. Where current data do not

constitute a complete census of a population (most situations), this requires using other information (e.g., Tier 1 ecosystem status information, special studies) to assess the representativeness of existing data. [Source of figure: USFWS Bull Trout Workshop (ESSA Technologies Ltd. 2002a).]

The RME proposal oversight committee incorporates scientists and biologists involved in activities like bull trout and salmon recovery planning, which are required to address habitat stability and connectivity, and genetic and life history diversity. It is anticipated that this approach would coordinate with USFWS and NMFS scientists to address information collection design and implementation and the associated analyses to address these issues. These same scientists are also presently working on updating, validating, and developing rules for additional resident fish species (i.e. cutthroat trout, redband trout, and bull trout) for the Ecosystem Diagnosis and Treatment (EDT) model. The EDT model approach addresses ecological processes and function through an expert system. We anticipate that the RME approach will coordinate with the subbasin assessment approaches, EDT, to design and implement studies to evaluate underlying hypotheses in the EDT model relating to population dynamics and structure, genetic and life history diversity, and ecosystem process and function.

**2. Tier 3 is their “effectiveness monitoring of recovery projects” and is in direct competition with the BPA-RME program. The sponsors approach to effectiveness monitoring is an attempt to standardize research experiments from the top down, which may not be possible. Effectiveness monitoring (research) should be called for in RFPs to answer specific questions. For tier 2 monitoring impacts of non-native species need to be explicitly considered.**

**Response:** *Competition with BPA-RME program.* While it is unclear to which BPA-RME program the ISRP is referring to, no competition or conflict is proposed. The ISRP recommends project effectiveness monitoring associated with every project funded by BPA under the provincial review process. The Collaborative Systemwide Monitoring and Evaluation Program would provide the guidance, framework and context for a consistent effectiveness-monitoring program that would complement project specific implementation monitoring. The NMFS-AA RME program, supported by BPA, has similar goals and guidelines for a comprehensive monitoring program, using the NMFS FCRPS BiOp as the context for project effectiveness monitoring. In both cases, the proposed monitoring program would unify all current project monitoring programs by providing a clear, regionally consistent context for effectiveness monitoring. It would build on the knowledge gained from retrospective analyses, pilot studies and prospective design studies (see response to Project Organization Issues, Question 2 above). Over time, it would expand on the efforts of Paulsen et al (2002) and Hillman and Giorgi (2002) to establish guidance for Tier 3 studies solicited through RFPs, by providing a larger context for such studies.

*Top-down.* The proposal recognizes the need for both top-down and bottom-up approaches. For example, on page 9 the proposal states:

“At the same time, this proposal utilizes “bottom-up” efforts to build on the existing and extensive information base that has been developed and that is being added to all the time. Ongoing monitoring efforts exist for many legitimate reasons independent of systemwide questions and should be expected to continue. Clearly, the Basin needs to catalogue, critically

assess, and make the maximum best use of existing information. This will require assessments of how representative these data are of the level of interest (e.g., populations, ESUs, DPSs, watersheds, sub-basins and provinces), and the accuracy and precision of measurements. Ultimately, evaluations of both fish status and the effectiveness of management actions will need to rely on a mix of studies, with gradual improvements over time (Table b4).”

We agree with the ISRP that research experiments often cannot be standardized, due to varying contexts, landscapes and objectives. However, it is possible to make substantial gains in statistical inference by utilizing a multi-watershed approach and common indicators. We believe that collaborative efforts towards multi-watershed designs and standardization (and cross-comparison) of monitoring indicators will be mutually beneficial to all researchers.

*Non-native species.* We agree with the ISRP that non-native species need to be explicitly considered. While there is a focus on salmon, steelhead, bull trout and other species of regional importance, RM&E must recognize the community and ecosystem context in which these species live.

### **3. The proposal needs to more clearly define “classes” of management actions.**

**Response:** Tier 3 monitoring assesses the effectiveness of specific recovery actions by comparing the impact of the action to reference or control conditions. The proposal identifies key questions needing answers to determine effectiveness of recovery actions.

Questions

3.1 How are various classes of management actions affecting habitat conditions for fish and wildlife populations?

3.2 How are various classes of particular management actions affecting fish survival, abundance, distribution or condition?

3.3 What are the mechanistic connections between recovery actions and fish population responses?

Questions 3.1 and 3.2 refer to “classes” of management actions. We don’t know yet what the best method is to group or cluster management actions, but we do know that some form of classification is required for extrapolation. By grouping habitat actions in management “classes” and evaluating the effectiveness of actions in each class, results from individual projects can be used to predict the effectiveness of similar actions proposed for similar locations throughout the Basin. Innovative project proposal 34008 will provide some insights on methods of classifying actions according to different restoration hypotheses, and will test such hypotheses for a pilot set of watersheds with previous restoration projects.

Currently the Bonneville Power Administration RME program requires “effectiveness monitoring” for each individual project. The resultant data is not evaluated or housed in an accessible location. Evaluation and comparison of data is made more difficult because each project develops individual monitoring plans collecting different kinds of data. Work products from this proposal will provide guidance to those project sponsors on what kind of data to collect for overall evaluation of all projects in the same class of management actions and will work within the region’s evolving distribution data management system. The data can then be evaluated and results compared for similar projects across the basin, providing the best value for RME funds spent on individual projects.

