

Independent Scientific Review Panel

for the Northwest Power and Conservation Council; 851 SW 6th Avenue, Suite 1100; Portland, Oregon 97204

Independent Scientific Advisory Board

for the Council, Columbia River Basin Indian Tribes, and the National Marine Fisheries Service

Memorandum (ISAB&ISRP 2006-4)

June 6, 2006

To: Northwest Power and Conservation Council

From: Nancy Huntly, ISAB Chair, and Eric Loudenslager, ISRP Chair

Subject: Review of the *Draft* Monitoring and Evaluation Guidance Document
(March 2006 version)

In April 2005, the Northwest Power and Conservation Council requested that the ISAB and ISRP (ISAB/RP) jointly review the document, *Draft* Guidance for Developing Monitoring and Evaluation as a Program Element of the Fish and Wildlife Program. The review request noted that, “The Council is not interested in a plan to develop a plan for monitoring and evaluation. Instead we need a monitoring and evaluation plan that is ready to guide the 07-09 funding recommendations and satisfies the following conditions:

1. Does this draft adequately account for and evaluate the current level of monitoring and evaluation in the Council’s program?
2. Does the draft adequately identify priorities for future funding for monitoring and evaluation?
3. If implemented, will this draft provide sufficient information to allow ‘the Council to produce an annual evaluation report of the success of the program in meeting its objectives?’
4. Are the timelines in this plan sufficient to guide current funding decisions for 07-09 projects?”

The Council also requested that the ISAB and ISRP concurrently review a section of the Project Selection Programmatic Issue Memo, version three, that addresses the implementation monitoring and evaluation tasks for the program.

The answers of the ISAB and ISRP to the four questions posed by the Council are below, followed by comments on the Project Selection Programmatic Issue Memo excerpt; overall recommendations for development of an immediately useful monitoring and evaluation (M&E) plan; and general review comments on the Draft Monitoring and Evaluation Guidance Document.

Overall, the M&E Guidance Document under review is an important scoping document that contains ample background material that can constitute a "Guide for Developing a Plan for Monitoring and Evaluation;" however, it does not yet constitute such a Plan, as it does not yet adopt the sharp focus and provide the specific detail needed for application. To become a useful working document, the Guidance document needs to specifically address the Council's four questions, stating the priority objectives for evaluation through monitoring, as well as procedures for evaluating the current status of M&E of those and for implementing needed monitoring to achieve adequate evaluation.

I. Answers to the Council's Four Questions

The answer to each of the Council's four questions is "No." The draft document does not communicate well the existing type and level of monitoring nor does it provide adequate description of priorities, integration, progress, or timelines for a monitoring and evaluation program. Although the draft covers the components of a successful monitoring program, it is very general, diffuse, often redundant, lacks focus, and does not provide adequate information on Fish and Wildlife Program accomplishments, past performance, or specific future timelines.

1. Does this draft adequately account for and evaluate the current level of monitoring and evaluation in the Council's program?

No, it proposes to do so, but has not yet done that. The steps identified in Section III subsection "Point of Departure" could provide an adequate approach to evaluate the current monitoring of the Council's program.

2. Does the draft adequately identify priorities for future funding for monitoring and evaluation?

No. This draft guidance document covers most data collections obtained by monitoring that would be used for evaluation, but there is no section that clearly lays out the Council's priorities. The section describing the Council Staff's suggestions is useful and well focused, but does not appear to be a priority list. The document seems to advocate for monitoring programs to bubble up from the bottom and be comprised primarily of programs that are already underway. Past project and subbasin reviews by the ISRP and ISAB suggest that approach would not be effective; rather, it seems likely to be expensive, inefficient, and inadequately focused and coordinated to serve the purpose of evaluation of the progress of the Fish and Wildlife Program. Further, the document gives little attention to M&E of terrestrial resources and environment, so is not satisfactory for evaluation of program effects on either terrestrial resources (such as wildlife) or terrestrial influences on fishes. Additionally, the document appears to overestimate both what project-level monitoring can accomplish and the ease of achieving broad collaboration in monitoring. Provision of a more specific set of monitoring and evaluation objectives in a revised M&E Guidance Document is most

likely needed to guide development of an appropriately focused and coordinated approach.

