

# Scientific Review of Subbasin Plans

for the

## Columbia River Basin Fish and Wildlife Program



Independent Scientific Review Panel  
Independent Scientific Advisory Board

August 12, 2004  
ISRP/ISAB 2004-13

## **Independent Scientific Review Panel**

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

## **Independent Scientific Advisory Board**

for the Council, Columbia River Basin Indian Tribes, and NOAA Fisheries

---

### Subbasin Plan Reviewers

#### *Joint ISRP and ISAB Members*

**Charles C. Coutant, Ph.D.**, Distinguished Research Ecologist, Oak Ridge National Laboratory, Oak Ridge, Tennessee, Past President of the American Fisheries Society, with expertise in fish-habitat relationships.

**Daniel Goodman, Ph.D.**, Professor of statistics at Montana State University, an expert in ecological risk assessment.

**Susan Hanna, Ph.D.**, Professor of agriculture and resource economics at Oregon State University (also an IEAB member).

**Nancy Huntly, Ph.D.**, Professor of wildlife biology at Idaho State University.

**Lyman McDonald, Ph.D.**, Consulting Statistician at Western Ecosystems Tech., Inc., Cheyenne, Wyoming, formerly Professor at the University of Wyoming.

**Brian Riddell, Ph.D.**, Senior Scientist at the Pacific Biological Station, Department of Fisheries and Oceans Canada, Nanaimo, British Columbia, an expert in the biology of Pacific salmon and international fisheries management.

#### *ISRP Members*

**John Epifanio, Ph.D.**, Director and Associate Professional Scientist for the Center for Aquatic Ecology at the Illinois Natural History Survey, an expert in conservation genetics and molecular ecology,

**William Liss, Ph.D.**, Professor of fisheries at Oregon State University.

**William Smoker, Ph.D.**, Professor of fisheries at the University of Alaska Fairbanks, Juneau Center for Fisheries and Ocean Sciences.

**Richard R. Whitney, Ph.D.**, Consulting Fisheries Scientist, Leavenworth, Washington, formerly Professor in the School of Fisheries, University of Washington.

**Richard Williams, Ph.D.**, ISRP Chair, Associate Research Professor, Aquaculture Research Institute, University of Idaho an expert in population and evolutionary genetics, ecology.

#### *ISAB Members*

**Robert Bilby, Ph.D.**, Ecologist at Weyerhaeuser Company an expert in riparian ecology.

**Peter A. Bisson, Ph.D.**, Senior Scientist at the Olympia (Washington) Forestry Sciences Laboratory of the U.S. Forest Service.

**Eric J. Loudenslager, Ph.D.**, ISAB Chair, Hatchery Manager at Humboldt State University, California, an expert in genetics and fish culture.

**David P. Philipp, Ph.D.**, Principal Scientist at the Illinois Natural History Survey and Professor at University of Illinois, an expert in conservation genetics and reproductive ecology.

***Scientific Peer Review Group Members***

**Rich Aldredge, Ph.D.**, Professor of statistics at Washington State University.

**Stan Gregory, Ph. D.**, Professor of fisheries and wildlife at Oregon State University, an expert in fish habitat relationships and stream ecology.

**Jack Griffith, Ph. D.**, Consulting Fisheries Scientist, formerly Professor at Idaho State University.

**Linda Hardesty, Ph.D.**, Associate Professor of range management at Washington State University, an expert in the biological diversity of eastern Washington.

**James Karr, Ph. D.**, Professor of aquatic and fishery sciences and biology at the University of Washington, an expert in ornithology and aquatic and terrestrial ecology.

**Jim Lichatowich, M.S.**, Consulting Fisheries and Aquatic Scientist, author of *Salmon Without Rivers*, formerly Assistant Chief of fisheries, Oregon Department of Fish and Wildlife, and a past ISAB and ISRP chair.

**John D. “Jack” McIntyre, Ph. D.**, Consulting Fisheries Scientist, formerly Project Leader at the Rocky Mountain Research Station, U.S. Forest Service.

**Thomas P. Poe, M.S.**, Consulting Fisheries Scientist, an expert in behavioral ecology of fishes, formerly with the U.S. Geological Survey.

**Dennis Scarnecchia, Ph. D.**, Professor of fish and wildlife resources at the University of Idaho, an expert in large river fisheries population dynamics, and salmon, trout and charr.

**Bruce Ward**, Fisheries Scientist, Ministry of Water, Land and Air Protection, Aquatic Sciences Section, Fisheries Centre, University of British Columbia, an expert in population dynamics, aquatic ecosystems, and international fisheries.

**Ray White, Ph. D.**, Consulting Fisheries Scientist, formerly Associate Professor of fishery science, Montana State University.

***Staff***

**Erik Merrill**, Project Coordinator for the ISRP and ISAB, Northwest Power and Conservation Council

**Daniel J. Spear**, Intern, Graduate Student in Public Administration at Portland State University's Mark O. Hatfield School of Government

**Eric Schrepel**, Technical and Web Data Specialist, Northwest Power and Conservation Council

# Scientific Review of Subbasin Plans for the Columbia River Basin Fish and Wildlife Program

## Table of Contents

Executive Summary .....	iv
Part 1. Programmatic Concerns in the Subbasin Plan Review Process .....	1
I. Introduction to Subbasin Planning and Scientific Review .....	1
A. The Subbasin Plan Review Process .....	1
B. The Subbasin Plan Review Effort .....	3
1. Summary .....	3
2. Strengths of the Subbasin Planning Process .....	3
3. Shortcomings of the Subbasin Planning Process .....	4
4. Progress toward Fish and Wildlife Program Goals.....	5
C. Review and Implementation of Subbasin Plans: Problems of Document Organization and Presentation .....	6
1. Presentation and Writing.....	6
2. Limit Length of Plans .....	7
II. The Subbasin Plans .....	8
A. The Assessment.....	8
1. Thoroughness of Assessment.....	8
2. Assessment Tools.....	13
3. ESA Issues .....	17
4. Focal Species and Ecosystems.....	18
5. Natural Production and Interactions with Hatchery/Supplementation Fish .....	20
6. Limiting Factors.....	22
B. The Inventory .....	24
1. Thoroughness.....	24
2. Effectiveness of the Protections and Past Management Actions .....	24
3. Gap Analysis.....	25
C. The Management Plan.....	25
1. Thoroughness.....	25
2. Vision Statements .....	25
3. Biological Objectives and Strategies .....	25
4. Research, Monitoring, and Evaluation.....	26
5. Fish and Wildlife Program’s Scientific Principles.....	28
6. Prioritization .....	29
III. Final Recommendations.....	30
1. Near-term Planning.....	30
2. Longer-term plans for revising and updating subbasin plans .....	32
References.....	33

Part 2 – Review Summaries for each Subbasin Plan .....	35
Subbasin Plan Evaluation Ratings .....	36
Summary Table of ISRP/AB Ratings by Subbasin.....	38
Headwaters and Blocked Areas .....	39
<i>Mountain Columbia Province</i> .....	39
Flathead and Kootenai .....	39
<i>Intermountain Province</i> .....	41
Coeur d’Alene.....	41
Pend Oreille .....	44
San Poil.....	46
Spokane.....	48
Lake Rufus Woods.....	51
Upper Columbia Mainstem.....	52
<i>Upper Snake, Upper Closed Basin, Snake Headwaters</i> .....	54
<i>Middle Snake Province</i> .....	56
Boise, Payette, Weiser .....	56
Bruneau.....	59
Burnt and Powder .....	59
Upper and Lower Middle Snake Mainstem.....	61
Malheur.....	64
Owyhee .....	66
Subbasins with Anadromous Fish Access .....	69
<i>Columbia Cascade Province</i> .....	69
Entiat.....	69
Lake Chelan .....	70
Methow .....	72
Okanogan.....	73
Upper Middle Columbia Mainstem .....	74
Wenatchee.....	76
<i>Mountain Snake Province</i> .....	79
Salmon .....	79
<i>Blue Mountain Province</i> .....	81
Grande Ronde .....	81
Imnaha.....	86
Snake River Hells Canyon.....	90
Asotin.....	93
<i>Columbia Plateau Province</i> .....	95
Walla Walla .....	95
Tucannon.....	99
Lower Snake Mainstem .....	104
Crab Creek .....	106
Palouse .....	108
Yakima.....	109
Umatilla.....	113
John Day .....	116
Deschutes .....	117

Lower Mid-Columbia Mainstem .....	121
<i>Columbia Gorge Province</i> .....	124
Klickitat.....	124
Big White Salmon.....	127
Columbia Gorge.....	129
Fifteenmile .....	130
Hood.....	131
<i>Lower Columbia and Estuary Provinces</i> .....	134
Willamette.....	134
Lower Columbia Fish Recovery Board Plan: Elochoman, Grays, Cowlitz, Kalama, Lewis, Washougal, Little White Salmon, Wind .....	136
Mainstem Lower Columbia and Estuary (Bi-state Plan) .....	137

## Executive Summary

A group of 26 members from the combined Independent Scientific Advisory Board, Independent Scientific Review Panel, and its Scientific Peer Review Groups reviewed the 45 plans that cover 58 subbasins for the Columbia River Fish and Wildlife Program. We appreciate the efforts of representatives of the various subbasins who briefed us on their plans and patiently answered our questions. We made every effort to thoroughly review the plans and to apply a consistent level of scrutiny for all subbasin plans, but we acknowledge that the time constraints of the review process made it impossible to examine each plan and discuss each review in the detail we would have liked. For each plan, we address the central questions asked by the Council with regard to the likelihood that the plans would succeed in their attempts to recover fish and wildlife, but, given the sheer volume of material to review, some things no doubt were overlooked. In addition to individual reviews, we provide overarching programmatic observations that represent our *general* view of the technical merits of the subbasin plans as a whole, but that do not apply equally to every plan. We realize that subbasin planning is a work in progress and hope that our programmatic comments, as well as our specific review summaries and checklists for each plan, assist the Council in developing a strategy to incorporate the plans into the Fish and Wildlife Program, and guide planners in future revisions.

## Planning Achievements

The planning process has unquestionably achieved some important improvements in understanding fish and wildlife recovery efforts at the local level, including:

- Increased stakeholder involvement at the subbasin level
- Improved provincial overview and insights into local restoration questions
- Established planning organization at provincial and subbasin levels
- Enhanced coordination among subbasin and provincial fish and wildlife managers
- Focused attention on causes of fish and wildlife declines
- Enhanced the empirical basis for assessments of habitats, both terrestrial and aquatic, and provided extensive data records of these efforts

## Strengths of the Plans and Planning Process

**Beginnings** - Most of the draft subbasin plans constitute a reasonable beginning for subbasin planning. Approximately one quarter of the plans are complete enough to serve as standalone, scientifically sound amendments to the Fish and Wildlife Program without major additional treatment. A few plans stand out for their completeness – these include the Flathead, Kootenai, Fifteenmile, Willamette, and the Umatilla subbasin plans. Even these plans, however, lack a scientifically acceptable and complete Research, Monitoring, and Evaluation Section. The remaining three quarters of the plans, however, need substantial additions and revisions, especially to establish restoration priorities and to complete the Management Plan.

**Assessments** - The strongest part of most subbasin plans was the Assessment, where substantial information about the subbasin's physical environment and biological resources was described. Many Assessments were quite thorough, providing information well beyond that contained in earlier subbasin plans and summaries. This achievement

alone should be viewed as a major accomplishment of the subbasin planning process. In some instances, the thoroughness of the Assessment sets the stage through the limiting factors analyses to prioritize proposed implementation objectives and strategies in the Management Plan, i.e., the ultimate goal of the process. Although many of the plans failed in these latter phases, that failure was not due to an inadequacy in their Assessments.

## **Needed Improvements**

### **I. The Assessment**

#### ***Thoroughness***

- Current information – some of the plans do not use current information, instead relying on out-of-date habitat inventories.
- Natural variation – many plans do not consider dynamic watershed and ecological processes, nor take natural variation into account when setting habitat goals.
- Biodiversity – few plans contain strategies for assessing or increasing the diversity of native fish and wildlife, although diversity is a central element of the Fish and Wildlife Plan.
- Mainstem habitat – most of the mainstem subbasin plans neglect to include mainstem river habitats, instead developing a plan only for the small tributaries entering the mainstem. This is a major deficiency.
- Out-of-subbasin effects – the plans often neglect to include an explanation of how actions within the subbasin could affect fish and wildlife elsewhere in the Columbia River System. The notion of cumulative effects was inadequately addressed in these geographically based efforts.
- Future population growth – most plans do not evaluate likely changes in land uses, human population, or fish and wildlife populations into the relevant future (at least two to three human generations). We considered this a major omission from a forward-looking planning initiative.

#### ***Assessment Tools***

- Data resources – some assessments do not provide the specific information needed to analyze limiting factors and to develop well-justified Management Plans. Although in some cases the data needed to accomplish that task truly were not available, in many others that task simply was overlooked.
- Analytical tools – use of habitat models often led to inadequately documented conclusions. For example, a common concern noted by reviewers is that the intended use of EDT is frequently confused in the plans. EDT is a tool designed to assess relative habitat capacity by species and to identify habitat attributes that are likely limiting factors to survival and production. EDT is a tool that is based on the weight of expert opinion (expressed in the rule sets by species). If future planning is to be assisted by analytical tools, it is increasingly important to determine if the current tools are adequate, if they are accessible for testing, and if their use is supported by the communities that will be influenced by the results of the analysis.

### ***Endangered Species Act***

- ESU coverage – although the plans generally note ESA-listed species and describe any threatened and endangered populations that occur within the subbasins, the plans do not usually include any larger discussion of the evolutionarily significant units (ESUs) at the geographic scale of the ESU itself or with respect to adjacent ESUs within the Columbia River Basin, even for focal species. For example, there is usually no discussion of how important a local population is to the ESU; i.e., whether it is one of only two populations remaining or one of many populations?
- Recovery planning – subbasin plans vary in coverage of the information needed for Technical Recovery Team (TRT) efforts and USFWS recovery plans. In some cases, however, TRT recovery objectives dominate the biological goals, to the detriment of developing a “ground-up”, locally supported subbasin plan.
- Consistency with ESA – consistency with the ESA was frequently “checked off” with respect to the Technical Guide. To complete this task adequately, the viable salmonid population (VSP) metrics of biological performance for ESA-listed aquatic focal species developed for the subbasin plan need to be checked directly for consistency with VSP metrics proposed by NOAA Fisheries and the USFWS.

### ***Focal Species and Ecosystems***

- Focal species selection – the emphasis on ESA-listed species, especially aquatic species, led some planners to exclude non-listed species, which resulted in some important habitat types being overlooked. The strongest plans were those that used functional analysis in selecting terrestrial focal species. Focal species that had very low abundances present a costly task for monitoring changes in these species and their habitats.
- Focal species and native species assemblages – augmenting focal species information with an assessment of changes in the characteristics of biological communities or ecosystem processes would provide a more complete picture of progress towards improved “ecosystem health.”
- Discussion of population status and trends – this was almost universally lacking for terrestrial and non-salmonid aquatic species.

### ***Artificial Production***

- Integration of natural and artificial production -a major shortcoming in nearly all subbasin plans is a failure to link artificial production activities in the subbasin with ongoing and proposed habitat improvement activities in either the Assessment or Management Plan sections. Large, complex hatchery programs, such as those that occur in the Yakima, Salmon, Grande Ronde, and Clearwater subbasins, are not well described (except in appendices), nor are they integrated with the plans’ limiting factors analyses and proposed habitat actions.
- Supplementation – some plans do not justify the role and scale of this type of proposed artificial production activities in achieving the subbasin’s future vision. After the extensive dialogue on supplementation that has occurred over the years in the Columbia River Basin, this failure to justify supplementation causes

continued concern over the integration of supplementation programs with natural production.

### ***Limiting Factors***

- Limiting factor identification – limiting factors often included a mix of environmental variables that ranged from single parameters that could limit one life history stage of a focal species at a single location in the subbasin, to broad landscape processes that affect the entire drainage system. The problem with mixing individual limiting factors with watershed processes is that simple remedies for one factor almost never addressed problems with the others.
- Applying results of limiting factor analysis – most of the plans do not discuss management actions in the context of the dynamic nature of watersheds, nor do they examine limiting factors within the context of the range of natural conditions. Recommendations for restoration tended to favor one-size-fits-all habitat conditions that were inadequately linked to limiting factors.

## **II. The Inventory**

### ***Thoroughness and Evaluation***

- Existing habitat protection – the quality of the Inventories varies greatly. In many instances, the Inventory simply lists acreage or stream miles under land management protection (e.g., wilderness areas, wild and scenic rivers, etc), rather than give a true assessment of whether or not this protection status is improving the environmental problems identified in the assessment. Rarely is the significance or durability of existing protection evaluated; e.g., under current roadless area proposals, are roadless areas really protected?
- Success and failures of past activities – only a few plans analyze how the successes or failures of past projects and their accomplishments relate to the list of problems and needs that emerge from the Assessment.
- Gap analysis – there is little effort to identify the gaps between actions that have already been taken or are underway and the needs identified in the Assessment process to inform prioritization of strategies in the subsequent Management Plan. Many plans require further inventory and/or analysis to structure a credible Management Plan.
- Good examples – Some subbasin plans, like the Yakima, developed database management applications that associate key words in the Assessment with database inventories of programs, plans, and projects. A few subbasin plans, such as the Flathead and Kootenai, use the information in the Inventory to identify needed monitoring efforts and to design future proposed monitoring activities. Such approaches could be employed usefully in other subbasins.

### **III. The Management Plan**

#### ***Thoroughness***

- Comprehensiveness – the Management Plans are almost universally the weakest elements of the plans; less complete than Assessments, but often more complete than Inventories that are intended to inform Management Plan development.
- Wildlife, biodiversity, and ecosystems – the Management Plans tend to incorporate far less attention to wildlife than to fish and often do not include much consideration of landscapes, ecosystems, and overall biodiversity.

#### ***Objectives and Strategies***

- Confusion about terms – the Management Plans consistently confuse objectives, strategies, and actions. Indeed, many of the strategies read like objectives. Objectives should be measurable. Strategies, on the other hand, are the particular actions that would be implemented to achieve a given biological objective. Strategies are intended to be more specific than objectives and should comprise an integrated set of actions designed to achieve the objectives.
- Limiting factors and restoration prioritization - most plans do not identify a well-documented set of limiting factors in the Assessment, nor address these factors logically in a prioritization framework or use them to develop justifiable, prioritized implementation actions in the Management Plan. Prioritization is particularly important, not only to provide direction for restoration activities, but also to serve as the basis for evaluating project proposals. The general lack of adequate prioritization appears to result from a lack of time to complete the planning process, a lack of follow-through on the logic path after limiting factors were presented, a judgment that available information was insufficient, a conscious choice among participants not to prioritize, or an inability among participants to reach consensus on priority items.

#### ***Fish & Wildlife Program Principles***

- Need for explicit statements – there are no explicit statements of how the Management Plans address the Fish and Wildlife Program’s principles. Future versions of the plans would benefit from this addition. Some plans, such as the Flathead and Kootenai, directly incorporate the Program’s Scientific Principles as explicit guidelines for program development. More direct comparison of objectives, strategies, and priorities with the scientific principles that are intended to help supply an underlying framework of sound science is needed in most or all plans.

### **IV. Research, Monitoring and Evaluation**

#### ***Thoroughness***

- Completeness – the research, monitoring, and evaluation (RM&E) section is incomplete in all subbasin plans, partially due to limitations in the objectives and strategies. RM&E sections usually do not mention the data needs identified in their own Assessments. Most plans need to include a clearer path from RM&E to adaptive management.

- Linkages between habitat projects and fish and wildlife responses – there is a critical need to evaluate (and demonstrate, if possible) where and when habitat restoration efforts increase or sustain fish and wildlife populations and at the same time maintain or increase diversity.
- Stock assessments – must include the smolts/spawner and adults/smolt separation of freshwater and ocean life stage information. Assessing habitat capacity and trends in adult production and recovery require this basic information.
- Regional coordination – the Management Plans do not discuss present strategies to coordinate regional monitoring programs and to share data, perhaps due to the inadequate assessment of current and proposed efforts.