The division of management actions into classes will occur as part of the work of the Core Group and Oversight Committee. The basis for defining management classes will also be determined by those participants. The Core Group with direction from the Oversight Committee will consider the range of management actions being undertaken or likely to be undertaken, and create classes of management actions to provide the best possible framework for evaluating the effectiveness of multiple projects.

The justification for undertaking this exercise is contained in the 2000 FCRPS Biological Opinion, on page 9-170, “critical information can be gained by initiating experimental studies on readily identifiable general classes of habitat improvement actions.” ... “each major habitat or hatchery management action should be assessed immediately to obtain enough information for a complete evaluation at the 5- and 8-year check in points.” The BiOp goes on to describe management actions falling in this category to include the following (although division of classes for this proposed work plan may differ):

- Attainment of minimum instream flows
- Compliance with water quality standards
  - Alteration of grazing practices
  - Reduction of sediment through road closures
- Enhanced levels of marine-derived nutrients
- Improved riparian conditions
  - Alteration of grazing practices
  - Active stream restoration

#### **4. A monitoring and evaluation plan for the project itself is needed.**

**Response.** The summary table below outlines a plan for monitoring evaluating project performance. In the table we describe three types of measurable benchmarks of project success and possible metrics of whether/to what extent these benchmarks are met:

*Project Activities:* specific program actions taken by the project (metric might be simple activity completed/not completed, or # of times activity completed)

*Project Outputs:* direct products and services delivered by the program such as publications, presentations, etc. (metric might be a count of these products)

*Project Outcomes:* intermediate and longer-term results for which the program is designed

*Environmental and Population Indicators:* quantitative measures of progress over time towards achieving systemwide environmental goals

These metrics can be continually evaluated for local and regional effectiveness, in consultation with the ISRP, as the project develops. Project success can be determined by monitoring project activities, outputs, or outcomes and comparing them to the objectives set out in the table below. Consistent with our response to Project Organization Question 2 regarding evaluation, we have added two tasks:

- Task X.5 Implement pilot or large scale monitoring
- Task X.6 Evaluate new data

Table 2. Summary of performance measures used to monitor and evaluate project performance.

Category of Performance Measure	Project Objectives			
	1. Establish Oversight Committee and Core Group to direct project.	2. Provide monitoring data, evaluations and improved M&E designs for Tier 1 questions.	3. Provide monitoring data, evaluations and improved M&E designs for Tier 2 questions.	4. Provide monitoring data, evaluations and improved M&E designs for Tier 3 questions.
<i>Activities</i>	<ul style="list-style-type: none"> <li>- Review and finalize quarterly work plans, budgets</li> <li>- Establish work groups for specific tasks</li> <li>- Ongoing monitoring of progress and schedules</li> <li>- Liaison with external technical and policy groups (e.g. ISRP, NPPC)</li> </ul>	<p>Task 2.1, 3.1: Catalogue existing information</p> <ul style="list-style-type: none"> <li>- Review existing databases (presence/absence, stock status, habitat conditions)</li> <li>- Review watersheds</li> <li>- Contact project implementers, complete forms</li> <li>- Site visits</li> <li>- Acquire data sets acquired</li> <li>- Inventory actions, indicators, analytical methods in data base</li> </ul> <p>Task 2.2, 3.2: Develop standardized methods to store and display existing data</p> <ul style="list-style-type: none"> <li>- Review catalogue, identify priority datasets</li> <li>- QA/QC on existing datasets</li> <li>- Develop / update key indicators, link to more detailed information</li> <li>- Integrate priority datasets in data modules</li> </ul> <p>Task 2.3, 3.3, 4.3: Develop and apply pilot analytical methods</p> <ul style="list-style-type: none"> <li>- Evaluate existing data and identify gaps</li> <li>- Identify problems with experimental design, monitored indicators, analytical methods, etc</li> <li>- Identify potential hypothesis tests and assess data sets</li> <li>- Develop pilot analyses</li> </ul> <p>Task 2.4, 3.4, 4.4: Recommend modified and new monitoring designs</p> <ul style="list-style-type: none"> <li>- Identify components of existing monitoring programs to maintain / modify</li> <li>- Identify priorities for new monitoring to fill existing gaps</li> </ul> <p>Task 2.5, 3.5, 4.5: Implement pilot or large scale monitoring</p> <ul style="list-style-type: none"> <li>- implement modified and new monitoring designs from Task X.4</li> </ul> <p>Task 2.6, 3.6, 4.6: Evaluate new data</p> <ul style="list-style-type: none"> <li>- apply analytical methods to new data</li> <li>- if necessary, revise monitoring and evaluation methods to improve ability to make decisions</li> </ul>		<p>Task 4.1 Pose hypotheses and organize data</p> <ul style="list-style-type: none"> <li>- Form hypotheses to test</li> <li>- Assemble data sets for testing hypotheses</li> <li>- Identify appropriate analysis methods</li> </ul> <p>Task 4.2 Organize, display, prepare data for hypothesis testing</p> <ul style="list-style-type: none"> <li>- Organize data relevant to Tier 3 questions into modules</li> </ul>

