



Independent Scientific Review Panel

for the Northwest Power & Conservation Council
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Memorandum (ISRP 2016-14)

October 25, 2016

To: Henry Lorenzen, Chair, Northwest Power and Conservation Council

From: Steve Schroder, ISRP Chair

Subject: Review of the Fort Hall Bottoms Tributary Assessment and Enhancement Strategy (project #1992-010-00) – Response Requested

Background

In response to the Northwest Power and Conservation Council's August 11, 2016 request, the Independent Scientific Review Panel (ISRP) reviewed the [Fort Hall Bottoms Tributary Assessment and Enhancement Strategy](#). This document was developed by the Shoshone-Bannock Tribe (SBT) for Project #1992-010-00, *Fort Hall Habitat Restoration*. The project's purpose is to restore degraded habitat and promote the survival and population growth of native species, including Yellowstone cutthroat trout, within the Bottoms area. The document is intended to address the condition the Council placed on this project as part of the Resident Fish, Data Management and Program Coordination Category Review in July 2012:

Implement with condition through FY 2014. By March 2014, sponsors to develop and submit for an ISRP review a comprehensive habitat restoration plan to address ISRP qualifications. Council funding recommendation beyond 2014 based on favorable ISRP and Council review of the plan.

The ISRP's Category Review recommendation ([ISRP 2012-6](#), pages 154-156) included the qualification:

The sponsors should provide a comprehensive habitat restoration plan including a scientifically sound monitoring and evaluation strategy to the ISRP for review within 18 months. The plan should cover both montane and spring streams on the Fort Hall Reservation. The ISRP strongly recommends that the sponsors enlist the assistance of a fluvial geomorphologist in developing the restoration plan and a biostatistician to assist with the design of the M&E plan and analysis of data. Plans developed by the Crystal Springs and Yankee Fork projects may be useful examples. The ISRP also would like to review the Draft Resident Fisheries Management Plan.

ISRP Recommendation: Response Requested

The Fort Hall Bottoms Tributary Assessment and Enhancement Strategy (Strategy) addresses some of the ISRP's 2012 qualifications. The Strategy provides a good description of the purpose, vision, and goals for the overall project, and it was developed with assistance of fluvial geomorphologists. The Strategy is largely a time schedule for implementation of proposed projects on four streams over a four-year period, but at present it lacks details and appears to fall short of being a systematic planning effort that identifies the most efficient and effective uses of resources. Consequently, the ISRP requests a revised Strategy that addresses the technical issues described below. Elements of a comprehensive plan that are currently missing and should be added to the revised Strategy include:

1. Yellowstone cutthroat trout population and limiting factors assessment

A comprehensive review is needed of the life history requirements of Yellowstone cutthroat trout and other native fishes in the project area. Such a review should include a description of available data on the status and recovery goals for Yellowstone cutthroat trout in each target stream, identification of the specific factors limiting fish populations in each stream, and an explanation of how proposed habitat management activities will affect these limiting factors. In their [July 25, 2016 cover letter](#) to the Council, the proponents describe that an investigation of limiting factors for Yellowstone cutthroat trout population distribution and growth began in 2015.

The results of the 2015 investigation should provide insights into the habitat features that need to be enhanced. Assessments of habitat needs should include (a) spawning, (b) larval and young-of-year rearing, (c) juvenile and adult habitat across all seasons, and (d) necessary movements among habitat patches to effectively complete the life cycle. The revised Strategy should address habitat needs separately for low-gradient spring streams and for higher-gradient mountain and foothills streams.

Insights from the integration of reviews of the life history needs, determination of current status of populations, and assessment of limiting factors for each target species are necessary for identifying potential management actions to alleviate or reduce the factors limiting populations. Such insights may also identify conflicting habitat needs of different species and the need to consider all native fishes in the tributaries.

In sum, linkages are missing but need to be made between the proposed actions associated with each project and the extent of Yellowstone cutthroat trout habitat or population responses that may result. The Strategy needs to better address its primary stated purpose, "to identify a strategy for habitat improvements and management solutions to protect, enhance and/or restore habitat to benefit YCT [Yellowstone cutthroat trout] and other native salmonids within the Bottoms Area."

