

FINAL REPORT ◦ DECEMBER 2013

# Monitoring Investment Strategy for the Salmon Recovery Funding Board



P R E P A R E D   F O R

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Cover photo: Smith River, Oregon; Chinook Salmon; Nisqually River, Washington; Longfellow Creek, Washington

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# 1 INTRODUCTION

The purpose of this report is to provide an independent review of the existing monitoring strategy of the Salmon Recovery Funding Board (SRFB, or “the Board”) and to offer recommendations and alternatives that could improve and update this monitoring strategy. This work has been carried out by scientists from Stillwater Sciences (Drs. Jody Lando and Derek Booth) and Cardno/ENTRIX (Stephen Ralph), under contract to the Governor’s Salmon Recovery Office (GSRO), an agency created by the State Legislature in 1999 and presently within Washington State’s Recreation and Conservation Office (RCO). This review was developed in coordination with RCO and GSRO staff and was based on reports and prior reviews of the monitoring of salmon-recovery efforts in Washington State since the late 1990s (Appendix A); conversations with multiple stakeholders and participants in salmon recovery at local, state, and federal levels (Appendices B and C); and our own familiarity with monitoring principles in general and the State’s recovery efforts in particular.

## 1.1 Background

The SRFB Strategic Plan (Washington State Recreation and Conservation Office, n.d.) articulates three overarching goals for the work of the Board: funding the best salmon-recovery efforts (Goal 1), maintaining accountability (Goal 2), and promoting public support for salmon recovery (Goal 3). Monitoring activities are primarily embraced within Goal 2:

*“Be accountable for board investments by promoting public oversight, effective projects, and actions that result in the economical and efficient use of resources.” (p. 2 of the SRFB Strategic Plan)*

With respect to the Monitoring Strategy, this goal is further expanded:

*“Monitoring Strategy: Provide accountability for board funding by ensuring the implementation of board-funded projects and assessing their effectiveness, participate with other entities in supporting and coordinating state-wide monitoring efforts, and use monitoring results to adaptively manage board funding policies.”*

This goal invokes four themes—that of promoting the *effectiveness* of Board-funded activities (which is also the primary focus of Goal 1), demonstrating *accountability* for the expenditure of public funds in pursuit of salmon recovery, working *collaboratively* with other entities to support monitoring, and embracing the principles of *adaptive management*. These themes are interrelated, because ultimately the most compelling justification for taking action is that it produces the intended outcome and materially improves future actions.

Several challenges, however, complicate the simple execution of any monitoring program that seeks to demonstrate effectiveness and accountability, and that works collaboratively to achieve meaningful changes to resource management as a result of its findings. These challenges are best recognized at the outset of any program evaluation such as this one:

- The SRFB is not the sole supporter of salmon-recovery efforts in Washington State, and it also cannot influence some of the greatest recognized determinants of both local and regional salmon populations (e.g., hydropower, hatcheries, land use).
- Individual entities have distinct missions and information needs, and so satisfying the monitoring needs of one will not necessarily address the needs of all. Even though collaboration amongst regional monitoring programs is essential to make best use of practitioners' expertise and the value of measurements, imposition of uniform metrics and protocols (the most common implementation of "collaborative monitoring") rarely benefits all parties equally.
- "Effectiveness" is multi-scalar; even an "effective project" (i.e., one that meets all of its site-specific objectives) may not result in any demonstrable progress in salmon recovery at basin, regional, or statewide scales.
- Most actions, even if fully successful, take many years to produce a measurable response, commonly exceeding the planning horizon (and patience) of most public agencies.
- "Accountability," although ultimately determined by the effectiveness of actions and expenditures, also depends on clear messages that are widely distributed and easily understood by the public. These are not elements normally articulated as goals or specific objectives of a monitoring program.
- Adaptive management, the realigning of a program's goals and actions as a result of outcomes (particularly those that are "unexpected" or "undesirable") requires a deliberate management structure, including explicit feedback loops and mandatory (re)evaluations of planned trajectories, that is uncommon in most public agencies.

With this context, we now offer the details of the scope, approach, and findings of this review.

## **1.2 Scope of This Evaluation**

The original Request for Proposals issued by the RCO in January 2013 specified eight tasks to be accomplished within the scope of this project:

- Task 1. Review the three primary components of the current monitoring strategy used by the Board and assess their effectiveness in meeting the goals of the program.
- Task 2. Evaluate the monitoring components of the seven regional recovery plans and determine which of these components are appropriate for Board funding.
- Task 3. Evaluate how information on the results of monitoring is presently exchanged.
- Task 4. Evaluate how the current Board monitoring fits into the monitoring in Washington being conducted by federal agencies.
- Task 5. Evaluate the current monitoring funding and allocation methods used by the Board, and assess whether the funding for the three primary components is at the appropriate levels.
- Task 6. Evaluate whether (and how) a portion of the monitoring funding should be reserved for alternative methods for allocating funds.
- Task 7. Evaluate the pros and cons of adding additional effectiveness monitoring project sites.
- Task 8. Work with a Steering Committee to be established by RCO.

These tasks and discussions with the steering committee members on March 18 and May 6, 2013, developed into a workplan (Lando et al. 2013a) to structure this assessment. The overarching focus of the review anticipated by this workplan, and the bulk of our subsequent efforts, has centered on Task 1—an evaluation of the three primary components of SRFB-funded monitoring. The three components, as articulated in the SRFB Strategic Plan (p. 4 of the Plan), are as follows:

- Conduct monitoring to determine the *effectiveness* of different types of Board-funded restoration and protection projects in achieving stated objectives.
- Participate in supporting *status and trend* monitoring.
- Support validation monitoring of selected *intensively monitored watersheds* to determine whether watershed health and salmon populations are responding to recovery efforts.

The Strategic Plan also supports “implementation (compliance) monitoring of every board-funded project to ensure the project has been completed consistent with pre-project design objectives and criteria,” but this monitoring component was not included in the scope of this review. A separate review of the implementation compliance process is currently being conducted by the RCO/GSRO, Washington Department of Fish and Wildlife (WDFW) and TetraTech.

The three monitoring types highlighted in the Strategic Plan are commonly defined in various agency reports of the last decade as follows:

- *Effectiveness monitoring*, here meaning the evaluation of the local effects (both physical and biological) of a project on its immediate surroundings.
- *Intensively monitored watersheds (IMWs)*, the term given to an integrated suite of monitoring efforts at multiple scales within the same watershed (or set of watersheds), designed to reveal any cause–effect relationships between restoration actions in those watersheds and fish populations.
- *Status and trends monitoring*, which in the context of SRFB-funded efforts is focused on enumerating the passage of fish in and out of the major river systems of Washington State on an annual basis.

In addition, there are several other types of monitoring that are commonly recognized, but which are *not* included in this review:

- *Implementation (or compliance) monitoring*, which evaluates whether a project (or other action) was implemented as intended.
- *Status and trends monitoring* can be used to evaluate conditions of stream habitat and watershed land cover over time, in addition to evaluating trends in fish populations. The former application is not routinely funded by the SRFB.
- *Validation monitoring* is a term used in a variety of contexts: to evaluate more local scales of effectiveness of restoration efforts (i.e., equivalent to status and trends monitoring of regional fish populations) (King County Water and Land Resources Division), or to validate assumptions, models, and methods in a research context (Snohomish Basin Salmonid Recovery Technical Committee; Oregon Watershed Enhancement Board). However, this term is also used as a synonym for the SRFB-funded IMW programs (e.g., in documents from PNAMP).

The three components of SRFB-funded monitoring (effectiveness, IMWs, status and trends) have been described as the Board’s “three-legged stool” for monitoring, and the majority of articulated tasks for this review relate to this framework. The results of our work are thus organized primarily by these three monitoring types; however, a number of issues related to SRFB-funded

monitoring cross-cut these categories (as do several of the secondary tasks of the Work Plan), and so our presentation and discussion of results does not follow this organization in all respects.

### 1.3 Primary Components of the Current Monitoring Strategy

The *Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery* (Volume 2 of 3, December 2002; [http://www.rco.wa.gov/documents/monitoring/Comprehensive\\_Strategy\\_Vol\\_2.pdf](http://www.rco.wa.gov/documents/monitoring/Comprehensive_Strategy_Vol_2.pdf)) established the three-fold framework for all natural resource state agencies, one that has persisted to the present day. It was advanced to answer questions raised by the two articulated goals of the Comprehensive Monitoring Strategy, “Measure changes, in terms of scientific certainty, in wild salmon populations in terms of abundance, diversity, and geographic distribution and their causes due to trends in effects of harvest, hatcheries, ocean conditions, ecological interactions, and large hydropower”; and “Measure changes, in terms of scientific certainty, in water quality, water quantity, watershed health, salmon habitat, and their effects on salmon.”

To implement this framework, alternative approaches were originally considered. Given the recognized shortcomings of local, disparate evaluation of projects, a centralized approach to **effectiveness monitoring** (see above definition) of projects at the reach scale was implemented in 2004 based on a contracted report submitted to the Board by Taylor and Associates (2003), through recurring annual contracts with TetraTech EC Inc. Projects were randomly selected for long-term (typically, 10 years) monitoring across the state after being stratified into nine categorical “types”, with a variety of physical and biological metrics in the locality of the project itself being collected on an annual, biannual, or less frequent schedule as determined by the project type and age.

The **intensively monitored watersheds** program was first funded in 2005 and included the four watershed complexes presently monitored today with Board funding: selected areas of the Strait of Juan de Fuca (SJF), Hood Canal (HC), Lower Columbia (LC), and the Skagit River estuary. An IMW is defined as a “watershed-scale coordinated restoration effort with an associated effectiveness monitoring program implemented in an experimental fashion to maximize the ability to detect fish responses to changes in their habitat” (Desgroseillier et al. 2011). As stated in the Comprehensive Monitoring Strategy (Crawford et al. 2002), “The common theme of these studies is to develop an understanding of the linkage between management actions and the resource” (p. 22), accomplished by monitoring a variety of physical and biological parameters at multiple spatial scales, with the intended concurrent implementation of sufficient habitat-restoration projects that measurable effects on salmonid populations could credibly be expected to occur within about a decade. In 2006 the Independent Science Panel (Currens et al., 2006) conducted a review of the IMW program.

The third element of Board-funded monitoring, **status and trends (also called “fish in–fish out”) monitoring**, was an original element of the Comprehensive Monitoring Strategy (Crawford et al. 2002), with SRFB funding for juvenile monitoring starting in 2001 and the Fish In/Fish Out program starting in 2007. It remains primarily a Department of Fish and Wildlife-funded program, whose “...basic objective is to estimate fish populations, generally at the ESU [evolutionarily significant unit] scale, and to track indicators of habitat, water quality, water quantity, and other factors that impact wild fish.” The SRFB has contributed limited (<10%) funding to this program for most of the past decade, but the focus has been almost entirely on the first dimension of such monitoring (i.e., smolt counts) rather than on the tracking of habitat “...and other factors that impact wild fish.”

## 2 EVALUATION OF THE THREE BOARD-FUNDED MONITORING COMPONENTS

### 2.1 Evaluation Approach

Our evaluation of the monitoring components emphasized four criteria, based on the underlying goals for monitoring as articulated in the SRFB Strategic Plan:

1. What has been accomplished by SRFB-funded activities?
2. Have the monitoring results been used to inform future management decisions?
3. What is the time frame for generating new information useful for management; can monitoring results actually be used/useful?
4. Does the monitoring support a regional context to enhance the interpretation of other monitoring results?

To accomplish this evaluation, we used a variety of approaches: specifically, reviews of documents (Appendix A), structured interviews with key stakeholders and others with long-standing knowledge of salmon-enhancement monitoring in Washington State (Appendix B), and three face-to-face meetings with the RCO-convened Steering Committee for this project (Appendix C).

### 2.2 Findings

We have organized the presentation of our findings by the three monitoring components evaluated here (effectiveness monitoring, IMWs, and status and trends monitoring). We consider each component in two ways:

1. A descriptive evaluation, using the four criteria listed above; and
2. A numerical rating, structured around the SRFB themes (see Section 1.1) and informed by the above four criteria.

Although we recognize that each criterion does not equally apply to each monitoring component, the set does provide a systematic, structured framework for highlighting what should be the key issues for any monitoring program. We also recognize that a singular score for each monitoring component and theme cannot capture the wide range of performance that exists within each component. That said, the scoring serves as a tool to demonstrate average performance levels and relative differences between the components and within the themes. As such, we believe it serves a useful role to better focus attention on the components with the greatest opportunities for improvement.

#### 2.2.1 Effectiveness monitoring

NOAA (2011, *Guidance for Monitoring Recovery...*) defines *Project Scale Effectiveness* as determining “[w]hether an implemented project is effective in its stated goals: ‘e.g. The installed large wood is working to provide cover and channel alterations.’ This is an outcome of the strategy and may have both a habitat and fish outcome at the project scale. Note that this level of monitoring may be appropriate for groups of projects or sites rather than on an individual project basis...If designed properly, it tests whether project design features were effective; whether habitat was restored at the project site as intended; whether local fish populations at the project site were improved.” (p. 63)



Effectiveness monitoring is the most “intuitive” and well-defined of the monitoring components in terms of both its objectives and its scope; it occurs at a scale that is readily grasped by scientists and the lay public alike, and the objects of its attention—habitat-restoration projects—are the explicit mission for the SRFB. Thus, its long-standing inclusion in the monitoring portfolio of the SRFB is fully warranted and widely supported.

The present Effectiveness Monitoring Program traces its origins back to an early review of individual project monitoring efforts (Taylor and Associates 2003), commissioned by the RCO and SRFB in order to improve this aspect of Board-funded monitoring. Because the key findings of that report have structured much of the present Effectiveness Monitoring Program, they are quoted here in their (near)-entirety (with emphasis added):

“Overall, very few of these completed projects or activities were (or are being) rigorously monitored to demonstrate an effect on fish survival or production... Given these findings and the accompanying observation that most monitoring has tended to rely on characterization and limited before-after comparisons rather than a structured monitoring plan, demonstrating that a project resulted in increased survival and fish production or if a project simply resulted in redistributing fish may not be possible in most cases... **causal linkages were not determined between the visually observed results of increased fish usage upstream and increases in fish production in the system as a whole.**

“The preliminary results from this pilot assessment suggest that **an experimental design to test positively the cause and effect between a specific project or set of projects and increased salmon production would require a significant amount of thought and subsequent financial and time commitments.** Meeting such a rigorous experimental design may not be currently feasible on a project-by-project basis without significant funding increases.

“**Given the potential scale of monitoring required to evaluate the direct impact of projects on salmonid production, the SRFB could consider instead monitoring programs at the project-type level (passage, diversion, habitat, and so on).** Such an effort could focus on determining: (1) what type of monitoring is appropriate to evaluate project effectiveness or success; (2) what specific questions should be addressed by each project type’s monitoring plan; and (3) how monitoring results might affect SRFB’s future decision-making processes” (Taylor and Associates 2003, pp. ix-x).

The thrust of these recommendations bear a close resemblance to the wording subsequently used to describe validation monitoring (i.e., Intensively Monitored Watersheds; see Section 2.2.2 below): “This part of the SRFB Monitoring Strategy [i.e., Intensively Managed Watersheds] pertains to monitoring that addresses how management and habitat restoration project activities, and their cumulative effects, specifically affect fish production.” However, the present Effectiveness Monitoring Program, as established following the release of this report, has pursued a less ambitious path that does not attempt to measure “fish production in the system as a whole.” Instead, it is characterized by a random selection of projects stratified by project type; a uniformity of monitoring questions, metrics, and protocols within each category of project; and a Before-After-Control-Impact (BACI) experimental design (for most projects). It therefore has embraced the more specific goals posed by Taylor and Associates (2003) for project-type monitoring to evaluate “success” (#1, above) and to frame monitoring questions (#2 above), with a presumed expectation (but no clear process) that influence over future decisions (#3 above) would follow.

### 2.2.1.1 The four criteria

#### What has been accomplished by SRFB-funded monitoring activities?

The Effectiveness Monitoring Program receives ~20% of the 2011-2013 total SRFB monitoring budget and has been quite successful in defining and executing a systematic program of project-scale assessments. Working from a matrix of projects grouped into each of several project “types,” most of the project monitoring plans follow a schedule of yearly visits to each site at Years 0, 1, 2 (or 3), 5, and 10 (and, in some cases, later). With some projects not having been implemented until 2011, the current schedule is not anticipated to be completed until 2020, although the number of remaining projects starts to drop rapidly after 2014. Annual reports for each project visited and an annual summary of the monitoring for all projects from the prior year are regular written products, together with oral presentations before the SRFB and at regional conferences. Reports are archived and can be accessed through the web-based “Habitat Work Schedule” (<http://hws.ekosystem.us/>).

Reviews of a subset of these written products show a common, systematic presentation framework that emphasizes the “accountability” element of monitoring—the methods, the results, and a summary of observed changes since the prior visit are summarized in narrative text, maps, and graphs. Confirmation of the project’s implementation is easy to accomplish, and any broad trends in local reach-scale metrics at any particular project site (e.g., LWD, channel dimensions, vegetation survival) are readily apparent. Reports are archived and can be accessed through the web-based “Habitat Work Schedule” (<http://hws.ekosystem.us/>).

#### Have the monitoring results been used to inform future management decisions?

We have found no evidence of any systematic feedback, or “adaptive management loop,” associated with the Effectiveness Monitoring Program, although many participants and other users of the information have reported anecdotes of how the results have been used. There is little doubt that informal contacts are occurring between monitoring crews and project designers in the field, and between presenters and their audience in conferences—but these are overwhelmingly *ad hoc* in character, suggesting that opportunities for more systematic integration of past findings into upcoming decisions are being missed.