Category of Performance Measure	Project Objectives			
	1. Establish Oversight Committee and Core Group to direct project.	2. Provide monitoring data, evaluations and improved M&E designs for Tier 1 questions.	3. Provide monitoring data, evaluations and improved M&E designs for Tier 2 questions.	4. Provide monitoring data, evaluations and improved M&E designs for Tier 3 questions.
<i>Outputs</i>	<ul style="list-style-type: none"> <li>- Quarterly workshops</li> <li>- Quarterly work plans, budgets, and schedules</li> <li>- Short workshop summaries</li> <li>- Regular progress reports</li> <li>- Presentations on methods / results to decision-makers and policy groups</li> </ul>	<p>Task 2.1</p> <ul style="list-style-type: none"> <li>- Pilot Inventory/Catalogue Report w/ Executive Summary</li> <li>- Relational database (structured to be consistent with existing databases)</li> </ul> <p>Task 2.2</p> <ul style="list-style-type: none"> <li>- Internet-accessible data modules of fish presence/absence data, ecosystem characteristics, and relevant metadata (structured to be consistent with existing databases)</li> </ul> <p>Task 2.3</p> <ul style="list-style-type: none"> <li>- Tier 1 Pilot Analysis Report w/ Executive Summary</li> </ul> <p>Task 2.4, 3.4, 4.4</p> <ul style="list-style-type: none"> <li>- Integrated Design Document w/ Executive Summary, linking recommendations in Tiers 1, 2, and 3</li> </ul> <p>Task 2.5, 3.5, 4.5</p> <ul style="list-style-type: none"> <li>- Updated databases, including QA/QC data from new monitoring programs</li> <li>- Implementation Report w/ Executive Summary</li> </ul> <p>Task 2.6, 3.6, 4.6</p> <ul style="list-style-type: none"> <li>- Revised Tier 1, 2,, and 3 Data Analysis Reports w/ Executive Summary</li> </ul>	<p>Task 3.1</p> <ul style="list-style-type: none"> <li>- Pilot Inventory/Catalogue Report w/ Executive Summary</li> <li>- Relational database (structured to be consistent with existing databases)</li> </ul> <p>Task 3.2</p> <ul style="list-style-type: none"> <li>- Internet-accessible data modules of stock assessment, descriptors of habitat condition, and relevant metadata (structured to be consistent with existing databases)</li> </ul> <p>Task 3.3</p> <ul style="list-style-type: none"> <li>- Tier 2 Data Analysis Report w/ Executive Summary</li> </ul>	<p>Task 4.1</p> <ul style="list-style-type: none"> <li>- Tier 3 Data Analysis Plan w/ Executive Summary</li> </ul> <p>Task 4.2</p> <ul style="list-style-type: none"> <li>- Internet-accessible data modules of contrasts in human management actions and associated habitat and fish data</li> </ul> <p>Task 4.3</p> <ul style="list-style-type: none"> <li>- Tier 3 Data Analysis Report w/ Executive Summary</li> </ul>

Category of Performance Measure	Project Objectives			
	1. Establish Oversight Committee and Core Group to direct project.	2. Provide monitoring data, evaluations and improved M&E designs for Tier 1 questions.	3. Provide monitoring data, evaluations and improved M&E designs for Tier 2 questions.	4. Provide monitoring data, evaluations and improved M&E designs for Tier 3 questions.
<i>Outcomes</i>	<ul style="list-style-type: none"> <li>- improved ability to test Tier 1 and 2 hypotheses by providing hierarchical monitoring framework, consistency across monitoring programs (RPAs 180, 190, 193, 196, 197)</li> <li>- improved ability to monitor RPA effectiveness (Tier 3) through development of explicit experimental framework, integration with Tier 1 and 2 information, and placement of focused effectiveness monitoring in larger geographical context (RPAs 183 to 189,191,192,194,195)</li> <li>- catalyst for sharing information and improving coordination and communication among monitoring programs (RPA 198)</li> <li>- improved guidance for future research proposals leading to much stronger proposals and monitoring plans</li> <li>- improved project selection by funding/review agencies</li> <li>- more cost effective expenditures of FWP funds for given environmental benefit</li> <li>- reduction / elimination of weaknesses of existing M&amp;E programs inventoried in Task 2.1, 3.1, and 4.1</li> </ul>			
<i>Indicators</i>	<p>Examples of environmental and population indicators that may be used in the existing monitoring projects we intend to review:</p> <p><b>Environmental indicators:</b></p> <ul style="list-style-type: none"> <li>- Gravel: grain size distribution, gravel quality, permeability</li> <li>- LWD: maps of habitat types, juvenile fish distribution</li> <li>- Riparian Vegetation: abundance, distribution</li> <li>- Barriers: juvenile fish distribution, passage; adult fish distribution, passage</li> <li>- Water Quality: stream temperatures, flow, stream shading index</li> <li>- Channel Restoration: fish distribution, estimates of Weighted Usable Area (WUA)</li> </ul> <p><b>Population indicators:</b></p> <ul style="list-style-type: none"> <li>- Survival Measures: egg to fry, fry to smolt, egg to smolt, spawner to recruit, lambda, etc.</li> <li>- Fish Abundance: juvenile densities, smolt output, spawners (5-year geometric mean), recruits</li> </ul> <p>Examples of data quality indicators that may be used to evaluate new or modified monitoring programs:</p> <ul style="list-style-type: none"> <li>- statistical power to detect trends in environmental and population indicators</li> <li>- reduction in uncertainty in performance standards used in decision-making and ability to generate those standards at appropriate spatial scales</li> </ul>			