### ***Prioritization***

- Approaches – most Management Plans failed to prioritize RM&E activities.
- Feasibility assessment – once they reach a prioritized set of RM&E recommendations, to determine their practicality, Management Plans should provide a feasibility assessment that includes estimates of costs. The scale of the plans makes such determinations subjective.

Finally, we believe review and future use of the 45 subbasin plans would be greatly facilitated by specifying page limits for each Plan (perhaps a 200 page total). The current subbasin plan drafts range from approximately 150 pages at the shortest to more than 2,000 pages in several instances. While making the review process more manageable, more importantly, a page limit would make the plans a more effective and accessible set of public documents, facilitating their implementation. The page limit also would encourage subbasin planners to focus concisely on larger issues while reducing details not needed for assessing the plans' potential effectiveness. This process was a learning experience for all involved, representing an enormous information management and analysis task. The next steps in this process, however, must focus on synthesis and the identification of prioritized opportunities for achieving restoration goals.

## **Part 1. Programmatic Concerns in the Subbasin Plan Review Process**

---

### **I. Introduction to Subbasin Planning and Scientific Review**

This report presents a collective review by the Independent Scientific Advisory Board (ISAB), the Independent Scientific Review Panel (ISRP), and its Scientific Peer Review Groups (PRG) of 45 plans that cover 58 subbasins for the Columbia River Basin. The report describes the review process, identifies programmatic concerns that arose from the individual reviews of the subbasin plans, and finally presents review comments for each of the subbasin plans.

Subbasin plans were developed throughout the Columbia River Basin to help the Northwest Power and Conservation Council (the Council) plan for the future in each subbasin. These plans will eventually be adopted as part of the Council's Columbia River Basin Fish and Wildlife Program (the Program). The Council anticipates that the plans will help direct Bonneville Power Administration (Bonneville) funding of projects that protect, mitigate, and enhance fish and wildlife that have been adversely impacted by the development and operation of the Columbia River hydropower system. The Council, Bonneville, NOAA Fisheries, and the U.S. Fish and Wildlife Service (USFWS) intend to use subbasin plans as a foundation for recovery planning for threatened and endangered species.

The plans were developed locally and collaboratively among fish and wildlife managers, local governments, interest groups, and stakeholders, as well as other state and federal land and water resources managers where they elected to participate.

#### **A. The Subbasin Plan Review Process**

##### **1. Review Questions and Criteria**

The 2000 Fish and Wildlife Program calls for independent scientific review of proposed subbasin plans to help ensure that those subbasin plans that are adopted are technically sound and direct scientifically credible fish, wildlife, and habitat actions. The combined ISRP, ISAB, and PRGs (hereafter ISRP/AB), 26 reviewers in total, conducted the independent scientific review. The ISRP chaired the review.

Subbasin plan review questions are provided in the 2000 Fish and Wildlife Program and the Council's August 2002 Notice of Request for Recommendations (for subbasin plans). Specifically, the ISRP/AB was asked to evaluate whether subbasin plans are consistent with the Fish and Wildlife Program and its Scientific Principles. The Council identified a list of seven issues on which it seeks advice to assist it in determining the scientific soundness of recommendations proposed for adoption into the program:

1. Do the assessments appear to be thorough and substantially complete?
2. Are the subbasin goals, objectives, and strategies scientifically appropriate in light of the assessment and inventory of existing activities?

3. Does the plan demonstrate a linkage between the strategies, the biological objectives, the subbasin vision, and the assessment?
4. Are the goals, objectives, and strategies consistent with those adopted in the program for the province and/or basin levels?
5. Does the plan demonstrate that alternate management responses have been adequately considered?
6. Does the plan include a procedure for assessing how well subbasin objectives are being met over time?
7. Does the plan provide a scientifically supportable procedure for refining the biological objectives as new information becomes available about how fish, wildlife, and the environment interact, and in relationship to how the plans are implemented over time?

Reviewers addressed these questions using a checklist derived from the Council's Subbasin Planning Technical Guide, which includes the Council's review questions. The checklist asked reviewers to evaluate whether or not the plan satisfactorily provides the assessment, inventory, and management elements requested by the Council and, as necessary, to recommend the level of need to revise specific elements of the subbasin plan before it meets the criteria of completeness, scientific soundness, and transparency.

## **2. Review Steps**

The ISRP/AB subbasin plan review was based on the review approach that was successfully implemented for the Fish and Wildlife Program's Provincial Review. The approach involves independent review by individual reviewers, an opportunity for the reviewers to have formal interactions with planners including oral presentations of the plans by the planners, and meetings among the reviewers to discuss individual reviews and reach consensus findings. For a majority of the 59 subbasin plans, the ISRP/ISAB review began immediately following the May 28<sup>th</sup> deadline and concluded with submittal of this final report(s) to the Council on August 12, 2004 – a total review timeline of two and a half months.

To complete the review, the ISRP/AB established ten review teams and one basinwide umbrella committee. The review teams were organized to review sets of subbasin plans grouped by province. Each review team consisted of six or more reviewers and included a mix of ISRP, ISAB, and PRG members. At least three reviewers from the team were assigned to review each individual subbasin plan, although frequently as many as five or six reviewers supplied reviews. After the subbasin presentations, review teams met and discussed each subbasin plan and consolidated their individual checklists and review comments into a single report with a summary checklist and comments for each subbasin. Finally, to ensure that the review teams provided a consistent level of review scrutiny and comment quality, the ISRP/AB assigned members to share duties on: 1) attending review meetings and presentations and 2) providing final reviews and edits of the various review team reports.

## **B. The Subbasin Plan Review Effort**

The subbasin planning effort of the last several years in the Columbia River Basin has involved thousands of people and many thousands of hours of work, resulting in the submittal of subbasin plans for 59 subbasins<sup>1</sup> in the Columbia River Basin. The ISRP/AB review group appreciates and acknowledges the extraordinary efforts of people throughout the basin in producing the subbasin plans on May 28, 2004, despite the obvious constraints on time and funding.

This report is provided by the ISRP/AB review group to the Council and Council staff in an effort to assess the state of the submitted subbasin plans, to identify the strengths and weaknesses of individual subbasin plans, and to provide recommendations for the improvement of plans that are judged incomplete or lack sound scientific analysis or underpinnings.

### **1. Summary**

Although most of the draft plans constitute a reasonable beginning for the subbasin planning process, only about one in four are complete enough to serve as scientifically sound amendments to the Fish and Wildlife Program without additional treatment. Significant addition and adjustment will be needed in many cases, especially to establish priorities and complete the Management Plan. Even most of the best plans, as they now stand, provide more of a planning framework than an actual plan ready for implementation, as will be evident from later comments. The planning frameworks are necessary to generate workable planning documents, but do not yet constitute complete plans. As planners indicated in many of their oral presentations to the ISRP/AB, the drafts could have been more complete if severe pressures of time and budget had not been in effect and if more guidance had been provided by Council and Council staff. Only certain aspects of the present plans can be recommended for adoption as scientifically sound and meeting the criteria given above. Adoption of incomplete subbasin plans would set a harmful precedent and could foster future mismanagement.

### **2. Strengths of the Subbasin Planning Process**

Thus far, the planning process has resulted in increased provincial overview and insights, increased planning organization at both provincial and subbasin levels, and in most cases, increased coordination among subbasin and provincial fish and wildlife managers. The subbasin planning process also intensified the local and province-wide focus on the decline in fish and wildlife populations, particularly as that decline relates to human-generated degradation of habitat at the local and subbasin level. The attention to the causes of those declines is an improvement from previous tendencies to devise projects that propose technical fixes without thoroughly analyzing causative problems. Although many subbasin plans do not go far enough in identifying key problems or providing well-

---

<sup>1</sup> According to the Council breakdown, there are 62 subbasins in the Columbia River Basin. Subbasin plans were not submitted for the Bitterroot, Blackfoot, Clark Fork, or Sandy. The 59 subbasin plans submitted include the Lake Rufus Wood subbasin, which was not identified as a separate subbasin by the Council, and the Clearwater subbasin. The ISRP reviewed the Clearwater plan earlier and that review is not included in this report.

documented analyses of limiting factors, exploration of the causes of declines within life stages of focal species (e.g., spawning, egg-to-fry, fry-to-parr, parr-to-smolt, smolt-to-adult in salmonids), the steps taken thus far toward more fundamental focus are encouraging and useful. Further cause-oriented planning should be promoted, and the Council should promote future management actions that follow from such planning. A strongpoint of the subbasin planning process is that it often brought stakeholders together for the first time to talk about fish and wildlife in their subbasin. This was especially true in some of the more sparsely populated subbasins such as the Owyhee.

Nearly without exception, the strongest part of each subbasin plan was the Assessment, where substantial information about the subbasin's physical template and biological resources were described. Many Assessments were quite thorough, providing information well beyond that provided in earlier subbasin plans and summaries. This alone should be viewed as a major accomplishment of the subbasin planning process.

In some instances, the strength of the Assessment set the stage through its Limiting Factors Analysis for a prioritization of proposed implementation of objectives and strategies in the Management Plan. Only about one in five plans, however, reached this point of analysis, synthesis, and integration. These plans, while still needing additional attention and revision on some matters, provide a sound scientific foundation that can be used to guide and inform the next round of project solicitations and provincial reviews for these subbasins. A few plans stand out for their completeness – these include the Flathead, Kootenai, Fifteenmile, Willamette, and the Umatilla subbasin plans; although, even these plans lack a scientifically acceptable, complete Research, Monitoring and Evaluation Section.

### **3. Shortcomings of the Subbasin Planning Process**

While a subset of subbasin plans is complete enough to help guide the next set of project solicitations and provincial reviews, most are not. Most plans did not identify a well-documented set of limiting factors in the Assessment and drive these factors logically into a prioritization framework or a set of justifiable, prioritized implementation actions in the Management Plan.

In general, the Inventories were weak, being primarily listings of regulatory mandates and restoration projects. Only a few plans analyzed how past projects and accomplishments compared with the list of problems and needs that were apparent in the Assessments. A few subbasin plans, such as the Flathead and Kootenai, used the Inventory to synthesize monitoring efforts and used this synthesis directly in the Management Plan to inform future proposed monitoring activities. A few others, like the Yakima subbasin plan, tried to link the limiting factors/key finding in the Assessments with existing Inventories of projects by use of databases and then conducted preliminary gap analyses by linking key words. Most subbasins, however, did not link effectively the Inventory with the Assessment in a manner that informed the subsequent Management Plan. At a minimum, this level of synthesis is needed for all relevant resource management efforts, not just monitoring, and in fact was the purpose for requesting the

Inventory. Without sufficient synthesis at this stage, management cannot be “adaptive” because previous experiences remain unexamined.

The Technical Guidelines requested that the Inventory describe and synthesize Fish and Wildlife Program accomplishments over the last five years. Only a few subbasin plans did this well. A larger opportunity was missed by all subbasin plans, perhaps in part due to the Technical Guidelines’ directions for summarizing accomplishments only over the last five years. The Council’s Fish and Wildlife Program has existed for nearly 25 years and numerous subbasins, like the Yakima, Salmon, and Grande Ronde, have received fish and wildlife funding from the program’s inception to present. None of the subbasin plans thoroughly described Fish and Wildlife Program accomplishments *in terms of biological responses of the managed species to recovery efforts* at the subbasin or higher geographic scale.

Another major shortcoming in nearly all subbasin plans was a failure to link fisheries production activities (artificial and natural) in the subbasin with ongoing and proposed habitat improvement activities in either the Assessment or Management Plan portion of the subbasin plan. Large complex fisheries programs, like those that occur in the Yakima, Salmon, Grande Ronde, and Clearwater subbasins, were not well described (except perhaps in appendices), nor were they integrated with the plan’s limiting factors and proposed habitat actions. If these large hatchery programs are to be considered true supplementation efforts, they must be integrated fully with habitat and fish production planning. The current and past involvement of many reviewers with these supplementation programs made this omission very obvious and reinforced a continuing concern about the degree of integration that has been achieved.

#### **4. Progress toward Fish and Wildlife Program Goals**

The Council's Fish and Wildlife Program began about 25 years ago. Fifteen years ago, the Council implemented the first round of subbasin plans. The 2004 iteration of subbasin plans could have been an opportunity for the Council to ask, “How are we doing as a basin-wide program composed of numerous diverse subbasins? What have we accomplished after 25 years of fish and wildlife restoration in the Columbia River Basin?” In retrospect and with all the clarity of hindsight, this assessment should have been part of the subbasin plans, especially in those subbasins that have received significant funding for salmon and habitat restoration over the last quarter century.

We suggest that a high priority task for Council Staff or the ISAB and ISRP should be to assess the progress toward real improvement in aquatic and terrestrial habitat and species populations in the subbasins due to the Fish and Wildlife Program. Questions that might be asked are:

- What has the Fish and Wildlife Program accomplished over the past 25 years?
- What has worked and what has not worked? What have we learned and what does that learning tell us about changes that are needed? This kind of assessment would make a good follow up to the Independent Scientific Group’s analysis of the Fish and Wildlife Program in 1996 and 2000 (*Return to the River*, ISG 1996, 2000). .

- What are the critical uncertainties or gaps in knowledge that must be addressed to further recovery of native fish and wildlife?
- Has monitoring and evaluation evolved to a level at which Columbia River Basin managers can now assess the value of their investments and explain the results observed. Is there an adequate core monitoring and evaluation program that assesses survival and production through the life cycles of fish and wildlife?

Recent reviews by the ISRP (*Retrospective – progress-in-work*), the ISAB (e.g., Supplementation Review), and the recent ESSA report (Marmorek et al., 2004) all make it clear that existing data and analyses are not adequate to answer these critical questions. The ISRP has noted that it cannot complete a retrospective look at past year expenditures at the biological level because results of individual projects are not reported. The effectiveness of past actions cannot be judged in part because of the large effects of natural variability (e.g., in ocean survival) and inadequate study designs (or lack of adherence to study designs). The major problem facing the region in this regard lies in the lack of a well-planned regional RM&E effort, which appears to be in an incipient stage with the Action Agencies RME efforts and Pacific Northwest Aquatic Monitoring Partnership. One role for the independent scientific advisory groups to play is to assist the current regional effort in helping set up an RM&E program, suggesting experimental designs, uniform protocols, the regional database structure, etc. Our involvement in reviews of proposals and Action Agency RM&E plans has already done this to some extent.

### **C. Review and Implementation of Subbasin Plans: Problems of Document Organization and Presentation**

At the time of this writing, the next step toward adoption of subbasin plans is being formulated. Significant uncertainties remain as to how ISRP/AB and public review comments will be addressed, the status (or next steps) of scientifically deficient plans, and whether or not additional review to revised plans by the ISRP/AB will occur.

#### **1. Presentation and Writing**

Subbasin plans vary in content, readability, format, and presentation. Presentation strongly influences how useful the document will be for future planning by a diverse audience of fish and wildlife managers, planners, and an interested public, as well as for implementation by individuals and groups that extend beyond those that wrote the plans. Some plans do this very well; others are less successful. A few subbasin plans are extremely well organized and well written and should serve as models for subbasin plan revisions. The Flathead, Kootenai, Fifteenmile, Willamette, Hood, Umatilla, and most of the Intermountain Province subbasin plans stand out in this regard.

Presentation and format of the subbasin plans are both extremely important. Well-crafted, concise, and logically organized plans aid readers and planners in understanding issues within a subbasin and in planning for future actions. Poorly organized and presented plans, particularly those that present vast amounts of detail with little overall synthesis, are an impediment to planning and are not likely to be used for subbasin or regional planning or to effectively solicit, develop, and select fish and wildlife projects.

Some specific format requirements would be helpful, e.g., single column, consistent headings to facilitate future review, and a more coordinated appearance when considered either for review, for amending the Fish and Wildlife Program, or for on-the-ground implementation.

## **2. Limit Length of Plans**

Review and future use of the subbasin plans would be greatly facilitated by specifying page limits (perhaps a 200 page total). Subbasin plans ranged from approximately 150 pages at the shortest to more than 2000 pages in several instances. While making the review process more manageable, more importantly, a page limit would help the plans to become more effective and accessible public documents. This change would also help facilitate their implementation and would encourage subbasin planners to focus concisely on larger issues while reducing details not needed for assessing the plans' potential effectiveness.

Restricting document length could also motivate planners to avoid undue emphasis on the Assessment portion of the plan (with respect to time and content), to define linkages between the Assessment, Inventory, and Management Plan, and to identify prioritization opportunities. Finally, it would likely result in more readable and useful plans, as well as make them more suitable for inclusion into the Fish and Wildlife Program as amendments. If the Council were to provide a simple, hypothetical example in text and graphic format of the way an item of information should progress through the process to a final strategy, it would help guide revisions of subbasin plans.

Many of the current subbasin plans were very large (> 1,000 pages) and provided an inordinate amount of background information, often without synthesis or summary, that cluttered the plan and detracted from the plan's usefulness as a strategic planning document. Many plans included hundreds of pages of tables in appendices that are of little or no immediate use to the plan itself, but may have formed an important part of the background information that was (or should have been) synthesized into the plan. Such information should be archived at the subbasin or state level, referenced by the subbasin plan, and omitted from future versions of the plan. Alternatively, available information could be incorporated in the subbasin plan and appendices without becoming overwhelming by using new information sharing technology. This could be accomplished through integration and synthesis in the presentation, and careful ordering, organization, and interpretation of the content of appendices and other linked information. The Flathead and Kootenai subbasin plans, for instance, found a good way to link lots of information, including the evaluation spreadsheets, that were used in their assessment, and further linked to data and references that were used to load the spreadsheets.

Had subbasin plans been presented within a broader provincial perspective (as happened in the Intermountain Province), much of the redundant material in subbasin plans could have been eliminated. The voluminous nature of many of the subbasin plans makes them intractable as practical strategic and planning documents. Furthermore, such unwieldy

documents, all offered at once, effectively restrict the likelihood of any thorough, substantive public review.

## **II. The Subbasin Plans**

### **A. The Assessment**

#### **1. Thoroughness of Assessment**

##### ***a) Completeness of Assessment***

The subbasins exist within a region where great advances in understanding of stream ecology and management have recently developed. Subbasin planning in the Pacific Northwest should embody this modern knowledge. However, this is generally not the case in the draft plans that were submitted. For example, many plans relied on older and often outdated citations, rather than citing relevant recent literature. We provide specific examples of this below. One solution is to include individuals with up-to-date scientific expertise on the planning team.

##### ***b) Natural Variation***

The Fish and Wildlife Program adopted a dynamic view of ecosystems, as embodied in the scientific foundation, specifically in Principles 2 and 4. Furthermore, the biological objectives for environmental characteristics in the Fish and Wildlife Program call for acceptance of significant variation in biological characteristics as a normal condition. As a result the measure that “key ecological functions have increased sufficiently” will be determined by whether or not the system can accept environmental variation without collapse.

In the dynamic view of ecosystems, the state of an ecosystem is changing continually as a result of the operation of natural external and internal factors. The emphasis in this dynamic view is on maintaining and restoring ecosystem processes, rather than striving to attain fixed habitat states. In the dynamic view, natural variation is the norm, and that view must be incorporated into the Management Plans. In the last couple of decades, changes in ocean conditions have provided a dramatic example of how natural environmental variation can affect salmon abundance. Changes in aquatic habitats also can occur, often dramatically, as a result of fires, floods, and other natural processes within subbasins. In the dynamic ecosystem paradigm, fixed performance measures (e.g., a specific riffle:pool ratio, an amount of large wood, or a set escapement level) are often either unattainable or unsustainable over the longer term. Many scientists furthermore, believe that attempting to maintain a static condition can be detrimental to the ecosystem.