The ISAB and ISRP suggest that the Council produce a much shorter M&E guidance document that clearly identifies priority issues, questions, objectives, and general approaches for M&E. Then, the Council could use those stated priorities to solicit proposals and to guide selection from among them of the best, most efficient, concrete plans to construct the needed priority M&E. Although it often seems that using existing projects will be an inexpensive way to build a monitoring program, existing projects may be incompatible or unrepresentative of the range of conditions for which evaluation is sought, making it impossible to draw valid interpretation of the results at the desired scales.

3. If implemented, will this draft provide sufficient information to allow “the Council to produce an annual evaluation report of the success of the program in meeting its objectives?”

Not over the short term. If all the work presented in the draft were completed, the Council could begin to evaluate whether the program was meeting its objectives. However, the likely timeframe for an initial program-level evaluation would be five to eight years. That timeframe would require that standard protocols for EMAP monitoring of population status and habitat condition be in place and operational in two to three years, followed by three years of data collection, and one year of data analysis and report preparation. The resulting three-year window of integrated data collection would be very useful but would not be fully representative of, for example, a particular anadromous fish (salmon, lamprey, etc.) for which survival is known to vary significantly on decadal scales and with ocean cycles.

Monitoring and evaluation of the Fish and Wildlife Program will be a long-term, iterative process, the success of which will depend critically on careful planning to define priority objectives for evaluation and coordinated development of strong experimental and sampling designs that can provide adequate evaluations. Annual reports that incorporate information from such focused, well-designed monitoring efforts will play important roles in continuing development of the M&E program and will inform adaptive management. The current draft Guidance document discusses monitoring scales and purposes but does not give adequate attention to specific applications of monitoring in the Fish and Wildlife Program. This limits its use in developing the sampling designs and database that would enable annual evaluation reports. Additionally, it seems very unlikely that the current data collection would address all evaluation needs and wants. Priorities for evaluation should be stated, and whether or not sufficient monitoring is in place to provide this evaluation should be determined in the Guidance document.

Based on professional experience, including experience in review of Fish and Wildlife Program projects and Subbasin Plans in the Columbia River Basin, the ISRP and ISAB believe that it is unrealistic to assume that rigorous monitoring schemes, or

adequately coordinated monitoring programs, will be devised by all of the many project proponents and action agencies that play a role in the Fish and Wildlife Program or in other related activities in the Columbia River Basin. A Program-sponsored monitoring team could be very useful in implementation of an M&E program. The roles of a central monitoring team could include providing advice to projects and to the Council on appropriate monitoring for both projects and the larger Program goals, selecting common monitoring protocols, overseeing data collection and incorporation into larger data and meta-data sets, assisting in design of coordinated wide-scale monitoring to evaluate Program progress at higher levels, and providing quality control and interpretive consultation. Such a common monitoring support group, if well implemented, should significantly increase the quality of M&E of many individual projects as well as the ability of these projects to contribute to larger-scale monitoring and evaluation. Such a group also could be a first step in developing the coordinated regional approach that the M&E Guidance document envisions and deems necessary for many evaluation needs.

4. Are the timelines in this plan sufficient to guide current funding decisions for 07-09 projects?

No. Several critical shortcomings in the current draft document cause it to fall short of providing guidance for the current funding decisions. First, the document needs considerable revision to be sufficiently clear and focused to be useful. Second, the current draft does not sufficiently clarify priorities, which are needed for the document to guide decision-making. Third, since the 07-09 solicitation cycle is well underway, it seems unlikely that the current M&E document can be used in any significant way in evaluation of and selection among project proposals for 07-09. Additionally, the assessment work that is described in the document will take some time to complete. For instance, in the “Point of Departure” subsection, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP), Collaborative Systemwide Monitoring and Evaluation Program (CSMEP), and the Workgroup are assigned eleven tasks to complete as part of a review of the Mainstem & Systemwide projects. Given the depth of treatment required for each of these topics, and that many projects beyond the Mainstem/Systemwide pool contribute to monitoring for evaluation of the Program, it is unlikely that a complete assessment can be accomplished within the 07-09 solicitation. Similarly, Table 1 identifies that during the 07-09 project selection process for Hydrosystem Survival, an unidentified group will review the current smolt monitoring program, review adult PIT tag detection needs, and coordinate with Corps-funded components. The first two tasks are not known to the ISAB and ISRP to be underway at this time. Perhaps these tasks could be completed over the summer, or perhaps not. The draft provides no evidence on which to base an answer.