Opportunities are also being missed to generalize the findings of the effectiveness monitoring into a form that could be more useful to others. We provide multiple examples below, because this issue offers the greatest opportunity for improvement in the present program. Consider, for example, the entire text of the “Summary” section from the Year-8 evaluation of Project 02-1622 (Issaquah Creek Log Cabin Reach Acquisition) in 2012, wherein a reader might expect to find guidance useful to other such projects:

*“Overall, in-stream conditions in Year 8 (2012) appeared to be relatively similar to what was observed during previous years’ monitoring, however, the stream is migrating, as evidenced by the undercutting of the left bank, inputting sand into the system. The vegetation at the Issaquah Creek project in 2012 has not changed substantially since 2007. However, deciduous trees are continuing to fill in the edges of the grassy fields at the southern portion of the site, and conifer plantings on the eastern slope have been installed. Over time, these will likely help to decrease the abundance of non-native species in this area. Year 12 monitoring of this site is scheduled for 2016.”*

Similarly, the Summary Report for this project type (“Habitat Protection”) for the same year not only omits any generalized discussion that could be useful to other project designers/proponents, but also appears to question the very purpose of such monitoring:

*“Determining the effectiveness of Habitat Protection Projects is difficult since there is no restoration action implemented at these sites. Change may occur slowly, or may not occur at all if conditions are maintained. Furthermore, a decline in conditions may not be the result of actions taken on that parcel, but rather outside of the protected area.” (p. 35)*

We also reviewed the [2012 “Annual Report”](#) to determine how these findings from one project type are rolled up into a summary document to address the program’s goal of informing future management decisions. The 2102 report covers three of the project types: in-stream habitat projects, floodplain enhancement projects, and habitat protection projects. The summary of results, recommendations, and conclusions for each project type are extracted below, as follows:

- In-Stream Habitat Projects are “...retaining placed structures, significantly improving channel morphology and habitat by increasing pool area, pool depth, and log<sub>10</sub> volume of wood. None of the juvenile fish species are showing statistically significant results currently...” (p. 31), but the report notes that up to 10 years may be needed to show significant changes in fish. With respect to recommendation, the report notes that “The effects of In-Stream Habitat Projects are difficult to determine due to the number of objectives accomplished using this method and the types of approaches grouped together under this category”, and goes on to suggest “expanding the study in this category to include more projects and allow for stratification of the project type into groupings such as similarities in geography, geology, hydrology, project type, project objectives, and target fish species.” (pp. 34-35)
- Floodplain Enhancement Projects “are maintaining connection with the main channel, as well as showing significantly increasing trends in bankfull width and flood prone width...”, with more ambiguous results for pool area and juvenile coho density. (p. 31) Recommendations include making repeat topographic surveys and, as with in-stream projects, “expanding the study in this category to include more projects and allow for stratification of the project type into groupings such as similarities in geography, geology, hydrology, project type, project objectives, and target fish species.” (p. 35)
- Habitat Protection Projects “have shown significant improvements in several of the upland vegetation indicators, including non-native herbaceous absolute cover, non-native herbaceous relative cover and coniferous basal area. Significant results were not found for any of the fish or riparian indicators in Year 8.” (p. 31) Repeating the caveat from the Summary Report, however, the text goes on to note that “Determining the effectiveness of Habitat Protection Projects is difficult since there is no restoration action implemented at these sites. Change may occur slowly, or may not occur at all if conditions are maintained. Furthermore, a decline in conditions may not be the result of actions taken on that parcel, but rather outside of the protected area.” (p. 35)

In total, such reporting generates clear demonstration of accountability with respect to project implementation, somewhat more ambiguous conclusions concerning project effectiveness of specific performance metrics, and very little to guide future management decisions. This final shortcoming is in part a consequence of the lack of formal structures to require that it occurs, and in part because the documents that first articulated the need of an effectiveness monitoring program have never had their stated goal of having “application to future projects” translated into

explicit objectives or actions. At present, project, summary, and annual reports are largely data repositories with a strong preference for highlighting positive outcomes; they show little effort to generalize findings, positive or (particularly) negative, in a way that could be used by other designers or reviewers, or to evaluate existing hypotheses or to reframe more appropriate ones.

Interestingly, one of the key tangible recommendations from the 2012 Annual Report is to further stratify the population of monitored projects with respect to geography, project objectives, etc. (see above). This appears to run contrary to the underlying principle of the Effectiveness Monitoring Program, namely the statewide clustering of projects of similar “types” to improve statistical power. It is quite well-aligned, however, with comments heard from many local and regional practitioners about how the program could be modified so that its results were more useful to project designers for informing future decisions.

**What is the time frame for generating new information useful for management; can monitoring results actually be used/useful?**

Of all of the monitoring types, the results of effectiveness monitoring should be the easiest to transform into useful, timely guidance. To some degree this has already occurred within this program, and the value of such applications are widely recognized. Although the some project reports include appropriate acknowledgment of the need for “more time,” particularly to interpret findings of changes in local fish abundance (see above), presumably not every study needs 10 years to return meaningful (even if negative) results. Recognition of this fact has been implemented to some degree (i.e., by the termination of three project monitoring categories already widely known to have clearly beneficial results— culvert replacement, irrigation screening, and riparian fencing) but beyond this minor modification to the monitoring program itself we see no evidence of any systematic evaluation of project effectiveness being translated into the planning or design of future restoration treatments.

**Does the monitoring support a regional context to enhance the interpretation of other monitoring results?**

This question is least relevant to project-scale effectiveness monitoring and so was not considered in the course of this evaluation. Effectiveness monitoring, in general, ultimately plays only a “supporting” role in achieving and documenting improvement in salmon populations, as originally recognized and articulated in documents from the last decade (despite the broader assertion of Taylor and Associates 2003, which is more appropriate to the IMWs). The successful administration and regular reporting of this monitoring program has suggested to some that its role should be expanded, but reach-scale effectiveness monitoring is inherently limited in what it can accomplish—and without more rigorous analysis and reporting, particularly giving specific attention to making the results more generally useful to future projects, even this limited utility is not being fully exploited.

## 2.2.2 Intensively monitored watersheds

As originally articulated in the 2001 Comprehensive Monitoring Strategy document, “Intensive (validation) monitoring ...is tailored to establish “cause and effect” relationships between fish, habitat, water quality, water quantity, and management actions.” (p. 22) This effort has been implemented in Washington State through *Intensively Monitored Watersheds*. As of 2013, the SRFB funds IMW monitoring in four watershed complexes: three adjacent tributaries draining to the Strait of Juan de Fuca (SJF), four adjacent tributaries draining to Hood Canal (HC), three adjacent tributaries to the Lower Columbia (LC), and the Skagit River estuary (Skagit).

*“This part of the SRFB Monitoring Strategy [i.e., Intensively Managed Watersheds] pertains to monitoring that addresses how management and habitat restoration project activities, and their cumulative effects, specifically affect fish production. As is discussed in greater detail below, validation monitoring (or as termed here, intensive monitoring) is the only way this can be achieved (ISP 2002)... Other types of monitoring are unable to answer questions like ‘to what extent did our recovery actions lead to more fish?’*

*“The SRFB intends to support intensive monitoring in watersheds carefully chosen to allow efficient and meaningful results...” (from the 5/23/2003 report, Monitoring and Evaluation Strategy for Habitat Restoration and Acquisition Projects, p. 6-7)*

And, as more explicitly stated in the 2013 summaries of the IMW program (e.g., Intensively Monitored Watersheds Synthesis Report, Lower Columbia River, 2013), “The goals of the IMW Program are to determine whether freshwater habitat restoration actions, as currently conducted in Washington state, measurably increase salmonid survival and production and to explain why or why not. The basic premise of the IMW Program is that the complex interactions between salmonids and their habitat can best be understood with concentrated monitoring and research efforts at a few locations.”

#### 2.2.2.1 The four criteria

##### **What has been accomplished by SRFB-funded monitoring activities?**

IMWs have been the largest single component of the SRFB monitoring budget (for example, it was ~70% of the 2011-2013 total SRFB monitoring budget), although it is noteworthy that this funding also supports both effectiveness and status-and-trends monitoring within the affected watersheds (60% of IMW funds provided by the SRFB support status-and-trends monitoring with the IMW watersheds). IMWs are also extensively supported with matching funds from other sources (e.g., Weyerhaeuser, Skagit Cooperative, Tribes, NOAA Fisheries Science Center).

IMW monitoring is the most ambitious, insofar as it seeks to establish a robust, scientifically defensible and causal linkage between restoration actions and recovery of salmonids populations (Bilby et al., 2004). The approach has an excellent scientific foundation, with the documents that established this program providing good rationale for their inclusion in the mix of SRFB-funded monitoring, systematic evaluation of quantitative criteria, and statistical justification for a likely decadal timeframe for showing results.

The accomplishments of this monitoring component, however, have been severely hampered by the general lack of “treatments” (i.e., habitat restoration projects) in the target watershed complexes. In this respect, two of the IMWs have been most problematic – Hood Canal and Lower Columbia. This is evident from the executive summaries to the watershed-specific Intensively Monitored Watersheds Synthesis Reports, which acknowledge the paucity of on-the-ground treatments to date:

“In Little Anderson Creek, completed restoration projects include one culvert replacement and two large woody debris additions. In Seabeck Creek, completed and in-progress restoration projects include three culvert replacements and one undersized bridge replacement. In Big Beef Creek, final plans are being developed to remove bank armoring and reconnect a wetland in the lower watershed.” (Hood Canal report, p. 7)

“Few physical habitat restoration treatments have been completed. However, in Germany Creek a blocking culvert was replaced and a bank was stabilized with bioengineered armoring by Sierra Pacific Industries on their land. The Columbia Land Trust also restored some side channel habitat in 2009 and armored a tidal portion of the mainstem using concrete dolos in 2012. Restoration was initiated in Abernathy Creek in 2004 with a road abandonment followed by limited riparian invasive species removal and replanting in 2008.” (Lower Columbia report, p. 1)

Both the analysis of limiting factors and the subsequent implementation focus on projects in the Skagit estuary have been more comprehensive and complete than those of the other three SRFB IMWs. Despite the schedule for full project implementation being many decades into the future, the projects are addressing what is widely judged to be the most important limiting factor, and the monitoring program should be able to determine if Chinook populations are increasing with restoration within a credible length of time.

Given limitations on project implementation throughout most of the other IMWs, and thus the absence of any credible expectation for systemic responses, the IMWs have generally met only those objectives of collecting a diversity of physical and biological data. In time, these data could presumably be integrated into a meaningful understanding of restoration–population linkages, but in general this has not occurred and the prospect for meaningful results is still many years into the future. Some results provided for some of the IMWs (in particular, HC and Skagit) show promising responses, but none are yet able to articulate any defensible conclusions.

#### **Have the monitoring results been used to inform future management decisions?**

We find no evidence of IMW results influencing management decisions, likely for two reasons. First, insufficient time has passed since the implementation of restoration projects to expect monitoring to reveal significant effects. This is only partly a consequence of the program’s duration (not quite 10 years)—mainly, it reflects the slow pace at which projects have been implemented in most of the target watersheds, even after the program was initiated. We return to this underlying problem below.

The second reason for the general lack of influence being exercised by IMW findings is the lack of any systematic, widespread dissemination of results, and the absence of any formal feedback mechanism to make use of such results even if they were/are available. For example, we have identified three “synthesis reports” as referenced above for HC, LC, and SJF, all published in 2013, but their distribution is uncertain and they have no apparent precedent in the history of any of the IMWs. The Skagit has an extensive list of project-specific reports, accessible on the Skagit System Cooperative web page (<http://www.skagitcoop.org/index.php/documents/>), but this collection is not IMW-specific and appears to include every document produced by the Skagit Cooperative on any subject for the past 15 years. Although surely convenient for active workers in this region (who likely maintain an active, informal network for sharing information), it is a daunting archive for “outsiders” seeking to learn from the Skagit experience.

We have been introduced to a variety of irregular and/or informal settings wherein information is shared (such as at the recent IMW workshop hosted by the Pacific Northwest Aquatic Monitoring Partnership [PNAMP]). The focus of these exchanges appears to be most strongly on the methodological advances and the evaluation/documentation of the effectiveness of a set of treatments on a particular group of streams. Even in the Skagit, where we have found the greatest level of documentation, the utility of presented results for future management is limited. For example, a recent PNAMP presentation (“The Skagit IMW: Examining the Effects of Estuary Restoration on Chinook Salmon” by Greene and Beamer) apparently follows historical patterns of

detailed oral/PowerPoint presentations but without readily accessible, systematic written documentation elsewhere. The Skagit is also unique in its scope and size, and there is no indication of direct feedback or cross-pollination between it and other IMWs. The 2007 study plan for the Skagit IMW states “Lessons learned in the Skagit estuary could benefit recovery efforts in other Puget Sound Chinook salmon bearing rivers. This should be true in places that have the same habitat and life history types as the Skagit, although out of system transferability will need to put in a river specific context” (p. 6). However, it also notes that the Skagit is unique amongst the other three SRFB-funded IMWs, and it identifies NMFS as the lead for identifying whether, and to where, the results from this watershed could be extrapolated.

**What is the time frame for generating new information useful for management; can monitoring results actually be used/useful?**

The IMWs, in both the original defining documents and the individual reports, have always been careful to articulate a roughly decadal time frame in which scientifically defensible results could be generated. For example, the 2007 SJF study plan presumed that “up to 10 years” would be needed to see statistically meaningful results. Monitoring began in 2004, which might suggest that another year or two from the present should now be sufficient. However, the last project is not scheduled for implementation until 2013. This decadal time frame was determined by a power analysis and it appears robust. However, slow pace of implementation, episodic large storms, and expectation that biological response will lag physical changes suggest that yet longer time could be needed to show any fish response.

These are issues not unique to the SJF IMW. The HC study plan anticipates 10 years of monitoring to detect any changes, with an initial analysis in 2010. This plan likely did not anticipate implementation to proceed so slowly (2007–2009 being the main treatment period). Post-project monitoring on Seabeck Creek was not even scheduled to begin until 2013. The 2013 LC summary states, “Within seven to ten years following the completion of restoration treatments the IMW project should reliably determine whether restoration treatments increase salmon survival and production and provide valuable guidance that will improve the efficiency of future habitat restoration that is intended to increase salmon survival and production. To ensure the success of the IMW Program and reduce the cost of long-term monitoring, restoration treatments must be implemented in the IMW treatment watersheds and ongoing monitoring must continue.” The anticipated time frame is thus about a decade *following* the last treatment, a restoration trajectory that by some measures has barely begun.

**Does the monitoring support a regional context to enhance the interpretation of other monitoring results?**

This criterion is of potential relevance to the IMWs, and it was apparently an articulated potential benefit of this program at its initiation. The intent was to have IMWs located in various geographic regions and ecotomes in order to help predict recovery response for a variety of limiting factors for both westside and eastside environments. Although each IWM watershed complexes support only a small fraction of the populations that utilize them (with the exception of the Skagit), they are credible analogs for small- to medium-sized westside watersheds. However, we have found no indication that this potential is being explored in other watersheds, or even that it is a recognized objective for the three “small” IMWs (i.e., HC, LC, SJF) as expressed in their respective 2013 Synthesis Reports. Monitoring of the Skagit could, credibly, contribute to a regional understanding of Chinook populations in Puget Sound, although this application also has not been evident in the reporting to date.

We recognize that the four SRFB-funded IMWs are part of a larger network of IMWs across the Pacific Northwest. This offers hope that, in aggregate, this network could help support such a “regional context” if so oriented in the future.

### 2.2.3 Status and trends monitoring

NOAA (2011, Guidance for Monitoring Recovery...) defines status and trends monitoring as a way to “assesses changes in the condition of a metric important for tracking progress in a population or listing factor. Typically conducted at the population scale, smolts are measured to reflect the cumulative fish population response to all freshwater conditions. It serves as the main monitoring necessary to determine the biological condition of the species and the status of specific statutory listing factors and threats.” More specifically, status monitoring characterizes the condition of physical, chemical, or biological attributes across a given area at a single point in time (e.g., abundance of fish at time x in a watershed). Trend monitoring determines changes in biota or conditions over time (Roni, 2005). Status and trends data also can provide high-level indicators that can be easily understood by the public and policy makers and are used to plan and inform management and restoration actions.

#### 2.2.3.1 The four criteria

**What has been accomplished by SRFB-funded monitoring activities?**

WDFW collects status and trend data for juvenile, smolt and adult fish in each ESU for each listed species. The primary use of the fish information is to track abundance, productivity, diversity, and spatial structure of listed populations in major population groups. The regularity of the data collection and the high quality of the data are successful attributes of this program. By quantifying abundance, productivity, distribution and diversity paired with restoration projects, status and trend data can integrate the recovery boards and lead entities habitat actions with monitoring. Within most of the regional salmon recovery plans, status and trend data for fish and habitat are identified and meaningful questions are being discussed.

Starting in 2001, SRFB funding was used to complement WDFW fish sampling (coined “Fish In/Fish Out”) for populations that would not otherwise be monitored. The financial allocation for status and trend support by the SRFB varied for many years; however, in the last three years, SRFB funding has been stable and consistently applied (e.g., Hood Canal monitoring for juvenile summer chum). Currently the SRFB provides \$208,000 (about 10% of the 2011-2013 total SRFB monitoring budget) annually on status and trend monitoring statewide. This represents a small percentage of the full WDFW program. In order to manage the ongoing sampling programs within the Fish In/Fish Out framework, WDFW updates and evaluates an annual table of status and trend sampling to identify gaps and priorities. Such a process helps supporting organizations such as the SRFB to know where best to allocate available funds.

An example of the type of data generated from the Status and Trend Monitoring Program is shown in Table 1 (Table 4 of Crawford et al. 2007). This table is updated annually to reflect changes in population structure and plan forthcoming sampling efforts. Gaps in monitoring are given high priority using the following criteria:

- Primary populations that are the only source of juvenile and adult monitoring per major population group (MPG) per evolutionarily significant unit (ESU) are given higher priority than all other populations within the ESU.
- Monitoring locations where previous year’s data exist for a specific species and lifestage (data continuity) are given higher priority than initiating a new monitoring project.



- Projects with no alternative source of funding (e.g., Hood Canal summer chum juvenile monitoring) are given higher priority than projects with alternative sources of funding.

Table 1. Description of fish in and fish out monitoring in Washington (from Crawford 2007).

Statewide monitoring of listed species—juveniles & adults													
2/13/2007 10:34					Proposed for FY07-09 GF-S Funding								
					Proposed for FY07-09 GF-S and submitted for BPA funding								
					Submitted for BPA funding								
Recovery region	Major population groups	WRIAs	Target species	Primary populations	Juveniles				Adults				
					Smolt sites	Production	Smolt trapping agency	Funding	Spawners (Stocks)	Data quality	Monitoring agency	Funding	
Puget Sound	North Sound	1 to 2	Chinook	NF Nooksack	Nooksack	Index	Lummi	Tribal	NF/MF Nooksack	Very Good		GFS	
				SF Nooksack					SF Nooksack	Very Good		GFS	
									Samish/MS Nooksack	Poor			
	Whidbey Basin	3 to 7	Chinook	Upper Skagit	Skagit	Yes	WDFW	Federal (Dingall/ Johnson) 50% Seattle PU 50%		Good			
				Lower Skagit				Upper Skagit MS/Tribs	Very Good				
				Upper Sauk (early)				Lower Sauk	Good				
				Lower Sauk				Upper Sauk	Excellent				
				Suiattle (early)				Suiattle	Excellent				
				Cascade (early)				Upper Cascade	Excellent				
				NF Stillaguamish	Stillaguamish	Yes	Stillaguamish	Tribal	NF Stillaguamish	Good			GFS

**Have the monitoring results been used to inform future management decisions?**

In some cases status and trend monitoring has informed future management. For example, the Skagit River has had a successful history of long-term status and trend monitoring, particularly adult abundance, with integrated fish monitoring and habitat restoration (Skagit Chinook Recovery Plan 2005). This integration subsequently has resulted in a focus on the estuary as the most significant limiting factor. Such success is not as clear for other watersheds that collect similar data but lack integration between fish monitoring and the selection of habitat-restoration actions.

Another challenge with status and trend monitoring lies with the articulated purpose(s) for the monitoring. To date, the focus on status and trend monitoring (as funded by WDFW and SRFB) has been to document net biological results (i.e., numbers of fish). Little progress has been made towards evaluating those results and asking meaningful questions of purpose (e.g., are we monitoring the right life stages in the right places? What are the limiting factors that might respond to changes in habitat conditions?). Without such information and an intentional focus in study design, monitoring resources can be readily misappropriated. The absence of biological status and trend analysis is exacerbated by a lack of habitat status and trend monitoring, a program currently lead by Washington Department of Ecology. Although it reflects an important component of salmon recovery, habitat status and trend monitoring has not historically been a focus of SRFB and, given funding constraints, this is unlikely to change without enacting significant reductions to other components of the program.

**What is the time frame for generating new information useful for management; can monitoring results actually be used/useful?**

Status and trend monitoring is explicitly intended to compile long-term adult and juvenile fish population data at a watershed scale. The longer the time series, the more opportunity for analysis. That said, we have found little discussion of the recommended duration of status and trend sampling, or the point at which monitoring results would become statistically robust and useful for the purpose of salmon recovery. The Oregon coho recovery plan provides such an example. Despite the absence of much explicit discussion of time frames for utility, we note that status and trend monitoring results are actively being used to inform management (e.g., steelhead data in the Lower Columbia are informing watershed management planning and process; coho data are used to forecast run sizes throughout Washington State).