2. Incorporation of Grazing Management, Resident Fish Management, and Tributary Habitat Restoration Plans

Explanation is needed of how the Grazing Management Plan, the Resident Fish Management Plan, and the Tributary Habitat Restoration Plan are being integrated into a comprehensive approach to watershed restoration. It is evident in the Strategy that livestock grazing is a primary cause of stream habitat degradation among the tributary streams and that degraded stream habitat must be restored to benefit Yellowstone cutthroat trout. However, it is not evident how management activities will be integrated to (a) alleviate the impacts of livestock grazing, (b) restore stream habitat features critical to the ability of resident Yellowstone cutthroat trout to complete their life cycle, and (c) enhance the populations of self-sustaining Yellowstone cutthroat trout in the tributary streams. Mention is made of both a Grazing Management Plan and a Resident Fish Management Plan within the Strategy. However, details of these plans are not discussed. The Resident Fish Management Plan should describe management actions that are planned and the array of assessments to be implemented along with a description of methods for conducting assessments.

3. Justification for sequencing of actions

Explanation and justification is needed regarding the sequencing of proposed project elements. Currently, the proposed enhancement and maintenance projects (pages 39-43) focus heavily on construction of “physical improvements” that modify channel features and appear to be expensive. A time schedule and plan for specific management actions is presented for each of the tributary streams; it appears that construction of physical improvements is proposed to occur simultaneously with watershed and livestock management. It seems that plans for effective management of grazing and resident Yellowstone cutthroat trout should precede a habitat restoration plan and that a habitat restoration plan should be responsive to the needs defined in the grazing and Yellowstone cutthroat trout management plans. Consequently, the proponents should explore and discuss an alternative sequencing approach in which watershed and livestock management practices are initiated and evaluated over several years before decisions are made to initiate more intensive, and potentially more costly, physical improvements.

On page 37 of the Strategy, the following is stated: "It's important to note that without a proper holistic livestock management plan in place, the other physical improvements recommended herein will not function as intended. It is therefore recommended that an appropriate livestock management plan be developed in conjunction with the other physical improvements recommended in this Tributaries Assessment." The proponents of the Strategy are aware of the grazing issue and the importance of addressing it to facilitate an effective habitat enhancement strategy.

4. Costs and benefits of management alternatives

Detailed documentation and assessment is needed of the relative costs and benefits of the array of management alternatives proposed for each of the four tributaries with inclusion of full costs for fencing and livestock management. This assessment would help identify the most cost effective means to restore habitat for Yellowstone cutthroat trout and other native fish species. Alternative management actions that could alleviate or reduce the impacts of livestock grazing, the apparent primary cause of habitat degradation in the tributary streams, have not been included. Although the ISRP bases its recommendations on scientific criteria, the ISRP believes the inclusion of a costs and benefits assessment in a revised Strategy would help guide and inform decision makers and restoration practitioners.

5. Clarification of reach assessment criteria

Each of the tributaries was divided into reaches for both assessment of current conditions and project planning. The criteria used for separation of individual reaches need to be fully explained in the Strategy. Are the distinctions based on geomorphic changes, land use, land ownership, barriers to upstream movement, or other factors that may affect variation in water quality, channel morphology, riparian condition, and/or fish habitat?

6. Summary of accomplishments

A summary is needed of what has been accomplished since 1992 in the restoration of habitat in the tributary streams and responses of resident populations of Yellowstone cutthroat trout. Given that the project has been active since 1992, there is a number of lessons learned that should be used to inform the Strategy. A good deal of monitoring and evaluation information is provided in the 2012 proposal and in the 2014 Annual Report. This information is not reported or summarized in the Strategy. Given the long history of the project, a separate section—which summarizes protection and restoration work completed, physical and biological responses, and key lessons learned—would be a valuable addition to the revised Strategy. The summary should also describe what restoration activities and results have been accomplished since 2014 when the Strategy was drafted. Was the Strategy useful in guiding restoration activities?

7. Monitoring and adaptive management

Additional detail is needed in the Monitoring and Adaptive Management section. Although the proponents have indicated that few resources are currently slated for monitoring and evaluation, a plan is needed describing how both habitat and fish will be monitored following the implementation of the proposed projects. Monitoring and evaluation is critically important because it will help the proponents determine if habitat restoration is being achieved and whether fish abundance has increased enough to achieve harvest objectives.