**5. What is meant by the statement, “...Tier 1 data layers are intended to be coarse scale assessments that do not capture inter annual variation and spatial variation in covariate magnitude. “Specifically what does “in covariate magnitude” mean?”**

**In addition, the Coded Wire Tag Programs that are among the primary monitoring and evaluation programs for stock identification in the harvest, magnitude of harvest on various stocks, etc. Should be brought under this integrated effort to catalogue, make available, critically assess, and improve system wide monitoring and evaluation for fish and ecosystem status. Other projects that should be brought under this overarching projects to provide system-wide monitoring and evaluation include parts of or all of projects # 198810804 (Streamnet), #198712700 (Smolt Monitoring), # 199008000 (Pitagis), #199403300 (FPC) and #199602000 (CSS).**

**Response:** Even though the data layers collected for Tier 1 monitoring are suggested to be treated as censuses (e.g., developed from satellite imagery and presence absence surveys), they are only to be collected every 3 to 5 years. Therefore, they will not capture interannual variation in habitat or population indicators. Habitat indicators are often referred to as “covariates” since they’re often used in statistical models to predict spatial/temporal variation in population indicators. Since the Tier 1 data will be of unknown representative power, it is not wise to build detailed statistical models that depend on the accuracy and precision of the data on a fine spatio-temporal scale. If this is the case, you may then ask, what is the point of these data? Tier 1 data supports coarse scale analyses of LULC characteristics and fish population data, as well as serving as the data to define the sampling universe for Tier 2 data collection programs. For example, has the range of a species of interest expanded beyond the limits of a previously established sampling program?

This proposed project is intended to be overarching only in terms of providing a framework for organizing systemwide monitoring and evaluation information and recommending future M&E activities to inform decisions under the Fish and Wildlife Program and Biological Opinions. Project sponsors do not propose to formally bring other existing M&E projects under this project in the foreseeable future, but rather to coordinate activities with these other projects, and collaboratively improve the systemwide information to aid decision-making. This proposal for a collaborative, systemwide M&E program would provide a framework within which the above listed programs (CWT; StreamNet; Smolt Monitoring; FPC; CSS), or portions of these programs, could operate to monitor and evaluate the life cycle survival of listed and unlisted Columbia basin salmon, steelhead and other regionally important species.

The project does propose to integrate relevant Tier 1, 2 and 3 data from these component programs into a systemwide M&E program, and make recommendations for filling critical information gaps related to key management questions facing the region. With respect to the other projects listed above (StreamNet, Smolt Monitoring, PTAGIS, FPC, CSS), this proposal specifically does not propose to incorporate administration and implementation of these projects, or to dictate individual project M&E actions and protocols. The component projects will need to mesh functionally for a successful systemwide M&E program, which we propose would be best accomplished by close coordination of data collection and analytical activities, recommendations

from the systemwide M&E Oversight Committee and Core Group in a collaborative process, as well as specific interagency work groups (Figure 1). ISRP peer review of major work products from the systemwide M&E project would also be beneficial as guidance to M&E activities of the component projects.

**Action Agency/NMFS RME Group Comments:**

**Planning Group – This project is well written and has several valuable objectives and tasks that are needed by the region. However, most all of the objectives and tasks are currently underway as part of other regional processes and associated contracts or proposals such as:**

**1. The NMFS Biological Opinion and Federal Caucus’ Basinwide Salmon Strategy RME Program;**

The proposed Collaborative Systemwide Monitoring and Evaluation Program builds on the monitoring and evaluation guidelines as developed to date by the NMFS Biological Opinion and the Federal Caucus’ Basinwide Salmon Recovery Strategy. This is indicated by the proposal’s adoption of structure, guidelines, and indicators outlined in the Status Monitoring Guidelines document developed to meet the NMFS BiOp RME requirements (Jordan et al. 2002). The obvious similarity between elements of this proposal and the guidelines document is not an indication of duplication. Rather, it is the application of the guidelines in exactly the manner expected by their authors.

**2. NMFS and USFWS TRT Recovery Planning;**

This proposal does not compete with the Federal process for the NMFS Biological Opinion or other regional processes, rather it provides a mechanism for a collaborative approach to systemwide M&E, sponsored by the agencies responsible for fish and wildlife management in the Basin.