**Does the monitoring support a regional context to enhance the interpretation of other monitoring results?**

Status and trends monitoring provides a unique source of fish population data over large spatial and temporal scales. The information collected is directly in line with the SRFB goals. The challenge is to clearly identify how the data can be linked to other scales of monitoring in order to utilize data and justify its continued support from SRFB. It is not enough to simply collect the data.

**2.2.4 Numerical ratings for the “three-legged stool”**

In an effort to distill a large volume of information into a tractable summary assessment, each of the three legs of the monitoring stool were evaluated based on their success to date at meeting or supporting the articulated themes for SRFB monitoring (accountability, effectiveness, collaboration, and adaptive management). The table does not take into account the relative value of each monitoring type. The scores were assigned by the project team using a 5-point scale, based on our professional judgment using information provided by the steering committee,

document review, and interviews conducted with key stakeholders and others with long-standing knowledge of salmon-enhancement monitoring in Washington State (see Appendices A–C).

**Table 2.** Numerical rating of the SRFB monitoring.

Monitoring component	SRFB monitoring themes (see Section 1.1)*			
	Effectiveness	Accountability	Collaboration and communication	Adaptive management
Effectiveness monitoring	3	4	4	2
IMWs	2 (4 Skagit)	2	3	2 (4 Skagit)
Status and trends	3	3	3	2

\* Level of performance is scored from low (1) to high (5), using the following generic criteria:  
 1 = no evidence of support for this theme  
 2 = minor support for theme but with only limited effectiveness  
 3 = supportive of theme, but with significant opportunities for improvement  
 4 = highly supportive of theme; limited improvements warranted  
 5 = fully supportive of theme, no changes warranted

Although we do not find any of the programs to be completely lacking in support for these themes, several challenges for the overall SRFB monitoring program are highlighted by this summary. We recognize the programs operate under disparate timelines, but believe they can still be held accountable for addressing each of the SRFB monitoring themes. The near-uniformity of “2”s for the theme of adaptive management reflects our judgment that meaningful feedback of monitoring results into future actions is critically deficient and requires substantive consideration by the Board. Although the Skagit was independently scored for two themes due to a distinct level of performance, the generally low ratings for IMWs lead us to some key recommendations for decision-making by the Board. The positive scores for effectiveness monitoring emphasize the success of this component in disseminating results, but it has yet to achieve its potential for driving fundamental improvements in the implementation of restoration projects. Status and trends monitoring, as a program only marginally under SRFB direction, could nonetheless benefit from a thoughtful assessment of its potential benefits beyond the mere annual tallying of fish.

We return to these overarching issues in greater detail in the sections that follow.

### 2.3 Adaptive Management and SRFB-funded Monitoring

Project funding decisions, monitoring, data analysis, decision-making, and accountability are all disconnected activities under the present operating structure of the SRFB. Each of these activities tends to happen in a different place, or not at all. This is a fundamental obstacle to the creation and execution of an effective adaptive management program. Moving the basic decisions for project selection from a centralized, SRFB-run program out to the Regions may have been a well-guided effort to improve the design and implementation of projects; but without the monitoring program following suit (*also* for good reasons), this action has had the unintended consequence of severing any intrinsic connection between the two—it retains the possibility for *ad hoc* feedback but provides no mandate for it.

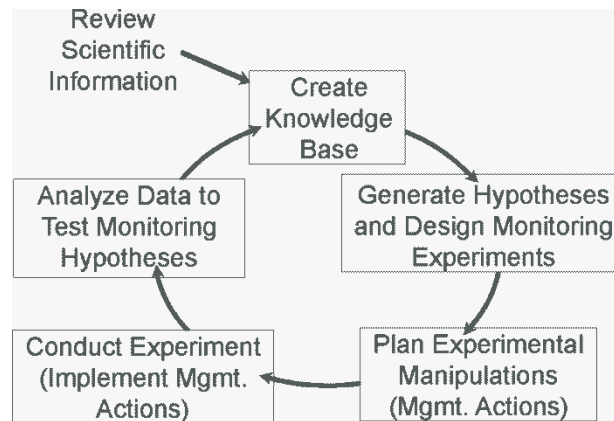


Figure 1. The adaptive management cycle (from Ralph and Poole 2003).

Consider a representation of the adaptive management cycle, reproduced above (Figure 1) from Ralph and Poole (2003, their Figure 3). The links between each step are critical to having a successful program, but many have noted how difficult they are to implement, even under the best of circumstances. However, those links are particularly challenging to implement when they connect activities being conducted by different entities. We believe these disconnections lie at the root of many of the issues that limit the overall value of the present monitoring program.

These challenges are particularly evident in the IMW program. Its most successful aspects are widely recognized to be its scientific rationale, a foundation that was carefully documented in reports from the early 2000's, affirmed by the ISP review in 2006, and no less compelling today. This foundation was executed through the well-coordinated *Washington Comprehensive Monitoring Strategy For Watershed Health and Salmon Recovery*, which continued from initial guidance documents through the generation of hypotheses and monitoring experiment design for the initial SRFB-funded IMWs (SJF, HC, LC). The next step, the planning of experimental manipulations in each watershed, was executed by smaller teams that had only partial overlap with the initial hypothesis-generating team.

Most problematic, however, is that the funding and execution of the management actions was entirely removed from these prior steps. This created what the ISP in 2006 called "Serious weaknesses [in the]...apparent disconnect between how treatments (i.e., the habitat improvement actions) are selected and funded, in relation to experimental design and monitoring needs, and uncertainty about the duration of the commitment to fund the long-term nature of the IMW program." (Currens et al., 2006, p. 1) The responsibility for data analysis returns from the SRFB to the individual IMW study teams, but we find only limited examples across the four IMWs that such analyses have been systematically executed, and even less evidence that they have been formulated and released so as to contribute to the preexisting "knowledge base" (see Figure 1) even were such a repository of such information to be identifiable. A procedure to generate and/or refine hypotheses and monitoring experiments may exist within each IMW working group, but forums for cross-fertilization amongst the multiple IMWs in Washington State (funded by both the SRFB and NOAA-PSMFC) have been slow in development and seemingly informal in past execution.

Thus, IMWs began with a strong scientific mission and have executed varying levels of scientific analysis, but they have no influence of the funding priorities and so they can't actually answer the

questions they were designed to answer (indeed, key questions for salmon recovery that *only* they are able to answer).

The Effectiveness Monitoring Program, in principle, aligns more closely to the adaptive management cycle depicted above, and its widespread support undoubtedly derives in part from its consistency and coherence within that framework. Its foundation was also established by the strategic assessment of monitoring needs in the early 2000's, with hypotheses, plans, and treatments all implemented within a few years under the overarching auspices of the SRFB monitoring program. However, we have seen only modest efforts to analyze the data so collected, and even less of an attempt to add to a "knowledge base" that could inform, except on an *ad hoc* basis, the development of new understanding and (ultimately) better projects.

In the case of the Effectiveness Monitoring Program, this disconnection has not been a result of a diffusion of responsibility across multiple entities, as in the case of IMWs, but rather a lack of any credible impetus to "drive" the adaptive management cycle forward. Although monitoring was first (2000) argued as necessary to provide accountability to funding agencies and the public, who were expected to demand some demonstration that the funds were creating a genuine, measurable improvement in salmon habitat and salmon populations, this has not happened in fact. We see few substantive calls today for accountability from either the PCSRF, which distributes money to the SRFB provided by an annual Congressional allocation; or from the public, who sees little reason to complain about a distantly funded program that provides jobs and a sense of nominally beneficial actions—an attitude reinforced by publications such as the State of the Salmon, which combine such broad metrics of "miles of stream treated" and "dollars spent" with high-level indicators as "number of fish in Puget Sound" that no credible inferences can be drawn about the actual effectiveness of state-funded recovery actions. Making those causal linkages should be the role of the IMWs, but they have not been implemented in a fashion that actually serves this purpose.

Consider, by way of contrast, the Regional Stormwater Monitoring Program (RSMP), in the early phases of implementation under the current round of Phase 1 and Phase 2 NPDES permits. In many ways the RSMP is analogous to the Effectiveness Monitoring Program of the SRFB (although it was built from the bottom up [i.e., by the affected jurisdictions themselves], not the top down [i.e., from the state or federal regulators]): local entities pool resources, centralize the development of a monitoring strategy that results in a few individual, "characteristic" projects being monitored by a centralized entity, with results being used to inform all. In our view, its fundamental differences from the SRFB Effectiveness Monitoring Program stem from the regulatory context in which they are each embedded: for the RSMP, a feedback loop is already established (DOE has demonstrated a history of upgrading 5-year permit requirements based on the information collected in previous permits). Contrast this with the SRFB Effectiveness Monitoring program, which was developed under a concern for accountability that has never truly materialized, and for which permit requirements (presumably under the ESA) are diffuse and largely unconnected from the agencies conducting the work. We also note, however, that full implementation of the RSMP has not yet occurred, and successful "closure" of the adaptive management cycle is by no means guaranteed here, either.

In summary, local examples are available to demonstrate a successful implementation of the adaptive management feedback: in the case of stormwater monitoring, the work of measurement and analyses are done by the regulated permittees, who are required by their permits to come to management conclusions. In turn, the subsequent permits are changed substantially every cycle based on what has been learned in past permit cycles, through the implementation by technically knowledgeable Ecology staff. Curiously, we note that this process has been more successful for

stormwater than for salmon recovery. We speculated that in large measure this likely reflects the more litigious environment of Clean Water Act regulations, and perhaps the greater financial resources (over \$1M for the annual implementation of stormwater effectiveness monitoring); despite the distant regulatory threat of the Endangered Species Act, there has been little impetus for concerted action with respect to habitat monitoring. In addition, the chain of accountability is much shorter for stormwater: ongoing support for the NPDES permit program is provided by the permittees themselves, whereas the monitoring programs of the SRFB have seen continued, annual funding by the US Congress.

## 2.4 Thematic Issues, Concerns, and Needs

### 2.4.1 Cross-cutting issues

***Project implementation in IMW watersheds need to be accelerated, or the IMW(s) need to be abandoned.*** This recommendation was made by the ISP in 2006, and it is as true today as it was 7 years ago. As presently implemented, the IMWs are unlikely to provide useful management information or compelling accountability for the expenditure of SRFB funds. To prioritize the implementation of these projects, however, would require a change in the SRFB's present approach to the regional allocation of funds, with the selection and sequencing of projects largely determined by the lead entities. This "regional" approach, no matter how supportive of other SRFB priorities, is simply inconsistent with implementing a successful IMW program. Thus, a clear policy-level decision needs to be made about how best to reconcile these competing priorities to avoid the continued inefficiencies and loss of opportunity inherent in the current approach.

***Effectiveness monitoring needs to better demonstrate its value to salmon recovery.*** Because this type of monitoring is so intuitive, and the program's execution has been so competent, it has escaped some of the closer questions that should be raised with any such effort: What do we learn by monitoring changes in habitat and vegetation resulting from stream projects? What's the scientific question that drives the data collection? How are the results being used to design and select better projects? Until these questions can be answered, the focus of this program should be on how to make it better, not larger.

***Every monitoring program should identify specific time frames for delivering meaningful results.*** All monitoring should be initiated with an explicit statement, ideally based on statistical analysis or prior experience, of the likely duration of monitoring needed to return meaningful results that can be used to demonstrate outcomes or provide guidance to future projects. Although such preliminary estimates should always be subject to revision as new data are collected, establishing clear expectations for monitoring should be a recognized component of any new data-collection initiative.

***Monitoring programs should evaluate the quality of the data being collected with respect to specific monitoring objectives.*** Although important, it is insufficient to consider the geographic location, species and frequency of monitoring efforts. The SRFB should require that monitoring programs evaluate the quality of the data being collected and explicitly tie the evaluation to clearly articulated monitoring objectives. Without such a linkage, it is quite possible that monitoring efforts will not advance the goal of salmon recovery.

***SRFB-funded monitoring should demonstrate accountability beyond implementation.***

"Accountability" includes reporting on monitoring effectiveness, collaboration, and adaptive

management. Improvement is needed in each of these areas for all types of monitoring (although some more than others). A systematic process of documenting such information would significantly advance the monitoring benefits.

***Communication is essential, and presently inadequate.*** The majority of monitoring data is accessible to only a minority of people. With limited time and resources, valuable monitoring data are not being appropriately disseminated; as such, any potential for adaptive management cannot function as intended.

***SRFB monitoring should substantively engage with the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) to advance collaborative opportunities and benefit from the collective efforts of the region.*** PNAMP is a forum to facilitate collaboration around aquatic monitoring topics of interest, promote best practices for monitoring, and encourage coordination and integration of monitoring activities as appropriate. The forum’s activities are conducted by participant working groups and teams as endorsed by the partner-based steering committee. Participation in PNAMP is voluntary, but widespread. Signatory partners include BPA, California Department of Fish and Wildlife, Columbia River Inter-Tribal Fish Commission, Colville Confederated Tribes , Idaho Department of Fish and Game, NOAA, Northwest Power and Conservation Council, Northwest Indian Fisheries Commission, Oregon Watershed Enhancement Board, Pacific States Marine Fisheries Commission, Bureau of Land Management, Environmental Protection Agency, United States Army Corps of Engineers, United States Bureau of Reclamation, United States Forest Service, United States Geological Survey, Washington State Department of Ecology, WA GSRO/RCO, WDFW.

#### 2.4.2 Specific questions from the workplan

**Which of the monitoring programs of the seven regional recovery plans are “appropriate” for SRFB funding, given the Board’s mission and mandate (Task 2 of workplan)?**

The seven regional recovery plans have varying levels of ongoing monitoring, as summarized in Table 3. This element of the workplan was not assigned a high priority, and thus our evaluation consisted only of a cursory review of readily available recovery plan documents.

Table 3. Monitoring elements in the regional recovery plans.

Recovery plan	Program element	Level of monitoring (low to high, 0 to 3)
Lake Ozette	Status & Trends	0*
	Implementation & Compliance	0
	Effectiveness	0
	Validation	0
Lower Columbia	Status & Trends	2
	Implementation & Compliance	1
	Effectiveness	2
	Validation	1



<b>Recovery plan</b>	<b>Program element</b>	<b>Level of monitoring (low to high, 0 to 3)</b>
Middle Columbia	Status & Trends for Steelhead	2
	Implementation & Compliance	0
	Effectiveness	0
	Validation	0
Upper Columbia	Status & Trends	3
	Implementation & Compliance	0
	Effectiveness	3
	Validation	0
Puget Sound	Monitoring varies by sub-watershed	
Hood Canal	Status & Trends	1
	Implementation & Compliance	2
	Effectiveness	1
	Validation	0
Snake River	Status & Trends	3
	Implementation & Compliance	1
	Effectiveness	3
	Validation	0

\* Ozette sockeye are the only ESA listed species in this region; therefore, PCSRF money is limited.

Any expansion of funding in support of regionally-focused monitoring as suggested by this workplan element, however, should be predicated on the assumption that such monitoring data flowing from the efforts of the regional recovery boards would amplify, support and expand on and at the scale of the existing triad of programmatic monitoring efforts currently supported by the SRFB. Given our assessment that the three existing SRFB-funded monitoring components as currently organized lack a common set of objectives, lack sufficient analysis of results, and have not been well-integrated with each other, it is premature to recommend further funding of regional monitoring efforts. Additional support for regional efforts that focus on understanding how specific restoration actions might vary by geographic context, while laudable, can only be useful when there exists an organized and coherently designed overall monitoring program that addresses a common set of objectives, and that yields complimentary and relevant evidence in support of adaptive management. If monitoring results have yet to become relevant to management decisions, there is little justification to expand efforts to collect data. That said, we do note that the importance of regional recovery efforts and the SRFB’s desire to increase collaboration with the regions and maximize monitoring potential. The proposed improvement to link SRFB-funded monitoring to management decisions, particularly for IMWs, is an example of one such opportunity that would provide beneficial information to the recovery regions.. In summary, this question highlights a more fundamental issue with the current SRFB-funded monitoring efforts. If the institutional capacity does not exist to use the monitoring results to

improve decisions on how to spend scarce restoration dollars on the most effective restoration actions, then the first step must be to address this critical shortcoming in existing monitoring efforts. Expansion is a question for a later date.

**Are relative funding levels appropriate and commensurate with the utility and application of the results (Task 5 of the workplan)? In particular, should additional effectiveness monitoring project sites be added (Task 7 of the workplan)?**

In recent years, funds for SRFB monitoring have followed a relatively steady pattern (\$2.2–2.8 million from 2011-2013). This reflects the NOAA minimum mandatory requirement that at least 10% of PCSRF funds to be allocated to monitoring. In general, IMWs receive half or more of the annual allotment, reflecting the variety of monitoring activities conducted in the IMW watersheds, and the need for detailed annual information if their scientific objectives are ever to be achieved. We have not conducted a detailed audit of monitoring expenditures across the four SRFB-funded IMWs; as noted previously, the disconnection between project implementation and IMW timelines is far more critical an issue than any details of how monitoring funds are allocated.

Of the two other SRFB-funded monitoring components being addressed in this review, effectiveness monitoring is the next largest cost item (~20%). Although the most successful of the components to date, at least as evaluated by our four criteria with respect to the monitoring themes of the SRFB Strategic Plan, its utility within the framework of statewide monitoring is ultimately limited—the statewide uniformity of hypotheses, study questions, methodology, and metrics is defensible from a statistical-power perspective, but the limitations of such an approach are also clear given the diversity of aquatic systems across the state. The current Effective Monitoring Program has not demonstrated that the statewide amalgam of projects into presumably homogenous “types” has generated results any more useful than those being executed more regionally and with a more targeted set of questions (e.g., King County, or the estuary program of the Skagit [i.e., the Skagit IMW]), and its own 2012 Annual Report recommends greater stratification and regionalization of monitoring sites. Thus, nothing in the execution to date of this program suggests that its further expansion as a statewide program would produce commensurate benefits.

We note that other, more regionally focused effectiveness monitoring programs are being explored or established. The SRFB could have a relevant interest in providing support for these regional efforts, but without clear indications that the lessons of the present program have been fully incorporated into any new framework—particularly the importance of systematic data analysis, meaningful synthesis of results for future management application, and a clear feedback between monitoring results and future management actions—such an additional investment would not be likely to translate into greater utility or applicability.

**Are opportunities for additional program value being missed through insufficient opportunities for funding (either out-of-cycle or competitive funding opportunities) (Task 6 of the workplan)?**

Although we have neither seen nor heard any direct communications about such alternatives, the existence of a standing funding source will always invite consideration of changes to the *status quo* for allocating resources. There is ample precedent for alternate methods of funding allocation in both state and federal agencies (for example, the National Science Foundation issues both directed solicitations to researchers for targeted, multi-year investigations and open-ended “calls for proposals”): they all reflect an effort to balance the relative benefits of steady, predictable

funding vs. new initiatives that can yield benefits well beyond (or, for that matter, well below) their tangible cost. We have seen documentation of only one such process for the SRFB (a December 2011 workgroup convened to allocate about \$800,000 of previously uncommitted monitoring funds, as referenced in a Salmon Recovery Funding Board “Briefing Memo” for the April 2012 Board Meeting, Item 7), but we also recognize that the interest in such possibilities reach well beyond this one-time event.