II. The Project Selection Programmatic Issue Memo, version three

The transition memo excerpt addresses the implementation of monitoring and evaluation tasks for the program and appears to outline the Council's plan for transition to a new, more integrated, regional M&E approach. The ISRP and ISAB believe that the decision to move to a larger-scale and more-integrated approach is good but that it is likely that more guidance is needed from the Council as to priority issues and approaches in order to move effectively to such an approach. Although the transition memo includes some guidelines that would be useful for the review and selection of the 07-09 proposals, it is very late in the process to attempt to effectively implement these guidelines. Proposals were prepared without them, and initial scientific review has been conducted without them. In the meantime, the programmatic memo could briefly summarize continuing problems with monitoring that are to be addressed in the revised M&E guidance.

The ISRP review criteria include attention to provision for M&E, but higher-level monitoring needs are not yet well dealt with in project selection. However, without a clear statement of the Council's monitoring priorities (particularly the priorities for regional coordinated monitoring but also the level desired for individual projects of various types) use of the memo by the ISRP in the 07-09 project selection is limited. In some cases, the memo states clear expectations of Council for monitoring programs (e.g., Section 3, Population status and trends; Section 2a, Watershed condition data). But, many sections of the current memo specify what Council will do (future tense) to establish monitoring goals or standards, and many monitoring questions that must be addressed during the ISRP's project review are not directly addressed (e.g., what fundamental evaluation is sufficient for what types of projects), so the utility of the memo in project selection seems mostly to be in the future.

The preliminary staff recommendations imply that the components of monitoring that are needed to evaluate the Fish & Wildlife Program have been defined. If so, they need much more clear articulation in the M&E guidance document. Although the transition memo names important "whats" to be measured, it does not sufficiently present the "whys" (the objectives to be evaluated), which are needed for effective design of monitoring approaches. Many of the sections are strongly oriented towards data collection, but sampling design is a critical concern for integrated regional M&E and is not a clear part of most sections of the memo. Additionally, contradictions between the transition memo and various parts of the M&E guidance document should be resolved before the M&E guidance document is finalized and implemented.

Additionally, the ISRP and ISAB strongly support the memo's endorsement of giving priority to production of an on-line peer-reviewed journal, an integrated regional evaluation of supplementation, and an annual report summarizing data for high-level indicators (but see comment below on high-level indicators).

III. General Recommendations on M&E Guidance from the ISAB and ISRP

To be effective, an M&E Guidance document should be much shorter and more to-the-point. It should clearly state monitoring and evaluation objectives, including a list of current priorities for evaluation and an implementation plan that includes at least the sequence in which the desired M&E should be implemented. Much as was the case for the Research Plan that the ISAB and ISRP reviewed in Fall 2005, a short (roughly 10 to 15-page) document that is effectively an Executive Summary/Plan, with other details as appendices, would likely suffice and be most accessible to users.

- Make this a short, concise, framework document, focused on articulation of the priority M&E needs.
- If the purpose of the M&E guidance is to outline the framework of a basinwide monitoring program, as appears to be the case, then make the Guidance document focus purely on monitoring to evaluate specified goals and objectives and limit discussion of research to a section that briefly addresses the interaction between the monitoring and research plans.
- Review and incorporate recommendations from the numerous ISAB and ISRP reports that have addressed monitoring.
- Include as priorities the initial steps in development of a monitoring program that are stated in the Research Plan (quoted below from *ISRP&ISAB 2005-20 Part 2*). These could serve as first steps in implementing and coordinating regional M&E.