In general, the aquatic portions of the subbasin assessments need to provide better descriptions of the dynamic nature of aquatic habitats within the subbasins. These descriptions should include more comprehensive treatments of what is known about short- and long-term changes in aquatic habitats and the role of natural processes such as fires and floods in shaping the habitats. Many of the plans, however, did provide some discussion of how anthropogenic processes influenced aquatic habitat. To understand how natural and anthropogenic events affect aquatic habitat, the Assessments need to link terrestrial and aquatic processes better. Although the Fish and Wildlife Program

encourages the use of EDT as an analytical tool, we recognize that EDT is an equilibrium model that makes analytical treatment of natural variation problematic.

Natural environmental variation also should have been addressed in the biological objectives and strategies provided in the Management Plans. For example, what actions would need to be taken to shift the frequency and magnitude of occurrence of natural processes toward historic levels? What changes in aquatic habitat could be expected from these actions. Some plans addressed this point, in part, by proposing strategies for alteration of regulated flows toward a more natural hydrograph. At what locations within the subbasin would restoration of natural disturbance regimes likely be most attainable, and where would that activity have the most long-term beneficial impact on habitat and fish? What impediments would have to be overcome to achieve a more natural disturbance regime, and what measures would have to be taken to overcome those impediments? Finally, how will changes in natural processes and their consequences be monitored?

### ***c) Biodiversity***

Principle 6 of the scientific foundation of the Fish and Wildlife Program emphasizes the importance of biodiversity in promoting ecosystem stability and resilience. The Fish and Wildlife Program defines biodiversity as “the variety of, and variability among, living organism and the ecological complexes in which they occur.” We take this statement to mean all fish and wildlife species, indeed all species composing a biological community, and not just salmonids or focal wildlife species. The importance of protecting and restoring biodiversity is well established in the Fish and Wildlife Program. The biological objectives in the Fish and Wildlife Program call for restoration of native resident fish species and increased biodiversity to improve the resilience of ecosystems to environmental variation. The basin-scale objectives and strategies call for expansion of the complexity and range of habitats to allow for greater biodiversity.

Few plans have objectives directed at increasing biodiversity. Although nearly all plans provide a list of focal and non-focal native and non-native species, few plans address biodiversity in any depth or explore how habitat changes proposed for focal species would affect biodiversity, and what kinds of habitat modifications are being done to enhance biodiversity. It is true, however, that many of the strategies proposed for focal species would also benefit non-focal species, but most plans do not sufficiently indicate which species would benefit and how they would benefit. Only one conclusion can be reached: the role of most non-focal species in aquatic and terrestrial communities is poorly understood and perhaps not appreciated.

These omissions are somewhat understandable. Species diversity is not emphasized in the Technical Guide, even though it is an important element in the Fish and Wildlife Program. The Technical Guide emphasizes focal species, and this emphasis clearly drove the development of the subbasin plans. Furthermore, most of the information for subbasins exists for salmonid species, and little may be available for non-salmonids. Finally, research and management of non-salmonid or non-listed native species is unlikely to be funded.

While we recognize the reasons that non-focal species receive little attention in the Management Plans, we still believe it is crucial to point out the importance of considering biodiversity in subbasin plans for several reasons. First, we agree with the Fish and Wildlife Program that biodiversity promotes resilience of ecosystems. Second, although habitat actions directed at restoration of focal species may benefit some non-focal species, others may be adversely affected. For example, measures that would expand the distribution of cold-water fish assemblages (salmonids) by lowering stream temperatures may compress the distribution of cool-water assemblages of native species (e.g., pikeminnow, various species of suckers, dace, shiners). While the compressed distribution of the cool-water assemblage may more closely resemble the historic condition, managers need to be aware of the changes in abundance and distribution of non-focal species that would result for restoration actions. Finally, many native species that are now listed or petitioned for listing were once largely ignored by most biologists. Examples abound throughout the Pacific Northwest, but prominent ones include lampreys and bull trout, which were once regarded as predators on salmonids and had a bounty imposed on them.

#### ***d) Mainstem habitat***

The Mainstem Columbia and Snake subbasins, below Chief Joseph and Hells Canyon Dams respectively, can be referred to as “sum-basins”<sup>2</sup> meaning that many of the aquatic species that are a focus of other subbasins travel through the mainstem at some point. Although this designation makes these subbasins especially crucial to the Columbia River Basin as a whole, it also makes them more difficult to assess because EDT and QHA are more applicable to tributaries than to mainstem segments of rivers. The mainstem subbasins also serve as the primary aquatic habitat for certain important species, e.g., sturgeon.

Most of the mainstem subbasin plans neglected to include mainstem habitat effects, instead developing a plan only for the small tributaries entering the mainstem within its subbasin boundaries. Within these plans, mortality in the mainstem segments was treated as an out-of-basin effect, rather than as occurring within the mainstem subbasin. This is a serious oversight, considering the significant mortalities imposed upon juvenile and adult salmonids in their migrations through the mainstem Columbia and Snake Rivers. The Council has focused considerable attention on these problems, such as the Council’s assignment to Giorgi et al, (2002), and the subsequent review by the ISAB.<sup>3</sup>

The two Snake River subbasin plans do not provide Assessments, Inventories, or Management Plans for the mainstem Snake River itself, but restrict their planning efforts only to the tributaries that empty into the mainstem. Consequently, a Management Plan specific to the Snake River Mainstem needs to be developed to provide a foundation of scientific soundness to the subbasin plans that deal with fish and wildlife in the tributaries

---

<sup>2</sup> Mainstem segments identified as subbasins in the subbasin planning exercise included the Upper Columbia, Upper Middle Columbia, Lower Middle Columbia, Columbia Gorge Mainstem, Lower Columbia River Mainstem, Snake River Hells Canyon, and Lower Snake River Mainstem.

<sup>3</sup> ISAB 2002-1: Review of Giorgi et al. Report - [www.nwcouncil.org/library/isab/isab2002-1.pdf](http://www.nwcouncil.org/library/isab/isab2002-1.pdf)

that empty into the Snake River below the Hells Canyon complex. It should encompass the mainstem portions of the two subbasins, the Snake River Mainstem Hells Canyon and the Lower Snake River mainstems. In our review of the Lower Middle Columbia Mainstem, we provide recommendations on the need for modification of the existing strategy in the Hanford Reach and for an additional RM&E element in the portion of the subbasin below the Reach.

The mainstem Columbia River between Puget Island (upper estuary) and Bonneville Dam remains largely un-assessed even after the current planning process. Although this limitation has been identified before, it continues. Approximately 100 miles of river is viewed either as a gauntlet common to all up-river and Willamette River salmonids, or as 100 miles of restoration opportunity. At this time there is apparently insufficient information to assess the importance of this large and highly modified subbasin.

***e) Out-of-subbasin effects.***

Although many of the Management Plans looked at how factors outside the basin affected aquatic and terrestrial resources within the subbasin, they neglected to include how actions within the subbasin can affect fish and wildlife outside the basin, e.g., pollution and hatchery releases of anadromous species may have pronounced effects on other subbasins. Out-of-subbasin effects (OOSE) are largely overlooked in terrestrial analyses even though many focal species are migratory, such as neotropical birds.

Reviewers generally agreed with the use of a common OOSE assessment (e.g., TOAST 2004), but a useful recommendation from us could be that the Council should prepare and maintain a report/website of OOSE that planners could draw on (e.g., current passage rates by species, literature associated with estimates, databases, climate trends and ocean effects, estuary studies) and even a simple spreadsheet program that estimates smolt-to-adult return (SAR) from specific points in the river and variance estimates associated with the SAR. It was never really clear whether planners used the OOSE values for any specific stock or if they tailored the estimates to the number of dams involved. This action would avoid groups suggesting that the primary effect on a focal species is out-of-basin without any supporting justification.

***f) Uncertainties Associated with Future Growth***

***1) Future Population Growth***

All subbasin plans, except perhaps the Willamette, share a common deficiency – they do not evaluate likely changes in land uses, human population, or fish and wildlife populations into the relevant future (at least two to three human generations). Generally, the most that is covered in the plans is a recognition that climate change is possible and that human populations are likely to increase. As a result, most of the subbasin plans largely document the history of land conversion, resource consumption, demand for water, and changes in fish and wildlife resources that were of concern (mostly for listed species). As a result, most of the plans address the problems of the past 50-100 years.

Alternate scenarios for the future are the essence of planning. All the elements described above are crucial to defining realistic restoration opportunities for the future. The Boise,

Payette, and Coeur d'Alene subbasins are prime examples of situations where current trends, unlikely to change in the near future, substantially constrain future management options, and to plan responsibly, this needs to be met squarely.

Most plans did not explicitly identify where future changes and impacts were likely to happen, even though we have much relevant information. Counties and municipalities are required to have growth plans. We know where urban and suburban expansions are likely to occur, and what the projected human populations will be. We know where transportation corridors are now, where they are stressed, and where future changes have been projected. We know that the zoning halos around towns and cities as well as the residential and industrial corridors along roads and highways are likely to expand. We have many credible analyses of future changes in agriculture and forestry. None of this was part of the detailed evaluation of impacts on fish and wildlife resources. Most plans only made projections within the 10-15-year horizon in EDT and most of that used only the current land use and land cover with no anticipated change over that time frame.

As they currently exist, the subbasin plans help us tackle the problems created by past decisions and actions. They hope that the list of existing programs for conservation and restoration will do something about past losses, but few say anything about future decisions. This is like driving down the road by looking in the rearview mirror while accelerating. The Council and regional leaders should encourage subbasin planners to recognize the value of existing planning documents for the analysis of alternative futures for subbasins of the Columbia River System.

## 2) Social, Economic, and Cultural Factors

A common feature of subbasin vision statements is the inclusion of social, economic, and cultural factors. Several subbasins envision healthy sustainable economies and communities as well as healthy sustainable ecosystems. Although some subbasins note, at least implicitly, the interdependence of economies, communities, and ecosystems, few, if any, include economic, social, or cultural issues in their guiding principles in operational form.

What are the expectations within the subbasins for their economic and social futures? How will fish and wildlife restoration actions affect economies and communities, and how will alternatives be assessed? How will uncertainty about future economic and social conditions in the subbasins affect strategies for restoring fish and wildlife? Understanding the issues embedded in these questions could be advanced through augmentation of subbasin plans with economic and demographic information.

Understanding current economic and social conditions and making reasonable projections about the likely outcomes of current trends are crucial to defining realistic opportunities for the future. Several subbasin presenters indicate a desire to have economic assessments inform the next versions of their subbasin plans. Although detailed economic or social information was not a required element of the subbasin plans, a few include enough economic and demographic data to form the basis for the development of a social and economic component. Other subbasin plans recognize the value of including information

on the economic base, trends in land use patterns, composition of agricultural production, and human population growth. One subbasin has already contacted the Council's Independent Economic Analysis Board (IEAB) to ask for guidance on appropriate types of economic assessment of management alternatives.

The further development and implementation of subbasin plans will be enhanced by a consideration of social and economic trends and their implications for fish and wildlife. The plans offer several near-term opportunities for introducing social and economic assessments of management alternatives:

- Projections of human population growth and its impact on land prices and patterns of land use
- Projections of agricultural land use conversions and the implications these may have for using habitat protections targeted at the agricultural sector and funded primarily through USDA
- Assessment of options that provide incentives to landowners to make habitat improvements and other actions, including practices such as no-till
- Analysis of social and economic tradeoffs among options for achieving objectives: e.g., to enhance in-stream flow, an assessment of the cost-effectiveness and distributional consequences of a water exchange program vs. buying or leasing water rights vs. increasing irrigation efficiencies
- Assessment of social and economic impacts of specific protection and restoration actions

The integration of fish and wildlife objectives proposed in some subbasin plans such as the Walla Walla, Asotin, and Umatilla can serve as the base for developing social and economic integration with fish and wildlife recovery actions. The consideration of future conditions proposed in the Willamette Subbasin can serve as a model for how other subbasins may incorporate expectations about future human conditions and their likely effect on achieving the vision for the subbasin.

## **2. Assessment Tools**

While there was clear value in documenting the aquatic (stream and riparian) and terrestrial habitat data and provision of a record of these assessments, there was apparent misunderstanding of the EDT model, variability in application of methods, and concern for use of the results generated. Very few subbasins considered the uncertainty in the attributes used or considered the influence of this in the Management Plans. Although the EDT model was the most commonly applied aquatic assessment tool, its application did occur at substantial cost to the planning process. Many subbasins commented on the extensive time invested in acquiring necessary data or expert opinions, in organizing the data, and the costs of having model runs conducted. *For these reasons, it is essential that the Council archive these analyses and safeguard the data as a major information source resulting from this planning process.* Wildlife assessments tended to rely more on existing databases and published analyses, but frequently commented on the mismatch in spatial scales of the existing analyses and the finer scale measures needed for planning

and monitoring of changes in more localized habitats. This was particularly true to measuring change in riparian habitats that are typically like corridors and smaller than existing spatial scales used. Similar comments were made concerning mountain wetlands that are typically smaller scale wetland units.

The Assessments display elaborate maps of subbasin characteristics (land form, vegetation types, human land use, etc.), but there is usually little or no narrative follow-through on the meaning of such watershed- and landscape-level information for aquatic and terrestrial habitats and focal species. More complete discussion of the aquatic habitat and of relationships of aquatic species to stream and watershed processes is needed.

### ***a) Assessment Needs***

Essentially, each subbasin Assessment should, preferably via descriptive narrative, provide answers to the following questions about the subbasin's aquatic resources as analyzed from a watershed perspective (questions quoted or paraphrased from Reid 1998):

1. What areas are important for each focal species, and why?
2. Where has the habitat of each of those focal species been impaired?
3. What aspects of the habitat have changed?
4. What is the relative importance of the various habitat changes to the focal species?
5. What is the present trend of changes in the system?
6. Which changes are reversible?

Following the Assessment, the Management Plan should, after (or within) statements of objectives and strategies, provide answers to the following (Reid 1998):

1. What is the expected level of effectiveness of potential remedies, both those prescribed, as well as those considered as alternatives?
2. What are the likely effects of those remedies on other land uses and ecosystem components?
3. What are the relative costs of potential remedies over the long term?

The sequence of steps laid out by Reid (1998) lead up to problem diagnosis, setting of management objectives, prescription of methods, and prioritization of efforts. The Council's Subbasin Planning Technical Guide essentially asks these same questions, but the ISRP/AB provides the Reid material for increased clarity on what the logic path should be in these assessments. In summary, the vagueness of the aquatic assessments in many subbasin plans means that those plans do not successfully meet the Council requirement that they embody the best available science.

### ***b) Limits to the Use and Interpretation of Analytic Tools***

Relatively few subbasins used EDT, QHA, IBIS, or other tools effectively to link with the project Inventory and reach agreed upon actions in the Management Plan. Some subbasins (e.g., Salmon, Clearwater, Boise-Payette-Weiser, Burnt, Powder, and others) failed to use any analytical tool in the aquatic portion of the Assessment.

A fundamental difference between aquatic and terrestrial assessments is worth noting. Whereas assessment of terrestrial wildlife resources seemed very descriptive of habitat characteristics and of relationships between focal species and habitat within the subbasin (and terrestrial authors typically applied standard literature sources), aquatic assessments were by the nature of the diagnostic tool, very detailed sets of habitat characteristics that were limited to sets of prescribed habitat functions and ecological processes. Wildlife assessments could incorporate local conditions and local knowledge in their assessments (though it is seldom fully developed), but aquatic assessments using EDT or QHA could not access or change the rules inherent in the assessment tool in response to locally derived data. This inflexibility of the tools in addressing localized conditions was noted by several subbasin groups (see next section).

These differences lead to some common differences in outcomes:

- The scale of action for terrestrial habitats and species are inherently much larger than the scale of actions that would result from the aquatic assessments applied.
- Aquatic assessments left planners with a myriad of detailed actions by stream reaches and species, and they required extensive collation of results. The success of this approach was among the most variable and problematic to evaluate of the review process
- The fragmentation of habitats in the assessment of both terrestrial and aquatic habitats detracted from any efforts to prompt more landscape-oriented planning. Any assessment tool is likely to start by categorizing habitats or species, but the role of planners should be to integrate the pieces (i.e., the results) into a package of actions taken at appropriate scales of time and space that are most likely to benefit fish and wildlife within their ecological settings.

### ***c) Future Issues for Analytical Tools***

#### **1) Intended Use of EDT**

A common concern noted by reviewers was that an understanding of the intended use of EDT was frequently missing or confused. EDT is a tool designed to assess habitat capacity by species and to identify habitat attributes that were likely limiting factors to survival/production based on the weight of expert opinion (expressed in the rule sets by species). The model compares biological production under present conditions (expressed in the habitat attributes) with production that could have existed before (the historical template) and/or a future set of conditions achieved through restoration actions. These comparisons, however, are in *measures of relative change* and would seldom be expressed in absolute values. Only the current condition could be displayed in absolute values of survival and abundance, and only then if the model had been field verified, an action that was not documented in any of the subbasin reports.

Significant differences exist between the plans in how they deal with the model outcomes. Some subbasin briefings revealed that planners had not had adequate time to “calibrate” the model and, therefore, put little faith in the results. Others suggested that the results were consistent with their previous beliefs and, therefore, thought the modeling was useful in supporting their Assessments. An obvious concern to the latter is

whether or not both were incorrect. *The results from EDT are hypotheses that should be tested.* The outcomes reflect simply what local experts put into the model (i.e., empirical data) together with the rules connecting habitat attributes to biological performance indicators. The model could play an important role in directing future actions, because it collates large volumes of data and provides specific hypotheses for study. The hypotheses are, at a minimum, based on a currently available inventory of habitat conditions and populations and on the empirical data collected for the specific watershed.

## **2) Adequacy of Current Tools**

If future planning is based on analytical tools, it is increasingly important to ask if the current tools are adequate, if they are accessible for testing, and if they are supported and understood by the communities that will be influenced by the results. For example, a number of groups questioned EDT: why was it necessary for the model to be so detailed; why was it so costly to access and use; and why was access to the rule set restricted? The QHA model offered some simplification, but much more detailed comparisons of EDT and QHA outputs are needed. Although the IBIS wildlife model was free to users, many comments were received concerning the high cost of EDT analyses for focal fish species. Reviewers suggest that the Council consider two actions, (1) request a peer review of existing models, including a procedure to test outputs under various environmental conditions; and (2) ensure that monitoring programs are maintained so that within subbasin and out-of-basin production rates are estimated, and future analyses are adequate to partition changes in abundance into trends caused by in-subbasin and out-of-subbasin effects.

A critical question that needs resolution is how do EDT and QHA accommodate the various types of artificial production programs in the Basin (mitigation hatcheries, supplementation programs, captive brood, etc.). Essentially none of the subbasin plans adequately described how this major source of fish production is accounted for in the analytical tools used in the assessments.

Topics identified for future development in the analytical models include mixed-species assessments (e.g., how to optimize actions to benefit spring Chinook salmon and steelhead or other resident species), and determining how to conduct sensitivity analyses or more adequately account for uncertainty in the data incorporated in the models. Some Management Plans did attempt to incorporate uncertainty levels in their use of EDT results and to account for it during their consideration of management planning options (similar to a Decision Analysis). This topic may deserve a more thorough development that would be valuable for achieving locally based agreement for actions and direction for the Council.

## **3) Issue of Scale**

The issue of scale in habitat assessment and mapping is important. Many gaps remain in the coverage of habitat conditions throughout the Columbia River Basin. Completion of habitat inventories and storing habitat information in geospatial databases will become a significant task that will require extra funding, but it may be essential for monitoring

habitat restoration programs, and linking the terrestrial and aquatic ecosystems (i.e., via riparian habitats).

#### **4) Tools Not Used**

GAP analysis and the USFWS Habitat Evaluation Procedures (HEP) program are resources for terrestrial analysis that were generally not used. In general, fewer assessment tools are available for terrestrial resources, although many assessments used IBIS. IBIS, however, does not include spatial, temporal, or population dynamic elements, which are needed for a thorough assessment.