In general, we recognize the potential for high benefits accruing from even a modest expansion of the funding mechanisms available for monitoring. The greatest difficulty that we see is in providing systematic, technical review at the state level for such requests coming into the SRFB—such a mechanism does not appear to be readily available, but without it such a program would risk becoming another region-based allocation of funds without adequate assessment or oversight. We have seen evidence of poor results from “local” monitoring, because it is commonly subject to shortcomings of no accountability, no meaningful results, and ultimately no outcomes. However, we also see clear indications that some local entities are creating highly functional, useful monitoring programs: for example, the Snake River Region could provide a useful case study for how to “build” a new IMW from the ground up; multiple project examples demonstrate that King County knows how to do (and use) effectiveness monitoring.

These examples suggest the potential benefit of a SRFB-sponsored “initiative fund,” subsequently used as examples to move the entire statewide monitoring enterprise forward. Without adequate in-house technical review capacity available to the Board (and subsequent follow-up accountability imposed on the grantees), however, any such program risks repeating the failed examples of the past—which have, in turn, led to the program as currently implemented.

In addition to considering an open-ended competitive allocation of some funds, the most commonly articulated “missing” component of SRFB-funded monitoring is habitat status-and-trend monitoring. Should this be a SRFB concern? Many say “yes,” from the perspectives of both tracking ultimate success (because fish numbers may be too variable to draw meaningful conclusions) and because it is likely to achieve a rapid level of public understanding. Such evaluations were already expressed in the State of our Watersheds (2012) report from the Northwest Indians Fisheries Commission (<http://nwifc.org/publications/sow/>), but the information there is presented more anecdotally than systematically. The SRFB should have an interest (and potentially a significant role) in supporting a systematic, scientifically based effort along these same lines. However, implementing such a program would need to override the current approach of strict Region-based funding, since only a centrally coordinated, pooled approach would be likely to produce useful results with adequate scientific and statistical rigor. This type of effort appears to be growing in certain regions (Puget Sound, Columbia Basin) without SRFB assistance, and as with more regional efforts at effectiveness monitoring this may be the best (and perhaps only) way to move such an initiative forward.

### **3 THE INTERRELATIONSHIP OF SRFB MONITORING ACTIVITIES TO OTHER REGIONAL MONITORING**

Based on a review of published material, steering committee discussions and the interviews conducted for this study, SRFB monitoring has an insufficient level of engagement with other regional monitoring activities (e.g., USEPA, BPA, NOAA, WDOE, WDFW). We acknowledge the challenge faced by diverse monitoring programs (e.g. different goals, funding cycles, regulatory requirements and constraints), nevertheless a lack of coordination can result in funding

inefficiencies, misguided monitoring efforts and a lack of knowledge transfer (e.g. a disconnect between fish and habitat monitoring). That said, there have been efforts to coordinate the programs such as:

- The “Skamania process”, developed for the Columbia River, prioritized monitoring gaps and led to funding from both the SRFB and BPA. This evolved to the point where BPA is currently implementing an Action Effectiveness Monitoring program based on part on SRFB monitoring
- Northwest Power & Conservation Council’s Fish and Wildlife program, which collaborates with BPA, CRITFC, the ISRP, state and federal fish and wildlife managers, tribes, and others.
- The Integrated Status and Trends Monitoring (ISTM) Demonstration Project, a PNAMP based project intended to demonstrate the approaches and utility of integrating the collection of information in the bi-state lower Columbia (LC) river demonstration area to address multi-scale questions about the status and trends of fish (salmon, steelhead, and potentially bull trout), and physical, chemical, and biological attributes in stream networks. WDFW’s annual process for prioritizing gaps in status and trends monitoring (Table 1), being done at the request of the SRFB using the monitoring criteria (juvenile monitoring in at least one primary population per major population group per ESU) defined in the “Washington State Framework for Monitoring Salmon Populations Listed under the Endangered Species Act” document.
- Development of standardized regional monitoring protocols, which enables the SRFB monitoring to integrate with other regional monitoring (e.g., UCSRB, OWEB, BPA), thereby expanding the sample size without additional effort or funds.
- The Skagit River IMW, which has done an exemplary job integrating habitat restoration and fish monitoring from the outset
- A recent review of SRFB effectiveness monitoring sites by TetraTech, which identified additional sampling needs that are now being funded by BPA.

These examples suggest a continued value in supporting and expanding the SRFB’s efforts to continually seek for ways to improve the effectiveness of their funding. One such opportunity is to identify monitoring efforts funded by other entities. Such coordination can provide value added support between monitoring programs. In some cases coordinated efforts will expand the sample population; in others, it may identify overlapping efforts or unnecessary sampling.

## **4 INFORMATION TRANSFER**

Successful monitoring requires the effective dissemination and active exchange of monitoring results (Task 3 of the workplan). Doing so can highlight (although not ensure) a level of accountability. Depending on the information exchanged, it can also communicate critical information regarding project effectiveness (e.g., IMW findings that may be applicable to other, similar watersheds and listed species).

Information transfer is one of the major shortcomings of the present monitoring framework in the state, and particularly with those programs directly funded by the SRFB. Although a substantial amount of SRFB-funded monitoring is occurring, only a select group has access to the resulting information: those implementing the work, those who know where to find key reports, those who

attend monitoring workshops. In our advanced digital age, information transfer should be operating at a much higher level.

Two web-based systems are presently in place that focus on project tracking, implementation and performance: PRISM and the Habitat Work Schedule (HWS). PRISM, a grant management system employed by RCO and used to apply for SRFB grants ([http://www.rco.wa.gov/prism\\_app/about\\_prism.shtml](http://www.rco.wa.gov/prism_app/about_prism.shtml)), provides publically available information to apply for grants, review information on funded grants, and produce reports about projects. The HWS (<http://hws.ekosystem.us/>), a primary tool of the Effectiveness Monitoring program, is a “*mapping and project tracking tool that allows Lead Entities to share their habitat protection and restoration projects with the public... By mapping projects, linking them to each other and recovery goals, and making it all available on the web, the HWS system makes salmon recovery more accessible to partners, potential funders, and the public.*” PRISM and HWS are both useful frameworks for achieving public project accounting and displaying project-specific performance, but neither provides meaningful guidance for future efforts, which should be generated from analyses of monitoring results. As such, these tracking systems are both potentially useful tools, but neither presently supports critical adaptive management needs.

Without regulatory drivers, statutory or contractual requirements, and/or public/agency accountability for funding, these programs (both the monitoring, and the underlying project implementation itself) will continue whether anyone is paying attention or not. Tangible examples of constructive feedback between monitoring results and future management actions are few and far between, and there is scant appreciation of the inherent inefficiencies and lost opportunities that result from a sole reliance on informal, *ad hoc* interactions.

Information transfer is an essential component of an effective monitoring program, but also a daunting mission. PNAMP has facilitated the transfer of monitoring information for other entities funding similar regional monitoring efforts (e.g., BPA). Although SRFB monitoring has engaged with PNAMP on an informal basis, we encourage the SRFB to formalize this relationship in order to significantly expand the current information transfer.

## 5 CONCLUSIONS

### 5.1 Opportunities and Limitations of the Present Program

The SRFB faces a laudable, but challenging, set of goals. Thanks to the dedication and groundbreaking work of innumerable scientists and policy makers, there is a wealth of guidance documents, monitoring programs, and monitoring data collected to date. That said, there is also significant need for improvement in SRFB-funded monitoring programs. The most commonly posed question is this: are we sampling the right things, in the right places, using the right methods, at the right time? However, we believe that this question, although important, does not focus on the key challenges facing the SRFB monitoring program, because it addresses the *mechanics* of monitoring but not the underlying purpose for collecting monitoring data and ultimate use of the results.

At the forefront of these potential improvements, the SRFB needs to provide clear and specific leadership to guide the monitoring of salmonid habitat and populations. It is currently not fulfilling that need, nor is anyone else. We respectfully assert that the real issue facing the SRFB is not the need to reallocate monitoring funds, but rather the need to articulate a common set of objectives, a plan to implement those objectives, and a strategy to integrate the results of ongoing

monitoring programs, all under the auspices of its centralized leadership. First and foremost, the SRFB needs an explicit framework and process of decision-making with a clear definition of roles and responsibilities to ensure its timely implementation. That framework is the SRFB Strategic Plan, which offers broad goals but currently lacks adequate specificity in the form of clear, measurable objectives, reporting requirements (beyond implementation) and a feedback mechanism based on monitoring results. Such an absence of guidance, evaluation, a timeline (with milestones) and performance metrics creates a void for decision-makers who currently have no clear road map for making decisions.

As an example of the specificity that is currently lacking, consider the fundamental differences between “goals” and “objectives.” Both are necessary to mapping out a successful strategy but they are not synonymous. Goals are “broad, general statements of what the program, course, or activity intends to accomplish” (from <http://assessment.uconn.edu/primer/goals1.html>, as just one example). Management “questions” are commonly presented in the form of goals. In contrast, objectives are “SMART”: **S**pecific, **M**easurable, **A**ttainable, **R**elevant, and **T**ime-bound (see, for example, Doran, 1981, Management Review, Volume 70, Issue 11, pp. 35–36). They describe the tangible path forward towards the attainment of articulated goals. Contrast this framework, however, with the “Objectives” in the *Washington Comprehensive Monitoring Strategy and Action Plan for Watershed Health and Salmon Recovery* (2002): as an example, Objective 1A states “Measure status and track trends of the numbers of spawning salmon by stock in each Salmon Recovery Region. Evaluate whether numbers are improving.” This is neither attainable nor time-bound, and as such provides no real guidance about how to structure a monitoring program nor what activities are the most important to pursue first. Thus, despite the voluminous and carefully thought-out literature of the last decade that provides the intellectual foundation for the SRFB monitoring programs, it has provided insufficient concrete direction or clear criteria against which to evaluate success.

The second overarching limitation of the present program is ambiguity in the appropriate and effective role of the SRFB. Tough technical evaluations and decisions are required to move beyond compliance monitoring, but should the SRFB be making these technical decisions, or should they instead focus on programmatic requirements, coordination and collaboration while seeking scientific input from a technical advisory board (e.g., an ISP)? We observe the later has been a successful approach for other regional monitoring programs (e.g., BPA) and is worth careful consideration by the SRFB. This was a concern/recommendation that was raised in virtually all interviews conducted for this assessment.

## 5.2 Levels of Funding vs. Value Provided

Given the relative levels of funding for the three components being reviewed here, this is fundamentally a question of the relative cost/benefit of the most costly component—Intensively Monitored Watersheds—relative to the Effectiveness Monitoring and Status and Trends programs. We agree with the judgment expressed in multiple documents surrounding the formation of the Monitoring Program in general, and the IMWs in particular, that only such a program can answer the fundamental question of any recovery program: Are our efforts doing any good? If this question cannot be answered, it is difficult to justify *any* long-term expenditure on restoration or monitoring; and for the current implementation of salmon recovery in Washington State, IMWs are the only vehicle with the hope of providing an answer.

The current execution of IMWs, however, is not positioned to answer this question, which raises the policy decision of whether the Board considers this to be an important question to answer. If it

is, then a secondary issue is raised: is it worth waiting yet another decade with the existing panel of watersheds to learn these answers, or should the Board funding should be redirected or consolidated to other, ongoing IMWs or to an entirely new set. In either case, the Board would need to support funding of projects in those watersheds, independent of any local priorities. The Adaptive Management cycle (and common sense) argues that without a commitment to project funding within these watersheds, there is no sense in providing monitoring funds and effort. The “policy question,” and one that cannot be answered by this review, is thus whether the Board’s interest in scientific understanding and long-term accountability trumps the principle of Regional allocations.

### 5.3 Recommended Improvements

To develop recommendations for the SRFB Monitoring Program, it is essential to recall the primary drivers for monitoring – *accountability*, to show value for the cost of habitat-restoration projects; and *adaptive management*, to drive continued improvement in future projects. These reflect two distinct, but complementary purposes of monitoring: “looking backward,” to document what has been accomplished through the expenditures of public funds; and “looking forward,” to improve the value and effectiveness of future efforts. It is not sufficient to be successful in just one realm in the absence of the other. Thus, the next step in advancing a “successful” monitoring program for salmon recovery in the State of Washington must be to define and implement revisions to the current program that clearly document the expenditures being made on salmon restoration, inform improvement in restoration design, and guide future resource allocation based on monitoring results. There has been good progress towards these overarching goals but much remains to be done.

To be truly effective, these fundamental drivers of accountability and adaptive management must be well integrated and executed at multiple geographic scales, because salmon recovery seeks to achieve population-scale benefits primarily through the collective benefits accrued from localized treatments. So, for example, the Project Effectiveness Monitoring Program supports regional accountability but cannot tell us whether salmon populations are actually increasing; Intensively Monitored Watersheds (IMW) support centralized adaptive management by testing credible hypotheses about limiting factors through multiple integrated actions and broad-scale evaluation of results; status and trends monitoring of fish can both document the integrative biological response within individual watersheds and provide a statewide context to gauge overall improvements and variability in salmon populations. As recognized in the original 2002 strategic documents for monitoring, each of these drivers has a critical role to help guide progress towards recovery and sustainability of salmon populations.

Based on the information compiled herein and subsequent work with select members of the SRFB and GSRO, we identified six recommendations and associated rationale to improve the quality of SRFB-funded monitoring (Lando et al. 2013b). The recommendations are summarized below:

#### **1. Establish (or restate) the SRFB goals with respect to monitoring**

##### SRFB Monitoring Goals (from the SRFB Strategic Plan):

*Be accountable for board investments by promoting public oversight, effective projects, and actions that result in the economical and efficient use of resources.*

Embraced by these goals are four elements that Lando et al. (2013) termed “themes”, also articulated by the SRFB Strategic Plan:

*“Provide **accountability** for board funding by ensuring the implementation of board-funded projects and assessing their **effectiveness**, participate with other entities in supporting and **coordinating** state-wide monitoring efforts, and use monitoring results to **adaptively manage** board funding policies.”*

These themes set a foundation for a monitoring program that not only documents past efforts but also guides future resource allocation. Both are essential, but as stated herein, the former has been emphasized far more than the latter.

The SRFB needs to clarify their role in salmon recovery and monitoring. This should consist of an updated and explicit statement of goals; an explicit, time-bounded plan to implement those goals; and a clear framework for integrating the results of the ongoing monitoring programs to achieve the fundamental needs of accountability (backward-looking) and adaptive management (forward-looking).

Each of the monitoring components funded by the Board (effectiveness monitoring, IMWs, and fish status and trends) should demonstrate annual fulfillment of these strategic goals, acknowledging their specific role(s) in the overall monitoring strategy, in order to receive continued funding. The SRFB should require this information in a consistent and publically-accessible format. For this approach to be successful, however, the monitoring components must each be told what is expected—what role does each component play in the overall strategy, and how is it best suited to support these four themes?

## **2. Develop a functional adaptive management program**

A focus of SRFB-funded monitoring to date has been accountability; however, that alone will not direct the effective use restoration and monitoring funds for salmon recovery. In order to move beyond accountability monitoring and strategically guide future salmon recovery efforts, an adaptive management program is essential. To be functional rather than cumbersome, such a framework must be streamlined, transparent, and efficient. It should incorporate two key elements: (1) a policy element, whereby key management questions or concerns are articulated and an administrative body with the capacity to act upon new information to change management actions; and (2) a science element that can help translate those management questions into objectives that form the basis for the design of specific monitoring efforts. Results from the combination of monitoring elements would provide information relevant to the policy group so that improvements in their decisions can be based on relevant and reliable information.

As such, we recommend the formation of an Adaptive Management Board to establish an explicit framework, set of expectations and process for timely implementation (Year 1). In years to follow the AMB will work with input from the Independent Science Advisory Board (ISAB) to verify accountability by each monitoring component and integration of their findings into future decisions.

## **3. Establish an Independent Science Advisory Board**

Develop a 5-member independent review panel with strong scientific credentials and explicit monitoring expertise is needed to evaluate the degree to which the monitoring themes are being fulfilled by annual reporting. They should also provide ongoing programmatic guidance as needed to support the adaptive management program. A successful evaluation of



each monitoring component by this review board should affect the likelihood of future funding for that component.

#### 4. Provide specific requirements of each monitoring component

The SRFB, with support from an Independent Science Advisory Board (see #3 above), should provide specific requirements of each monitoring component, a framework for reporting, and a performance assessment for each SRFB themes. Only the SRFB themes in greatest need of improvement (i.e., rated 3 or lower in Table 2) are listed below with suggested improvements. Unless otherwise specified, the reporting timeframe for each theme should be as part of an annual, written summary.

##### Effectiveness Monitoring

- a. **Project effectiveness:** as a central focus of the Effectiveness Management Program, this theme is well-supported by the present reporting framework for conveying key information: each visit to a project site is documented in a report of observations and data, with annual summaries across all projects for each of the habitat-restoration project “types.” However, as documented herein, these reports have limited interpretation beyond some basic statistical tests for “significance” and almost no exploration of the implications for future project design and implementation. An improved annual reporting framework for the EM Program will therefore need the additional analytical and reporting elements listed in recommendation #2, above.
- b. **Adaptive management:** see recommendation #2 for an integrated approach to this theme, including specific recommendations to improve the analysis and reporting of the Effectiveness Management Program to support this theme.

##### IMW

- a. **Accountability:** post the monitoring sites, analyses and results to a centralized location. Identify attributes of a given IMW that would be transferable to other basins and increase the relevance of a particular IMW, recognizing that the long-term value of the IMW program is not in developing a watershed-specific understanding of limiting factors but rather in testing analytical approaches and prospective treatments that are more widely applicable.
- b. **Project effectiveness:** analyze and report on project effectiveness with respect to salmon endpoints, with a particular focus on the response of hypothesized limiting factors within the IMW.
- c. **Coordination:** seek additional funding and outreach opportunities to fill critical gaps. SRFB-funded IMWs need to collaborate with other IMWs to troubleshoot common challenges and increase program effectiveness. SRFB-funded IMWs should emphasize the degree to which findings from any individual IMW can be generalized to other IMWs, and thence to watersheds throughout Washington State and the PNW.
- c. **Adaptive management:** see recommendation #2 for an integrated approach to this theme.

##### Status and Trends

- a. **Accountability:** first determine if each SRFB IMW has adequate status and trend monitoring. This is fundamental to a successful monitoring program. Next, post the SRFB-funded monitoring sites, data and statistical analyses and results to a centralized location. Location and species are not sufficient; data analysis and

reporting on an annual basis are critical for this component of the SRFB Monitoring Program to provide value.

- b. **Project effectiveness:** Status and Trend monitoring as it is currently reported does not provide analysis and results that adequately benefit SRFB goals. Status and Trend results need to be evaluated in the context of salmon recovery and adaptive management, with clear articulation of the value of specific Status and Trends monitoring for a given basin. This should be an ongoing effort with annual reporting.
- c. **Coordination:** require recipients of SRFB monitoring funds to analyze and interpret the data with respect to salmon recovery efforts. Given the scale of Status and Trend monitoring, this will require coordination across multiple agencies.
- d. **Adaptive management:** see recommendation #2 for an integrated approach to this theme.

## 5. Resolve the IMW implementation problem

Limit IMW funding to watersheds with the ability to implementing restoration projects in a timely manner and with an explicit tie between habitat restoration and fish monitoring. Consider IMW success to date, future potential of matching funds to support implementation and resolve delayed restoration schedules, integration/overlap with other non-SRFB-funded IMWs, and statewide value to salmon recovery in deciding which IMWs to maintain. If adequate progress is not determined by the ISAB in 2014, the IMW program should face funding reallocation.