The relationships of NMFS TRTs and USFWS Bull Trout Recovery Planning to this proposal are discussed on pages 16-18 of the proposal. Coordination between the Recovery Planning processes and this project will be essential. The NMFS TRTs will propose delisting criteria, and provide evaluations and M&E recommendations relevant to ESA-listed anadromous fish populations. The proposed systemwide M&E project will go further, however, in that it will synthesize the TRT recommendations with the requirements for salmon and steelhead populations that are not listed, listed resident species (e.g., bull trout), and other resident species of importance. This proposal provides a mechanism for supporting the necessary integration, without which many inefficiencies and duplication of efforts are likely to occur.

**3. The NWPPC’s Provincial Review Process**

The first round of provincial reviews compiled a summary of present goals, objectives, programs and activities. As such, system-wide M&E needs were not addressed. The next round of provincial reviews will be based, to the extent they are completed, on subbasin plans, which include specific local M&E programs. These plans, including M&E, will be developed, however, from the perspective of individual subbasin and will not address all system-wide needs. Indeed system-wide M&E issues are not scheduled to be addressed by NWPPC processes until development of provincial and basin-wide plans – at least three years from present.

**4 (a). Data Protocols and Needs Assessment**

The NWPPC and NMFS have entered a contract with the Scientific Applications International Corp. (SAIC) to assess information needs, existing information management efforts, and to identify options for improving regional information management relative to the needs of the Fish and Wildlife Program and recovery planning under the ESA. The information needs portion of the project consists of a user survey of current information needs. It will not assess nor identify systemwide M&E information needs in a systematic manner. This proposed Collaborative Systemwide M&E Program will systematically identify M&E information needs and will compile much of that information. These products do not duplicate any of the deliverables of the SAIC contract.

The review of monitoring protocols for salmon habitat by Johnson et al. (2001) and similar work for population indicators (in preparation) is an important step in identifying possible methods to improve the consistency and accuracy of M&E systemwide. Actually establishing consistent protocols within existing monitoring programs however requires collaborative discussions by the agencies conducting this work. The proposed Collaborative Systemwide M&E Program will allow such discussions to occur through Interagency Workgroups, and to develop better integrated M&E programs.

**4 (b). Sub basin planning**

The NWPPC has instructed subbasin planners to include an M&E plan to monitor implementation and progress toward goals for each subbasin. The M&E plans will address subbasin needs, but will not address system-wide M&E issues and problems. Indeed, immediate funding of this project could provide a valuable system-wide perspective and advice to subbasin planners. This proposal will enhance the M&E portions of subbasin plans rather than duplicate those efforts.

**5. The Regional Assessment Advisory Council**

The Regional Assessment Advisory Committee was formed for the specific purpose of reviewing and validating the EDT model whose use the NWPPC encourages during subbasin planning. The RAAC has not been given a wider role during subbasin planning and it is likely to disappear at the end of this year. There is no conflict or duplication of this proposal with the RAAC, a group whose expected life can be measured in months.

**6. USFS, BLM, and EPA Monitoring Programs, 7. Oregon and Washington State Monitoring Programs, 8. The Lower Columbia River Estuary Program**

The project proposal, #35033 is not redundant with other monitoring efforts in any other forums. Table 1, clearly shows that the fundamental basis of project #35033 is existing programs including programs by state, tribal and federal agencies. There is no duplication or conflict with these programs, but these programs do form the basis of the systemwide effort described in this project.

**9. The Corps AFEP Program**

The proposal is not redundant with the Corps of Engineers AFEP program. As stated previously, project # 35033 builds upon the existing programs and data collection efforts. In addition the primary emphasis of the AFEP program addresses adult and juvenile project specific passage at

each project. Table 1 describes the M&E responsibilities of regional entities and M&E process in a larger context.

**The NMFS and Federal Action Agencies have developed a draft RME framework that overlaps much of the needs of the Fish and Wildlife Program and other Federal land state RME programs. A regional workgroup session in September 2002 with the formation of an RME Regional Coordination Group is already planned to provide a collaborative process for coordinating these overlapping programs. The state and tribal fishery agencies, CBFWA, USFWS and the NWPPC will be included in the Regional Coordination Group as well as other key agencies for the RME Programs identified above. This coordination effort will include resident fish RME needs under the USFWS BiOp. The work proposed by 35033 would be redundant to these other processes and associated contracts.**

The RME workgroup of the Federal caucus appears to be in early stages of formation. State and tribal participation in the Federal caucuses RME efforts has yet to be offered by the Federal caucus. We believe the September workshop provides an important opportunity for discussions among co-managers but it does not substitute for the regular and on-going coordination envisioned by this proposal.