The Monitoring and Adaptive Management section (page 44) provides a sound justification for monitoring and adaptive management. However, the section needs additional detail. The section includes one brief paragraph on monitoring, but information is needed on how habitat and fish will be monitored before and after the implementation of the proposed projects. Adaptive management is discussed in two paragraphs, but a process for assessment of monitoring data and making decisions on alternative management actions is also necessary. Quantitative objectives and timelines for assessment of management actions for each of the projects are essential elements of monitoring and adaptive management. In short, the Strategy needs to include a more detailed monitoring and adaptive management plan.

The ISRP requests that the proponents address these seven issues, as summarized from the comments below, in the development of a revised Strategy. This revision should be accompanied by a cover letter with point-by-point responses to the ISRP concerns. Additionally, the cover letter should indicate the sections of the revised Strategy in which each concern has been addressed. The ISRP looks forward to receiving these documents within the next 18 to 24 months.

Finally, the Strategy is presented as a very attractive printed document. The high quality illustrations and photos provide an effective mechanism of communication to stakeholders. However, when preparing a technical document for ISRP review, it is more effective to use a standard reporting format (such as a Microsoft Word document) that can be readily modified and updated. This is a programmatic comment that applies to all ISRP reviews.

ISRP Comments

1. Comments on Introductory Sections (Vision, Goals and Objectives, YCT, and Snake River Ecosystem)

The introductory sections were generally well organized, clearly presented, and provided needed background information on the Snake River Ecosystem, the target streams, and their hydrogeology. However, the sections are written in a broadly descriptive form more appropriate for a general audience. A mixture of text with minimal referencing and inclusion of numerous figures (i.e., photos, maps, and graphs) that are not cited or discussed is presented in the Strategy. The introductory sections appear to be a generalized summary of past work and do not specifically refer to proposed actions on the Fort Hall Bottoms. These sections need to be strengthened in a revision by providing a more thorough review of past work on the Fort Hall Bottoms and its relation to proposed actions.

The proponents responded to the ISRP recommendation to include the assistance of a fluvial geomorphologist in developing the Strategy. However, expertise of fisheries biologists familiar with Yellowstone cutthroat trout appears to have been minimally utilized in the development

of the Strategy; the limiting factors analysis discussed in the proponents' [July 25, 2016 cover letter](#) may address this issue.

There is a mixture of statements in the Strategy regarding project purpose, vision, goals, and objectives. However, movement from a long-term vision of desired outcomes to specific, measurable project objectives leading to achievement of the long-term vision is not clearly articulated in the Project Purpose, Vision, Goals, and Objectives sections. The linkages between goals and objectives (page 7) are difficult to follow, especially since goal statements relate more to strategy than to desired outcomes. The objectives need to be quantitative or measurable with desired time frames for completion. Of special concern is the lack of quantifiable objectives with specified timelines to address specific habitat features that are limiting Yellowstone cutthroat trout populations. In summary, quantifiable objectives need to be included when the Strategy is revised so that progress can be assessed through the project's monitoring and evaluation effort.

The Yellowstone cutthroat trout section (pages 8-9) contains a limited discussion of the subspecies and its habitat needs. For example, existing information on the habitat needs, population dynamics, and life history requirements of Yellowstone cutthroat trout and other native fishes is not fully described in the Strategy or used to any appreciable extent in the assessment of current habitat in the four streams in the Bottoms Area. Instead the proponents have defined optimal habitat using the habitat suitability index (HSI) of Raleigh and Duff (1981). The HSI is a 35-year-old assessment tool based on a summary of literature and professional judgment. A published assessment of the HSI using field data has not appeared in the scientific literature. A vast array of information on the habitat needs of Yellowstone cutthroat trout has been obtained since the publication of the HSI in 1981. Yellowstone cutthroat trout, for instance, reside in other spring streams within the upper Snake River watershed, particularly in the vicinity of Jackson Hole and the Salt River Valley. Information on habitat use and habitat improvement efforts is available for these systems, which are similar to the spring streams in the Bottoms Area and could be used to help revise the existing Strategy.

The Yellowstone cutthroat trout section also lacks important information on current and desired distribution and population targets, primary limiting factors by stream, habitat preferences by life history stage and a quantitative description of current habitat conditions. There also needs to be some discussion devoted to past protection and restoration work. Were desired outcomes achieved?

The map on page 9 of the Strategy ("Yellowstone Cutthroat Trout Distribution, Current and Historic") appears to indicate that there are no current Yellowstone cutthroat trout in the Fort Hall Bottoms Area (all streams are shown in red as "Historic Distribution"). This appears to be an error and should be corrected.