According to review comments on the Stillwater report, matching funds have been supported IMWs to date: *“IMWs have partnered with ongoing fish monitoring programs in order to leverage those programs and their technical expertise. These partnerships have leveraged over \$900k per year in existing monitoring resources and in-kind contributions of several hundred thousand dollars per year as well as technical expertise from NWFSC, Lower Elwha Tribe, Skagit River Cooperative, Weyerhaeuser Co., WDFW, and Ecology.”* This support notwithstanding, greater levels of financial support from either within or beyond the SRFB are needed to justify expenditures to date, and into the future. Although the need for a long-term commitment to IMWs was always recognized and affirmed, a completely unbounded commitment with no credible path to a successful outcome is also not warranted.

## 6. Identify how the SRFB can improve coordination with other statewide monitoring.

The following specific tasks would advance SRFB monitoring coordination efforts:

- Programmatic changes recommended above and resulting reports should be uploaded to the SRFB website.
- The SRFB would benefit from consultation and collaboration with Northwest Power and Conservation Council regarding their Fish and Wildlife monitoring program.
- The SRFB would benefit from an expanded engagement with the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) to advance collaborative opportunities and benefit from the collective efforts of the region in the following ways: 1) Collaborate with PNAMP webtools to identify and post the location of all SRFB funded restoration and monitoring; 2) provide incentives for SRFB-funded monitoring programs to participate in PNAMP sponsored workshop and contribute to workshop products and documentation; 3) fund a SRFB representative to engage with PNAMP.

## 5.4 Next Steps

The focus of this report was to assess the three primary components of the SRFB monitoring program (effectiveness monitoring, intensively monitored watersheds, and status and trends monitoring). With this assessment and the development and discussion of targeted recommendations (December 5, 2013 SRFB meeting), the next step is to determine *how* best to implement the recommendations. Many of the observations and recommendations provided in this report have been raised in earlier forums (such as the 2006 ISP review of the IMW program), but moving beyond recommendations to action has not always occurred. We believe that a major impediment to action is a sense by some partners that the SRFB should play a larger role in overseeing salmon recovery. However, the legislature established the board as a funding board, not a centralized body to oversee statewide salmon recovery. That centralized role for oversight of the state's salmon recovery strategy is the Governor's Salmon Recovery Office. The SRFB should work closely with the GSRO to decide the means by which to implement those recommendations judged appropriate.

The SRFB could assist in minimizing the ambiguity by funding or supporting the development of a set of statewide policies, organizations, and scientific decision-making processes, one that would reflect a natural continuation of the statewide Monitoring Strategy advanced over a decade ago. An alternative approach appears to have developed in recent years, with stronger support by the SRFB for region-based salmon recovery—particular for the selection and funding of salmon restoration projects, but with inescapable consequences for monitoring efforts as well. As we have observed throughout this report, certain goals and initiatives of the SRFB—particularly IMWs, systematic analysis and dissemination of effectiveness monitoring results, and adaptive management—require an integrated approach without the distribution of responsibilities, authority, and scientific expertise amongst multiple groups (no matter how well coordinated they may be).

We also recognize the possibility of a hybrid option, wherein the SRFB and the GSRO together transparently and purposefully operate at both scales. In the case of monitoring, for example, two thirds (or more, or less) of the Board's annual monitoring funds could support the centralized statewide programs for guiding an overall monitoring framework, creating and enforcing adaptive management, and conducting critical science (IMWs, status and trend monitoring, and either an ISP or increased technical staff); the remaining funds could be allocated to regional programs, particularly to improve the region-specific value and feedback of project effectiveness monitoring. The first step, however, must be a clear expression of intent. Regardless of the decision made, it would advance the effectiveness of current SRFB funding and clarify the most appropriate use of resources.

Deciding upon the role of the SRFB and its relationship to the GSRO has significant consequences moving forward. We encourage this issue to receive careful consideration and the recommendations are being enacted.

## 6 REFERENCES

See Appendix A.

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## Appendices

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## Appendix A

### Documents Reviewed (partial list)

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Beamer, E., R. Henderson, and K. Wolf. 2013. Juvenile salmon, estuarine, and freshwater fish utilization of habitat associated with the fisher slough restoration project in 2012 Skagit River System Cooperative. Prepared for The Nature Conservancy.

Bennett, S., and N. Bouwes. 2008. Southeast Washington Intensively Monitored Watershed Project: selection process and proposed experimental and monitoring design for Asotin Creek. Final draft report. Prepared by Eco Logical Research Inc., Providence, Utah for the State of Washington, Recreation and Conservation Office, Olympia, Washington.

Bilby, R., W. Ehinger, C. Jordan, K. Krueger, M. McHenry, T. Quinn, G. Pess, D. Poon, D. Seiler, and G. Volkhardt. 2004. Evaluating watershed response to land management and restoration actions: intensively monitoring watersheds (IMW). Progress report. Prepared by The IMW Scientific Oversight Committee.

Bilby, R., W. Ehinger, C. Jordan, K. Krueger, M. McHenry, T. Quinn, G. Pess, D. Poon, D. Seiler, and G. Volkhardt. 2005. Evaluating watershed response to land management and restoration actions: intensively monitoring watersheds (IMW). Progress report. Prepared by The IMW Scientific Oversight Committee.

Bilby, R., W. Ehinger, C. Jordan, K. Krueger, M. McHenry, T. Quinn, G. Pess, D. Poon, D. Seiler, and G. Volkhardt. 2006. Evaluating watershed response to land management and restoration actions: intensively monitoring watersheds (IMW). Progress report. Prepared by The IMW Scientific Oversight Committee.

Cramer, M. L., managing editor. 2012. Stream habitat restoration guidelines. Co-published by Washington Departments of Fish and Wildlife, Natural Resources, Transportation and Ecology, Washington State Recreation and Conservation Office, Puget Sound Partnership, and U.S. Fish and Wildlife Service. Olympia, Washington.

Crawford, B. A., editor. 2007. Washington State framework for monitoring salmon populations listed under the federal endangered species act and associated freshwater habitats. Produced by the Governor's Forum on Monitoring Salmon Recovery and Watershed Health.

Crawford, B. A. 2011. Protocol for monitoring effectiveness of in-stream habitat projects (channel reconfiguration, deflectors, log and rock control weirs, roughened channels, and woody debris removal). MC-2. Washington Salmon Recovery Funding Board. Recreation and Conservation Office, Olympia, Washington, revised by Tetra Tech EC, Inc.

Crawford, B. A. 2011. Protocol for monitoring effectiveness of floodplain enhancement projects (dike removal/setback, riprap removal, road removal/setback, and landfill removal, off-channel habitat creation, side channel creation). MC-5/6. Washington Salmon Recovery Funding Board. Recreation and Conservation Office, Olympia, Washington, revised by Tetra Tech EC, Inc.

Crawford, B. A. 2011. Protocol for monitoring effectiveness of instream diversion projects (irrigation diversion dams, water treatment plants, pipes, ditches, headgates, hydropower penstocks). MC-8. Washington Salmon Recovery Funding Board. Recreation and Conservation Office, Olympia, Washington, revised by Tetra Tech EC, Inc.

Crawford, B. A. 2011. Protocol for monitoring effectiveness of instream diversion projects (land parcel biodiversity health). MC-10. Washington Salmon Recovery Funding Board. Recreation and Conservation Office, Olympia, Washington, revised by Tetra Tech EC, Inc.

Crawford, B., C. Drivdahl, S. Leider, C. Richmond, and S. Butkus. 2002. The Washington comprehensive monitoring strategy for watershed health and salmon recovery. Volume 2 of 3. Prepared by Washington State Recreation and Conservation Office, Olympia, Washington.

Currens, K. P., H. W. Li, J. D. McIntyre, W. F. Megahan, and D. W. Reiser. 2006. Review of “Study Plan for the Intensively Monitored Watershed Program” (April 26, 2006 review draft). Report 2006-1. Independent Science Panel, Olympia, Washington.

Desgroseillier, T., J. Samagaio, T. Taylor, C. Yonce, H. Potter, R.D. Nelle, and M. Cooper. 2012. Integrated status and effectiveness monitoring program – Entiat River intensively monitored watershed study, 2011. U. S. Fish and Wildlife Service, Mid-Columbia River Fishery Resource Office, Leavenworth, Washington.

Greene, C. M., and E. M. Beamer. 2011. Monitoring of population responses by Skagit River Chinook salmon to estuary restoration. In Appendix E: intensively monitored watersheds plan. Intensively Monitored Watershed Project Annual Report.

Habitat Work Schedule database. Various single year effectiveness monitoring reports. State of Washington , Recreation and Conservation Office. <http://hws.ekosystem.us/> (accessed 2013).

Hillman, T. 2006. Monitoring strategy for the upper Columbian basin. Prepared for Upper Columbia Salmon Recovery Board, Bonneville Power Administration, and National Marine Fisheries Service.

IMW (Intensively Monitored Watersheds) Scientific Oversight Committee. 2013. Intensively monitored watersheds synthesis report, Hood Canal. Prepared for the Salmon Recovery Funding Board.

IMW Scientific Oversight Committee. 2013. Intensively monitored watersheds synthesis report, Lower Columbia River. Prepared for the Salmon Recovery Funding Board.

IMW Scientific Oversight Committee and IMW Partners. 2007. Study plan for the Intensively Monitored Watershed Program: lower Columbia complex. Prepared by Washington State Department of Ecology, Washington State Department of Fish and Wildlife, Lower Elwha Klallam Tribe, Skagit River Systems Cooperative, NOAA-Northwest Fisheries Science Center, Weyerhaeuser.

IMW Scientific Oversight Committee and IMW Partners. 2007. Study plan for the Intensively Monitored Watershed Program: Strait of Juan de Fuca complex. Prepared by Washington State Department of Ecology, Washington State Department of Fish and Wildlife, Lower Elwha Klallam Tribe, Skagit River Systems Cooperative, NOAA-Northwest Fisheries Science Center, Weyerhaeuser.

Kinsel, C., P. Hanratty, M. Zimmerman, B. Glaser, S. Gray, T. Hillson, D. Rawding, S. VanderPloeg. 2009. Intensively monitored watersheds: 2008 fish population studies in the Hood Canal and Lower Columbia stream complexes. Fish Program, Washington Department of Fish and Wildlife.

Kinsel, C. P. Hanratty, M. Zimmerman, B. Claser, S. Gray, T. Hillson, D. Rawding, and S. VanderPloeg. 2009. Intensively Monitored Watersheds Technical Report: Hood Canal and lower Columbia stream complexes. Fish Program, Washington Department of Fish and Wildlife.

Kinsel, C., and M. Zimmerman. 2011. Intensively monitored watersheds: 2009 fish population studies in the Hood Canal stream complex. Fish Program, Washington Department of Fish and Wildlife.

Lando, J.B., D.B. Booth and S.C. Ralph. 2013a. Developing a monitoring investment strategy for the Salmon Recovery Funding Board. Work Plan. Prepared by Stillwater Sciences, Portland, Oregon for Washington State Recreation and Conservation Office.

Lando, J.B., D.B. Booth and S.C. Ralph. 2013b. Recommendations for improvements to the Salmon Recovery Funding Board Monitoring Program. Prepared by Stillwater Sciences, Portland, Oregon for Washington State Recreation and Conservation Office.

NOAA (National Oceanic and Atmospheric Administration). 2011. Guidance for Monitoring Recovery of Pacific Northwest Salmon & Steelhead listed under the Federal Endangered Species Act: Bruce A. Crawford and Scott M. Rumsey, National Marine Fisheries Service, NW Region, January 2011, 160 pp. (<http://www.pnamp.org/document/3338>)

NOAA. 2012. Scientific conclusions of the status review for Oregon coast coho salmon (*Oncorhynchus kisutch*). NOAA Technical Memorandum NMFS-NWFSC-118.

NMFS (National Marine Fisheries Service). 2006. Pacific Coastal Salmon Recovery Fund performance goals, measures and reporting framework.

Ralph, S. C. and G. C. Poole. 2003. Putting monitoring first: designing accountable ecosystem restoration and management plans. Chapter in D. R. Montgomery, S. Bolton, and D. B. Booth, editors. Restoration of Puget Sound Rivers. University of Washington Press, Seattle.

Roni, P., M.C. Liermann, C. Jordan, E.A. Steel. 2005 in P. Roni, editor. Monitoring stream and watershed restoration. American Fisheries Society, Bethesda, Maryland.

Roni, P., T. Bennett, R. Holland, G. Pess, K. Hanson, R. Moses, M. McHenry, W. Ehinger, J. Walter. 2012. Factors affecting migration timing, growth and survival of juvenile coho salmon in two coastal Washington watersheds. Transactions of the American Fisheries Society 141: 890–906.

Roni, P., R. Scranton, and J. O’Neal. 2013. Action effectiveness monitoring of tributary habitat improvement: a programmatic approach for the Columbia Basin Fish and Wildlife Program.

Salmon Recovery Funding Board. 2013. Manual 18: salmon recovery grants. Washington State Recreation and Conservation Office.

State of Washington, Recreation and Conservation Office. 2013. Washington State Application, Grant 11-438. Project title: FFY 2013 Pacific Coastal Salmon Recovery Fund for Washington State: implementing integrated habitat, harvest, and hatchery actions for salmon recovery.



Taylor Associates, Cascadia Consulting Group, and R2 Resource Consultants. 2003. Assessment of monitoring methods and benefits for Salmon Recovery Funding (SRF) Board projects and activities. Final report. Prepared by Taylor Associates, Inc., Cascadia Consulting Group, Seattle, Washington and R2 Resource Consultants, Inc., Redmond, Washington for Interagency Committee for Outdoor Recreation, Salmon Recovery Funding Board, Olympia, Washington.

Tetra Tech. 2013. Reach-Scale Effectiveness Monitoring Program 2012 Annual Progress Report. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Hood Canal region. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Juan de Fuca region. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Lower Columbia region. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Middle Columbia. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Puget Sound region. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Snake River region. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Tetra Tech. 2013. Regional project-scale effectiveness monitoring synthesis report, Upper Columbia Region. Prepared by Tetra Tech, Mt. Vernon, Washington for the Governor's Salmon Recovery Office, Olympia, Washington.

Ward, M.B., P. Nelle and S.M. Walker, editors. 2011. CHaMP: 2011 pilot year lessons learned project synthesis report. Prepared for the Bonneville Power Administration by CHaMP. Published by Bonneville Power Administration, Portland, Oregon.

Washington Department of Ecology, Washington State Conservation Commission, and Washington Department of Fish and Wildlife. 2006. Status and trends monitoring of watershed health and salmon recovery—quality assurance monitoring plan. Ecology Publication No. 06-03-203. Olympia, Washington.

Washington Salmon Recovery Funding Board. 2003. Monitoring and evaluation strategy for habitat restoration and acquisition projects. Draft report.

Washington State Recreation and Conservation Office. n.d. Salmon Recovery Funding Board strategic plan. Prepared by Washington State Recreation and Conservation Office, Olympia, Washington.

Zimmerman, M. K. Krueger, B. Ehinger, P. Roni, B. Bilby, J. Walters, and T. Quinn. 2012. Intensively Monitored Watersheds Program: an updated plan to monitor fish and habitat responses to restoration actions in the lower Columbia watersheds. Fish Program, Washington Department of Fish and Wildlife.

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**Appendix B**

**Steering Committee Members**

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## STEERING COMMITTEE MEMBERS

Jen Bayer	Pacific Northwest Aquatic Monitoring Partnership, U.S. Geological Survey
Jeff Breckel	Lower Columbia Fish Recovery Board
Bruce Crawford	National Oceanic and Atmospheric Administration
Raquel Crosier	Northwest Power & Conservation Council (alternate)
Ken Currens	Northwest Indian Fisheries Commission
Bob Cusimano	Washington Department of Ecology
Ken Dzinbal	Puget Sound Partnership
Stacy Horton	Northwest Power & Conservation Council
Anne Marshall	Washington Department of Fish & Wildlife
Kathy Peters	Lead Entities
Timothy Quinn	Washington Department of Fish & Wildlife
Phil Rockefeller	Northwest Power & Conservation Council
Phil Rogers	Columbia River Inter-Tribal Fish Commission
Russell Scranton	Bonneville Power Administration
Derek Van Marter	Upper Columbia Salmon Recovery Board
James White	Upper Columbia Salmon Recovery Board
Lance Winnecka	South Puget Sound Salmon Enhancement Group

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**Appendix C**  
**Interviews Conducted**

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## INTERVIEWS CONDUCTED

Jennifer Bayer	Pacific Northwest Aquatic Monitoring Partnership, U.S. Geological Survey
Bruce Crawford	National Oceanic and Atmospheric Administration
Ken Dzinbal	Puget Sound Partnership
Bill Ehinger	Washington State Department of Ecology
Steve Leider	Washington State Governor's Salmon Recovery Office
Steve Martin	Snake River Salmon Recovery Board
Jenifer O'Neal	Tetra Tech
Tim Quinn	Washington Department of Fish & Wildlife
Phil Rockefeller	Northwest Power and Conservation Council/Salmon Recovery Funding Board
Bill Ruckelshaus	Salmon Recovery Funding Board (retired)
Russell Scranton	Bonneville Power Administration
Carol Smith	Salmon Recovery Funding Board
David Trout	Salmon Recovery Funding Board
Mara Zimmerman	Washington Department of Fish and Wildlife

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**Appendix D**  
**Review Comments**

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*The mission of the Upper Columbia Salmon Recovery Board is to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region.*

11 Spokane Street, Ste. 101, Wenatchee, WA 98801

phone: (509) 662-4707

[www.ucsrb.com](http://www.ucsrb.com)

September 25, 2013

Keith Dublanica  
Science Coordinator  
Washington Governor's Salmon Recovery Office  
Submitted via email: [keith.dublanica@gsro.wa.gov](mailto:keith.dublanica@gsro.wa.gov)

Dear Keith:

We developed the following comments in response to the Stillwater Sciences *Monitoring Investment Strategy for the Salmon Recovery Funding Board*. In the Upper Columbia we have a broad monitoring effort implemented by many different organizations and agencies. This effort is mostly funded and driven by Bonneville Power Administration and the local PUDs for the purpose of mitigation compliance tracking. With the exception of a handful of reach-scale effectiveness sites, very little of the monitoring in the Upper Columbia is funded by the SRFB. The UCSRB is currently going through an exercise similar to that conducted by Stillwater Sciences to evaluate the value of our existing monitoring information in the Upper Columbia, and what it tells us about our progress to date. In fact, we have organized a regional science conference for this fall, November 13-14, in Wenatchee. Details are at [www.ucscience.org](http://www.ucscience.org).

#### General Observations

The fundamental issue at the heart of this dialogue, regionally and statewide, is the marginal cost in monitoring investments versus the marginal benefit in influencing future habitat treatments. The SRFB monitoring funding is principally in place to provide continual evaluation of federal and state funding on a portfolio of projects, *not to develop new science*. Regionally, we are spending significant effort on long-term monitoring information (e.g. Intensively Monitored Watershed). While promising, these long-term monitoring programs have not resulted in useful, timely information about habitat and fish that can help us evaluate completed actions and plan for future restoration efforts. In principal, the Stillwater report appears to come to a similar conclusion.

Even more important is the observation in the report of the disconnect between regional funding for habitat implementation and statewide direction and funding for monitoring (section on *Adaptive Management*). Recovery Plans were developed regionally for a reason: recovery occurs at an ESU scale. While the state has long been interested in economies of scale for monitoring efforts, the current investments in monitoring have not generated results that can influence habitat restoration. This is why we have long suggested that monitoring funding should, at least in part, be controlled by the regional boards that are in a place to



understand more intimately the types of monitoring most necessary to effectively influence future restoration goals.