### **3. ESA Issues**

#### ***a) Plans did not deal effectively with ESA***

Subbasin plans are intended by both NOAA Fisheries and the Council to link ESA recovery planning with the Council's Fish and Wildlife Program. The Technical Guide for subbasin planning instructs planners to provide a summary of ESA recovery units within their subbasin overview, to include ESA listed species as focal species, and to review whether or not the Management Plan is consistent with ESA goals. ESA considerations appear in the subbasin Overview, Assessment, and Management Plan. Often, the ESA treatment in the subbasin plans is superficial. More meaningful discussion could occur; guidance on what is needed is provided below.

In the subbasin overview, although the Management Plans generally note ESA-listed species and describe any ESU populations that occur within the subbasins, they rarely include the ESU's component populations in any larger discussion of the ESU beyond the subbasin boundaries or with respect to adjacent ESUs within the Columbia Basin. The subbasin plans should be useful to individuals not well versed on the technical details of the distribution of ESUs and distinct population segments for listed species. Several subbasin plans, however, did include detailed and expanded discussions of focal aquatic species relative to ESA and ESUs within the species. Examples that may serve as models to other subbasin planners include the discussions of bull trout ESUs in the Flathead subbasin plan and steelhead and redband trout ESUs in the Umatilla subbasin plan.

#### ***b) Subbasin Plans and NOAA Recovery Planning***

When useful and appropriate, the assessments of ESA-listed focal species will be used by NOAA Fisheries' Technical Recovery Teams (TRTs) in recovery planning. For example, the Interior Columbia TRT reviewed the ESA focal species assessment for the Asotin subbasin in April 2004. In that review, the TRT provided recommendations on the information they believed would be most useful to them in subsequent recovery planning.

Subbasin plans had variable coverage of the information suggested as appropriate for TRT and NOAA needs. Consequently, NOAA Fisheries is left with an issue of how to identify the best opportunities for recovery efforts among the subbasins, how to prioritize the opportunities, and how to determine what is actually achievable with local communities. Because subbasin plans generally lacked this level of synthesis, TRTs may have to examine the list of actions generated in each subbasin plan and determine if they

meet NOAA goals for productivity, abundance, spatial structure, and diversity. The lack of thorough treatment of ESA issues in most subbasin plans will make it difficult or impossible to “roll up” subbasin plans into ESU-level recovery plans. Clearly, many plans missed an opportunity to take the lead by producing an analysis of the viability needs of ESA species and a proposal for how they will meet these needs.

In fairness, many subbasin planners may not have had access to TRT guidance on ESA issues within their subbasin. For the benefit of future revisions of those subbasin plans, we incorporate the Interior Columbia TRT suggestions here within the following recommendations:

- ESA-listed focal species assessments need to arrive at a comparison of current population status for VSP parameters (abundance, productivity, spatial structure, and diversity) to a reference condition (historic or recovery conditions).
- Measures used for abundance and productivity should be documented, along with an assessment of the precision of the estimates.
- The contribution of hatchery-origin fish to the population, with estimates of population productivity with and without successful hatchery-origin adult reproduction needs to be provided.
- A potential abundance and productivity should be estimated based on habitat quality and quantity.
- Estimates developed using empirical analysis should be clearly differentiated from estimates based on models (i.e., EDT).
- Finally, abundance and productivity based on habitat models such as EDT are most appropriately treated as relative, rather than absolute, estimates.

### ***c) Consistency with ESA***

In the Management Plans, consistency with the ESA was frequently “checked off” with respect to the Technical Guide. To complete this task adequately, VSP metrics of biological performance for ESA-listed focal species developed for the subbasin plan need to be checked directly for consistency with VSP metrics proposed by NOAA Fisheries and USFWS.

Limiting factors identified using habitat models such as EDT need to identify causal mechanisms, not just lead to working hypotheses about environmental characteristics. For example, if sediment is identified as a limiting factor, it needs to be linked to a specific anthropogenic disturbance such as agricultural runoff or timber harvest. Finally, the assessment needs to hypothesize the specific life stage and limiting factors that produce bottlenecks for the focal species. Quantitative treatment of out-of-subbasin effects and species status that is used in the assessment can be drawn from ESA status reviews, other viability analyses, and interim recovery standards.

## **4. Focal Species and Ecosystems**

The choice of focal species affects not only the selection of objectives and strategies in a plan, but also the ability of plan implementers to monitor the effectiveness of actions towards meeting plan objectives. The emphasis that subbasin planners place on ESA-listed species is understandable, particularly given the emphasis in the Technical Guide

and by NOAA Fisheries. Several of the primary tasks associated with the subbasin planning effort, including the provision of “bottom-up” input on recovery planning and on the fish and wildlife management plan under the Northwest Power Act, would reinforce this emphasis. Nearly every subbasin plan, however, indicated in the vision statement that a primary goal was the restoration of ecosystem health or integrity. Determining progress against this goal would require a broader perspective on the selection of focal species.

#### ***a) Selection of Focal Species***

Ideally, the focal species selected should exhibit three characteristics: (1) they should represent the diversity of aquatic and terrestrial habitats that are the target of restoration actions in the plan; (2) they should be species that are expected to respond to the actions being implemented; and (3) it should be possible to collect abundance or distribution data for these species – ideally, some of these data will already be available. For this reason, focal species that are extremely rare or difficult to sample are generally poor choices. Increasing the abundance or distribution of currently rare species is certainly a legitimate objective for a subbasin plan, but all species for which actions will be implemented do not have to be included as focal species.

Wildlife focal species that were selected in some subbasins were representative of the range of natural habitats. In some cases these focal species were identified by first listing “focal habitats”, i.e., those habitats that the plan intends to protect or restore. Species associated with each of these focal habitats were selected as focal species. This approach is an effective method of assuring good focal species representation. The aquatic focal species identified in nearly all the plans did not provide comprehensive representation of aquatic habitats. Apparently, the emphasis on ESA-listed species discouraged planners from including non-listed species. None of the plans included a warmwater, native fish as a focal species, despite the fact that some of these species are ESA listed or at some risk (e.g., Umatilla dace, Oregon chub). Some non-salmonid coldwater species have different, sometimes contradictory, habitat requirements compared to salmonids. Inclusion of a species of sculpin or of Pacific lamprey as a focal species might help ensure that the range of habitat conditions responsible for supporting the entire native, coldwater fauna in a subbasin was being addressed. Pacific lamprey is identified as a focal species in some plans, but in many cases, that species is extremely rare (possibly extirpated) in these subbasins. It is questionable whether or not lamprey would be a useful focal species in these instances due to concerns about collecting sufficient population information for such a rare species.

The feasibility of collecting data on the current and future status of focal species was ignored in many of the subbasin plans. The tendency to select focal species for which little status and trend information exists (or can be practically collected) compromises the ability to evaluate the success of plan implementation. There are many species, however, for which data can be collected, given sufficient commitment to this effort. The process used to accumulate, analyze, and archive information of focal species status should be a prominent component of the monitoring section in each plan. Often, this was not the case (see programmatic comments on RM&E below).

### ***b) Alternatives or Additions to Focal Species***

Although the planners were expressly instructed to select focal species, other characteristics of biological communities or ecosystem structure and function also might be useful in gauging the success of a subbasin plan. The vision for all subbasins is to have a healthy ecosystem with sustainable fish and wildlife resources. Presumably, the response of focal species to restoration actions will provide an index of the rate of ecosystem health recovery – i.e., if the focal species is “healthy,” then the ecosystem is healthy. Augmenting focal species information with an assessment of changes in the characteristics of biological communities or ecosystem processes would provide a more complete picture of progress towards “ecosystem health.”

In future revisions of the subbasin plans, some thought should be given to the identification of “focal processes” as well as focal habitats and focal species. For instance, a great deal of watershed research in recent years has focused on the relationship between aquatic habitat condition and landscape processes. In general, it is now recognized that the condition of aquatic habitat is a product of the landscape processes operating throughout a watershed. Many aquatic sections of subbasin plans, however, are focused narrowly on in-channel conditions. Various chapters in Wissmar and Bisson (2003) discuss the need for and approaches to watershed-process-based assessment and management planning. In addition, Fausch et al. (2002) set forth needs for investigation and management based on the whole-stream processes.

## **5. Natural Production and Interactions with Hatchery/Supplementation Fish**

### ***a) Failure to integrate artificial and natural production into the plan***

Aquatic portions of the Assessment and Management Plan sections emphasized habitat restoration. Artificial production of fish, however, has actually been the main aquatic management activity (GAO 1992, 2002; ISG 2000), and will undoubtedly continue to be, at least for the foreseeable future. Nearly all subbasin plans fail to assess salmon and steelhead production within the subbasin in a holistic fashion, integrating natural and artificial production with habitat capacity. The Umatilla subbasin plan, however, provides integrated production goals for anadromous stocks, while the Kootenai and Flathead subbasin plans integrate proposed resident fish management activities with proposed habitat activities.

An integrated approach links the vision for future fisheries with achievable production objectives. This linkage is achieved by breaking down total production into a natural production component that factors-in expected gains (perhaps scoped via EDT scenarios) resulting from habitat improvements and an artificial production component with approaches and scales appropriately justified to integrate with the natural production component. Caution is warranted here, because little actual evidence exists to date that hatchery fish can be used to rebuild wild populations; indeed, testing this assertion is the stated primary purpose of the Yakima Fisheries program and the Idaho Supplementation Studies project in the Salmon and Clearwater. The very few cases of successful reintroduction, e.g., the Umatilla subbasin, seem to occur where the effects of limiting

factors are not acute. Furthermore, the natural production component identifies gains attributable to ongoing or proposed habitat improvements. The overall integrated production effort should be scaled to conditions within the subbasin, including the within- and out-of-subbasin effects of the artificial production.

The Technical Guide may have inadvertently led to the omission of an integrated consideration of artificial production from subbasin plans. The Technical Guide recommends describing artificial production programs in the subbasin plans and suggests incorporating information from the recently completed APRE and appropriate HGMPs. Many HGMPs, however, are not yet complete. This general guidance contrasts with the Council's 1999 Artificial Production Review and the 2000 Fish and Wildlife Program (pp.22-23), which gives specific guidance about the kind and level of information to include in subbasin plans. Artificial production is clearly meant to be integrated with natural production and habitat improvement. Most subbasin plans fell far short of this standard.

The Technical Guideline recommendation to subbasin planners to use EDT (or QHA) as an aquatic assessment tool may also have contributed to the inadequacy of the artificial production portion of subbasin plans. EDT and QHA are habitat-based tools and, therefore, drive assessment toward habitat issues. While this provides needed information, the Assessments and Management Plans fail to bring fish production (artificial and natural production components) into the analysis because EDT and QHA do not emphasize it. Part of this failure may occur because hatchery personnel may not have participated in some plans. Subbasin planning input about aquatic systems often seems to have come from habitat specialists only.

The ISRP/AB recognizes that tools for analyzing the impacts of artificial production on natural production are inadequately available at this time. We identified this inadequacy in our review of basin-wide RM&E (ISRP/AB-2004-1).<sup>4</sup> In the near term, inference from retrospective analyses of steelhead hatchery programs in the Salmon River (Levin et al. 2002), coho salmon programs in coastal Oregon (Nickelson 2003), and steelhead programs throughout Oregon, including the Columbia River Basin (Chilcote 2003) could be used to develop evaluations of the scale of hatchery releases and their impacts on natural populations. In the longer term, the Columbia River Basin needs to design better experiments to measure the impacts of hatchery releases on natural populations.

***b) Supplementation as a central strategy in population recovery***

In the Klickitat, Yakima, Salmon, Clearwater, Grande Ronde, and Imnaha subbasins, the planned supplementation activities are a central organizing issue for the fisheries programs. This was evident during the provincial reviews and through various Council Three Step Reviews. However, the supplementation/augmentation programs are not presented in the subbasin plans as a central organizing program. Instead, both the Klickitat and Yakima plans include the fisheries master plans as appendices that are largely unreferenced in the subbasin plan itself. The Salmon and Clearwater plans show numerical objectives for anadromous and artificial production. They do not, however,

---

<sup>4</sup> ISAB/ISRP 2004-1: RME Report - [www.nwcouncil.org/library/isab/isab2004-1.htm](http://www.nwcouncil.org/library/isab/isab2004-1.htm)

discuss the total fish production plan for the basin in a way that partitions future production goals (and objectives) into natural and artificial components. They also fail to justify the role and scale of the proposed artificial production toward achieving the subbasin's future vision. Plans for the Grande Ronde and Imnaha subbasins, where much research has occurred on artificial production, contain many of the needed elements in an integrated artificial and natural production system, but fell short of fulfilling the issues outlined just above.

***c) Linking habitat improvements with production management***

The lack of discussion about the linkage of production (natural and artificial) objectives with proposed habitat activities is a particular concern in the Salmon, Clearwater, and Yakima subbasin plans. In these large subbasins, where the artificial production programs form a large part of the Council's basinwide program to evaluate the efficacy of supplementation programs, the omissions constitute a major deficiency in their subbasin plans.

For example, one of the significant actions proposed to increase spring chinook salmon distribution in the Klickitat basin is to improve passage at Castile Falls. This action would provide access to 35 miles of upper basin meadow habitats that are typical of highly productive spawning areas for spring Chinook salmon elsewhere in the Columbia River Basin. Nevertheless, the subbasin Assessment (pp. 130-131) describes pervasive long-term negative effects on habitat and riparian condition in the upper river section from over 60 years of intensive grazing. Other habitat impacts in this section include roads in the river floodplain and legacy effects of logging. The subbasin plan should specify that investment in passage improvements at Castile Falls is unwarranted without a simultaneous commitment to stream and habitat improvement activities that positively benefit spawning and rearing for the spring Chinook salmon and steelhead passing the falls.

## **6. Limiting Factors**

***a) Identification of Limiting factors***

The term "limiting factor" is easy to state, but much more difficult to define. There are several common uses of the term, and each has a somewhat different emphasis. The Plans often reference limiting factors in different ways, which can lead to confusion in those cases where the term is not clearly defined. The term was usually used to identify a single environmental factor believed to limit the abundance or survival of a species, either by exceeding a hazard threshold (e.g., high temperature, elevated fine sediment level in the stream, or formation of a migration barrier) or by being an important resource whose scarcity hampers the ability of members of the population to meet life history requirements (e.g., lack of winter rearing habitat or availability of prey).

A second use of the term, limiting factor, was to identify anthropogenic features or processes that harm focal species, such as road density, loss of riparian forest to logging or grazing, water diversion, migration blockage, or introduction of non-native organisms. In some cases, such factors do not directly cause declines in focal species, but rather catalyze environmental changes that harm the species in question. It is important to note

that the first use of the term can include natural conditions, which are not always favorable for every focal species, whereas the second use of limiting factor is generally reserved for human-related changes.

A third usage of the term, limiting factor, pertains to watershed-scale ecological processes that generate unfavorable localized conditions that limit focal species. Often, such processes are strongly influenced by various types of land and water development that lead to changes in erosion and other hydrologic processes, reduced wood recruitment, or competition from introduced species. Removal of this type of limiting factor usually involves restoring “natural” watershed processes under which the population had existed historically.

We encountered several difficulties with the ways that subbasin plans used the concept of limiting factors. First, there was insufficient clarity about which of the three common usages applied. Limiting factor identification often included a mix of environmental variables, ranging from single parameters that could limit one life history stage of a focal species at a single location in the subbasin to broad landscape processes that affected the entire drainage system. The problem with mixing individual factors with watershed processes is that simple remedies for one factor almost never address problems with other factors. In addition, the plans almost never specify what evidence exists to support the contention that a factor limits a focal species in a particular subbasin. At best, the Assessments note that potentially harmful conditions exist in a reach (or reaches), and, based on the scientific literature relating the focal species to that factor, infer that the condition indeed limited the population. More often, limiting factor identification appears to be based on opinions of local experts. Although local knowledge is helpful, relatively few cases are based on locally derived data, and the plans almost never acknowledge the amount of uncertainty involved in determining the limiting factor. Where limiting factors are identified using a habitat model such as EDT, there had to have been uncertainty about the relationship between the model’s attribute and the target species. There had to be further uncertainty that the species actually faced those conditions at the site in question (especially when no local data existed for verification). Neither of those types of uncertainty is ever specified in subbasin plans.

Finally, many plans confuse limiting factors with “desired future conditions”, i.e., the set of conditions that is believed to represent the best feasible outcome of watershed restoration activities. If a particular environmental factor departs significantly from a desired condition (e.g., if fine sediment in spawning gravel should be lower than 10%, but was thought to exist in greater amounts), then the factor is usually judged as limiting the population. In this example, fine sediment may have been limiting egg survival, but there was no direct evidence that this was so (due to an absence of data on sediment and egg survival in the reach). Furthermore, this approach to identifying limiting factors tends to favor selection of easily measured variables, such as water temperature, pieces of large wood, or pool frequency, rather than other potentially important factors that are much more difficult to quantify, such as food supply and competition with introduced species.

### ***b) Use of Limiting factors in Management Plans***

Limiting factors identified in the assessment section of the plans were commonly addressed in the management section by recommending measures that would remove the problem (e.g., migration barriers) or restore the stream to a desired condition (e.g., providing riparian vegetation that would shade the stream and reduce the maximum temperature to some sub-lethal level). While these measures were often based on common sense and would in all likelihood be beneficial, we were concerned that the designation of target habitat conditions for focal species would lead to one-size-fits-all prescriptions for many streams. The problems with such an approach were discussed in an ISAB report on tributary habitat (ISAB 2003-2, A Review of Strategies for Recovering Tributary Habitat: [www.nwcouncil.org/library/isab/isab2003-2.htm](http://www.nwcouncil.org/library/isab/isab2003-2.htm)), which noted that attempting to force stream channels to conform to fixed habitat conditions was unworkable and did not allow for natural disturbances needed for long-term watershed productivity. Most of the plans did not discuss management actions in dynamic watersheds, nor did they examine limiting factors within the context of the range of natural conditions. Few if any subbasin plans dealt with riparian plant succession as a fish-habitat-forming process. Effectively addressing limiting factors where watershed conditions vary naturally adds considerable challenge to management planning, yet we feel such an approach is needed for long-term restoration effectiveness.

## **B. The Inventory**

### **1. Thoroughness**

The Inventory was meant to link the Assessment to future options by strategically identifying unique management opportunities and providing a starting point for adaptive management (if results are analyzed in terms of effectiveness rather than implementation). In many instances, the Inventory was simply a listing of environmental agency mandates and restoration projects (or sometimes just the agencies associated with them), rather than a true compilation of the protections in place within the subbasin. Likewise, similar shortcomings were common in the subbasins' compilation of existing local, state, tribal, and federal fish and wildlife management plans and water resource management plans that affect fish and wildlife. In fact, many of the inventory sections failed to identify the physical areas under protection within the subbasins. It was unclear how the various planning groups obtained their information (often, apparently via voluntary response surveys sent to agencies within the subbasin). It was also unclear how complete the responses were to those surveys, and hence, how complete the Inventory's coverage of ongoing protections really was.

### **2. Effectiveness of the Protections and Past Management Actions**

Beyond the completeness of the project and protection listings, with only a few notable exceptions, no real assessment of the adequacy of the protection in place within the subbasin was offered. Few explanations of the interrelationships of the various protection activities were offered either. Finally, with some exceptions, e.g., Flathead and Kootenai, there was no evaluation of which programs would be considered successful, and which were unsuccessful.

### **3. Gap Analysis**

For most of the Inventories, there was a clear lack of synthesis. There was little information relating the protections listed in the Inventory to limiting factors identified in the Assessment or to any actions proposed in the Management Plan. As a result, there was no effort to identify the gaps between actions that have already been taken or are underway and those proposed in the subsequent Management Plan for the subbasin. More analysis is needed to reach that level of completeness.