Some priority research topics require a monitoring program for answers. For example, supplementation has significant critical uncertainties that require extensive and coordinated monitoring to resolve (ISRP and ISAB 2005-15). This can be addressed by coordination of supplementation projects across the Columbia River Basin so that, in aggregate, they constitute a basinwide adaptive management experiment that includes un-supplemented reference streams. Thus, an initial monitoring and evaluation priority will be to address the critical uncertainty:

1. What are the range, magnitude, and rates of change of natural spawning fitness of integrated (supplemented) populations, and how are these related to management rules, including the proportion of hatchery fish permitted on the spawning grounds, the broodstock mining rate, and the proportion of natural origin adults in the hatchery broodstock?

Additionally, the ISRP Retrospective Report (ISRP 2005-14) identified three steps to build a foundation to address critical monitoring needs of the Fish and Wildlife Program, as well as to support the coordinated monitoring and evaluation needs of other regional research and management programs. These form three additional monitoring and evaluation priorities for this Plan:

2. Develop, cooperatively, common probabilistic (statistical) site selection procedures for population and habitat status and trend monitoring.

3. Develop a sound trend monitoring procedure based on remote sensing, photography, and data layers in a GIS format.

4. Develop empirical (e.g., regression) models for prediction of current abundance or presence-absence of focal species concurrent with the collection of data on status and trends of wildlife and fish populations and habitat.

- Develop a geographic database of all proposed monitoring programs for all species, watershed by watershed, using a GIS, and use this to check for overlaps and for problematic omissions.
- Strongly support Intensively Monitored Watersheds, adding a lower Columbia site with an estuary component, such as Grays River.
- Give high priority to development of a web-based escapement database.
- Consider sponsoring a monitoring team to provide expert support in implementation of an M&E program.
- Reorganize the current M&E Guidance document by reducing it to elements that address the objectives that the questions from the Council imply are its core content:
 - 1) Introduction and Statement of Purpose: objectives of the Fish and Wildlife Program, role of M&E in evaluating success in meeting those objectives, need for coordinated regional M&E, relationship of M&E and Research Plans;
 - 2) Goals and objectives to be given priority for monitoring to enable evaluation of the Council's Fish and Wildlife Program (what is to be monitored and for what purpose, the core of an M&E Guidance document or Plan), which can be cast in much the same form as the Research Plan was;
 - 3) Process for inventory and evaluation of current M&E in the Council's program (establishing the current baseline of M&E);
 - 4) Procedures for implementing the M&E priorities stated in section 2, through modifying ongoing M&E, soliciting specific new projects, and selecting among project proposals;

5) Procedures for analyzing monitoring data to produce an annual evaluation of the success of the Council's program.

IV. General Comments on the Draft M&E Guidance document:

Focus and Purpose of the Document:

To be useful, the document needs to be shorter and more focused on only the necessary steps for establishing an effective monitoring program. The guidance document should state, with brief rationale for each, basinwide and regionwide monitoring objectives. Setting these objectives, and emphasizing the basis for their priority, is the most important element for providing guidance to implement wide-scale M&E. The specific program elements cannot be determined without clear objectives to be evaluated. There are many examples of monitoring programs that have collected extensive data that were never used because the questions these data were supposed to address were not established at the outset of the program.

The first two sections of the current document are overly philosophical and not sufficiently focused on the concrete problems to be addressed. They also include extensive repetition that should be eliminated. For instance, the "why monitor" question is addressed over and over in various forms but need be addressed only once, succinctly, in an introduction.

The introductory material should briefly present an argument for a coordinated and integrated broad-scale monitoring plan with guidelines for data collection, analysis, dissemination, and adaptive management. The rationale for the program should make this problem the centerpiece of this section, but it is obscured by a large quantity of information that has little bearing on the problems associated with the lack of a coordinated monitoring program. The needed material is probably present within the current draft, but it is too diffuse to be clear. Basically, the evaluation of individual projects does not necessarily result in evaluation of overall Program success at larger spatial scales. Currently, there is no reliable method for extending project-level monitoring results to larger spatial scales. The monitoring Guidance document should provide the framework for solving this problem through development of a monitoring program for evaluation of the ultimate biological goals of the Fish and Wildlife Program, which are realized at larger landscape scales.