The BPA review comments indicate that a regional workgroup session is planned with the formation of an RME Regional Coordination Group. We were unaware of such a group prior to submitting the CBFWA M&E Program proposal. We reviewed the document "2000 NMFS FCRPS Biological Opinion RME Implementation Plan Workgroup" on the BPA website to learn more about the proposed scope of work and functions of this group, ([http://www.efw.bpa.gov/EW/FishandWildlifeDocs\\_Post/MainstemSystemwide/RME/rme\\_workgroup\\_02\\_0722.pdf](http://www.efw.bpa.gov/EW/FishandWildlifeDocs_Post/MainstemSystemwide/RME/rme_workgroup_02_0722.pdf)). The June 10th, 2002 version of this document did not mention such a Regional Coordination Group. The July 22nd, 2002 version has only the following brief paragraph on page 3:

"This technical/policy group will provide regional coordination and points of interface between the BiOp required RME program and 1) the Federal Caucus All-H Salmon Recovery Strategy (including NMFS and USFWS TRT recovery planning efforts); 2) other regional Federal RME Programs (USFS, BLM, EPA); 3) regional state RME programs; and 4) NWPPC Fish and Wildlife Program RME (CBFWA, state/tribal fish agencies, Subbasin Planning). This group is planned to form through a regional workgroup session in September, 2002."

It is gratifying to see that BPA recognizes the need for regional coordination amongst various M&E programs. Indeed, their recognition of the need for systemwide coordination somewhat undermines their first comment that the CBFWA objectives and tasks duplicate other programs. Unfortunately, the BPA document contains no detailed description of the responsibilities, tasks and process of the recently proposed Regional Coordination Group. We feel that the CBFWA M&E Program proposal (delivered to the ISRP and NWPPC on June 3rd) provides a much better rationale and description of how collaborative, systemwide M&E should occur. Our responses to the ISRP's legitimate concerns further elaborate on necessary details. The proposed M&E Core Group and M&E Oversight Committee, plus the specific objectives and work products we have outlined, provide much greater assurance that advances in M&E will actually be implemented by the federal, state and tribal agencies who conduct M&E.

**The proposal also appears to duplicate current CBFWA support contract objectives of coordinating the state and tribal fisheries agencies and the region. In addition, funding is proposed for federal and state employees that are already requirements under current programs and activities.**

This proposal requires the participation of experienced senior technical staff from CBFWA. It is true that these people are presently supported by a variety of existing programs. The project sponsors will not over-bill for the time spent on this project by senior staff. Instead, new staff will be assigned an appropriate portion of the duties presently conducted by senior staff so they may produce the deliverables described in this proposal. The work proposed in CBFWA project #198906201 compliments work in project #35033. CBFWA employees (one biologist and one database tech) will assist the regional M&E group with facilitation and coordination. The CBFWF contract and accounting administration is provided through the 12.8% indirect costs on project #35033, as required by BPA. No funds for federal agencies have been requested. The state agencies request is to hire an additional person to perform this work. This work is not covered under other contracts.

### **Endnotes**

1. Decision makers and policy advisors frequently are not comfortable in specifying limits on decision errors. Type I error involves falsely rejecting a null hypothesis (e.g. concluding that there was a trend in abundance when there actually wasn't any). Type II error is the risk of falsely accepting the null hypothesis (e.g. concluding that there was no trend in the population when it was actually increasing or decreasing). Wilson (in Appendix C of ESSA Technologies Ltd. 2002a) summarizes recent literature on the relative risks of these errors and their implications for monitoring endangered species. Lindley et al. (2000) suggest that standard methods, which control for the Type I error rate and accept the resulting Type II error rate are inappropriate when monitoring endangered species. They believe a more logical and precautionary approach is to set the Type II error rate at an acceptably small value that yields a reasonable Type I error rate. Shrader-Frechette and McCoy (1992) note that Type II error leads to possible harm or loss of benefit, respectively. In endangered species recovery activities, if a Type II error is committed, a population could be on its way to extinction before the decline is detected and preventative action is taken. Conversely, if the population is monitored after initiating recovery actions, and the population is actually increasing, a Type II error would lead to the mistaken inference that the actions are not having the desired effect, perhaps jeopardizing continuance of those actions.

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## **ATTACHMENT 1**

### Collaborative Systemwide Monitoring and Evaluation Program (Proposal 35033) Relationship to other Mainstem / Systemwide Proposals

#### **199602000 Comparative Survival Rate Study (CSS) of Hatchery and Wild Pit Tagged Chinook and Steelhead & Comparative Survival Study Oversight Committee**

The smolt to adult return rates developed by this study represent an important source of Tier 2 data. CSMEP would complement the CSS study by providing an integrated framework for cataloging, storing, and displaying these data for basinwide users. The database would also include documentation of data sources and metadata, descriptions of stock life history and habitat characteristics, and links to more detailed biological and habitat information. Agencies comprising the CSS Oversight Committee (WDFW, ODFW, IDFG, CRITFC, FPC) are also represented on the CSMEP Oversight Committee, ensuring close coordination between the two programs. CSMEP would link the CSS data with egg-to-smolt survival information to provide an overall life cycle assessment of stocks of interest for NMFS' Biological Opinion.

#### **199008000 Columbia River PIT Tag Information System 200100300 ISO Adult PIT Interrogation System Installations 198331900 New Marking and Monitoring Techniques for Fish**

These proposals maintain / upgrade the necessary, basic infrastructure required by ongoing PIT tagging projects and provides Internet data access via PTAGIS. As the PIT-tagging and detection system is an established project, there is no need for CSMEP to duplicate the PIT-tag data collection and organization function. CSMEP will assess how limitations in these data affect inferences drawn, explore the potential benefits of collecting complementary data sets, and in general provide a systemwide framework for integrating this important Tier 2 data into existing and new monitoring data to address research and management questions at multiple spatial and temporal scales.