## **C. The Management Plan**

### **1. Thoroughness**

In general, the Management Plans were less complete than the Assessments, but more complete than the Inventories. In many instances, subbasin planners acknowledged this in the written plans and in their presentations. As noted above, many spent disproportionate amounts of time in developing the Assessment, so that the development of the Management Plan frequently suffered. Nevertheless, several subbasin plans (Kootenai, Flathead, Fifteenmile, Umatilla, and Willamette) had well-written Management Plans that flowed logically from their Assessments and Inventories.

### **2. Vision Statements**

Although developing vision statements was an important collaborative exercise for the planning community, the vision statements in many of the plans are so general and vague that they are relatively meaningless, failing to embrace the specific uniqueness of individual subbasins or to acknowledge the tradeoffs between different land and water uses.

### **3. Biological Objectives and Strategies**

#### ***a) Confusion about objectives and strategies***

Biological objectives and strategies are the most important element of a Management Plan. They define what the plan is trying to accomplish and how it proposes to accomplish it. Proper conceptualization and design of strategies will make the plans more useable and the resulting programs more effective. In addition, adequate development of strategies and their prioritization is important because the strategies will serve as a basis for project proposal review. We recommend that the Council do everything possible to ensure that the biological objectives and strategies in the subbasin plans that are adopted into the Fish and Wildlife Program meet the requirements for objectives and strategies set forth in the program.<sup>5</sup>

The subbasin Management Plans consistently displayed confusion between objectives, strategies, and actions. Indeed, many of the strategies read like objectives. Difficulty in distinguishing between these concepts also was a major failure in many projects during the provincial review process. The objectives should be measurable. Strategies, on the other hand, are the particular actions that would be implemented to achieve each

---

<sup>5</sup> According to the Fish and Wildlife Program, biological objectives “describe the conditions that are needed to reach the subbasin vision, consistent with the scientific principles.”

biological objective. Strategies are intended to be more specific than objectives and should comprise an integrated set of actions designed to achieve the objectives.

By appropriately framing the objectives and strategies, a clear linkage is created in the plan from the limiting factors identified in the Assessment through to the specific actions identified in the Management Plan. This linkage is critical to establishing a firm technical basis for proposed actions.

Three difficulties were apparent from the confusion about objectives and strategies. First, the strategies of many plans were so general as to be of little value in determining whether or not they would constitute sufficient actions to reach the objectives. For example, two strategies that were often mentioned were to maintain and preserve genetic diversity and to control the spread of exotic species. While both of these strategies were desirable in the context of the stated objectives, the reader was left wondering how genetic diversity would be increased and how exotics would be controlled. In these cases, nearly any management intervention imaginable could be justified. Second, strategies tended to consist of a set of individual actions with little, if any, integration. Consequently, the logic pathway to achieving an objective often was obscure. Finally, many plans failed to prioritize objectives and strategies.

#### **4. Research, Monitoring, and Evaluation**

The subbasin plans attempted to pull together the available resources for coordination of research, monitoring, and evaluation with no provisions for funding of such coordination. As a result, they all struggled and the evidence for coordinated measurement, data management of any kind, and coordinated evaluation was extremely weak. It seems that the Council and regional leaders need to decide on what basic level of R&ME is essential and identify the funding level available to support it. This is an important but enormously expensive part of resource planning that often is listed as a goal, but almost always is dropped because the tasks of implementation exhaust the available funds and energy of participants.

##### ***a) Thoroughness***

The research, monitoring, and evaluation (RM&E) section was incomplete in all subbasin plans. Eventually, the RM&E sections must contain descriptions of the specific terrestrial and aquatic variables to be monitored and evaluated, including data collection protocols for effectiveness monitoring (research) and for status and trend monitoring.

##### ***b) Linkages between Habitat Projects and Fish Responses***

There is a critical need to evaluate (and demonstrate, if possible) whether habitat improvements lead to increases in fish and wildlife numbers (or diversity, productivity, etc.). Locations in the subbasins where these relationships could be examined for aquatic species need to be identified. Potential locations might include those with a combination of prior or ongoing work, and the ability to monitor adult and juvenile fish numbers. Systems identified during the subbasin reviews where this might be approached at the subbasin level include the Asotin, Fifteenmile, John Day, and the Lemhi, for example. Tributaries in other watersheds, such as Trout Creek in the Deschutes River subbasin,

may also offer the opportunity to address this relationship.

***c) The Need for Stock Assessment***

A basinwide salmonid stock assessment program is required as the basis for management and research of fish and fisheries in the Columbia River Basin. Stock assessment and watershed assessment are consistent with the required elements of the subbasin plan. Careful selection of index sites will be necessary, since these sites will become the standard for comparison, or controls, in Tier 2 and 3 levels of evaluation, monitoring, and research, as described below. Careful coordination of subbasin activities and effectiveness evaluation is thus centered on the stock assessment and index stream system. The ISRP has previously noted a lack of consensus over a uniform stock assessment protocol. Stock inventory is critical, in particular, to the selection of appropriate tools for recovery.

For anadromous salmonids, key variables required in a stock assessment include harvest, adult escapement, smolt yield (to determine smolts/spawner as a function of spawner density), adults returned per smolt, and trends in these statistics over time periods that define the productivity and capacity within a climatological and/or ecological regime. A standardized, uniform index management system is required, where sites are selected to represent a particular geographic location (e.g., province or ESU), where detailed life stage monitoring may be required, usually at a fish enumeration facility. Other watersheds are tracked to determine relative abundance, via harvest records, spawner surveys, redd counts, fry abundance, or other means that have been calibrated to the index site results. Such a program is rare, if non-existent, in the Columbia River Basin, but examples of its use may be found in British Columbia for several salmonid species, and in eastern North America for Atlantic salmon. A program of stock assessment is briefly described on the Fisheries and Oceans Canada website ([www.pac.dfo-mpo.gc.ca/ops/fm/Salmon/stock.htm](http://www.pac.dfo-mpo.gc.ca/ops/fm/Salmon/stock.htm)), including a listing of crucial information needs, and case studies.

From an adequate stock assessment and stock status analysis (e.g., healthy, depressed, endangered, or critical), a list of management tools appropriate to the stock's recruitment level may be selected. These tools include choices within harvest, habitat, hydro, and hatchery management. In the Columbia River Basin Provincial Reviews, we rarely encountered a project justification that provided a solid reference to such a stock assessment framework. Projects need to coordinate their efforts around a strong stock assessment framework, and indicate the linkage of stock assessment and stock status to their proposed work within project and program applications.

The Council and its science advisors, or perhaps an RFP process, should direct subbasins to produce a stock assessment plan that is comprehensive and representative of conditions throughout the subbasin and from which management actions can be derived. In some cases, more detailed life stage sampling will be necessary, but at a minimum, it must include the smolts/spawner and adults/smolt separation of freshwater and ocean life stages.

#### ***d) Regional Coordination of RM&E***

Although many subbasin plans include development of monitoring programs to meet certain objectives, the ISRP/AB judged that the subbasin planners should look outside the subbasin for guidance and examples of cooperative efforts. Furthermore, there are advantages in coordination of status and trend monitoring among subbasins so that data can be “rolled up” to larger units of State and Tribal lands and eventually, to the entire Columbia River Basin. In particular, for the monitoring of aquatic resources, the subbasin plans should include cooperation with the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) and Action Agencies’ pilot projects (John Day, Upper Salmon, and Wenatchee, see Action Agencies and NOAA Fisheries (2003)). Initial plans consistent with these efforts are included in the Wenatchee and Owyhee Subbasin plans. Also, see Hillman (2004) and ISAB (2003).

#### ***e) Future Needs in Subbasin RME Planning***

The subbasin plans present much open-ended discussion and many ideas, but true monitoring agendas are not given. The topics discussed are an array of issues identified through the planning process, some of which are being addressed by various agencies in the Columbia River Basin, and others that are not. The topics might be regarded as “wish lists” that are both overly optimistic and not prioritized. It is very likely that the number of issues and indicator variables must be limited to create cost-effective plans that can be funded over the lifetime of the subbasin plans.

Unfortunately, we are not aware of a good model plan for monitoring of terrestrial habitats or species and rolling up data across subbasins. There is not a regional monitoring effort for terrestrial resources to match the aquatic efforts of PNAMP and the Action Agencies.

Subbasin RM&E plans cannot be based exclusively on monitoring of habitat improvement actions or status and trend monitoring of habitat quantity or quality. Monitoring plans must include evidence to determine if sufficient quality habitat can be protected or improved to provide viable populations, or if the presumed needs of the population are excessive. Data were generally missing to estimate viability requirements, but reasonable hypotheses can be developed and tested via monitoring in an adaptive management program.

### **5. Fish and Wildlife Program’s Scientific Principles**

The Fish and Wildlife Program’s Scientific Principles are conceptual, and it is difficult to step down from these general principles to specific objectives and actions at the local scale. Plans were not derived directly from the principles, but rather followed a Technical Guide that spelled out the specific types of information to be included in the plan. Reviewers were asked to evaluate the consistency of each plan with the scientific principles. Consistency was difficult for reviewers to assess in detail without extensive, time-consuming analysis.

It would be useful for planners to include a narrative section in which they explain how the plan meets each of the eight principles. Some of the subbasin plans listed the eight principles and implied their intent to follow them. Several of the plans (Flathead, Kootenai, and Willamette) also elaborated on the importance of the eight principles. None, however, demonstrated explicitly how the plan adhered to the principles. While reviewers noticed that the gist of some plans conformed well to some of the principles, it was not possible to determine systematically whether or not the principles were followed in a plan without a section on that subject written by the planners. For the more complete plans, reviewers felt comfortable making a “subjective” assessment as to whether the principles were well represented or not.

## **6. Prioritization**

Some subbasin plans, e.g., the Flathead and Kootenai, prioritized restoration activities (and objectives and strategies) and described how the prioritization derived from their limiting factors analysis. Many more subbasins, however, failed to present prioritizations of activities. Strategies were prioritized in very few plans. The identification of those strategies most likely to address limiting factors and achieve biological objectives is one of the most important products of the subbasin planning process. The plans are far less useful as a tool for judging the value of proposed projects without this element.

Problems related to proper framing of the strategies were partially responsible for this deficiency. In some instances, the failure to develop priorities or frameworks for prioritization appeared to result from a lack of time or follow-through of the restoration logic path after limiting factors were presented. Some subbasin teams made the effort to identify immediate short-term opportunities. Unique or “last chance” opportunities might be one prioritizing criterion.

It was also noted in several plans that no consensus on strategy prioritization could be reached among the subbasin stakeholders. In most cases, there simply was not time for this step. In cases where it was accomplished, other prioritization processes had been operating prior to the initiation of the Council’s subbasin planning effort. In at least one instance, a presenter noted that prioritization was not conducted in the planning process in an attempt to preserve all options for actions and future funding.

Public involvement is critical in the decision process. Often, there simply was insufficient time for this step. In cases where it was accomplished, other priorities had already been established prior to the implementation of the Council’s subbasin planning effort, and public feedback reflected these priorities.

### ***a) Prioritization Approaches***

Among the subbasin plans that prioritized (or attempted to prioritize) actions, a variety of approaches were used. Prioritizations were based on species, reaches, limiting factors, or habitats, or a combination of these. For example, one strategy was to emphasize the maxim “Save the best; restore the rest.” Most ecologists believe protecting good habitat should take priority over restoring damaged habitat. Alternatively, a triage approach

might be used that would be helpful when planners try to deal with certain prioritization problems that they now view as dilemmas. A triage approach would assign actions (or reaches, species, etc.) to one of three action categories: (a) urgent – needs to be done immediately, or irreparable loss will occur; (b) priority, but not urgent; and (c) optional, but not urgent or high priority. The goals of a triage-type approach for setting priorities would be to eliminate from further consideration and effort those problems that clearly cannot be fixed, and then to prioritize the rest of the problems and objectives according to criteria of urgency and potential effectiveness, including benefit/cost analysis.

Problems that subbasin planners see as insolvable or beyond the implementation capabilities of subbasin managers should be identified in the subbasin plan. These problems should be described in subbasin plans and the impossibilities of solving them explained. Likewise, the reasons for prioritization of problems and objectives according to urgency and potential effectiveness should be explained thoroughly.

***b) Feasibility assessment.***

All the plans, once they reach a prioritized set of recommendations, need to provide a feasibility assessment, including estimates of costs of projects, to determine the practicality of their recommendations.

### **III. Final Recommendations**

A major planning question is how does the current subbasin planning effort and reviews fit into the Council's Fish and Wildlife Program amendment process and into a longer-term planning horizon of 10-15 years? This question deserves serious discussion by regional policy makers, Council staff, and members of the ISRP/AB review team.

#### **1. Near-term Planning**

The next steps for how to best integrate this effort in the Fish and Wildlife Program and future funding processes are yet to be determined for the region and the Northwest Planning and Conservation Council. This uncertainty hindered public involvement and, most likely, prioritization. If there are several planning processes going on, participants will have to weigh which one will likely be most important for them. As a result, they are less likely to participate in a process that has an indeterminate future and may not influence direct funding.

After the scientific reviews of the 45 plans for the 58 subbasin received, the Council is faced with three issues and one large logistical problem. The issues are:

- a. With a few exceptions the review process indicates that the plans require revisions and well over half of them require substantial work. To complete this work would require more time, effort, funding, and would continue delays in identifying actions intended for recovery of listed species and the Fish and Wildlife Program, but would result in more useful and technically adequate plans.
- b. Subbasin plans differed substantially with regard to information content, completeness, and recommended future actions. Even though such variation was not unexpected given the diversity of plans, available information, success of the

consensus-building process, and time allocations by the planners, the vast majority of subbasin plans were weakest in completing the Management Plan portion. Most plans did not provide the anticipated community-based advice on priority actions to advance the Fish and Wildlife Program.

- c. The Council's 2000 Fish and Wildlife Program includes a set of eight scientific principles that constitute the Program's conceptual foundation. Although very few of the plans make evident how their subbasin plan is consistent with these principles, the Council (and ISRP/AB) must be careful to ensure this consistency over the full range of the plans reviewed.

The logistical problem is simply how to appropriately capture the extent of information provided in the subbasin submissions. Few plans have Executive Summaries that provide the concise advice on prioritized actions and their basis. There is an immediate need to summarize the essential information from each plan that could affect future actions in the Fish and Wildlife Program, while also respecting the local perspectives represented in each plan. The Council must also consider how to incorporate these efforts into the next Fish and Wildlife Program funding cycle.

The ISRP/AB reviewers recommend that the Council consider the following factors:

- a. The need to complete Plan revisions before adoption into the Fish and Wildlife Program by December, 2004;
- b. Acknowledgement that different capabilities existed between subbasins which resulted in plans of varying depth, completeness, and advice provided to the Council; and
- c. The desire to progress positively from the recent extraordinary effort invested by so many planners to date, and to incorporate this local knowledge and community-based support into the Fish and Wildlife Program.

We propose that each subbasin prepare a short, but focused, summary that will provide the locally based strategies and actions to be included as amendments to the Fish and Wildlife Program. These summaries should reference the existing plans, but where subbasins were unable to complete consultations on recommended actions, the process will also provide a short but additional opportunity to provide that advice to the Council. For plans that are substantially complete, this task should be relatively easy to accomplish. For plans that were less complete, this provides an opportunity to put forward in a clear and concise manner, the major conclusions and a priority set of actions for each subbasin. The Council should limit subbasins in undertaking new analyses, since any new material should also receive peer review. Although that opportunity may be provided in future revisions, to proceed in a timely manner, the Council's first interest would be in receiving locally based recommendations for actions based on the plans that have been prepared.

To accomplish this transition from the current plans and their reviews to near-term local guidance to the Fish and Wildlife Program, each subbasin would need to prepare a 15-page summary of their plan that:

- a. Concisely identifies the subbasin and eco-province, the principle fish and wildlife populations, and concerns to the Fish and Wildlife Program and NOAA Fisheries, and, specifically states why the subbasin plan is consistent with the eight scientific principles stated in the 2000 Fish and Wildlife Program (page 15, Council Document 2000-19) or why the plan is not, but merits consideration.
- b. Provides conceptual descriptions (objective, basic statement of method and justification) for up to five recommended actions that would most benefit fish and wildlife in that subbasin, and how each action relates to the assessment and projects or opportunities described by the submitted subbasin plan, and
- c. A summary section that describes the level of community support and concerns for these actions and projected issues anticipated in the subbasin in the near to medium term. If the planners fail to agree on recommended actions, then a statement of factors blocking agreement should be provided, particularly where the appropriate action would be large scale and require multiple agency participation and funding.

Because we understand the difficulty in prioritizing strategies given the Council's desire for consensus from managers and stakeholders in developing management plans, the ISRP/AB makes this recommendation with some trepidation. We also advise that priority items be specific enough so that every activity conceivable would not fit under the five prioritized actions. We are also concerned that these Executive Summaries could take on a life of their own, and the subbasin plans, as large and complex as they are, would not receive the attention they deserve. With that concern in mind, we recommend that the Executive Summaries be made available with explicit links to the full plans, and that long-term plans for revising and adopting subbasin plans be developed and pursued.

## **2. Longer-term plans for revising and updating subbasin plans**

Also uncertain are the region's and Council's longer term plans for integrating the subbasin plans into the Fish and Wildlife Program, when or if subbasin plans will be revised again, and how subbasin plans feed into the next round of project solicitations and provincial reviews. The ISRP/AB understands that it the Council's intent that the next project solicitation build directly from the subbasin planning exercise. This is needed to validate the plans and the extraordinary effort that went into them by countless people throughout the Columbia River Basin. Failure to link the next project review cycle directly to the subbasin plans will erode good will and participation in the Council's Fish and Wildlife Program and validate a minority opinion that the subbasin planning exercise was more about process than about substance.

## References

- Action Agencies (Bonneville Power Administration, U.S. Bureau of Reclamation, and U.S. Army Corps of Engineers) and NOAA Fisheries. 2003. Draft research, monitoring and evaluation plan for the NOAA-Fisheries 2000 Federal Columbia River Power System Biological Opinion. Bonneville Power Administration, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, and NOAA Fisheries, Portland, OR. Web link: <http://www.nwr.noaa.gov/1hydrop/hydroweb/fedrec.htm>
- Chilcote, M. W. 2003. Relationship between natural productivity and the frequency of wild fish in mixed spawning populations of wild and hatchery steelhead (*Oncorhynchus mykiss*). *Canadian Journal of Fisheries and Aquatic Sciences* 60:1057-1067.
- Fausch, K. D., C. E. Torgerson, C. V. Colden, and H. W. Li. 2002. Landscapes to riverscapes: bridging the gap between research and conservation of stream fishes. *Bioscience* 52: 483-498.
- General Accounting Office (GAO). 1992. Endangered Species: past actions taken to assist Columbia River salmon. General Accounting Office. Briefing Report to Congressional Requesters, GAO/RCED-92-173BR. Washington, D.C.
- General Accounting Office (GAO). 2002. Columbia River Basin salmon and steelhead: Federal agencies' recovery responsibilities, expenditures and actions. US General Accounting Office. Report to the U.S. Senate, GAO-02-612. Washington DC. 86p.
- Giorgi, A., M. Miller, and J. Stevenson. 2002. Mainstem passage strategies in the Columbia River system: Transportation, spill and flow augmentation. Report 2002-03, Northwest Power Planning Council, Portland, Oregon.
- Hillman, T. W. 2004. Monitoring strategy for the Upper Columbia Basin. February 1 Draft Report. BioAnalysts, Inc. Report to the Upper Columbia Regional Technical Team, Upper Columbia Salmon Recovery Board, Wenatchee, WA.
- Independent Scientific Advisory Board. 2002. Review of Giorgi et al. Report "Mainstem Passage Strategies in the Columbia River System: Transportation, Spill, and Flow Augmentation" Northwest Power Planning Council. ISAB 2002-1. Portland, Oregon. 29 p.
- Independent Scientific Advisory Board. 2003. A review of strategies for recovering tributary habitat. Northwest Power Planning Council. ISAB 2003-2. Portland, Oregon. 56 p.
- Independent Scientific Advisory Board and Independent Scientific Review Panel. 2004. Review of the Action Agencies and NOAA Fisheries' Draft Research, Monitoring & Evaluation Plan for the NOAA-Fisheries 2000 Federal Columbia River Power System Biological Opinion (RME Plan). Northwest Power and Conservation Council. Portland, Oregon. ISAB/ISRP 2004-1. 63 p.
- Independent Scientific Group (ISG) 2000. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem. Northwest Power Planning Council, Portland, Oregon. ISG Report 2000-12, 538p.