Lastly, the Stillwater report falls short on a thorough description of the existing monitoring in the Upper Columbia, for obvious reasons. In a couple of cases, there are important omissions. For instance, most of our monitoring is funded by the Action Agencies to the FCRPS Biological Opinion, rather than SRFB. We have used this funding to increase Tetra Tech monitoring sites under effectiveness monitoring to increase the statistical power of the information generated from that effort. We identified this need in 2009, and have been funding additional sites for the last 3 years. The following sections are a description of our existing monitoring efforts under each of the three categories in the Stillwater report: effectiveness, IMW, and status and trends. We include in each section our knowledge on what more is needed in our region under each of those types of monitoring.

### Effectiveness Monitoring

The programmatic approach to effectiveness monitoring seems to be a cost effective way to get at these questions. However, fish monitoring under the current program is insufficient to answer questions related to fish response. The current monitoring is adequate to answer questions about fish presence/absence during one day of the year at the site scale. The fish monitoring component is not frequent enough and does not cover enough area to provide an accurate assessment of fish use of a site.

Sampling should be conducted across at least two seasons (summer and winter) throughout the sampling schedule. To put site-scale results into tributary and watershed contexts, monitoring should also be conducted consistent with other juvenile fish monitoring. Without expanding the fish monitoring component of the current program, the usefulness of the information is significantly reduced and that component should be dropped.

### Intensively Monitored Watersheds

The Entiat sub-basin is an Intensively Monitored Watershed in the Upper Columbia. This design was established through a collaborative effort between monitoring personnel (ISEMP) and project implementers in 2008. The design calls for pulses of implementation every 3 years, starting in 2011 and ending in 2020. We will be executing our second pulse of implementation in 2014. Pre-implementation monitoring was an important component of the design, as is intense pulses of implementation in different reaches every 3 years. This monitoring effort is designed to tell us about the fish response at a population scale. We agree that IMWs need to have intensive implementation – in pulses or all at once – in order to make this investment worthwhile.

If the current SRFB funded IMWs cannot achieve that goal, investing that money in other monitoring needs is prudent. Given the current implementation and budget constraints of the IMWs, there are so many confounding factors (e.g. hatchery effects, fire, ocean conditions) that attributing cause of population-scale change to restoration activities appears unlikely.

### Status and Trends Monitoring

Fish status and trends measure the ultimate outcome of habitat restoration efforts. This is the most important monitoring activity for implementation and adaptive management. Status and trends information can also inform life-cycle models that are being developed to provide answers to integrated management questions, including habitat effectiveness, to the recovery regions and Lead Entities. These programs in the Upper Columbia are primarily driven by hatchery effectiveness questions and do not necessarily analyse or report on results that could answer questions about habitat effectiveness, or influence habitat restoration activities. In

addition, their efforts often do not coincide with existing restoration activities in terms of where monitoring is conducted (e.g. location of rotary screw traps for juvenile monitoring).

Increasing investment in fish status and trends would be the most cost effective way for the SRFB to improve the quality and usefulness of information generated from its monitoring efforts. The most cost-effective way to do status and trends to get at effectiveness is the large-scale implementation of PIT tagging programs at the site, tributary, and watershed scales. This should include remote PIT tagging in priority restoration areas and reference tributaries. Any remote PIT tagging could provide additional site-scale effectiveness answers if interrogation arrays are placed at restoration sites.

Although the SRFB defines fish status and trends as “fish in/fish out,” there is additional benefit from tracking fish throughout their freshwater life-cycle (e.g. parr and juvenile) to answer questions about individual life stage survival and performance as well as life history and habitat use. This information can be critically important to targeting the most appropriate restoration actions that will provide the greatest fish benefit.

We appreciate the opportunity to comment on the report, and GSRO’s effort in this exercise. The report appears to have identified appropriate issues with the current funding scheme for monitoring. It is really useful to continually evaluate how we are doing, and to be willing to change course if the findings suggest doing so. We very much look forward to the dialogue and decision from this exercise, which is arguably the most important and most difficult step.

King Regards,

A handwritten signature in black ink, appearing to read "Derek Van Marter". The signature is stylized and cursive, with a large initial "D" and "V".

Derek Van Marter  
Executive Director

TO: Keith Dublanica, RCO

FROM: Bruce Crawford, NOAA Fisheries

SUBJECT: Stillwater Report Monitoring Investment Strategy for the Salmon Recovery Funding Board

DATE: November 6, 2013

Thank you for the opportunity to provide input to the report prepared by Stillwater Science to the SRFB on the monitoring programs. Many of their insights and recommendations have been provided to the Board in the past and I am glad that they are also emphasizing them such as the need to have treatments funded in IMWs in a timely manner.

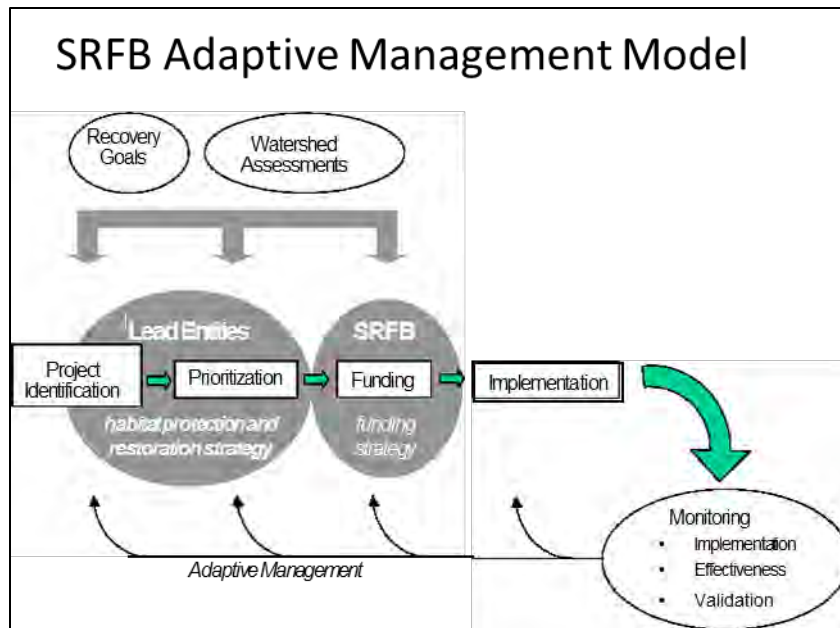
However, there are two areas I have taken some time to comment on and these are the questioned role of the SRFB in salmon recovery and monitoring and the second is the total absence of any recommendations concerning expanding habitat monitoring commitments to include watershed scale habitat status/trends. These comments have not been vetted with my supervisor and represent my own conclusions.

## Comments

Following comments are provided in the spirit of assisting the Salmon Recovery Funding Board and the Recreation and Conservation Office in meeting their goals and obligations. As a former employee and active participant in establishing the monitoring programs at the SRFB I undoubtedly come with my own bias.

On page 2 the bullets apparently are the lenses through which Stillwater viewed their assignment and revealed their bias and focus for this report.

**Bullet #1** Although the SRFB obviously does not have authority over hatcheries, harvest, and regulatory functions, they are and have been the chief source and designated lead for implementing habitat restoration and in monitoring the effects of their funding actions. This was clearly described in HB 2496. In addition, the state of Washington designated the RCO as the state channel for all federal grants for habitat restoration received from the Pacific Coastal Salmon Recovery Fund established as a result of the 1999 Pacific Salmon Treaty. The earliest adaptive management diagram produced by the IAC in 2000 for the SRFB clearly shows the perceived relationship between SRFB grants, Lead Entity implementation, and monitoring.



In addition, the federal government has clearly indicated that the PCSRF grant recipients have monitoring obligations for not only reporting implementation monitoring of project metrics such as acres of trees planted, but also in whether their restoration actions were effective. The SRFB state appropriations are also obligated by the PCSRF grant requirements. Following language from the 2010 Federal Register notice

*“That funds disbursed to States shall be subject to a matching requirement of funds or documented in-kind contributions of at least thirty-three percent of the Federal funds: Provided further, that, in order to fulfill the matching requirement in the previous proviso, non-Federal contributions of funds pursuant to the previous proviso must be used in direct support of this program.”*

The NOAA 2009 PCSRF Report to Congress stated:

*“PCSRF grantees are required to allocate at least 10 percent of their project funding to monitoring and evaluation activities of individual and regional projects. These dedicated funds allow grantees to collect data on both listed and non-listed salmonids for multiple years during and after project completion. These data not only help to determine the status of populations, but also identify effective actions essential to species recovery and sustainability”*

On July 7, 2012 Mr. Scott Rumsey of NOAA Fisheries was invited to the SRFB meeting in Olympia to provide NOAA perspectives on PCSRF priorities. He provided the following guidance for monitoring:

- Project-Level Effectiveness Monitoring:
  - Focus programmatically on the effectiveness of various treatment types

- Apply consistent design and methodology
- Conduct sufficient pre-project monitoring given project type, response variables, geographic scope, etc.
- Adequate sampling of each project type, ecoregions and species
- Coordinated across funding entities
- Regular analysis and dissemination of results to restoration community
- Intensively Monitored Watersheds:
  - Sufficient pre-treatment monitoring
  - Timely implementation of planned treatments of sufficient scale and intensity
  - Annual synthesis of results to inform adaptive implementation and monitoring
  - Coordination and information exchange with broader IMW community
- Population Status and Trends:
  - Inform population-scale viability assessments
  - Natural spawner abundance estimates for every population
  - Juvenile migrant estimates for at least one population per major population group
  - Annual dissemination of standardized data to NOAA and regional fish managers
  - VSP Prioritization and gap analysis recently completed for Puget Sound that will assist in prioritizing funding needs

**Bullet #2** I disagree with the statement in the second bullet that “*imposition of uniform metrics and protocols (the most common implementation of “collaborative monitoring”) rarely benefits all parties equally.*” Experience at the SRFB and the US Forest Service shows that without the imposition of uniform metrics and protocols the results are rarely usable by anyone other than the local entity who designed them.

**Page 10** Stillwater ignores the linkage with other IMWs in Washington and in the Columbia Basin in terms of the greater context of watersheds.

**Page 13 Section 2.2.4**

Stillwater refers to the three legged stool of monitoring but out of context with the original intent. The original intent was to show the need for three types of habitat monitoring, effectiveness, validation, and status/trends. The desire and need for broad scale and watershed scale habitat status/trends was identified in the Comprehensive Monitoring Strategy as the first Recommendation under “Trends in Environmental Conditions page 21 of the Executive Summary. It was also identified in the Washington Forum on Monitoring in its 2006 “*Report to the Office of Financial Management Concerning Monitoring Programs and Associated Databases*” as one of the two highest monitoring needs. It also is given emphasis in the Forum’s “*Washington State Framework for Monitoring Salmon Populations Listed under the Federal Endangered Species Act and Associated Freshwater Habitats*”. After three biennial budget tries, the Department of Ecology succeeded in obtaining the broad scale probabilistic habitat status/trend monitoring at the Salmon Recovery Region scale but not at the watershed scale.

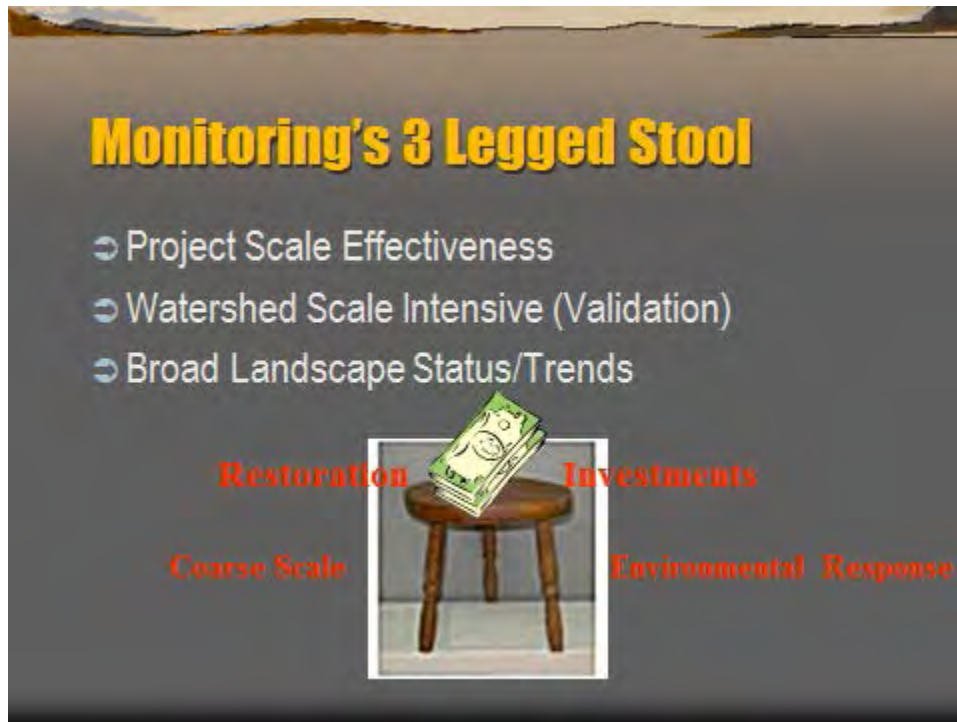


Figure 1. Slide taken from 2005 presentation to the Forum On Monitoring.

More recently NOAA's National Marine Fisheries Service provided specific guidance to the salmon recovery entities in Washington, Oregon, and Idaho in the "Guidance for Monitoring Recovery of Pacific Northwest Salmon and Steelhead Listed under the Federal Endangered Species Act" (Crawford & Rumsey, Guidance for Monitoring Recovery of Pacific Northwest Salmon and Steelhead Listed under the Federal Endangered Species Act, 2011). This document was designed to help prioritize monitoring associated with the recovery of listed salmonid species.

Additional emphasis has been placed on the need for a cohesive habitat monitoring approach through the *2011 Implementation Status Assessment Final Report* (Judge, 2011) and the tribal white paper *Treaty Rights at Risk* (Treaty Indian Tribes In Western Washington, 2011). In October 2011 the Regional Office of NOAA Fisheries announced the *Puget Sound Habitat Initiative* as a concentrated effort to address habitat loss in Puget Sound and how to monitor its status.

"Guidance for Monitoring Recovery of Pacific Northwest Salmon and Steelhead Listed under the Federal Endangered Species Act" (Crawford & Rumsey, 2011) called for the following components of habitat monitoring:

- A. Implement a randomized geospatially tessellated stratified (GRTS) habitat status trend monitoring program incorporating on the ground protocols coupled with remote sensing of land use and land cover. Coordinate and correlate habitat status/trend monitoring with fish in and fish out monitoring wherever possible.

- B. Reach scale action effectiveness monitoring should be conducted for various habitat improvement categories using a Before and After Control Impact (BACI) design whenever possible. Recovery entities should coordinate their monitoring to reduce costs and improve sample size, and wherever appropriate utilize the same protocols for conducting reach scale project effectiveness monitoring as those used in broad scale status/trends monitoring so that the results can be compared.
- C. Implement at least one intensively monitored watershed (IMW) for each domain and address different limiting factors by coordinating IMW sites and designs across the Pacific Northwest utilizing a BACI design wherever possible. This type of validation monitoring is used to determine whether the sum of adaptive management actions taken in specific watersheds has resulted in increased salmon production.

**Page 20** Stillwater is critical of the SRFB effectiveness monitoring program but they fail to give any real examples of other effectiveness programs of any broad scale significance. They also fail to mention that the Bonneville Power Administration is adopting the SRFB approach to monitoring categories of projects for projects they fund throughout the entire Columbia Basin because it is the most cost effective and produces scientifically valid results. They have hired Tetra Tech EC to assist them in implementing the process.

Thank you again for reviewing my thoughts on this important report.

## WASHINGTON STATE'S REGIONAL SALMON RECOVERY ORGANIZATIONS



November 4, 2013

Keith Dublanica  
Governor's Salmon Recovery Office  
Recreation and Conservation Office  
P.O. Box 40917  
Olympia WA 98504-0917



Re: Comments on the draft Stillwater Monitoring Investment Assessment Report

The Council of Regions is pleased to see the SRFB taking a measured look at its monitoring investments. We believe that the report provided by Stillwater Associates provides an insightful overview of the status of current SRFB monitoring investments. The report also properly emphasizes the need to better align monitoring investments with specific management questions and ensure that the scales at which monitoring is conducted is consistent with the scale of management questions. However, the Council of Regions is concerned that the Stillwater report failed to give adequate consideration to monitoring needs at the ESU or recovery region level. While coordination on monitoring methods and protocols and data management on a statewide or multiple agency basis is appropriate, on-the-ground monitoring activities for salmon recovery typically occur on an ESU or recovery region level, not on a statewide level. The recovery regions have developed research, monitoring and evaluation plans, which identify key management questions and associated monitoring needs, approaches, and priorities. SRFB monitoring activities should be consistent and/or coordinated with regional monitoring programs to ensure maximum benefit for both SRFB and regional monitoring needs.

Fish in/out monitoring is a high priority in all regional recovery plans. It is being implemented around the state using a wide range of funding sources (with BPA and Mitchell Act funding as primary contributors). The SRFB has played an important role by helping to cover the costs of critical fish in/out monitoring not covered by these other sources. The regional directors encourage the SRFB to provide ongoing funding and/or work with partners to ensure adequate and secure ongoing funding sources for this critical work.

The recovery regions have generally supported ongoing project effectiveness monitoring. While this program has been generally successful in assessing the effectiveness of various project types, more needs to be done to strengthen the program and better link its results to key regional management questions.

In contrast, the recovery regions have seen limited benefit from current SRFB-funded IMW investments. Research questions are not well aligned with regional priorities, implementation of IMW treatments has been piecemeal, and to date, results have not been made available in a way that can inform management decisions. We understand the hard choice faced by the SRFB in determining whether to either fully fund implementation of IMWs it supports and the associated restoration actions or cut funding for some or all SRFB-funded IMW efforts. We look forward to participating in ongoing discussion about the future of the SRFB-funded IMW program and how it may be altered to better inform priority management questions. We do



To: Keith Dublanica  
RE: Comments on the draft Stillwater Monitoring Investment Assessment Report  
11/4/2013, Page 2

want to emphasize that the fish in/out monitoring conducted as part of all IMWs may fulfill important monitoring needs identified in regional monitoring plans, and may merit continuation in some areas even if an IMW program were not present.

Discussions about how monitoring programs fit together at the state level have been hampered by the lack of any statewide process focused on evaluating monitoring investments. We have participated in, and appreciated the ad-hoc monitoring allocation discussions convened by SRFB staff in recent years, but note that a more robust approach to allocating monitoring funding is needed in the future in order to better align SRFB monitoring investments with statewide and regional monitoring priorities. The regional directors have previously put forth two specific proposals that could be incorporated into an improved allocation approach. We would like to reiterate these recommendations:

1. Annually, the SRFB should allocate a portion of the PCSRF 10% monitoring funds to the regional organizations to help meet high priority monitoring needs specific to each region. How these funds are distributed will be determined by the SRFB. Additional monitoring requests beyond the 10% should not be funded through returned funds.
2. Add monitoring as an eligible project type for proposals that could be funded as part of a region's project list using the current allocation formula (sponsored only regional organization or in partnership with a regional organization).

We look forward to participating in ongoing discussions about the SRFB monitoring program's future, and are committed to working together across the state to ensure that monitoring investments help address the critical uncertainties we need to resolve to successfully recovery Washington's listed and at-risk fish species.