The document discusses a shift in monitoring focus to larger spatial scales, but the actual monitoring actions will still be implemented at local scales. For instance, responses of habitat and fish to the placement of wood in a stream channel must be assessed at the project site. The trick is to devise a system whereby such monitoring information is collected in a consistent, statistically valid manner that, ultimately, enables the determination of changes over time in key variables at larger spatial scales. The project-level monitoring is not replaced by subbasin-level monitoring, but data are collected in a more coordinated way and at a specifically chosen set of sites to enable

interpretation of responses at multiple spatial scales. This point should be made very strongly and provides a compelling argument for the coordinated efforts that the document seeks to inspire. The need to understand cumulative effects similarly argues strongly for development of coordinated M&E.

Section 2 should provide a brief summary review of where we stand now. What do the various projects (e.g., PNAMP, etc.) do, and how do they fit together? What are the relevant ongoing monitoring efforts of the Fish and Wildlife Program and others? What are the main monitoring needs of the Fish and Wildlife Program, and how do the existing programs address them?

Sections 3 and 4 of the draft document are not sufficiently clear but contain material that should form the core of the document. For instance, on pages 20 – 25, the steps needed to identify and select projects to achieve program objectives and the staff recommendations are well organized and are a good beginning to specification of a short list of M&E objectives, specification of priorities within these, and development of an implementation protocol.

Statement of the subbasin, basin, and region-wide monitoring questions or objectives of the Council should form the core of this document. That is what is needed to guide the effective proposal solicitation, presentation, and selection by which an effective integrated M&E agenda can be implemented. Setting these objectives, and emphasizing the basis for their priority, provides the central guidance for wide-scale M&E. A clear understanding of the objectives is needed in order to identify what to measure and how to measure it.

Needed Background on Ongoing M&E

The current document requires some assumed knowledge of the activities of the numerous agencies and researchers involved in monitoring and evaluation in the Columbia River Basin, ongoing projects, regional M&E programs (e.g., PNAMP, CSMEP, NED, IMWS, State of the Salmon, etc.) that should be included explicitly in the document so that it is broadly understandable as a stand-alone source of guidance for M&E. Early in the document, a brief section (which might simply summarize and interpret the content of a table of the more detailed information) should list regional M&E programs and briefly state the functions of each and how they relate to one another. Then, the document should state clearly how the Council's Fish and Wildlife Program will coordinate and collaborate with each of the above ongoing regional monitoring programs.

The document should explain what the ongoing monitoring programs do, how they fit together, and how they cover the landscape of monitoring needs. This will likely require inventory and analysis that has not yet been done so may have to be part of the implementation plan for transition to the more regional, integrative, and collaborative monitoring that the Guidance document invokes. Some of the tables in the appendices contain relevant details on this topic, but the conclusions that are drawn from this

information should be summarized briefly in the main body of the narrative. For instance, how successful have PNAMP and NED been in establishing common protocols so that comparisons can be made? What progress has been made in implementation of effective monitoring programs and in evaluation of progress in the Fish and Wildlife Program?

Appendices

Appendix A is extensive and includes more monitoring objectives than can be immediately addressed and evaluated. The objectives are cast as Management Questions that vary greatly in generality-specificity and as more-specific subordinate questions. As was the case with early drafts of the Research Plan, these questions should be refined to a much more focused list of key questions that constitute the current M&E goals and objectives. A smaller subset should be identified as the current priorities for evaluation. It is this shorter list of M&E objectives that should constitute the M&E Guidance for near and mid-term implementation. As with the research plan, an effective M&E Guidance document will be a working document that appears in iterations that each have a moderate (6-10 year) active lifespan. Although many specific monitoring programs will be long-term, their implementation will have to be prioritized and phased. As projects and programs are evaluated and management questions answered, priorities will evolve, dictating that the document be revisited and updated to reflect current knowledge and priority areas where evaluation is needed.

The material in Appendix A also needs to be supplemented with at least three more columns: 1. where are the data stored and are they accessible; 2. who is actually collecting the data; and 3. when did the data collection start and is it continuing?