#### **198712700 Smolt Monitoring by Federal and Non-Federal Agencies**

The Smolt Monitoring Program (SMP) provides real time fish passage data (timing, abundance, survival, fish quality) to fishery management entities and the hydroelectric power system managers. The SMP produces important Tier 2 and 3 data in a centralized database, so there is no need for CSMEP to duplicate the data collection and organization function provided by the SMP. However, CSMEP provides a method for integrating the SMP datasets with new and existing Tier 2 and Tier 3 datasets (e.g. basin-specific monitoring) to test large-scale, systemwide hypotheses about population trends and the impacts of management actions. One of the principal agencies involved in overseeing the SMP, the Fish Passage Center, is also on the CSMEP Oversight Committee. This will ensure that efforts are not duplicated and that the two programs complement each other in achieving systemwide monitoring and evaluation objectives.

### **199302900 Survival Estimates for the Passage of Juvenile Salmonids Through Dams and Reservoirs of the Lower Snake and Columbia Rivers**

Like the SMP, the juvenile survival program is a valuable ongoing study and the CSMEP will not attempt to duplicate it. Instead, the juvenile survival estimates represent an input to CSMEP which can be used in conjunction with other new and existing datasets to address questions across different spatial and temporal scales, and different species' life cycles. A representative of the NMFS NWFSC, which operates the juvenile survival program, is also on the CSMEP Oversight Committee and Core Group, to ensure efficient communication and coordination between the two projects.

### **198910700 Statistical Support for Salmonid Survival Studies**

This project fills a specific technical role by providing statistical and software support for the design and analysis of PIT-tag survival studies to the Northwest fisheries community. CSMEP would fulfill a different role by identifying high priority studies to fill existing data gaps. This will include providing guidance on how to design specific tagging studies to produce data that can be address questions at multiple spatial and temporal scales when integrated with other Tier 1, 2, and 3 datasets.

### **199105100 Monitoring and Evaluation Statistical Support**

This project has three elements: 1) provide internet-accessible real-time analyses of PIT-tag data and smolt passage indices to predict outmigration timing; 2) analyses of historical tagging data by testing hypotheses, estimating parameters, and investigating interrelationships; and 3) provide statistical assistance to the BPA and the NW fisheries community. With regard to element (1). CSMEP does not seek to duplicate this data cataloging and display function, but will explore how best to use these data with other existing and new datasets to address questions at multiple scales. With regard to elements 2 and 3, CSMEP does not preclude independent analyses of existing data. However, CSEMP can provide guidance on high priority analyses to address existing knowledge gaps. Most importantly, CSMEP will look at how different analyses can best be integrated into an overall systemwide monitoring and evaluation program for addressing a wider range of research and management questions than can be answered by individual analyses in isolation.

### **35019 Develop and Implement a Pilot Status and Trend Monitoring Program for Salmonids and their Habitat in the Wenatchee and Grande Ronde River Basins.**

This project provides an example of subbasin-specific Tier 1 and 2 monitoring that is carried out throughout the Columbia Basin. CSMEP will work with investigators performing this kind of monitoring to:

- provide criteria for ensuring data quality
- ensure that data collected are consistent with other subbasin-level monitoring being carried out in other watersheds throughout the Basin
- ensure that subbasin-level monitoring produces data that can be integrated with monitoring data from larger spatial scales to address larger scale questions



- distribute the data to systemwide users in a manner consistent with other similar types of data
- identify other high-priority monitoring sites or methods to address gaps in existing data
- work with state and tribal agencies to apply the lessons learned from pilot studies to a systemwide scale

In short, CSMEP will provide an integrative framework that will help the Basin to extract the most information from subbasin-level monitoring programs such as the one proposed here. Participation by NMFS-NWFSC and other agencies doing ground level monitoring in the CSMEP Coordinating Committee will ensure close coordination between these separate but inter-dependent research efforts.

### **35020 Regional Project Effectiveness Monitoring Program for Columbia River Basin Listed Anadromous Salmonids.**

This is a proposal to form a multi-agency team that will work with habitat action sponsors and regional agencies and biologists to implement projects in a statistically rigorous experimental framework. It is focussed narrowly on Tier 3 monitoring (effectiveness) in the area of habitat management. CSMEP has a broader focus, looking at all Tiers and all H's, and therefore can enhance effectiveness monitoring by separating the effects of single actions in specific life stages from effects of management and environmental factors over the entire life-cycle. Thus while there is some overlap between CSMEP and this proposal, CSMEP provides a more comprehensive framework for systemwide monitoring across subbasins and life stages. In addition, CSMEP has already begun to build the multi-agency collaboration required to achieve systemwide coordination, and will provide specific funding for maintaining this collaboration. Proposal 35020 could be coordinated with CSMEP through a CSMEP working group dealing with Tier 3 monitoring of habitat actions. Representation of NMFS-NWFSC (the sponsors of proposal 35020) on the CSMEP Coordinating Committee should reduce duplication and ensure efficient coordination between the two projects.