Sincerely,



Miles Batchelder  
WA Coast Sustainable Salmon Partnership



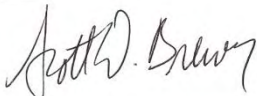
Alex Conley  
Yakima Basin Fish and Wildlife Recovery Board



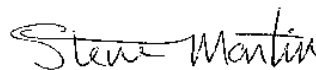
Jeff Breckel  
Lower Columbia Fish Recovery Board  
Chair, Council of Regions



Jeanette Dorner  
Puget Sound Partnership



Scott Brewer  
Hood Canal Salmon Recovery Board



Steve Martin  
Snake River Salmon Recovery Board

Cc: Brian Abbott  
Kaleen Cottingham  
David Troutt



Derek Van Mater  
Upper Columbia Salmon Recovery Board

Response to the October 2013 Draft Monitoring Investment Strategy for the Salmon Recover  
Funding Board from the IMW Science Committee

Bill Ehinger Dept of Ecology  
Bob Bilby-Weyerhaeuser Co  
Tim Quinn- Washington Dept Fish and Wildlife  
Mara Zimmerman- Washington Dept Fish and Wildlife  
Joe Anderson- Washington Dept Fish and Wildlife  
Kirk Krueger- Washington Dept Fish and Wildlife  
Correigh Greene- Northwest Fisheries Science Ctr-NOAA  
Phil Roni- Northwest Fisheries Science Ctr-NOAA  
Mike McHenry-Lower Elwha Klallam Tribe  
Eric Beamer-Skagit River Systems Cooperative

November 2013

Overall, the report accurately describes the pros and cons of the three monitoring types funded by the SRFB: Project Effectiveness Monitoring, Status and Trends Monitoring, and IMW. Our comments provide additional context and detail about the IMWs, especially regarding the IMW's relationship to Project Effectiveness and Fish in Fish out monitoring, and we suggest edits to the Recommendations and Next Steps sections.

## **IMWs**

*1. Funding for the implementation of the IMWs began in July 2004.*

The 2003 funding mentioned in the report was for a feasibility study that led to the funding and implementation of the IMWs in 2004.

*2. Lack of restoration projects in IMW streams.*

The portrayal of the 'lack of funding' for projects in the IMW basins is too stark. The issue is that projects were too few in some watersheds and delayed in others because there has been little effort to direct projects toward IMWs. Of the seven treatment streams and the Skagit estuary where restoration was needed, four (Little Anderson Creek, Skagit Estuary, East Twin River, and Deep Creek) have had extensive restoration implemented and, of these, Little Anderson Creek and the Skagit Estuary already show solid signs of a fish response to the restoration. Both Lower Columbia streams have ongoing watershed scale treatments testing the effects of salmon carcass analogs on fish growth and survival. The last distribution of carcass analogs will be spring 2014. Only Big Beef Creek and Seabeck Creek have not had a major habitat restoration project implemented recently. Seabeck Creek was a low priority because of road crossings that needed repair. Many are now repaired and habitat restoration can now be implemented. More detail for each complex is below:

- Skagit Estuary- Restoration projects are proceeding according to the ESA recovery plan. Restoration projects here take time because they are large, sometimes hundreds of acres, and often involve decommissioning old dikes and building of new ones.
- Straits-These watersheds have received extensive restoration because they were a high priority for the Lead Entity. The highest priority projects were completed by 2013. Additional restoration projects will probably not rank as high priority by the current selection process.
- Hood Canal-
  - Restoration of Little Anderson Creek via extensive LWD projects has largely been completed and success is apparent. We've seen a large increase in coho smolt production after a main stem culvert was replaced with a bridge and we may be seeing further increases in coho smolt production due to a recent LWD project.
  - Seabeck Creek- Based on a study completed in 2008 by Stillwater Sciences, fixing undersized road culverts was the top priority. Several problematic road crossings were fixed recently by local transportation agencies with more scheduled over the next few years. Habitat restoration projects can capitalize on these improvements to stream function.
  - Big Beef Creek has a large off-channel habitat restoration project recently submitted for SRFB funding for the second time. This project had been ranked relatively low, but the current design appears to correct previously identified shortcomings.
- Lower Columbia- Implementing restoration projects in this complex has been a concern in the past because few projects ranked high enough in the Lead Entity's prioritization process for SRFB funding. However, that has changed recently and restoration is underway.
  - Abernathy Creek has had several habitat restoration projects completed and more are being planned. In addition, in 2013 we (through the LCFEG) began a watershed-scale study of the effect of carcass analogs on fish growth and survival. The LCFEG has enough funding remaining to distribute analogs again in spring 2014.
  - Germany Creek-The LCFEG has distributed salmon carcass analogs since fall 2011 while we have monitored the effect on fish growth and survival. No additional restoration projects are currently planned for this watershed.

It should be noted that even before the IMW was funded the challenge of implementing multiple restoration projects in the IMW basins over a short time frame was brought to the SRFB's attention. It was discussed by the SRFB during the June 2004 meeting and was repeatedly brought to their attention over the years. However, our local partners have found means to implement many projects in the IMW basins using other funding sources or by waiting until these projects became high priority.

## **Relationship of IMWs to other monitoring types**

### *1. Funding*

Although the SRFB provides more funding for the IMW contract relative to Effectiveness and Status/Trends monitoring, the report should clearly describe what the IMWs are comprised of and the value of conducting monitoring in an integrated, paired-watershed, framework; thereby providing the most reliable and comprehensive results of the three monitoring types. Fish in Fish out monitoring alone comprises approximately 60% of the IMW monitoring funded by the SRFB. Although the report mentions that IMWs include both Fish in Fish out and Effectiveness monitoring, this important point is not discussed or accounted for in the cost estimates. Eliminating IMWs would result in a funding gap for populations included in the statewide Fish in Fish out monitoring framework and all of the Project Effectiveness monitoring that can be tied to a fish population response.

### *2. Relative value of the monitoring types to the SRFB*

Recommendations from outside technical experts and the Comprehensive Monitoring Strategy identified IMWs as a research priority that underlies Effectiveness Monitoring. This topic was covered in detail by the SRFB in 2002-03 and is worth revisiting. In 2002 the Independent Science Panel (ISP) asked Dr. Peter Bayley of the Department of Fisheries and Wildlife at Oregon State University to review the scientific literature on the responses of salmon and trout to habitat changes. Dr. Bayley concluded that the then “current freshwater-based monitoring programs will either: (1) fail to indicate an improvement associated with stream habitat restoration in terms of smolt recruitment, returning adults, or population size increase at the watershed scale, or (2) indicate an improvement but fail to demonstrate which and how habitat changes were responsible so that subsequent restoration policy could be made more cost-effective” (<http://digitalarchives.wa.gov/governorlocke/gсро/science/050802bayley.pdf>). These are the questions the IMW was designed to answer.

In the July 14, 2002 Technical Memorandum 2002-2 summarizing Dr. Bayley’s findings ([http://www.rco.wa.gov/documents/gсро/panel\\_reviews/tech\\_memos/071502techmemo.pdf](http://www.rco.wa.gov/documents/gсро/panel_reviews/tech_memos/071502techmemo.pdf)), the ISP reiterated a recommendation from an earlier report (ISP 2000-2). “Because sound bases do not seem to be readily available in the literature, we recommend that habitat restoration projects and other habitat altering activities be used to help define formal cause and effect relationships between habitat parameters and population change.” These recommendations from outside technical experts were the basis for funding IMWs by the SRFB. We believe these reports would be informative for the current SRFB discussion.

In addition, the rankings in Table 2 are misleading because they do not take into account the relative value of each monitoring type.

### *3. Collaboration*

Finally, it needs to be noted that the IMW has partnered with ongoing fish monitoring programs in order to leverage those programs and their technical expertise. These partnerships have leveraged over \$900k per year in existing monitoring resources and in-kind contributions of several hundred thousand dollars per year as well as technical expertise from NWFSC, Lower Elwha Tribe, Skagit River Cooperative, Weyerhaeuser Co., WDFW, and Ecology. Such cooperative partnerships and contributions speak volumes about the perceived value of the IMW program.

### **Suggested Edits to Recommendations and Conclusions**

The Conclusions contain several key issues, recommendations, or opinions that should be incorporated explicitly into the Recommendations section. These include:

- The need for the SRFB “to articulate a common set of objectives, a plan to implement those objectives and a strategy to integrate the results of ongoing monitoring programs...” should be the first action item for the SRFB.
- The question of “should the SRFB be making these technical decisions, or should they instead focus on programmatic requirements, coordination and collaboration while seeking scientific input from a technical advisory board (e.g. an ISP)?” should be emphasized in the Recommendations.
- The following statement is important if the SRFB’s objective is to justify the restoration expenditures. “We agree with the judgment expressed in multiple documents surrounding the formation of the Monitoring Program in general, and the IMWs in particular, that only such a program can answer the fundamental question of any recovery program: Are our efforts doing any good? If this question cannot be answered, it is difficult to justify any long-term expenditure on restoration or monitoring; and for the current implementation of salmon recovery in Washington State, IMWs are the only vehicle with the hope of providing an answer.”

### **Other**

There were are many documents (technical memoranda, meeting minutes, etc) generated a decade ago as state agencies grappled with salmon recovery, habitat restoration, and monitoring needs that can provide some insight for the SRFB’s upcoming discussions. It would help the current SRFB members if they understood the decisions made by their predecessors. These can be found at [http://www.rco.wa.gov/doc\\_pages/other\\_pubs.shtml#gsro](http://www.rco.wa.gov/doc_pages/other_pubs.shtml#gsro).

Response to the October 2013 Draft Monitoring Investment Strategy for the Salmon Recover  
Funding Board from the IMW Science Committee

Bill Ehinger Dept of Ecology  
Bob Bilby-Weyerhaeuser Co  
Tim Quinn- Washington Dept Fish and Wildlife  
Mara Zimmerman- Washington Dept Fish and Wildlife  
Joe Anderson- Washington Dept Fish and Wildlife  
Kirk Krueger- Washington Dept Fish and Wildlife  
Correigh Greene- Northwest Fisheries Science Ctr-NOAA  
Phil Roni- Northwest Fisheries Science Ctr-NOAA  
Mike McHenry-Lower Elwha Klallam Tribe  
Eric Beamer-Skagit River Systems Cooperative

November 2013

Overall, the report accurately describes the pros and cons of each of the three monitoring types funded by the SRFB: Project Effectiveness Monitoring, Status and Trends Monitoring, and IMW. Our comments will focus on providing context and additional background detail about the IMWs, more detail regarding the IMW's relationship to Project Effectiveness and Fish in Fish out monitoring, and some suggested edits to the Recommendations and Next Steps sections.

## **IMWs**

*1. Funding for the implementation of the IMWs began in July 2004.*

The 2003 funding mentioned in the report was for a feasibility study that led to funding and implementation of the IMWs in 2004.

*2. Lack of restoration projects in IMW streams.*

The portrayal of the 'lack of funding' for projects in the IMW basins is too stark. The issue isn't that no projects were implemented but that there were too few in some watersheds and delayed in others. Of the eight areas (seven treatment streams and the Skagit estuary) where restoration was needed, four (Little Anderson Creek, Skagit Estuary, East Twin River, and Deep Creek) have had extensive restoration implemented and, of these, Little Anderson Creek and the Skagit Estuary already show solid signs of a fish response to the restoration. Both Lower Columbia streams have ongoing watershed scale treatments testing the effects of salmon carcass analogs on fish growth and survival. The last distribution of carcass analogs will be in June 2013. Only Big Beef Creek and Seabeck Creek have not had a major habitat restoration project implemented recently. Seabeck Creek was a low priority because of the numerous road crossings that needed repair (and many of these have been completed via transportation funding). More detail for each complex is below:

- Skagit Estuary-Restoration projects here are large, sometimes hundreds of acres, and often involve decommissioning of old dikes and building of new ones. Projects of this magnitude simply take time, but they have been proceeding according to the recovery plan.
- Straits-These watersheds have received extensive restoration with the completion of the highest priority projects in 2013. These projects were a high priority for the Lead Entity. Additional restoration projects will probably not rank as high priority by the current selection process.
- Hood Canal-
  - Much of Little Anderson Creek has had LWD projects implemented on it. Most the stream reaches remaining are either owned by non-cooperating landowners or are relatively low value for restoration. We've seen a large increase in coho smolt production after a main stem culvert was replaced with a bridge and we may be seeing further increases in coho smolt production due to a recent LWD project.
  - Seabeck Creek- Based on a study completed in 2008 by Stillwater Sciences, fixing these culverts was the top priority. Several problematic road crossings were fixed recently by local transportation agencies with more scheduled over the next few years.
  - Big Beef Creek has a large off-channel restoration project that was recently submitted for SRFB funding for the second time. This project has been ranked relatively low in the past because of the presence of the fish-counting weir just downstream from the project.
- Lower Columbia-This complex was identified in the past because few projects ranked high enough in the Lead Entity's prioritization process for SRFB funding. However, that has changed recently.
  - Abernathy Creek has had several restoration projects completed and more are in the planning stages. In addition, in 2013 we began a watershed scale project to distribute salmon carcass analogs (through the LCFEG) in the late spring and evaluate the effect on fish growth and survival. The LCFEG has enough funding remaining to distribute analogs again in May 2014.
  - Germany Creek-The LCFEG has distributed salmon carcass analogs since fall 2011 while we have monitored the effect on fish growth and survival. No additional restoration projects are currently planned for this watershed.

It should be noted that finding a means to implement multiple projects over a short time frame in the IMW basins was brought to the SRFB's attention even before the IMW was funded, was discussed by the SRFB as early as the June 2004 meeting, and was repeatedly brought to their attention over the years. However, our local partners have found means to implement many projects in the IMW basins using other funding sources or by waiting until these projects became high priority.

## Relationship of IMWs to other monitoring types

### 1. Funding

Although the report mentions that IMWs do include both Fish in Fish out and Effectiveness monitoring, this does not carry through to the discussion. Fish in Fish out monitoring alone comprises approximately 60% of the IMW monitoring funded by the SRFB. Eliminating IMWs would result in a funding gap for populations included in the statewide ~~eliminate the majority of the SRFB's Fish in Fish out monitoring~~ monitoring framework and all of the Project Effectiveness monitoring that can be tied to a fish population response. The SRFB does provide more funding for the IMW contract relative to Effectiveness and Status/Trends monitoring but this should be presented in a way that recognizes what the IMWs are comprised of and the value of conducting monitoring in an integrated paired-watershed framework.

### 2. Relative value of the monitoring types to the SRFB

This topic was covered in detail by the SRFB in 2002-03 and is worth revisiting. In 2002 the Independent Science Panel (ISP) asked Dr. Peter Bayley of the Department of Fisheries and Wildlife at Oregon State University to review the scientific literature on the responses of salmon and trout to habitat changes. Dr. Bayley concluded that the then “current freshwater-based monitoring programs will either: (1) fail to indicate an improvement associated with stream habitat restoration in terms of smolt recruitment, returning adults, or population size increase at the watershed scale, or (2) indicate an improvement but fail to demonstrate which and how habitat changes were responsible so that subsequent restoration policy could be made more cost-effective” (<http://digitalarchives.wa.gov/governorlocke/gсро/science/050802bayley.pdf>). These are the questions the IMW was designed to answer.

In the July 14, 2002 Technical Memorandum 2002-2 summarizing Dr. Bayley’s findings) ([http://www.rco.wa.gov/documents/gсро/panel\\_reviews/tech\\_memos/071502techmemo.pdf](http://www.rco.wa.gov/documents/gсро/panel_reviews/tech_memos/071502techmemo.pdf)), the ISP reiterated a recommendation from an earlier report (ISP 2000-2). “Because sound bases do not seem to be readily available in the literature, we recommend that habitat restoration projects and other habitat altering activities be used to help define formal cause and effect relationships between habitat parameters and population change.” These recommendations from outside technical experts were the basis for funding IMWs by the SRFB. We believe these reports would be informative for the current SRFB discussion.

In addition, the rankings in Table 2 are misleading because they do not take into account the relative value of each monitoring type.

### 3. Collaboration

Finally, it needs to be noted that the IMW has partnered with ongoing fish monitoring programs in order to leverage those programs and their technical expertise. These partnerships have leveraged over \$900k per year in existing monitoring resources and in-kind contributions of several hundred thousand dollars per year as well as technical expertise from NWFSC, Lower Elwha Tribe, Skagit River Cooperative, Weyerhaeuser Co., WDFW, and Ecology.



## **Suggested Edits to Recommendations and Conclusions**

The Conclusions contain several key issues, recommendations, or opinions that should be incorporated explicitly into the Recommendations section. These include:

- The need for the SRFB “to articulate a common set of objectives, a plan to implement those objectives and a strategy to integrate the results of ongoing monitoring programs...” could be the first action item for the SRFB.
- The question of “should the SRFB be making these technical decisions, or should they instead focus on programmatic requirements, coordination and collaboration while seeking scientific input from a technical advisory board (eg., an ISP)?” should be emphasized in the Recommendations.
- The following item should be a task for the SRFB and is part of articulating their objectives. “The policy question that cannot be answered by this review is thus whether the Board’s interest in scientific understanding and long-term accountability trumps the principle of Regional allocations.”
- The following statement is important if the SRFB’s objective is to justify the restoration expenditures. “We agree with the judgment expressed in multiple documents surrounding the formation of the Monitoring Program in general, and the IMWs in particular, that only such a program can answer the fundamental question of any recovery program: Are our efforts doing any good? If this question cannot be answered, it is difficult to justify any long-term expenditure on restoration or monitoring; and for the current implementation of salmon recovery in Washington State, IMWs are the only vehicle with the hope of providing an answer.”

### **Other**

There were are many documents (technical memoranda, meeting minutes, etc) generated a decade ago as state agencies grappled with salmon recovery, habitat restoration, and monitoring needs that can provide some insight for the SRFB’s upcoming discussions. It would help the current SRFB members if they understood the decisions made by their predecessors.



November 4, 2013

Keith Dublanica, Science Coordinator  
Governor's Salmon Recovery Office  
Recreation and Conservation Office  
PO Box 40917  
Olympia, WA 98504-0917

RE: Stillwater Monitoring Investment Assessment Report

Dear Keith,

Thank you for the opportunity to review the October 2013 draft report "Monitoring Investment Strategy for the Salmon Recovery Funding Board" prepared by Stillwater Sciences. I believe the authors of the report (Lando et al.) have provided a thoughtful and extremely valuable review, and I complement your efforts and the Governor's Salmon Recovery Office for bringing this work to fruition.

My comments (following) represent my individual review of this report, and not the official position of either the Puget Sound Partnership (PSP) (those comments will be provided separately) or of the Puget Sound Ecosystem Monitoring Program (PSEMP), for which I serve as the Senior Monitoring Program Coordinator. In full disclosure, I must also acknowledge that I was appointed to and participated in the Steering Committee established by the Recreation and Conservation Office (RCO) to help frame this review.

The following comments are not listed in any particular order of priority or importance:

- 1) The authors have done an excellent job of compiling and sorting through a great deal of current and historical information, and I believe the majority of their conclusions and recommendations are made in an appropriate context.
- 2) Linking habitat restoration to changes in fish populations is critically important. However, the report correctly identifies a number of problems related to the execution of existing IMWs, including the particular concern that delays in completing restoration projects have seriously compromised the value of some IMWs. In some cases, this most likely reflects that regional recovery priorities (and therefore restoration projects) are not focused on the IMW watersheds but instead target ESA listed populations in watersheds other than the IMWs. This is not the case in the Skagit, which is almost certainly a main reason why that IMW has been particularly successful. I agree that continued funding for other IMWs should be limited to watersheds that can commit to and demonstrate the capacity for completing their restoration

efforts, or the IMW designs should be adjusted appropriately to assure that the assumptions of the BACI approach will be fully met.