Selection of Priority Indicators

The draft Guidance document indicates that the high priority indicators that will be collected consistently include water temperature, benthic macro-invertebrate assemblages, passage, flow, large woody debris, sedimentation, dissolved oxygen, nutrients, stream morphology, and species functions and redundancy. To collect information on all these attributes would be very expensive and so would limit the number of sites at which data could be collected, which could be a counterproductive trade-off. The relationship of some of the variables to program objectives is also somewhat suspect. To enable long-term and broad-scale monitoring and evaluation of even the highest priority issues in the Fish and Wildlife Program will require that the list of “required indicator variables” be relatively short, consisting primarily of attributes that are easy to measure consistently and are revealing of or good proxies for the ultimate biological objectives that are to be evaluated. Additionally, some of the variables that are more exotic or more expensive to measure should be collected only at sites where this information is key to answering the specific questions being asked at that location.

High-level Indicators (and Creation of New Terms and Jargon)

The document did not make a good argument for high-level indicators, and the use of this term was confusing and distracting rather than helpful. The document states that standard methods of data collection are needed so that data can be used at both local (site or reach) and larger (subbasin, province, or Basin) scales. In this situation, “high-level indicators” are simply metrics that are calculated using data from many sources; there is nothing special about them. These are just data collected at sites but analyzed across broader spatial scales than a reach or watershed. It is appropriate to discuss any special needs to accomplish such roll-up of data, and experimental or sampling design will be one such critical element that is given little attention in the current document, but new “indicators” are probably not needed and should be avoided to keep the document and planning process as simple as possible. If “high-level” indicators are to be developed, the process should be considered elsewhere.

Similarly, programmatic scale monitoring is not defined, and it would be better simply to avoid use of such jargon. It is not helpful.

Intensively Monitored Watersheds

Focusing on the IMW watersheds for assessing response to habitat projects is a good idea. However, to understand whether the responses observed at the IMWs are applicable to other locations in the basin, the IMW work needs to be coordinated with monitoring efforts occurring at locations outside of IMWs. The linkage between IMW studies and basinwide monitoring should be planned and discussed.

Design of Effective Monitoring Varies with Objectives to be Evaluated

In many places, the draft Guidance document, which gives appropriately strong weight to developing shared high-quality measurement protocols, seems to skip over the first critical step in each monitoring program, which is the sampling or experimental design. For instance, page 19 refers to a network of monitoring sites, indicating that locations would be established where measurements would be taken repeatedly. This approach is appropriate if the objective is to examine a trend in conditions through time. However, it is not the best approach to use if a characterization of conditions across the basin is the goal. Some monitoring efforts have attempted to develop a hybrid monitoring system where a subset of sites is monitored repeatedly while other sites are visited much less frequently, or only once. Whether this approach will meet the objectives of the program cannot be determined until a set of objectives are developed. Similarly, the document often invokes a before-after (BA) or Before-After-Control-Impact (BACI) sampling/analytical design, but these designs assume a hypothesis-testing, research framework that is not always the best approach and may often be of very low statistical power or very expensive to implement.

Monitoring to Evaluate Cumulative Effects

The need to understand cumulative effects argues strongly for development of coordinated M&E and also provides rationale for project selection to make such coordinated efforts. During the recent ISRP review, there appeared to be no projects dealing with evaluation of cumulative effects, but several watershed projects had the potential to evaluate them, because the proponents had a study design that might be amenable (e.g., a network of sites on multiple tributaries, the estuary). A suggestion would be to mold such projects into aggregate studies with a monitoring design that provides evaluation of cumulative effects, a needed element of programmatic evaluation.

Need for and Value of a Central Monitoring Support Team or Unit

In its review of 07-09 proposals, the ISRP suggested establishment of a statistical design and analysis support facility to provide input for the projects that have limited statistical expertise. Such a facility would answer questions about design and analysis and provide workshops on statistical topics of common interest in the Fish and Wildlife Program. The capabilities of a statistical support facility could play a large role in developing sampling designs for the higher-level evaluation that is the focus of the M&E Guidance document.

Funding

The funding discussion should be taken out of the plan. Issues like the inconsistencies in agency and BPA funding cycles are important in terms of implementation of the program, but including such administrative issues in this section distracts from the discussion of the required program elements. Non-technical issues such as this perhaps could be included in a brief section on implementation.

Coordinated Actions with Focused Funding to Evaluate Restoration at Large Scales

The following discussion highlights an issue that requires more consideration in developing program-level M&E Guidance. It is meant primarily to stimulate further discussion about the organization and implementation of monitoring to evaluate the Council's Fish and Wildlife Program.