- Levin, P. S., and J. G. Williams. 2002. Interspecific effects of artificially propagated fish: an additional conservation risk for salmon. *Conservation Biology* 16:1581-1587.
- Marmorek, D.R., I.J. Parnell, M. Porter, C. Pinkham, C.A.D. Alexander, C.N. Peters, J. Hubble, C.M. Paulsen and T.R. Fisher. 2004. A Multiple Watershed Approach to Assessing the Effects of Habitat Restoration Actions on Anadromous and Resident Fish Populations. Prepared by ESSA Technologies Ltd., Vancouver, B.C. for Bonneville Power Administration, Portland, OR. 420p.
- Nickelson, T. 2003. The influence of hatchery coho salmon (*Oncorhynchus kisutch*) on the productivity of wild coho salmon populations in Oregon coastal basins. *Canadian Journal of Fisheries and Aquatic Sciences* 60:1050-1056.
- Oregon Technical Assistance and Outreach Team. 2004. Understanding Out-of-Subbasin Effects for Oregon Subbasin Planning. Northwest Power and Conservation Council. Portland, Oregon. 21p. [www.nwcouncil.org/fw/subbasinplanning/admin/level2/or/oose.htm](http://www.nwcouncil.org/fw/subbasinplanning/admin/level2/or/oose.htm)
- Reid, L. M. 1998. Cumulative watershed effects and watershed analysis. Pages 476-501 in R. J. Naiman and R. E. Bilby, editors. River ecology and management: lessons from the Pacific Coastal ecoregion. Springer-Verlag, New York.
- Wissmar, R. C., and P. A. Bisson, Eds. 2003. Strategies for restoring river ecosystems: sources of variability and uncertainty in natural and managed systems. American Fisheries Society, Bethesda, Maryland.

## Part 2 – Review Summaries for each Subbasin Plan

---

### Introduction

This section of the report presents individual ISRP/AB review summaries for each of the 45 plans covering 58 subbasins of the Columbia River Basin. These summaries represent the culmination of a review effort that included: 1) reviews by individual members of ISRP/AB review groups using the review checklist derived from the Council's Subbasin Planning Technical Guide, 2) presentations from and discussions with the plan authors, 3) discussions among ISRP/AB review team members to consolidate individual checklists and review comments into a single consensus draft report that includes a summary checklist and comments for each subbasin, 4) circulation of draft reports to the ISRP/AB review group for final edits and comments.

The review summaries capture the key issues identified in the review checklist and incorporate information gained from the planners' presentations. The review summaries with complete checklists for each subbasin plan are available at [www.subbasins.org/science](http://www.subbasins.org/science). The website also includes a table showing evaluation ratings for all subbasin plan review questions. These tables and ratings should be used with the knowledge that although the ISRP/AB made every effort to review the plans thoroughly and apply a consistent level of scrutiny to all subbasin plans, the time constraints of the review process made it impossible to examine each plan and discuss each review in the detail we would have liked. For each plan, we address the central questions asked by the Council with regard to the likelihood that the Plans would succeed in their attempts to recover fish and wildlife, but, given the sheer volume of material to review, some things no doubt were overlooked.

In addition, although the checklist was very helpful in facilitating a consistent review for all plans and despite numerous reviewers having reviewed a large sample of subbasin plans, several factors demand that comparisons of reviews across plans should be based on a close reading of the ISRP/AB review summaries and comments. Over 40 combinations of ISRP/AB review group members constituted the review teams for the 45 plans, and the reviewers' knowledge of the process and concerns progressed over the two and a half months of the review. For sets of subbasin plans that were developed by a coordinated group of planners using similar methods, the ISRP/AB attempted to provide consistent scores and comments. These sets of plans include those for the Intermountain and Columbia Cascade provinces, as well as the Asotin, Walla Walla, Tucannon, and Lower Snake Mainstem subbasins. The Council, planners, and other users of this report should look at the entire set of subbasin plans in those sets to ensure full coverage of the issues.

Despite these qualifications, the ISRP/AB review summaries and checklists for each plan should assist the Council in developing a strategy to incorporate the plans into the Fish and Wildlife Program as well as guide planners in future revisions.

The review summaries are presented below, beginning with subbasins in the blocked areas and moving downstream to the estuary. In a few cases, review summaries are not geographically sequenced but are grouped by sets of subbasin plans that were developed by a coordinated group of planners using similar methods, such as the Asotin set.

### **Subbasin Plan Evaluation Ratings**

The table below shows summary review ratings for the three major components of subbasin plans - the Assessment, Inventory, and Management Plan. The ratings are from the review checklist that was derived from the Council's Subbasin Planning Technical Guide. The checklist asked reviewers to evaluate whether a plan satisfactorily provides the Assessment, Inventory, and Management Plan elements requested by the Council and, as necessary, to recommend the level of need to revise specific elements of the subbasin plan before it meets the criteria of completeness, scientific soundness, and transparency.

The first evaluation column shows the results of determining whether or not the plan addressed a specific planning element requested in the Subbasin Planning Technical Guide. Evaluations are a Y for yes, P for partial, or N for no. The second column shows the ISRP/AB evaluation of the level of need for further development of a specific element of the subbasin plan before the plan would meet the criteria of completeness, scientific soundness, and transparency. These evaluation scores are presented to assist the Council and planners in identifying and prioritizing their responses. The evaluation scale 0-4 is described below. Reviewers were encouraged to elaborate on evaluations of the specific planning element in the general review comment sections of the checklist, especially in cases where the level of need for additional treatment is high.

#### **Evaluation Scale: Need for Additional Treatment**

**0 - none.** For example, the subbasin plan's treatment of this issue was complete, transparent, and scientifically sound, and should lead to informed management of fish and wildlife resources in the subbasin.

**1 - little to none.** For example, the treatment of the issue is adequate:

- a) because the plan justifies, in a transparent manner, a limited treatment of the issue due to the state of data and analysis in the subbasin and further justifies a scientifically sound approach to treat the issue in the future;
- b) given the relative importance of the issue to scientifically sound management in the basin; or
- c) in the context of the overall treatment of related issues in the plan.

**2 - moderate.** For example, the plan's approach to this issue was scientifically sound given the time, data, and analytical/decision support tools available, but the plan should better describe further treatment of this issue in the future. Alternatively, the approach and conclusion look sound but the process and decision-making behind the treatment of this issue needs to be better described (transparency).

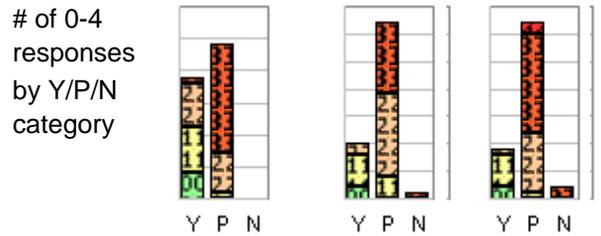
**3 - significant.** For example, the plan did not adequately address this issue given the data and analytical/decision support tools available, but further effort on this plan, consistent with the approach taken in the plan, is needed before the plan can be deemed scientifically sound by the ISRP/AB. In many cases, subbasin plans received Partial - 3

scores, because, although they provided the information to address the planning element, the information was not synthesized or presented in a manner that would enable effective use of the plan.

**4 - critical.** For example, the plan did not address this issue in a scientifically sound manner. Significant remedial work and perhaps a new approach or methodology needs to be applied to the issue before this element of the plan can be deemed scientifically sound.

## Summary Table of ISRP/AB Ratings by Subbasin

Subbasin	Assessment		Inventory		Mgmt Plan	
	ynp	0-4	ynp	0-4	ynp	0-4
<a href="#">Asotin</a>	Y	2	P	2	P	2
<a href="#">Big White Salmon</a>	Y	1	P	3	P	3
<a href="#">Boise/Payette/Weiser</a>	P	3	P	2	P	2
<a href="#">Bruneau</a>	P	3	P	2	P	2
<a href="#">Burnt/Powder</a>	P	3	P	3	P	3
<a href="#">Coeur d'Alene</a>	Y	1	P	2	Y	1
<a href="#">Columbia Gorge</a>	P	3	P	2	P	3
<a href="#">Crab Creek</a>	P	3	N	3	N	3
<a href="#">Deschutes</a>	P	3	P	2	P	3
<a href="#">Entiat</a>	P	1	P	1	Y	1
<a href="#">Fifteenmile Creek</a>	Y	1	Y	1	Y	1
<a href="#">Flathead/Kootenai</a>	Y	0	Y	0	Y	0
<a href="#">Grande Ronde</a>	Y	3	P	3	P	3
<a href="#">Hood</a>	Y	0	Y	1	Y	1
<a href="#">Imnaha</a>	P	3	P	2	P	3
<a href="#">John Day</a>	P	3	Y	1	N	3
<a href="#">Klickitat</a>	P	3	P	3	P	3
<a href="#">Lake Chelan</a>	Y	0	Y	1	Y	1
<a href="#">Lake Rufus Woods</a>	P	2	P	2	P	3
<a href="#">Lower Columbia Fish Recovery Board</a>	P	3	P	3	P	3
<a href="#">Lower Columbia/Estuary</a>	Y	2	P	3	P	3
<a href="#">Lower Mid-Columbia</a>	P	2	P	3	P	3
<a href="#">Lower Snake</a>	Y	2	P	2	P	3
<a href="#">Malheur</a>	Y	1	Y	1	P	2
<a href="#">Methow</a>	Y	1	P	3	P	2
<a href="#">Mid-Snake</a>	P	3	P	3	P	2
<a href="#">Okanogan</a>	P	3	P	3	P	3
<a href="#">Owyhee</a>	P	2	P	1	P	1
<a href="#">Palouse</a>	P	3	P	3	P	4
<a href="#">Pend Oreille</a>	Y	1	Y	1	Y	2
<a href="#">Salmon</a>	P	3	P	2	P	3
<a href="#">San Poil</a>	P	3	P	2	P	3
<a href="#">Snake Hells Canyon</a>	P	3	P	1	P	3
<a href="#">Spokane</a>	P	2	Y	2	P	2
<a href="#">Tucannon</a>	Y	2	P	2	P	2
<a href="#">Umatilla</a>	Y	1	Y	2	Y	1
<a href="#">Upper Columbia Mainstem</a>	Y	2	P	1	P	2
<a href="#">Upper Mid-Columbia</a>	P	2	P	2	P	2
<a href="#">Upper Snake</a>	P	3	P	3	P	4
<a href="#">Walla Walla</a>	Y	2	P	2	P	2
<a href="#">Wenatchee</a>	P	2	P	3	P	3
<a href="#">Willamette</a>	Y	0	Y	0	Y	0
<a href="#">Yakima</a>	Y	2	P	2	P	3



# Headwaters and Blocked Areas

## *Mountain Columbia Province*

### **Flathead and Kootenai**

The Flathead and Kootenai Subbasin Plans substantially meet the scientific elements for a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Technical Planning Guide. Because the two plans are closely coordinated, reviewers provide combined review comments for the two subbasin plans as if for a single plan. Where the plans differ in content or quality, these differences are noted in the review comments.

The subbasin plan is clearly, strongly, and explicitly linked to the Council's Fish and Wildlife Program and its Scientific Principles. The plan does an exceptionally strong job of giving attention to whole ecosystem function. It is strong on explicit incorporation of contemporary scientific understanding, as well as local knowledge, using extensive relevant literature. This is a commendable piece of work that could be used as a model of process, applied science, and presentation by other subbasins at earlier stages in developing their plans.

Plan authors demonstrate good coordination between the U.S. and Canada in these two subbasins, which cross national boundaries. Such coordination is a major challenge and the plan demonstrates significant work from parties on both sides of the border. The level of cross-boundary collaboration exceeds that of some subbasins that cross state borders.

This plan is ready for implementation. Most of the review comments are provided to improve the plan as it is implemented. The Flathead and Kootenai plans would have been excellent plans to use as models for the entire planning process, and they will be useful models for other subbasin plans if those less developed plans are revised. The Flathead and Kootenai subbasin planners might also have helpful observations on their consensus building process that could have regional application.

### **Assessment**

The Assessment does a good job providing the geographical, demographical, and environmental context for fish and wildlife resources in this subbasin. The overview presents information at several levels, ranging from sidebar "snapshots" to text descriptions (via links) to more detailed information in appendices and other sources. It is a very informative and user-friendly overview. The Assessment's description of the current status of fish and wildlife focal species is quite thorough. Focal species are extensively described and scientific literature is well referenced. The Assessment adequately describes the effect of the environment on fish and wildlife populations and does a good job synthesizing information regarding the health and functioning of the subbasin ecosystem.

The Assessment is extremely well done on many levels. It contains a thorough and well-explained rationale, procedure, and analysis of outcomes. The significant collaboration across state lines, with Canada, and among various interests is commendable, as is the user-friendly clear presentation of the document. The Assessment represents a complete review and description of the conditions in the subbasin. It evaluates limiting factors and future potential in a considered way that reflects understanding of the scientific literature and a thoughtful approach to its application.

The Assessment reads like a natural history of the Flathead and Kootenai Subbasins. As such, it would be a useful reference for many types of users beyond those directly involved in subbasin planning or research. It contains extensive citation of the scientific literature and useful links to additional data and information sources. The quality of the writing is high, making it a good resource for non-technical users. The authors should be complimented on providing a thoughtful narrative that didn't get caught in any traps.

The Assessment, in its final sections on opportunities and potential reference sites for monitoring, leads naturally into the Inventory and Management Plan.

### **Inventory**

The Inventory is excellent. It goes well beyond the minimum requirements and is one of the best of the entire set of subbasin plans. The analysis and interpretation are clearly presented and are useful in the evaluation of past and present actions and in linking these to the Assessment and subsequent priorities in the Plan. The authors did a particularly nice job of combining the Inventory and Assessment to guide subsequent actions.

### **Management Plan**

The Management Plan is very nicely done overall. The Plan and its priorities are clearly explained, well drawn from the background, Assessment, and Inventory, and clearly prioritized, using scientifically supported principles. The Plan provides less economic information than some others, but does achieve very good integration (e.g. through effects of human disturbance on ecological functioning) of the economic information presented. More explicit consideration of terrestrial animal species and assemblages might become a valuable larger consideration as the Plan is implemented and iteratively developed.

The Management Plan has some areas that still need to be developed. It has not yet completed a procedure for refining biological objectives as new information becomes available. The RME plan has yet to be completed. However, the RME plan notes attention to necessary elements, identifies a draft list of key subbasin items to include in research and monitoring, and states a clear intention to collaborate and cooperate in developing meaningful RME for the subbasin and region. This commitment to collaboration is well supported by the apparently broad and highly successful collaboration that went into development of the Kootenai and Flathead Plans.

The document as a whole is elegant in presentation, very clear, informative and useful — an excellent foundation and guide for future work and a model of user-friendly format. It also is commendable in including prioritization at several levels, with criteria clearly stated for each.

Overall, the subbasin planners did an excellent job. The Plan provides a good structure for moving ahead that is suitable for this kind of broad planning document. It offers a plan and criteria for further prioritizing the topics for funding. Although the RME section remains to be provided, the text provides confidence that this will happen.

## ***Intermountain Province***

### **Coeur d’Alene**

The Coeur D’Alene Subbasin Plan meets most of the scientific elements of a subbasin plan called for in the Council’s 2000 Fish and Wildlife Program and Subbasin Technical Guide. However, some parts need to be further developed, particularly: (1) the Assessment’s interpretation of QHA outputs require greater analytical discussion; (2) the good start on prioritizing objectives and strategies for restoration and protection should be carried further to refine the impractically large group of objectives now ranked as high priority; and (3) the research, monitoring and evaluation (RME) plan needs expansion to include adaptive management pathways.

A particular strength of the Coeur d’Alene Subbasin Plan is its integration with the Intermountain Province Plan. This gives the subbasin plan close linkage to provincial and regional levels, as well as to overall Fish and Wildlife Plan principles for the basin. Goals and objectives of the Fish and Wildlife Plan are the framework within which the province and subbasin goals and objectives are developed. The subbasin Management Plan objectives are explicitly tiered to those of the higher levels of aggregation.

Another strong characteristic of the subbasin plan is synthesis in the Assessment. This, in combination with the province-level plan, shows a high degree of synthesis across most important aspects, and across space and time. The Assessment’s material on the aquatic focal species—bull trout, westslope cutthroat trout, and kokanee salmon—displays exemplary knowledge about the populations of these fishes in the subbasin.

### **Assessment**

The provincial document, with which the subbasin plan is coordinated, provides good integration with the regional context. Little additional work is needed. Its aquatic approach is focal-species-based, whereas the terrestrial approach involves focal habitats, not species.

The aquatic assessment proceeds from the selection of the three focal fishes mentioned above. They are chosen for their ecological, cultural and recreational importance. Extensive descriptions of history, population status, limiting factors and restoration potential are provided for the aquatic focal species. Conclusions about limiting factors and restoration potential are based largely on results from use of a “Qualitative Habitat

Assessment” (QHA) model. The Assessment needs refinement of QHA output and much more interpretive discussion of the results; this will enable refinement and better prioritization of objectives in the Management Plan. Much more than physical habitat affects fishes; the Assessment could be improved by greater attention to interspecific relationships and to fishing harvest effects.

In the terrestrial assessment, the focal habitats chosen for this subbasin are wetlands, riparian and riparian wetlands, and upland forests. The terrestrial assessment is well done. It made use of recent mapping technology to locate the designated habitat types. The terrestrial assessment could be made more useful by greater discussion on use of the habitats by significant species.

The Assessment lists in its aquatic section twelve native and sixteen exotic fishes that inhabit the subbasin. For four of the native species and five of the exotics, the Assessment briefly summarizes history and present status. A partial listing of terrestrial species is also provided. Federal and state listed species, and priority species, are identified and briefly described. More detailed descriptions of history, status, and limiting factors are given for the three focal aquatic species: bull trout, west slope cutthroat, and kokanee salmon. Terrestrial animals may have been incompletely listed.

The Assessment could be improved by considering issues in the longer-term, namely demographic changes, population growth, economic growth, and the shift away from resource-extraction based economies. These matters will be important because this area has one of the Columbia River Basin’s fastest growing populations and economy.

The Assessment adequately describes the current status of focal fishes and focal wildlife habitats, particularly when considered in combination with the Intermountain Province-level overview. In some cases, data limitations prevent detailed description, with attendant changes in habitats for fish and wildlife.

The subbasin plan, taken in combination with the provincial overview, does a good job of putting the subbasin in the context of the whole Columbia River Basin. This is a strength of having province-level integration. This subbasin Assessment (or overview) briefly addresses some regional context but does not indicate how, except for hydrosystem influences, it ties in with the Columbia River Basin physically, ecologically, or with regard to human affairs. Although the provincial plan provides regional and Columbia River Basin-wide context of the province, it does not do this for subbasins. More subbasin-specific information would have been useful.

Out-of-subbasin factors are described, particularly in the provincial overview chapters. Estuary and mainstem issues are of minor importance to the IMP because anadromous fish are extirpated. On the other hand, operations of the FCRPS for power, flood control, irrigation and spill have profound effects on aquatic, and to a lesser extent, on terrestrial resources in the IMP.

The subbasin Assessment could be improved by better describing significant plants and by examining future human populations and land use trends.