The section of the Strategy describing the Snake River Ecosystem (pages 10-11) provides a brief description of the American Falls Reservoir and how the streams in the Bottoms Area fit into the Snake River ecosystem. The section alludes to the influence of upstream reservoirs on

Snake River flows, channel dynamics, and riparian vegetation in the Bottoms Area but does not effectively link the information to the ecology and dynamics of the tributaries in the Bottoms Area. This section should be expanded in the revised Strategy.

2. Comments on the Tributary (Bottoms) Condition Section

Appropriate background information on the landscape and geology of the Bottoms Area is provided. However, the habitat requirements of Yellowstone cutthroat trout need to be linked to this information. Overall, scientific evaluation of the text describing the assessments of the four tributaries is difficult because methods are not fully described or referenced prior to the presentation of data, and there are inadequate explanations of data included in the figures.

The Tributaries (page 12) and Springs and Hydrology (page 13) sections provide suitable background that relies heavily on hydrogeologic theory to support the conclusion that the springs in the Bottoms Area originate from the Snake River Plain aquifer. How this insight relates to the assessment and management of fish habitat in the spring streams in the Bottoms Area should be developed and added to the revised strategy.

The Diggie Creek, Clear Creek, Spring Creek, and Bannock Creek sections in the Strategy contain summary information on dissolved oxygen, turbidity, water temperature, total dissolved solids, *E. coli*, and phosphorous data for every stream. An aerial photo of each creek shows study reaches and graphs of HydroGeomorphic Scoring and HydroGeomorphic Function and Habitat Quality are also provided for each reach. This is followed by discussions on the findings and recommendations for management. However, information is needed about the criteria used to segment the streams into reaches, the methods used to obtain data, and the analyses used to develop the summary data.

A section of the Strategy, Data Analysis Key, provides some insight into how to interpret portions of the data presentation. Also, three appendices are included that partially describe data gathering and assessment methods. However, these appendices, A (Field Data Collection), B (GIS Analysis Methodology), and C (Hydromorphic Function Scoring) need further development. Methods used to collect and analyze data should be presented and variables need to be clearly defined. The appendices could be further strengthened if references indicating that these methods are standardized techniques used by fluvial geomorphologists in the assessment of stream systems could be added. In summary, a more thorough explanation of both the methods and the data that are presented in the text is needed in the revised Strategy.

A page of photos is provided for each of the four creeks (pages 30-33). These photos show the extent of habitat degradation and probable causes. However, it is not known if the photos are representative of the array of channel conditions in each stream and stream reach. Explanation of what the photos are intended to represent should be included in the revised Strategy.

Hydro Geomorphic (HG) Scoring is quite qualitative and is not supported by information on reference streams/conditions. This was noted in a prior ISRP review, it “would have been helpful if the sponsors had used data to compare reference streams to treatment streams in terms of flow regime, geomorphology, channel morphology, riparian conditions, and level of impairment. The Strategy should justify why these streams are good references based not only on fish abundance but also on habitat conditions.” Additionally, all six elements used in the scoring appear to be equally weighted. Discussion is needed in the revised Strategy on the potential value for weighting the elements or justification for equal weighting.

The Strategy ranks the stream reaches in the worst condition/least functional (indicated by the lowest hydrogeomorphic scores), as the highest priority for restoration. It would be helpful to include a discussion in the revised Strategy of the option of making the highest priority areas those reaches that will most readily respond to restoration and are most likely to remain protected in the future. This triage-like approach would focus on areas (functioning at risk) that retain their basic integrity but do show elements of degradation needing to be addressed by restoration. The basic functional integrity of these reaches would likely help ensure a more rapid and positive response as compared with areas that are non-functional and seriously compromised.

In a number of cases, reaches with low HG scores (low function), have fair to good Habitat Ratings. An example is on page 21 (Clear Creek) “The majority of reaches of Clear Creek are in poor functioning condition” while on page 20 all Habitat Quality Variables rank higher than Fair and 7 of 12 rank Good. Further explanation would be useful, as well as some discussion on how the different scores are used to prioritize restoration actions.

Maps that are provided for each stream show spawning locations of trout but lack information regarding key rearing habitat areas. Additionally, a discussion of possible fish passage issues as related to road-stream crossings or irrigation diversions is needed. These omissions should be addressed in a revised Strategy.