### **35050 UW Offsite Habitat and Fish Survival Effectiveness Monitoring**

This proposal is similar to 35020 in that it is narrowly focussed on Tier 3 monitoring of offsite mitigation actions. As with 35020, CSMEP offers several advantages over this proposal, including:

- a broader focus to allow separation of effects of single actions in specific life stages from effects of management and environmental factors over the entire life-cycle
  - an already-established multi-agency group for coordinating across tiers and subbasins
  - funding to support multi-agency participation in the Coordinating Committee
- Proposal 35020 could be integrated with CSMEP through involvement of the proposal's sponsors in a CSMEP working group dealing with Tier 3 (effectiveness) monitoring.

### **35016 A Pilot Study to Test Links Between Land Use / Land Cover Tier 1 Monitoring Data and Tier 2 and 3 Monitoring Data**

The proposed work links Tier 1, 2, and 3 data within a single subbasin, and proposes to transfer lessons to other pilot subbasins. This is an example of the kind of pilot study that CSMEP will seek to foster for testing hypotheses across multiple life stages. CSMEP provides a collaborative framework transferring the lessons learned from this pilot study across subbasins, ensuring methodological consistency among similar projects in different subbasins, integrating the data collected in different subbasins into a single, widely-accessible dataset, and using these data to make stronger inferences at multiple spatial scales. Involvement of NMFS-NWFSC in the CSMEP Coordinating Committee will help to ensure coordination between the pilot study and the CSMEP systemwide monitoring framework.

### **198810804 StreamNet**

StreamNet provides the operational infrastructure to manage M&E data over time. This project will cooperate with StreamNet to access existing information and, over time, capture new M&E data, references, and metadata collected as per recommendations of this project. The CSMEP will use recommendations of the NWPPC Information Evaluation and Planning Project and data management advice and expertise from StreamNet and other existing database systems to address tasks 2.2, 3.2, and 4.2 of this project. StreamNet will participate in CSMEP working groups to ensure close coordination between database systems. At the same time this project will identify clear information priorities for the region, which will be used to focus agency and StreamNet information management resources on the most important kinds of information, making them more effective.

### **199601900 Second Tier Database**

This is an ongoing project to provide web-accessibility to regional datasets through the University of Washington's DART (Data Access in Real Time) system. CSMEP will not attempt to duplicate this system, but will supplement it by making other data from Tier 1, 2, and 3 monitoring programs accessible in a similar manner. CSMEP will evaluate the data from DART and other datasets to address management and research questions across life stages and subbasins, identify gaps in existing data and information, and design monitoring programs to address those gaps. Providers of the DART system can participate in CSMEP working groups to ensure close coordination between the various database systems.

### **35048 NWFSC Salmon Data Management, Analysis, and Access for Research Monitoring and Evaluation Programs**

This proposal by NMFS-NWFSC seeks to expand its Salmon Data Management program to include a wide range of other regional data at various Tiers. There is considerable overlap between this proposal and CSMEP, at least in the data cataloging, storage, and display function of CSMEP (CSMEP also includes additional data analysis and systemwide monitoring design functions). It will therefore be necessary for the CSMEP Coordinating Committee to work closely with NMFS-NWFSC to ensure that data cataloging efforts are not duplicated and are

consistent with CSMEP's monitoring and evaluation functions. Involvement of NMFS-NWFSC personnel in the CSMEP Coordinating Committee will help to foster such coordination. In addition, the proposed data management activities should be integrated with the NWPPC-NMFS ongoing work to evaluate Columbia Basin information management needs and move towards a distributed data base management system.

### **35045 Model and Data Information Management System to Assess Effectiveness of Alternative Actions**

This is a proposal to develop a model and data management system and conduct comprehensive, site-specific pilot implementations to the South Fork Salmon and Methow watersheds. The proposal involves collaboration with WDFW and IDFG. The proposed data management system is focussed on Tier 3 monitoring in two subbasins, and thus provides a good example of the localized monitoring effort that CSMEP will seek to integrate with other similar efforts to improve the design of a systemwide monitoring and evaluation plan. As WDFW and IDFG are already involved in the CSMEP coordinating committee, there should be opportunity to maintain close coordination between the proposed project and CSMEP activities. Personnel from the PNNL (the main sponsors of proposal 35045) could also provide specific technical advice to CSMEP working groups dealing with Tier 3 monitoring issues.

### **RM & E Workgroup**

CSMEP will enhance the existing RM & E Workgroup (Jordan et al. 2002) by adding the participation of experts from various entities that are doing on the ground monitoring (i.e. state fish agencies, tribal fish agencies, FPC). The collaborative approach in CSMEP will allow federal agencies to more efficiently acquire existing data from CBFWA entities, complete required M&E activities under Biological Opinions, make necessary revisions to existing M & E methods and programs, and coordinate the design and implementation of new monitoring programs. It will also ensure that revised and new M & E programs consider multiple objectives and potential data applications.