### **Inventory**

The Inventory (taken together with the province plan), although comprehensive in listing and individually describing programs and projects, is far from complete in synthesis. The Inventory would be greatly strengthened by a more complete description of USFS and BLM programs. Those agencies control much of the land in the subbasin, but the Inventory does not cover their programs, and the provincial plan does not either. Given the importance of Federal ownership and management, the plans would be significantly improved by a thorough description of these agencies' pertinent activities.

### **Management Plan**

This Management Plan has an excellent outline summary of conclusions from the Assessment and Inventory and is strong on specification of objectives and strategies that address the limiting factors identified in the Assessment, and that are consistent with province- and basin-level objectives. The plan would be made more effective by expanding its ecological outlook. The province plan sets the stage for management planning very well. The subbasin plan needs more work in building on that.

To deal with the time constraint on subbasin planning, the Intermountain Province's planning groups developed their Assessments, Inventories, and Management Plans more or less concurrently. This had drawbacks that the planners recognized, but good communication (including personnel overlap in assessment and management-planning) enabled many subbasin Assessment results to inform planning. In the end, the procedure seems to have worked reasonably well, as the Coeur d'Alene Subbasin's Management Plan is better developed than those of most other subbasins in the Columbia River Basin.

A helpful feature of the Management Plan is that it begins with a summary of the limiting factors that are identified in the Assessment. The objectives address these limiting factors and are well organized and expressed.

The Management Plan could benefit from a more complete discussion. Much of it is set forth in lengthy tables. The brief items from tabular compartments could be expanded upon in much more informative text.

The plan has a systematic approach for setting priorities; this constitutes a good procedure and bodes well for refining the prioritization. Refinement is needed because the plan rates too many strategies as high-priority, and this does not permit choosing among strategies in order to accommodate a very limited budget. The prioritization done thus far is a major accomplishment.

Research needs are identified in the province plan but not in the subbasin plan. The RME plan would be made more useful by expanding on its tabular material with more text on explanation and rationale. The research could be tied closer to the objectives. This

research section flowed more from the Management Plan than from the Assessment and Inventory; it should link back to them more clearly.

The monitoring and evaluation plan is a good beginning, but more work is needed on it, namely, coordination for standard protocols; plans for cooperative monitoring of projects; definition of monitoring indicators; and development of infrastructure for RME quality assurance, data management/analysis, data reporting, and data archiving.

Importantly, adaptive management is not addressed in the RME plan. The logic path presentations in the province plan do incorporate this, but the subbasin RME plan does not appear to refer back to that. Failure to explain how the information from monitoring and evaluation will be used for evaluation, and how the monitoring and evaluation work outlined in this section will be used in adaptive management stands to hamper the effectiveness of restoration and protection in the subbasin.

### **Pend Oreille**

The Intermountain Province Subbasin Plan (IMP) integrates its five subbasins with the regional context. Details specific to each subbasin are provided in its respective subbasin plan. Linkages between this subbasin and other subbasins, the province and the region are addressed well in the provincial plan.

The Pend Oreille Subbasin Plan substantially meets the scientific elements of a subbasin plan as described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. A notable strength of the subbasin plans in the Intermountain Province is their consistency and direct linkage to the Fish and Wildlife Plan and its base principles. The logic path from Council goals to final subbasin strategies is especially good, as is the Assessment's balanced focus on hydropower system and ecosystem effects. However, the planners' choice to focus on strategies they feel are most consistent with Bonneville's mitigation responsibilities detracts from the ecological approach that is central to the base principles.

### **Assessment**

The plan offers an excellent Assessment that uses a good ecological approach. It provides a lot of rich detail, presented for focal species by subarea. It would be good to have a summary section that pulls it all together and connects it back to the subbasin level with some summary statements similar to those presented at the beginning of the Management Plan.

The interaction between environmental conditions and aquatic focal species status is well described with good detail and discussion. Wildlife populations, however, are not as specifically addressed, but are found in both focal habitats and focal species sections.

The descriptions of species, habitat characterizations and the current status of the aquatic focal species are adequate. These descriptions are less complete for terrestrial focal species.

Limiting factors for each focal species by subarea are well described for both historic and current conditions. The plan's guiding principles and working hypotheses are developed at the provincial level in an explicit attempt to integrate and provide consistency across subbasins.

### **Inventory**

The Inventory is well organized and presented. It is adequate in the listing of ongoing and past projects, but it could be better developed as an evaluative assessment of the worth of existing projects. It makes a good summary of the gaps that need to be addressed. This is one of the better Inventories among all of the subbasin plans.

The Assessment is related to the existing activities described in the Inventory, and gaps are evaluated in a fairly systematic way for aquatic species, but not for terrestrial species. The terrestrial component is presented by describing the mitigation requirements remaining from the various hydroelectric projects; much more than that is surely involved.

### **Management Plan**

The Management Plan is strong on the specific objectives and strategies that address the limiting factors identified in the Assessment and it is consistent with province and basin-level objectives. Its RME section is incomplete, and its strategies need to improve and extend into plans for adaptive management, but this effort still constitutes a good start.

The biological objectives adequately describe changes needed in the subbasin, although some objectives are written in rather general terms. A strength of the IMP approach is the close linkage among the subbasin, province and basin levels. Goals and objectives of the Fish and Wildlife Plan are the framework within which province and subbasin goals and objectives are developed. The Management Plan's objectives are explicitly tiered to those of the higher levels of aggregation. The tight logic and integration of this plan is an admirable model for subbasin plans outside the Intermountain Province.

The Management Plan wisely begins with a summary of limiting factors identified in the Assessment. Objectives are developed to address these limiting factors. The linkage of the strategies to the subbasin biological objectives, vision and the subbasin Assessment is explained well.

The plan has a systematic approach (including criteria) for setting priorities; this constitutes a good procedure and bodes well for refining the prioritization. Refinement is needed because the plan rates many strategies as high-priority, and this does not guide choices among strategies in order to accommodate a very limited budget. The prioritization done thus far is a major accomplishment. For terrestrial species, the focus is on completing mitigation HUs, but strategies are also prioritized.

The adaptive management component of the plan is not explicitly addressed, and the RME section is largely incomplete. It is not stated how the information from research and monitoring will be used for evaluation-and how all the material outlined in this section

will be used in adaptive management. This is a major failing that ultimately will affect the entire plan.

Research Projects are prioritized as "need to know" and "would like to know." However, research objectives and strategies are mixed in and prioritized with the other objectives and strategies. Other than those expressed in the objectives, monitoring indicators are not listed. Groups of potential indicators (the "tool box") are listed in Appendix I.

## **San Poil**

The San Poil Subbasin Plan benefited from the assessment and inventory information in the Intermountain Province Plan, but additional treatment is needed for each of the major components of a subbasin plan as called for in the Council's 2000 Fish and Wildlife and Subbasin Planning Technical Guide.

Although a notable strength of the subbasin plans in the Intermountain Province is their consistency and direct linkage to the Fish and Wildlife Program and its base principles, the planners' choice to focus on strategies they feel are most consistent with Bonneville's mitigation responsibilities detracts from the ecological approach that is central to the base principles.

## **Assessment**

The Assessment limits itself to rather brief descriptions of separate focal species issues, rather than trying to generate an evaluative subbasin-level appraisal. Synthesis and holism are lacking, as might be expected when various plan elements are completed simultaneously rather than sequentially, such that each component builds upon the previous one. Greater evaluation and synthesis could be done with the information already included within the Assessment. The planners should analyze their limiting factors down to a reach scale.

The provincial document provides a good integration of the subbasins with the regional context. The overview is too brief regarding streams. The Assessment presents a good, but brief, description of past and present conditions of the environment, including a section on human influences, entitled "major land uses."

For terrestrial species, the focus is on achieving the mitigation habitat unit targets associated with the dams. A tabular summary with cross references to Province level would be helpful in pointing out where more information is needed, as is discussed later in the research, monitoring and evaluation section. This is a reasonable assessment from the point of view of Bonneville's mitigation responsibilities, but it should be a more complete assessment of the entire subbasin ecosystem.

The Assessment should characterize the ecological significance of the aquatic focal species. It should include a threatened or endangered species to complement the group of aquatic focal species.

The Assessment focuses much attention on the limitations that the Grand Coulee and Chief Joseph dams cause, but it could go further in assessing the feasibility of removing

those limitations, and in assessing the degree to which associated factors (lake ecology and habitat) could be addressed if fish passage were reestablished. The out-of-basin effects are not adequately addressed. If anadromous species are considered for reintroduction then out-of-basin effects on the species should be assessed relative to potential production in the subbasin.

The limiting factor analyses and discussions are not detailed enough on conditions for each focal species in specific, representative water bodies. The plan would be improved by a better application of QHA results augmented by narrative descriptions of what they learned. They show QHA output without discussion. The limiting factors are vaguely described. More information exists than is synthesized and used in the planning effort.

### **Inventory**

The Inventory, especially when taken together with the provincial plan, adequately lists ongoing and past projects. It does not present adequate information on accomplishments (and failures) of aquatic projects. Aquatic activities performed are called accomplishments (caption of Table 39.1), and other brief statements on accomplishments cover aquatic habitat features but not the biological results. Descriptions of terrestrial accomplishments are much more thorough but still do not indicate the biological results. The Inventory could better assess gaps that need to be addressed. Social, economic and cultural aspects are not addressed. The pie-chart representations should either be omitted or be revised to more truly depict program emphases.

For aquatic species, the present draft's gap analysis is inadequate; it consists merely of noting that the number of projects is small, and stating that the most obvious gap is lack of action. Discussion of terrestrial gaps is almost solely in terms of habitat units that remain to be acquired in order to mitigate for effects caused by construction of the hydroelectric. Other terrestrial gaps need to be analyzed, as well.

### **Management Plan**

The Management Plan begins with a helpful summary of aquatic and terrestrial limiting factors identified in the Assessment. Objectives are then developed to address those limiting factors. The array of aquatic and terrestrial objectives is thorough and well organized, with explicit tiering to province-level objectives, to basin-level goals, and to basin-level categories of mitigation and substitution. Most objectives are appropriately specific, some aquatic objectives being very specific. The aquatic objectives and strategies section is outstanding among subbasin planning efforts in recognizing the potential that restoring riparian function holds for improving fish habitat (Objective IB3); that objective may warrant higher rating than priority 3. It would be well to show linkages that should exist between objectives, for example, how habitat restorations ought to integrate with removal of fish passage barriers and with fish production objectives. Some objectives do not specify the desired quantitative outcome and/or do not state a completion date. Both aquatic and terrestrial objectives are thoroughly prioritized; this should help considerably in selecting future projects in the face of limited funding.

Some strategies are inconsistent with the objectives under which they appear. For example, Subbasin Objective 1B1 is “Inventory all barriers in San Poil Subbasin by 2005 and begin implementing necessary passage improvements associated with man made barriers by 2006.” However, one of the strategies under it, c: “Develop minimum in-stream flows for fish-bearing streams within the San Poil River Subbasin that meet the biological requirements of salmonid fishes” loosely applies to the objective. Also, strategy c under objective IB5 does not apply to that objective.

This Management Plan’s strong emphasis on the stocking of artificially produced fish may not be consistent with Fish and Wildlife Program.

Research needs are identified in the province plan but not in the subbasin plan. The RME plan would be made more useful by expanding on its tabular material with more text on explanation and rationale. The research could be tied closer to the objectives. The research section flowed more from the Management Plan than from the Assessment and Inventory; it should link back to them more clearly.

A shortcoming of the Management Plan is that the RME section does not show connection to adaptive management. Failure to explain how M&E information will be used to improve management is a major flaw likely to hamper effectiveness of restoration and protection in the subbasin. The M&E plan also needs more work with regard to coordination for standard protocols; plans for cooperative monitoring of projects; definition of monitoring indicators; and development of infrastructure for RME quality assurance, data management/analysis, data reporting, and data archiving. The plan describes no infrastructure for RME quality assurance, data management/analysis, data reporting, and data archiving.

## **Spokane**

The Spokane Subbasin Plan substantially meets most of the scientific elements of a subbasin plan called for in the Council’s 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. Most of the ISRP/AB concerns are at a moderate level, with the exception that the plan lacks a complete research, monitoring, and evaluation plan.

A notable strength of the subbasin plans in the Intermountain Province is their consistency and direct linkage to the Fish and Wildlife Program and its base principles. Many of the Fish and Wildlife Program Principles are generally (and often nicely) reflected in the plan, often largely via Province coordination and influence, it appears. However, the planners’ choice to focus on strategies they feel are most consistent with Bonneville’s mitigation responsibilities detracts from the ecological approach that is central to the base principles. This plan has a poor balance of hydropower system and more holistic ecosystem issues.

## **Assessment**

The planning team selected five aquatic focal species: redband/rainbow trout, mountain whitefish, kokanee, largemouth bass, and Chinook salmon. The terrestrial assessment is organized around four focal habitats—wetlands, riparian and riparian wetlands, steppe

and shrub steppe, and upland forest—and does not consider focal species. The Assessment provides much hydrologic detail and appears to present detail on aquatic focal species according to availability of information. Synthesis and holism are lacking, as might be expected when various plan elements are completed simultaneously rather than sequentially, such that each component builds upon the previous one. Greater evaluation and synthesis could be done with the information already included within the Assessment.

The combined discussions of environmental conditions and focal species contain detail relevant to resource restoration. The overview provides context for the rest of the plan. The Assessment describes the current status of aquatic focal species to the degree that limited data allow.

The Assessment analyzes environmental effects on fish via QHA and has some narrative description of anthropogenic problems. It needs to relate QHA output to the ecology of the focal species via discussion. The issues of water quality and quantity are presented in detail. Wildlife populations are not addressed in detail, because emphasis is on assessment of terrestrial focal habitats.

The plan provides fairly detailed descriptions of current limiting factors, for the aquatic focal species and the terrestrial focal habitats. Historic descriptions are briefer. QHA is used to compare present to historic conditions for eleven attributes for each focal species. Limiting conditions for terrestrial species are addressed in terms of the dam mitigation HU targets. This is a reasonable assessment from the point of view of Bonneville's mitigation responsibilities, but it should be a more complete assessment of the entire subbasin ecosystem.

### **Inventory**

The overall impression of the Inventory is that it thoroughly describes ongoing and completed projects, especially when taken together with the provincial plan. It summarizes the gaps that need to be addressed. It is well organized and presented. This accounting of existing restoration and protection activities is done systematically for aquatic species, including an identification of areas needing attention. Gaps for terrestrial species are addressed through the dam construction mitigation HU targets, which are about 51% completed. The pie-chart representations should either be omitted or be revised to more truly depict program emphases.

### **Management Plan**

The Management Plan is strong on specifying objectives and strategies that address the limiting factors identified in the Assessment and that are consistent with province and basin-level objectives. The RME section is incomplete; it needs more specifics. The strategies need to be further developed and extended into plans for adaptive management, but this still constitutes a good start.

Most of the plan's biological objectives are written in specific, measurable terms. A strength of the Intermountain Province's approach is close linkage among subbasin,

province and basin levels. Goals and objectives of the Fish and Wildlife Plan are the framework within which province and subbasin goals and objectives are developed. The subbasin's Management Plan objectives are explicitly tiered to those of the higher levels of aggregation.

The Management Plan begins with a summary of limiting factors identified in the Assessment. Objectives are developed to address these limiting factors. The biological objectives are, for the most part, specific and measurable. Judged by the Inventory, the objectives seem to complement the programs of tribal, state and federal land or water quality management agencies in the subbasin. The objectives also make explicit reference to WDFW and tribal plans. The linkage of the strategies to the subbasin objectives, vision and Assessment is made well. The plan is internally consistent.

Prioritization is included in the Management Plan. A systematic approach is taken to assigning priorities for aquatic species. The terrestrial focus is on completing mitigation HUs, but strategies are also prioritized. Category-one and -two objectives are not ranked against each other. The prioritization done thus far is a major accomplishment.

Research needs are identified in the province plan but not in the subbasin plan. The RME plan would be made more useful by expanding on its tabular material with more text on explanation and rationale. The research could be tied closer to the objectives. This research section flowed more from the Management Plan than from the Assessment and Inventory; it should link back to them more clearly.

The monitoring and evaluation plan is a good beginning, but more work is needed on it, namely, coordination for standard protocols; plans for cooperative monitoring of projects; definition of monitoring indicators; and development of infrastructure for RME quality assurance, data management/analysis, data reporting, and data archiving.

Importantly, adaptive management is not addressed in the RME plan. The logic path presentations in the province plan do incorporate this, but the subbasin RME plan does not seem to refer back to that. Failure to explain how the information from M&E will be used for evaluation, and how the M&E work outlined in this section will be used in adaptive management stands to hamper effectiveness of restoration and protection in the subbasin. There is a good research opportunity in the Spokane subbasin because of the proximity of four universities: EWU, Gonzaga, WSU, and the U of I. In the future, planners should consider utilizing these institutions.

## **Lake Rufus Woods**

The Lake Rufus Woods Subbasin Plan benefited from the assessment and inventory information provided in the Intermountain Province Plan, but for the Lake Rufus Woods Subbasin Plan additional treatment is needed as called for in the Council's 2000 Fish and Wildlife and Subbasin Planning Technical Guide. A notable strength of the subbasin plans in the Intermountain Province is their consistency and direct linkage to the Fish and Wildlife Program and its base principles. This plan, however, puts too much emphasis on the effects of the hydropower system. The planners' choice to focus on objectives and strategies they feel are most consistent with Bonneville's mitigation responsibilities detracts from the ecological approach that is central to the base principles of the Fish and Wildlife Plan.

### **Assessment**

When combined with the Overview of the Intermountain Province Plan, this Assessment provides a brief but adequate general overview of the subbasin.

The Assessment is particularly strong regarding the status of species, and the determination of key limiting factors. It is deficient with regards to the biological performance of aquatic focal species in relationship to the environment, the health of the overall aquatic and terrestrial ecosystem, and the potential conflicts and compatibilities between individual species and ecological processes - this is especially true with regards to effects of the exotic brook trout.

The Assessment presents a variable amount of detail across its sections. The planners tend to overly emphasize limiting factors due to the hydropower system. They should consider a more ecological approach to looking at the subbasin's overall fish and wildlife habitat.

### **Inventory**

The Lake Rufus Woods Subbasin Plan benefited from the Inventory information provided in the Intermountain Province Plan. The overall impression of the Inventory is that it is a thorough description of the few projects in the subbasin. It makes a brief statement about gaps that could have been better addressed by reference to synthesis of limiting factors. The information should be better synthesized to identify gaps between ongoing and needed actions for the entire subbasin, including government agency programs, such as CRP and CREP in the Department of Agriculture.

### **Management Plan**

The Management Plan is strong in specifying objectives and strategies that address the limiting factors identified in the Assessment and that are consistent with province and basin-level objectives. The plan includes prioritization of objectives and strategies, however the stream habitat objectives/strategies that are so well expressed are buried so far down in the scheme of priorities that they might be rendered almost insignificant. For terrestrial species, the focus is on completing mitigation Habitat Units, but strategies are also prioritized. The Research Monitoring and Evaluation (RME) section is incomplete, but constitutes a good start. Adaptive management is not adequately addressed in the subbasin RME plan.

The overall Management Plan needs to have a more ecological outlook; the planners appear to be limiting their plan to what they believe Bonneville will fund.

### **Upper Columbia Mainstem**

The Upper Columbia Mainstem Subbasin Plan meets most of the scientific elements of a subbasin plan as described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. Some elements of the plan would benefit from additional treatment, but the reviewers' concerns are not insurmountable.

A notable strength of the subbasin plans in the Intermountain Province is their consistency and direct linkage to the Fish and Wildlife Program and its base principles; however, the planners' focus on objectives and strategies they feel are most consistent with Bonneville's mitigation responsibilities detracts from the ecological approach that is central to the base principles. This is a particular problem in the terrestrial sections.

### **Assessment**

The subbasin overview, along with information from the Provincial Plan Assessment, provides a good basis for the subsequent sections of the plan. Discussions of environmental conditions and focal species and habitats contain appropriate detail relevant to resource restoration.