It would also be useful to more fully explain the role of large woody debris (LWD) in the three spring fed streams. It appears that sedges and willows likely comprise vegetation expected on fully functional reaches of these streams. If this is true, it seems unlikely that LWD would be expected to occur or to play an important role in channel stability or the formation and maintenance of fish habitat. It would be useful to see a discussion of the potential risks of LWD introduction into stream reaches many of which are described as having fine-textured and erodible stream bank soils and chronic bank instability. It is stated, in more than one location of the Strategy, that using instream LWD is a useful restoration technique. An example is on page 17, where “Installing wood revetments, individual LWD pieces, or log jams would improve geomorphic and habitat functions of Diggie Creek.” Yet, the addition of LWD will likely reduce the channel cross section/channel capacity at these sites. Thus, further discussion, is needed on the potential risk that LWD may have on bank stability. It seems possible that once sites are stabilized through sloping and re-vegetation, such risks are reduced. The importance of design

and sequencing LWD treatments and/or discussion on past experiences with this type of work on these streams would be a useful addition.

Additionally a discussion of past protection and restoration work and the results of this work on riparian and aquatic habitat and water quality are needed. Such information was included in both the most recent project proposal and in the 2014 Annual Report. This information should be added to the Strategy as it will help justify decisions and priorities.

There is a good discussion of how Bannock Creek is different from the other spring fed tributaries and the important influence that upper watershed management has on conditions in its lowest reaches. Also, the importance of coordinating with the mix of landowners on Bannock Creek is noted. On page 26, it is mentioned that road development and land management practices have created unnaturally large and flashy runoff events which in turn have aggravated the erosion and head cutting observed in lower Bannock Creek. The proponents have proposed an aggressive, large-scale channel re-location/re-construction project in the lower Reaches 1-4 of the watershed. On page 29 the Strategy states, “aggressive and sustainable measures like wholesale channel reconstruction and floodplain reconnection are required to significantly improve off channel habitat and floodplain connectivity.” Additionally, “This enhancement strategy is preferred because it promotes meaningful and sustainable instream, riparian and wetland enhancements throughout the whole lower Bannock Creek floodplain.” The potential risks of beginning this major effort without first resolving the unnaturally large and flashy conditions caused by management practices in the upper watershed need to be carefully considered in the revised Strategy. It appears from the description of this watershed that restoring and securing more functional upper watershed conditions should be a pre-requisite to such a major undertaking in the lower watershed.

3. Comments on the Enhancement Strategies Section

The Enhancement Strategies section (pages 34-38) provides general information on the processes and strategies that are applicable to streams throughout the West where livestock grazing is the primary source of degradation. The section could be improved by adding information specific to the streams in the Bottoms Area. There is a good discussion, with detailed graphics, of possible approaches to improve range and livestock management. The section concludes by saying (page 37), “It is therefore recommended that an appropriate livestock management plan be developed in conjunction with the other physical improvements recommended in this Tributaries Assessment.” Specifics regarding timing, responsibilities, and whether physical improvements should go forward without grazing issues being resolved need to be determined prior to implementation of a large-scale active restoration program for the area.

The table on page 34 provides a nice graphic of the step down from Vision-Goals-Objectives. There are a total of 14 objectives listed. These objectives, however, need to be stated in quantitative terms with timelines for completion. Doing so will help the proponents determine if project elements are on schedule or if additional resources or time may be needed to

complete objectives. Additionally, as the Strategy currently exists the relative priority for completion of the objectives is not clear. Clarification would be useful in a revision.

4. Comments on the Projects Section

The Strategies Matrix on page 35 indicates that projects should be conducted roughly in this order: (1) watershed management, (2) livestock management, and (3) physical improvements. Effects of watershed and livestock and management should be evaluated before moving into physical improvements. However, this progression is not indicated in the details for the proposed projects on each of the tributaries. It appears that costly construction of physical improvements is proposed to occur concomitantly with watershed and livestock management. It would seem to make sense that less costly watershed and livestock management practices be initiated and evaluated for several years, allowing the system to establish a new hydrologic and sediment regime before decisions are made to initiate more costly, intensive physical improvements.