- 3) The report correctly identifies the significant disconnect between effectiveness monitoring and project planning. On page 19, this point is emphasized, and expansion of effectiveness monitoring is not recommended until such time as an effective adaptive management system can be developed. It should be noted, however, that building a truly integrated, adaptive management system that fully integrates science, monitoring, project planning, and implementation is not a trivial task, and there are relatively few good examples of a fully functioning adaptive management system (especially at a statewide scale). In defense of the current program, there are at least three good examples where the SRFB effectiveness monitoring approach has already helped save money by providing solid evidence of project effectiveness, thereby serving both to confirm the value of those investments and also saving money that might otherwise be unnecessarily spent on individual project monitoring (culvert replacement, irrigation screening, and riparian fencing). However, there are other project categories that have been evaluated by Tetra Tech and determined to require either significantly larger sample sizes, or significantly more years of monitoring before they are likely to produce useful results – and this point is not well addressed in the review. I would strongly suggest that – while a SRFB adaptive management system is developed – the effectiveness monitoring program be fully maintained with two conditions: A) effectiveness monitoring designs – and questions – should be refined based on updated power analyses, modeling, or other approaches to assure that meaningful results can be achieved with current sample sizes and funding capacity, and B) the recommendations to improve coordination with other regional programs (see pg 25) be fully supported as a means to potentially leverage additional monitoring and increase samples sizes where needed.
- 4) With regard to coordination opportunities (pg 25), I would certainly recommend adding the Puget Sound Ecosystem Monitoring Program as a key partner in the Puget Sound Salmon Recovery Region.
- 5) I fully agree that habitat status and trends, especially at the watershed scale, is a significant, high-priority monitoring gap that needs significant additional capacity. Habitat assessments should evaluate *net* change at the watershed scale and not be limited to evaluations of recovery efforts.
- 6) I agree with the recommendations to create some sort of technical advisory body to the SRFB, though I am undecided whether that needs to parallel (or could perhaps leverage?) the ISRP (pg 25). Earlier constructs (e.g. the Washington Forum on Monitoring Salmon Recovery and Watershed Health) had some ability to directly provide, or at least contract or coordinate, technical input on behalf of the SRFB and may be useful again. However, any such body requires funding to staff and support in order to be successful.

- 7) I think the key recommendation in the report (several places) is the recognition of the lack of strong linkage between monitoring and project planning/implementation. Adaptive Management is a term frequently used and much aspired to – but inadequately demonstrated in our current organizational structures. It might be a good idea to follow-up this review with a dedicated effort to create recommendations for how an adaptive management program might actually be created in the context of our current organizations, planning processes, state/federal/local/tribal laws, etc. I think this is a key problem and challenge for many – probably most – monitoring programs across the state. But the juxtaposition of the SRFB as a funding body focused on both restoration projects *and* monitoring, and the Governor’s Salmon Recovery Office as a key coordinating body, offers opportunities certainly worthy of serious exploration.

Thank you again for the opportunity to review and comment on this report. I believe the recommendations contained in the report are worthy of serious consideration, and I appreciate the chance to weigh in with a few additional thoughts.

Very sincerely,

Ken Dzinbal

**Ken Dzinbal**

Senior Monitoring Program Coordinator

**PUGETSOUNDPARTNERSHIP**

360.464.1222 | [ken.dzinbal@psp.wa.gov](mailto:ken.dzinbal@psp.wa.gov)

Thank you for the opportunity to review and reflect upon the draft report on SRFB funded monitoring programs prepared by your selected consultants (Booth, Ralph, et.al.). I was very impressed with the consultant's analyses, observations and recommendations. I'm not intending to provide a detailed review and comment, but I would like to offer a few observations on the report's findings and recommendations.

1. It is noteworthy and I share the consultants' concerns on the lack of attention to status and trends monitoring for salmon habitat quality and conditions over time. Although such monitoring may be largely beyond the SRFB's specific funding capabilities and/or priorities, it is nevertheless a significant element of any monitoring approach to salmon recovery that is intended to provide the basis for adaptive management of salmon recovery plans. Therefore, efforts to implement the numerous and substantial recommendations of this report related to better coordination of monitoring efforts and more effective communication of monitoring information funded by the SRFB could also include meaningful consideration of and coordination with current programs to monitor habitat status and trends.

2. The points made about the IMW program seem particularly relevant and cogent. The report is clear that the IMW approach is conceptually sound and is the only current monitoring approach that can conceivably answer the key question of whether recovery projects and actions are materially contributing to recovery of fish populations. Given this conclusion, IMWs are potentially the key, along with credible status and trends monitoring of fish populations and habitat conditions, to adaptive management of recovery plan implementation. However, the consultants' point about timely and adequate funding for treatment projects in IMWs is pivotal. I suggest that the answers that only an IMW approach can provide are so critical to longer term support for salmon recovery funding, that an effective means of providing more timely funding for IMW treatment projects must be developed. This could be addressed through either fewer IMWs and/or a specific allocation of SRFB or other other available funding to treatment projects that are most critical for obtaining more timely value from the IMWs.

3. There is a common theme to many of the consultants' recommendations that I would characterize as a critical need for SRFB and GSRO to give considerably more attention to "connecting the dots". By "dots" I mean the key connections (e.g. coordination and communication) that are needed between and among: a) the three types of SRFB funded monitoring efforts/programs that were evaluated (as well as the habitat status and trends monitoring efforts that were not evaluated); b) the key "players" in those monitoring efforts; and c) the multiple scales (watershed, regional, statewide) of organizations and strategies/plans that would be served by improved interconnectedness. The consultants' strongly imply that GSRO could have a critical role in the level of statewide and regional coordination that will be required to achieve significant improvements in this "interconnectedness" among the various monitoring efforts and between monitoring efforts and the implementation and adaptive management of recovery plans. They also imply that GSRO, with SRFB and RCO (and Governor's Office?) support, is the only existing structure that could develop and maintain an effective balance between statewide and regional responsibility and accountability for coordination of monitoring efforts in support of both statewide and regional interests in salmon recovery and recovery plan implementation. Given this analysis, SRFB could enhance GSRO's capacity to address the consultants' recommendations related to improvements in monitoring coordination and communication/use of monitoring information . It seems the consultants are implying this could and should be a higher priority for use of SRFB monitoring funds or other available funds, than any expansion of existing monitoring efforts. The extensive efforts required of GSRO for it to

have a major role in responding meaningfully to the consultants' recommendations, including creation and liaison to any new technical review panel for monitoring programs and/or related projects, would seem to require and deserve added capacity within GSRO

The report does seem timely in terms of the challenges and opportunities facing the GSRO and the "Washington Way" for salmon recovery at this point in time. I appreciate the good work and intentions for salmon recovery that are reflected in this report and hope these comments are helpful.

Best Wishes,  
Phil Miller



November 4, 2013

Keith Dublanica, Science Coordinator  
Governor's Salmon Recovery Office  
Recreation and Conservation Office  
PO Box 40917  
Olympia, WA 98504-0917

RE: Stillwater Monitoring Investment Assessment Report

Dear Keith,

Thanks to you and your colleagues at GSRO for providing an opportunity to comment on Stillwater Science's recent review of the *Monitoring and Investment Strategy for the Salmon Recovery Funding Board*. This report clearly articulates many of our concerns about how monitoring funds are allocated and monitoring information is shared in the Puget Sound region. The comments in this letter are a combination of PSP Salmon Recovery Program staff thoughts as well as coordination with PSP Science Director Tracy Collier and his team. We agree with many of the authors' recommendations and our comments below focus on their most relevant points.

***Connect monitoring to specific decisions.*** We agree that systematic, meaningful and clear connections are needed "between monitoring results and future management actions." We also agree that the scale of effectiveness monitoring needs to match the scale of project decision making. To strengthen this connection, we need to be more specific about which decisions the 10% allocation for monitoring is meant to inform. In Puget Sound, watersheds are the primary decision makers about which projects are priorities for funding. Monitoring designed to address watershed-scale questions could accelerate recovery within and across Puget Sound watersheds. The Puget Sound region is currently working with the watersheds to develop an intentional adaptive management system that will connect monitoring priorities with watershed and regional decision making.

***Support monitoring of habitat condition.*** We agree that "the 'missing' component of SRFB-funded monitoring is habitat status and trend monitoring." Our partners and funders need information about the effectiveness of our habitat restoration actions as well as a way to measure net change in habitat condition. The Regional Stormwater Monitoring Program for Puget Sound is one model for a monitoring program derived from the recommendations of an independent stakeholder group, based on robust statistical survey methods, and designed to answer specific questions about habitat condition and the impact of management actions.

***Share results from monitoring studies.*** We agree that results and data from IMW projects need to be made available as soon as possible and encourage the SRFB to insist on this. New databases are not

needed, these data should either be added to existing databases or made available as simple data files. Our partner scientists, project sponsors and funders need this information to set expectations for restoration projects, set targets for regional recovery, understand the relationships between habitat conditions and fish productivity, and use the data in regional effectiveness studies (e.g., meta-analysis) to integrate results across projects.

***Support communication and learning across the system.*** We agree that communication is essential and inadequate and that there is “no evidence of any systematic feedback” for the results of monitoring. We agree that institutional capacity is critical to “use monitoring results to improve decisions” and that a better balance is needed between using restoration dollars to implement projects and using funding to learn and communicate which projects are most effective. In Puget Sound, we are implementing Monitoring and Adaptive Management Plans that include check points to connect decision points with monitoring results.

Best regards,

A handwritten signature in black ink that reads "Jeanette Dorner". The signature is fluid and cursive, with a long horizontal stroke at the end.

Jeanette Dorner  
Local Ecosystem and Salmon Recovery Program Director  
**PUGETSOUNDPARTNERSHIP**





Keith Dublanica, Science Coordinator

Governor's Salmon Recovery Office

November 1, 2013

Dear Keith,

The Puget Sound Recovery Implementation Technical Team (PS RITT) is the regional technical team that supports implementation of the salmon recovery plan. The PS RITT advises the Puget Sound Salmon Recovery Council on technical issues.

The PS RITT appreciates the opportunity to review and comment on the recent report prepared by Stillwater Sciences entitled "Monitoring Investment Strategy for the Salmon Recovery Funding Board." The RITT strongly believes that monitoring of salmon recovery projects and programs, such as the Intensively Monitored Watersheds, should be used to inform and improve upon projects and programs. It is critical that information collected from monitoring be used for adaptive management at the project, watershed, region, and state scale.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kirk Lakey', is written over a faint, dashed-line signature guide.

Kirk Lakey

PS RITT Chair

## Stillwater Sciences – SRFB Monitoring Strategy Review

### Mara Zimmerman comments (IMW only)

p. 4 – I am pretty sure that IMWs were first funded in 2005 not 2003 (Bill Ehinger will know this).

p. 9 – The statement that the Skagit IMW is a Before-After design is incorrect. The Skagit estuary is divided into treatment (restoration) and reference (no restoration) channels and researchers are specifically comparing the fish densities between the two types.

I agree with statements that a major problem with the IMWs has been the lack of restoration treatments for Hood Canal and Lower Columbia (but not JDF or Skagit) and the inability of the scientific team to influence the funding of those restoration actions.

p. 24 – “Are our efforts doing any good? If this question cannot be answered, it is difficult to justify *any* long-term expenditure on restoration or monitoring; and for the current implementation of salmon recovery in Washington State, IMWs are the only vehicle with the hope of providing an answer.” I agree strongly with this statement.

p. 24 – “The “policy question,” and one that cannot be answered by this review, is thus whether the Board’s interest in scientific understanding and long-term accountability trumps the principle of Regional allocations.” Yes. This is the most important statement in the entire document with regards to the IMWs. This is the policy question which must be answered in order to come to a resolution on the continuation of IMW study. In my opinion, if the SRFB isn’t going to push for the restoration to be completed, then the IMWs with restoration should develop an end game (define the number of years to conclusion) and the IMWs without restoration should cease.

p. 25 – “Recommendation: project design and management decisions should stem from monitoring results, and any such linkages (or their absence) should be disclosed.” I agree that this would be productive – especially in the IMW watersheds where there is a lot of monitoring data available. Following this recommendation would force the connection and communication between entities proposing projects and agencies who are conducting the monitoring activities.

p. 26 - “Recommendation: limit IMW funding to watersheds with the ability to implementing restoration projects in a timely manner and with an explicit tie between habitat restoration and fish monitoring.” I would add to this statement that this issue is tied to the policy decision above that the SRFB must wrestle with and decide whether they think that the scientific understanding and long-term accountability provided by the IMW should trump the principle of regional allocations.

## **WDFW response to the Stillwater Sciences' draft report "Monitoring Investment Strategy for the Salmon Recovery Funding Board" (October 2013)**

In general, the report accurately describes the monitoring programs supported by Salmon Recovery Funding Board funding, described in the report as effectiveness monitoring, status and trend monitoring, and intensively monitored watersheds monitoring. Our perspective is that a third party, independent review of the monitoring programs adds value and we hope that the SRFB and RCO staff can effectively utilize and implement the information and recommendations contained in the report.

### **Suggested edits to Conclusions and Recommendations sections**

The following statements appear to us to be key recommendations pertaining to the role of the SRFB and whether they have a policy or technical role. We suggest these be incorporated into the recommendations section. Currently, there are vague references to these already in the recommendations sections but suggest more clarity and more explicit reference. We also suggest that the recommendations be put at the front of the paragraphs to increase clarity.

- The question of the role of the SRFB is at the core of many issues as an example, *"At the forefront of these potential improvements, the SRFB needs to provide clear and specific leadership to guide the monitoring of salmonid habitat and populations. It is currently not fulfilling that need, nor is anyone else. We respectfully assert that the real issue facing the SRFB is not the need to reallocate monitoring funds, but rather the need to articulate a common set of objectives, a plan to implement those objectives, and a strategy to integrate the results of ongoing monitoring programs, all under the auspices of its centralized leadership. First and foremost, the SRFB needs an explicit framework and process of decision-making with a clear definition of roles and responsibilities to ensure its timely implementation."* These should be articulated as recommendations for consideration by SRFB.
- We believe that the SRFB should seriously consider empowering an independent technical body (e.g., ISRP) to help advise them with technical issues. "The SRFB should focus on programmatic requirements, coordination and collaboration while seeking scientific input from a technical advisory board (e.g., an ISP)?"
- The following statement in the report should be captured as a recommendation, *"We agree with the judgment expressed in multiple documents surrounding the formation of the Monitoring Program in general, and the IMWs in particular, that only such a program can answer the fundamental question of any recovery program: Are our efforts doing any good?"* Our interpretation of this statement is that the SRFB should clearly state their objectives and set up programs to address their key questions.
- The following statement in the report should be captured as a recommendation, *"Are our efforts doing any good? If this question cannot be answered, it is difficult to justify any long-term expenditure on restoration or monitoring; and for the current implementation*

*of salmon recovery in Washington State, IMWs are the only vehicle with the hope of providing an answer.”*

- The following statement in the report should be captured as a recommendation for the formation of a technical panel to inform the board, *“If the institutional capacity does not exist to use the monitoring results to improve decisions on how to spend scarce restoration dollars on the most effective restoration actions, then the first step must be to address this critical shortcoming in existing monitoring efforts.”*
- The following statement in the report should be captured as a recommendation to the board: “The “policy question,” and one that cannot be answered by this review, is thus whether the Board’s interest in scientific understanding and long-term accountability trumps the principle of Regional allocations.” This is the policy question which must be answered in order to come to a resolution on the continuation of IMW study. The findings lead to the conclusion in the report that SRFB needs to require regional boards to fund restoration projects in IMW watersheds, or find additional restoration funding that doesn’t go through the boards, or decide these IMWs are no longer a priority and end the IMW focus.

We suggest that the report should acknowledge the large overlap between two monitoring programs it describes as somewhat separate efforts and in a confusing way: intensively monitored watersheds (IMW) and status and trends monitoring. The report may be giving a misleading impression when it states that the SRFB budget is heavily skewed towards IMW.

*“In general, IMWs receive half or more of the annual allotment, reflecting the variety of monitoring activities conducted in the IMW watersheds, and the need for detailed annual information if their scientific objectives are ever to be achieved.”*

This overlap between IMW and status and trends monitoring has important consequences for the report’s conclusions. Approximately 60% of IMW funding supports status and trend (fish in and fish out). This is important to remember when thinking about cost efficiencies of these studies and future decisions about the studies’ funding. . Although the report aims to address return-on-investment questions of funding efficiency, the report does not appear to acknowledge the very large matching funds and/or additional project funds (e.g., Weyerhaeuser, Skagit Cooperative, Lower Clallum Tribe, NOAA Fisheries Science Center) that makes IMW projects possible. We suggest this at least be acknowledged in the report.

### **Page-specific comments**

p. 4 – We think IMWs were first funded in 2005 not 2003.

p. 4 – The characterization of the ‘Fish-In Fish-Out’ program could be more fully explained and clarified. Fish In/Fish Out data are typically collected at the population scale, not the regional

scale. Smolts are measured because they are the cumulative fish response to all freshwater conditions, starting with spawners, continuing through spawning and rearing habitat available, and ecological interactions with wild and hatchery fish in the river. 10% may be a high upper limit for proportion of SRFB's contribution to status and trends monitoring statewide.

p. 9 – The statement that the Skagit IMW is a Before-After design is incorrect. The Skagit estuary is divided into treatment (restoration) and reference (no restoration) channels and researchers are specifically comparing the fish densities between the two types.

p. 11 – the report states that a total of \$3 million is spent annually on status and trend monitoring statewide. This figure seems like an under-estimate; for example, an annual budget of approximately \$1.8 million exists for WDFW's Puget Sound smolt monitoring work, which represents about half of Puget Sound smolt monitoring.

p. 18 – We agree that that coordination of monitoring work is valuable. An example of a regional monitoring partnership working towards overall coordination is the Puget Sound Ecosystem Monitoring Program (PSEMP). It is important to acknowledge however that coordination takes time and money; without changing funding levels, resources allotted to coordination conceivably would cut into resources available to do the actual monitoring work, which may not be desirable.

p. 19 – We agree with this statement: “If the institutional capacity does not exist to use the monitoring results to improve decisions on how to spend scarce restoration dollars on the most effective restoration actions, then the first step must be to address this critical shortcoming in existing monitoring efforts.” We suggest that such a shortcoming would be improved by a process that connects monitoring agencies (WDFW/tribes) with restoration agencies (regional recovery boards and their contractors), and by adequately staffing these agencies with scientists who can evaluate existing information and develop defensible and useful recommendations.

p. 22 – Correction on 4<sup>th</sup> bullet: “In the Puget Sound, NOAA evaluated the quality of monitoring data, identified data gaps and now the SRFB is funding those gaps”. NOAA did evaluate the quality of monitoring data and identified data gap, but, to date, those gaps have not been funded. The SRFB does fund monitoring “gaps” in Puget Sound (e.g., Hood Canal summer chum) but these projects were considered funded by the SRFB in the NOAA review.

p. 22 – Suggest clarification on 5<sup>th</sup> bullet, “The annual prioritization process for status and trends monitoring (Table 1). Led by WDFW, this process identifies opportunities for SRFB funding. However it is unclear to what extent the WDFW gaps align with SRFB gaps. Addressing this uncertainty would be value added for the SRFB.” WDFW's annual process for prioritizing gaps in status and trends monitoring is done at the request of the SRFB using the monitoring criteria (juvenile monitoring in at least one primary population per major population group per ESU) defined in the “Washington State Framework for Monitoring Salmon Populations Listed under the Endangered Species Act” document. In as much, this prioritization process is aligned with every definition of a monitoring gap that the SRFB has provided. The SRFB has not provided additional direction or criteria.