One of the problems with existing M&E efforts is that they are focused almost exclusively at the project level. Often a monitoring requirement is attached to restoration projects, and project managers must show that enhancement or restoration work of some type has actually been done. However, demonstration of population benefit often is not required, and it often is not possible to attribute population changes to site-level projects. To demonstrate population response, the minimum feasible monitoring scale is likely to be much larger, often the subbasin or major watershed (HUC-6 or larger). Yet monitoring populations at these larger scales can be time consuming and expensive, and to date the most promising attempts have been the Intensively Monitored Watersheds

(IMW) in Washington. For the most part, however, these sites are limited to Washington State with only a subset being in the Columbia Basin.

Additionally, there are ecological and institutional barriers to conducting watershed-scale effectiveness monitoring. Environmental factors limiting a population can shift from year to year; for instance, a severe flood may impair reproductive success in one year, while a drought may limit summer rearing space or food resources in another. The intensity of intra- and interspecific competition varies. For instance, it can be influenced by run sizes of anadromous fishes. An assessment of limiting factors can be based on incorrect information or on assumptions that are based on outdated data. It may be difficult or impossible to implement a set of similar restoration treatments at key points in a watershed because ownership issues. Finally, a commitment to long-term population monitoring requires extraordinary dedication by the responsible monitoring agency – a dedication that involves continued, stable funding and staff that understand the value of long-term data.

Organizations often allocate funds to monitoring so that no areas appear to be excluded from funding. Although this approach is useful for implementation monitoring (was the project successful at implementing whatever restoration action was to be taken?), it does not directly address the larger questions of how the abundance, population growth rate, spatial structure, or diversity of a target species have changed at the watershed scale. A better approach to answering these latter questions would be to (1) conduct a thorough limiting factor analysis of the watershed, (2) identify a restoration action that improves one or more of the most important limiting factors, (3) apply that action at a number of locations within the watershed, in sufficient quantity that the limiting factor will be significantly addressed, and (4) monitor the target population (e.g., for an anadromous fish: adults in, smolts out) for a time period long enough to detect a real response.

The strategy of spreading monitoring funds evenly across a large area may be the most politically equitable approach, but it is not a scientific strategy. And it may not be an effective means of learning how well restoration programs have worked. Instead, a strategy of focused, intensive, long-term population studies carried out at selected watersheds where restoration treatments can be applied in a coordinated fashion would require developing a regional network of controlled watershed restoration studies. Implementation monitoring can still be carried out wherever restoration is attempted, but the evaluation of restoration effectiveness may be best served by concentrating our efforts in fewer locations. The question of how long “long-term” should be is still a bit uncertain, but most analyses of salmonid population variability suggest that a minimum of about five salmon generations (20-30 years) is required for reasonable statistical confidence.

General Editorial Concerns

The draft guidance document would require significant editing to be accessible and useful. The current draft is unnecessarily wordy, making it easy for the reader to get lost and to lose the central points. Extensive duplication in the various sections should be reduced or eliminated to make the document clearer. The redundant presentation also includes some apparent inconsistencies among sections. For example, section IV relates some of the ISRP ideas about the organization of an M&E plan, but some of this information seems to contradict statements made earlier in the draft. Text on the more philosophical dimensions of monitoring is largely unnecessary. Although the document contains a lot of useful material, it is not as accessible as it should be because the report is overly long, repetitious, and not organized to tell a coherent and clearly reasoned story.

The overall organization of the report needs improvement, and the ISRP and ISAB have suggested above a format for reorganization around topics covered in the Council's review questions. Additionally, the final document must be consistent in style, progression, and level of aggregation. Headings and subheadings that organize the document serve to help the reader stay on track, and they must form a logical path to do so. Currently, the report structure doesn't address clearly the implicit structure of the Council's four questions, which would be: What are the objectives of M&E within the Fish and Wildlife Program? How will we evaluate Fish and Wildlife Program success? What are the M&E priorities? What M&E exists? What are the timelines for M&E program development? Reorganizing the document around these categories would give it a more logical progression. In combination with some good editing, these changes will produce a document that can provide useful guidance for development of a basinwide M&E program.