The section, Proposed Habitat and Maintenance Projects (page 39), provides generalized information regarding costs for design, permitting, construction, and monitoring and maintenance. This information is applied in the estimation of costs for each of the four projects in the sections that follow. The revised Strategy would benefit from more information on how the cost estimates were derived, if they are current, or if they are applicable to the Bottoms Area. The cost estimates in the Strategy may enable a comparison of the relative costs among proposed projects, but it is unclear whether they provide accurate estimates of project costs. It is noted on page 39 that “Other off channel fencing and livestock management solutions, as described on page 37, are not accounted for in these project costs and need to be addressed in a separate grazing management plan.” Given the central role that improvements in grazing management and grazing infrastructure are likely to play in the long-term success of this program, grazing management and grazing infrastructure should be incorporated into the overall implementation costs in the revised Strategy.

Sections for proposed projects on Diggie, Clear, and Spring creeks are similar. A brief description of the project is provided along with a table showing the estimated costs and project elements. Linkages between the assessment data (pages 14-27) for each stream and the proposed projects need to be developed further. Detail as to the specific stream improvement methods, the magnitude of the application of each method within each stream, and the costs of each method should be included in the revised Strategy. Currently, it is unclear how the physical improvements that are identified will be attained. Project descriptions need to be more detailed so that judgments regarding costs and benefits can be made.

The projects proposed for Bannock Creek are generally described. But, like those for Diggie, Clear, and Spring Creek more detail is needed to make judgments about the costs and benefits of the proposed work.

The Action Strategy section (pages 46-47) provides a time schedule for implementation of each of the proposed projects over a four-year period. What is needed, however, is a planning effort that assesses resources and identifies the most efficient and effective uses of resources. This approach would allow the proponents to consider alternatives for restoration treatment, either area-wide or by individual stream. When evaluating alternatives the proponents could consider different combinations of active versus passive restoration projects and/or select specific combinations of restoration projects (bank stabilization focus versus instream structures and/or channel reconstruction). Also, when judging alternatives, the proponents could evaluate restoration treatments that focus on a limited number of priority areas as compared with active restoration treatment of all reaches, as is currently proposed. These comparisons could also be used to evaluate costs versus likely restoration effectiveness and ecological benefits. Given the large scale and relatively high cost of the proposed project, this evaluation would be a useful addition to the revised Strategy.

5. Comments on the Monitoring and Adaptive Management Section

This section (page 44) is a valuable addition to the Strategy, though further detail is needed to make the description of the Monitoring and Adaptive Management program effective. Discussion and rationale are provided describing the needs and benefits for monitoring and evaluation and adaptive management. But details are needed in a revised Strategy on monitoring methods and how monitoring results will be applied to adaptively manage the system. Specifically, how will habitat or fish be monitored following the construction phase of the proposed projects? The ISRP recommends that each project being implemented should include monitoring of specific metrics¹ that provide effectiveness feedback for the adaptive management process. For example, categories for monitoring and reporting might include: (1) effectiveness of a specific effort such as fencing or maybe vegetation plantings (did they meet targets?), (2) effects on habitat features that are important to the focal species such as Yellowstone cutthroat trout, and (3) response by the focal species. As it currently exists, the adaptive management section provides little indication that specific outcomes have been visualized or likely responses identified. Specific quantified outcomes and timelines are needed in the revised Strategy.

On page 44 there is a statement “to minimize costs, monitoring only needs to focus [on] environmental conditions pertinent to determining if the overall goals or an individual project’s objectives are being met.” Description is needed on how this is to be implemented relative to the Strategy, especially when the goals and objectives, which are provided, are not quantitative or time sensitive. It is noted that the Resident Fish Management Plan (RFMP) will provide additional guidance and detail quantifiable objectives. The RFMP has not yet received final approval. The ISRP is concerned by this delay as the Bottoms Area tributary streams habitat project is now 3 years into the time frame covered by the Strategy. This issue should be addressed when the Strategy is revised.

¹ BPA’s Pisces database includes metrics for various work elements. Also see the ISRP’s report *Review of Project Reporting Metrics for the Columbia River Basin Fish and Wildlife Program* ([ISRP 2008-7](#)).

On a minor note, the listing of Data Gaps (page 45) includes a number of items that represent the development of management plans or data management products and so a different categorization for these items than “Data Gaps” would improve the revised Strategy.

Examples include:

Integrated Management

- Monitoring and adaptive management plan
- Geodatabase design and Implementation
- Data management plan

Vegetation and Wetland Resources

- Weed management plan
- Wetland management plan
- Fire management plan

Land Management

- Land use plan
- Wildlife and avian habitat management plan

Most of the other items are surveys or assessments that should be undertaken before project work begins and should provide information for better location, planning, and design of projects.