There is much good detail in the aquatic section both by focal species and subarea, and in the terrestrial section by focal habitats and species. It would be helpful to have a summary section that pulled it all together. Interpretation and synthesis is provided in the terrestrial section, and would be a useful addition to the aquatic one. The Assessment is reasonably complete, with the exception of the Inter-species Relationships section.

The selection of Chinook salmon and lamprey as focal species seems illogical because they no longer exist in the subbasin and prospects for their reentry are slim in the foreseeable future. The presumption is that the dams will stay in place, and other passage strategies are not well developed.

The Assessment presents a reasonable description of focal species' status, to the extent that information is available. The only species where more could have been done were bull trout and west coast cutthroat trout. Aquatic species are covered more extensively than terrestrial species. Out-of-basin effects are not adequately addressed for fish or migratory wildlife. If anadromous species are considered for reintroduction, then out-of-basin effects on the species should be assessed relative to potential production in the subbasin.

Overall, the interaction between environmental conditions and aquatic focal species' status is well described with good detail and discussion. Limiting factors are described for each focal species. QHA is used for white sturgeon, kokanee, and rainbow and redband trout. Passage obstructions within the subbasin are identified as the major

limiting factor for these species. Lamprey and Chinook, currently extirpated, are not assessed using QHA.

### **Inventory**

The Inventory provides a good description of ongoing management programs, their accomplishments and the gaps in coverage, but description of current protection measures for fish is lacking. The assessment of gaps between past and current actions and those needed to address the limiting factors and meet recovery and other goals is done systematically for aquatic species, including an identification of areas needing attention. Gaps for terrestrial species are addressed through the dam construction mitigation HU targets. The overall impression of the Inventory is that it is thorough, but it is too much a list of activities and too little a synthesis of what is being done for the resources.

### **Management Plan**

The Management Plan is sound and thorough, with the exception of the research, monitoring and evaluation (RME) section. Prioritization of objectives in the terrestrial section, which is only partially complete, is a good start. The plan is strong on specific objectives and strategies that address the limiting factors identified in the Assessment and are consistent with province and basin-level objectives. The overall plan needs to have a more ecological outlook. Its objectives are sound, but its strategies need to be beefed up and extended into plans for adaptive management.

Most of the plan's biological objectives are written in specific, measurable terms and link to the province and subbasin goals and objectives. For terrestrial species, focus is on completing mitigation HUs, but strategies are also prioritized. The prioritization done thus far is a major accomplishment.

The RME plan would be more useful if its tabular material was accompanied by more explanation in the text. The research section flowed more from the Management Plan than from the Assessment and Inventory; it should link back to the latter two sections more clearly. The monitoring plan is a good beginning, but more work is needed on coordinating standard protocols, plans for cooperative monitoring; definition of monitoring indicators and development of infrastructure for RME quality assurance, data management/analysis, reporting, and archiving. Adaptive management is not addressed in the RME plan.

The past management in the Upper Columbia Subbasin has emphasized stocking of hatchery-produced fish, but the main priority in this Management Plan is on habitat.

## ***Upper Snake, Upper Closed Basin, Snake Headwaters***

Three geographically large subbasins together comprising 14% of the Columbia Basin surface area are covered in this one plan. The three subbasins share in providing water for flow augmentation for anadromous fish, but differ enough from one another ecologically and in key issues to make this fusion unwieldy.

As the planners acknowledge, this is not a complete plan that addresses all of the criteria for a subbasin plan as outlined by the Council. They did a significant amount of work in the Assessment, but the material there and in the Management Plan does not provide a strongly focused basis for further planning. Lots of secondary information has been gathered, but planners now need to put it together in an effective way so that new understandings emerge and a logical plan follows.

The planners made a good public participation effort with seven public meetings. Only 47 people attended, but this is a stronger effort than many other subbasins have made.

### **Assessment**

The "entireplan" pdf file is confusing. It is not clear which elements should be considered part of the subbasin plan. The plan states that the "Assessment" was halted two weeks prior to completing the plan. The Assessment section of the "entire plan" is only four pages and is clearly not a completed product. An attached "Assessment," that also contains an Inventory, is 272 pages. This material is quite acceptable and is used by the reviewers to score the Assessment portion of the reviewer checklist.

The subbasin overview is generally sufficient, although it appears to overlook species that may have special importance for American Indians. The treatment of current levels of degradation and impact are sufficient. The level of impact in the next 50 years needs to be considered.

The description of life history, distribution, and current status is excellent for Yellowstone cutthroat trout, but less so for bull trout and mountain whitefish - because less is known. The choice of using a very rare snail as a focal species should be reevaluated because its status cannot be assessed in a timely fashion. The discussion of listed species as focal species in the Boise, Payette, and Weiser Subbasin Plan might be a reference on this question.

The terrestrial portion of the Species Status and Characterization Subsection does not inspire confidence and needs a major overhaul, if not to change choices then to support them more credibly. The planners should look at the discrepancies in approach and product between the aquatic and terrestrial sections.

The effects of the environment on the subbasin's fish and wildlife are stated in general terms. The plan's lack of synthesis and integration is especially evident in the section on environmental conditions. The Assessment did not include a discussion of stream resources on the Shoshone-Bannock Reservation. The plan does not utilize QHA or EDT

to assess limiting factors. It produces a generic list of limiting factors. Aquatic impacts are ranked for five watersheds but details of the ranking process are not made clear.

The Assessment includes lots of potentially useful information. It should include judgments regarding which things in the basin probably cannot be changed. It should acknowledge that achieving historic conditions are not a likely prospect and, given that, determine what conditions have a reasonable chance at being attained given human population projections, water and property rights etc.

Priorities are presented for information to be gathered or generated and where opportunities appear to be, but what management actions are likely to be most effective and most likely to ricochet through interrelated ecosystems have not been considered. Terrestrial focal species are rarely mentioned to the point that it is uncertain why they are included at all. Perhaps the species chosen are not informative from a management perspective.

### **Inventory**

Between the attachments and the plan, the Inventory is generally adequate but still unfinished in some respects. The planners did not provide an adequate description of the projects that have been funded through BPA. Ongoing and past programs should be carefully examined as either support for new recommendations or for reasons not to do more of the same.

Information on gaps between existing and needed actions is dispersed throughout the Management Plan and attachments. It is not easily accessible at a single location in the plan. Some gaps are discussed for aquatic species, but none are for terrestrial species.

### **Management Plan**

It looks like the planners ran out of energy and time while working on the Management Plan. They have an appreciation for the resources in their subbasins, and they seem to understand challenges they face in protecting and restoring resources. But the plan, as written, will contribute little to integrating the actions across agencies for the benefit of the focal species.

The plan is obviously and significantly incomplete. What is there is not a strongly focused basis for further planning. The planners have collected lots of secondary information, but do not appear to have been able to put it together in a way that new understandings emerge.

The general vision does not provide any guidance for knowing when one has attained it or any guidance for overcoming specific subbasin problems for ecosystem resources. In the Headwaters subbasin there is some prioritization of strategies, but for the plan in general it has not been done.

The plan offers very general recommendations for research for each subbasin. The recommendations are probably not sufficiently well developed to use to identify individual projects. Some research needs are noted here and there, but there is no

Research Monitoring and Evaluation (RME) section, so these needs are probably not thought out well enough to implement.

## ***Middle Snake Province***

### **Boise, Payette, Weiser**

One plan is provided for the Boise, Payette, and Weiser subbasins, which is justified because those subbasins share many similarities including geographical and biological characteristics, and all contain large amounts of privately owned land. The combined subbasin plan meets many of the scientific elements of a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide, but additional treatment is needed on several important issues in the Assessment, Inventory, and Management Plan.

#### **Assessment**

The Assessment is good on general concepts and information, but it is not information-rich regarding biota. In considering the effects of external environmental conditions on the subbasins, the planners apply ecological knowledge to assess large-scale influences on ecosystems, not just the hydropower system's effects on species. The plan could be improved by applying a similar "ecosystem-based approach" to the entire Assessment. In general, the Assessment's terrestrial section is stronger than its aquatic section.

The Assessment did not adequately describe projections of human population growth or changes in land use, although there is some mention of human development as a limiting factor in section 3-35. The plan does not project trends into the future quantitatively. This part of the plan could be strengthened and would be especially important for the Boise subbasin. Projecting population growth and its effects into the future is important for a major population center like the Ada-Canyon County area, which is growing rapidly. Reviewers expect that local and state planning agencies would have useful data. For Boise, urban aquatic and wildlife restoration should be incorporated into the subbasin plan. The City of Portland has an urban aquatic and wildlife restoration plan that could be a good reference for this.

On the terrestrial side, the planners offer an astute explanation for not selecting threatened, endangered, or candidate species as focal species. The plan's approach is habitat/niche based, with focal species selected to represent focal habitats. The rationale for selection of focal species and habitats is more transparent than in most plans, and the explanation and analysis are relatively rich, resulting in a truly useful section of the plan. For aquatic species, the plan covers genetic diversity in a vague manner. It deals with theories, but offers few if any specifics. Artificial production is only superficially addressed, even though it must be affecting focal species at current levels.

There is a general treatment of limiting factors for terrestrial and aquatic species in each subwatershed. The plan's presentation of terrestrial limiting factors is logical. The factors are easy to find, and how the planners arrived at them is clear. For aquatics, the plan does

not adequately discuss hatcheries and stocked fish as limiting factors. These subbasins should work toward more quantitative approaches for understanding aquatic limiting factors. The plan provides a list of limiting factors, but does not indicate the relative impact or severity of each factor. In addition, it is not clear which factors are limiting each focal species. In general, declines in focal species are attributed to general categories of environmental change caused by human actions, but the plan offers no quantitative demonstration of cause and effect. The plan needs to ask, “What are the factors most limiting production?” And, “What gain in production can be achieved from management?”

The primary weakness of the aquatic assessment is the lack of transparency for the expert opinion on which it rests. No quantitative assessment is available. QHA is scored for environmental attributes, but not fully executed. Even for qualitative scores by experts, methods and descriptions of the range and scale of certainty in the analyses should be provided.

Despite these concerns, the Assessment is a good initial effort that sets the stage for effective planning. Supplemental sections such as those covering near-term opportunities and priorities do a better job of addressing some of the planning questions than the plan itself does.

### **Inventory**

The Inventory offers a useful narrative for describing what has been done or is taking place in terms of activities in the subbasins. However, the limiting factors addressed are usually not explained, and accomplishments in terms of biological results (or other results) are usually not stated. The Inventory’s organization of categories is a helpful innovation, especially for the recognition of monitoring projects. There is a short section on gaps between existing projects and what needs to be undertaken, but the treatment is not of sufficient detail to evaluate whether additional actions are needed. Overall, the Inventory should prove useful for guiding substantive future planning, but it needs to go one step further and link ongoing protections and actions to limiting factors and thus identify gaps.

The Inventory acknowledges the importance of non-profit organizations and private landowners, but this is not carried through the rest of the plan including the research, monitoring and evaluation (RME) section.

### **Management Plan**

This Management Plan has many strong aspects but still needs considerable revision. The plan is about 80% complete towards being an effective guide for fish and wildlife management in the subbasins. The authors did a good job of synthesizing at the province scale while providing detail at subbasin scale.

The vision statement is so general that it could mean just about anything to different readers. This ambiguity could lead to additional conflicts or delays in addressing conflicts. The vision does not easily lead to biological objectives for focal species or

future environmental conditions. In fact, it is not acceptable to the Idaho Fish and Game Department, because their representative saw the vision as non-directing. The vision could be expanded beneficially to include more of the spirit of the Council's eight scientific principles.

Further clarification of some of the biological objectives would be helpful. For example, the Assessment gives the impression that native redband trout and hatchery rainbow trout are so thoroughly mixed both geographically and genetically that trying to separate them for management would not be attempted. Yet, in the biological objectives section, emphasis is given to resolving the hybridization and ecological impacts of stocking hatchery rainbows.

The planners have made a good start with a set of rules for prioritization and have accomplished a degree of prioritization. They have some good discussion on prioritization down to the stream level, but they really need to take this a step farther.

The plan's scientific framework varies in its consistency with the Council's eight principles; the aquatic section is not very consistent with the science foundation, while the terrestrial section is more consistent. The Management Plan should be augmented to more explicitly connect to the Eight Principles.

There is an underlying assumption that the habitat actions proposed would lead to realization of the plan's vision. This proposition needs a much greater base of support than is presented. It is likely that some habitat improvement actions can better conditions in these basins, but the vision is to provide "sustainable resource-based industries that provide goods and services and other activities for a growing human population." It is not convincingly argued that production of goods and services can increase to provide for an expanding human population. A realistic look at these subbasins is needed to show what is likely to be attainable given the changes in physical and biotic environments and projected population growth. The planners should ascertain what changes are likely to be irreversible (e.g., the continued presence of most exotics), what can be changed given water and land management policy, and what outcomes can be expected in terms of ecosystem structure and function, persistence of species, and harvestable surpluses.

According to the planners' presentation to the ISRP/AB, public meetings were not well attended, but for those who did attend, the collaborative dynamic helped develop an infrastructure for fish and wildlife planning that the planners would like to continue. Unfortunately, the various planning groups ran out of time to interact on drafting the Management Plan; consequently, the objectives and strategies suffer from being amalgamated statements that are not rigorously justified and prioritized. The planners recognized that their plan is a first step and hoped to maintain the local motivation to complete the plan.

## **Bruneau**

The Bruneau Subbasin Plan shows evidence of substantive leadership and commitment to actually using the plan. It is a good starting point for a successful program. Although more work is needed before all scientific elements of a subbasin plan called for in the Council's 2000 Fish and Wildlife are met, the plan in its current state would be useful in soliciting for, drafting, and selecting projects. The subbasin has several unique features that could benefit from the plan, such as an endangered mollusk (the Bruneau hot springs snail), a dramatic canyon (which is bat habitat), and the southernmost population of bull trout in the world.

The Bruneau Subbasin has received little BPA funding in the past, yet the planning team was able to gather sufficient information and conduct adequate analysis to produce a usable plan. This is evidence that the planners gave consideration to the purpose of subbasin planning and followed through on it. The planners hope this plan can be used to secure financial support from numerous sources, especially seed money that can leverage further USDA funding.

The Assessment includes an adequate amount of information and synthesis that can be used in selecting strategies in the Management Plan. Additional refinement would make it more useful, especially in regard to treatment of future human occupation trends, choice of focal species, and documentation of the analytical inputs and decisions. The Inventory has much useful information but doesn't take the final step of synthesizing the information to identify gaps. The Management Plan needs considerably more work on prioritizing strategies. The RME plan is a good start. Editorial attention is needed throughout the documents.

## **Burnt and Powder**

Individual plans were submitted for the Burnt and Powder subbasins, but the plans share so much in common — significant amounts of identical text, the same terrestrial approach, similar QHA analysis for fish — that the ISRP/AB provides one checklist for both plans. Generally, comments and review ratings apply equally to both subbasins. Comments specific to either the Burnt or Powder are identified.

The Burnt and Powder Subbasin Plans contain much of the assessment information and analysis called for in the Council's 2000 Fish and Wildlife Program and Subbasin Technical Guide. The wildlife assessments are especially well done. The plans, however, need additional work on their aquatic assessment, Inventory, and Management Plan components before they can most effectively guide fish and wildlife project solicitation, development, review, and selection.

## **Assessment**

The terrestrial component of the Assessments is well-developed and adequate for use in developing the Management Plan. The key findings, especially linkages between species, are done very well for terrestrial species and habitat, although possible conflicts between the needs of various species are not addressed.

The matrix approach to selecting and characterizing focal species is useful, replicable, and adds to the transparency of the process. For the Burnt and Powder, redband trout are used as a focal species. They are a Species of Concern with the USFWS and NOAA Fisheries. The Powder also includes bull trout as a focal species. Bull trout are not present in the Burnt, which is the primary distinguishing factor between the plans.

The aquatic limiting factors provided in the plans are the metrics generated by the QHA analysis, but a narrative is needed to better explain and justify these limiting factors. Specifically, the plans provide a list of generic habitat issues such as riparian condition, habitat diversity, sediment, etc., that do not provide an adequate basis (e.g. reach specific impacts, restoration needs) for prioritization of management activities. Overall, the plans aquatic sections are inadequate in regard to status of species, and status of the environment with respect to its suitability for native species. The potential for conflict with the many introduced/exotic species is great and, very likely, mostly unknown.

The characterization of environmental conditions in the basin reaches the general conclusion that the habitat can be better, but makes no attempt to show how much better (i.e., potential). Future and no action scenarios are not considered. The issue of mining is dropped in spite of huge past and potential future impacts. These issues need attention to improve the plan.

Private land is treated like uncharted territory, but in many subbasins, such as the Fifteenmile and Asotin, work with private landowners has been very effective in implementing actions intended to improve habitat, especially through USDA programs.

### **Inventory**

Overall, the Inventories provide a rough outline of public programs, but need to better address project specific, private, and NGO elements. The analysis of program gaps is the most important part of an Inventory in informing the Management Plan, but these Inventories do not include such analyses.

### **Management Plan**

The Burnt and Powder plans' potential effectiveness diminishes in the objectives section because many of their biological objectives are too broadly framed. The linkage from the strategies to the biological objectives, vision and assessment is not explicitly shown. Their strategies are very broad, and could essentially have been designed without much assessment or analysis. A realistic look at the basin is needed to show what is likely to be attainable given the changes in physical and biotic environments. Needs for the persistence of focal species (assuming they are adequate representatives) should be described (via modeling, expert opinion, etc.) and used as the basis for trying to define how the population structure necessary for their persistence can be provided and protected. Monitoring strategies are also needed to evaluate whether or not these population conditions are being developed and whether they provide long-term dynamic stability. The Management Plan should show that these monitoring and evaluation results would feed back into adaptive management.

The planners state they are going to protect and enhance native redband trout populations while concurrently stocking artificially bred non-native rainbow trout. This strategy may not be consistent with the Council's Fish and Wildlife Program and Artificial Production Review. Stocked rainbow trout are likely to adversely affect native redband populations if there is any overlap in their distributions. Therefore, the Management Plan needs to describe the potential problems of stocking rainbow trout and what will be done to avoid them.

An important component of the plans, as described carefully right from the outset, is to be compatible with private landowners' concerns and existing land use practices. In the overview, a public outreach process is described, but no specific mention is made of who, if anyone, participated or what their input consisted of. It is unclear how much effort was expended reaching the public (with the exception of the sponsoring conservation districts). Reviewers found no description of a watershed council, although one exists that is advisory to the County Court. Subbasin planning team leaders attended a watershed council meeting, but apparently no watershed council people were part of the plan preparation. It appears that no public meetings were held to discuss the plan, and no public comments seem to have been received. This is a serious limitation of a locally led process, and limited public involvement may explain why the Management Plan is weak on actual planning compared to its technical strength in the Assessment. Better inclusion (or evidence) of public participation would increase the likelihood that the plan would be successfully implemented.

A general research, monitoring and evaluation (RME) approach is outlined in the Management Plan, but a description is needed of how information gained would be used to implement any kind of adaptive management.

## **Upper and Lower Middle Snake Mainstem**

The plans for the Upper and Lower Middle Snake Subbasins, which cover three states and eighteen counties, were presented and reviewed as one plan. This review often refers to these two subbasins as a single unit. Overall, the plan is a good start and many scientific elements for a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide are met, but many elements need improvement before the plan can best guide fish and wildlife management actions and decisions. Foremost, the expert system used in the assessment needs to be better documented, more analysis should be provided to justify the identification of limiting factors, and objectives and strategies need to be further prioritized and tied back to the Assessment.

### **Assessment**

The Assessment provides a good overview of the subbasin, and the choice and characterization of focal species is adequate. The Assessment includes general statements about the effects of the environment on fish and wildlife. This effort to define environmental conditions may have been handicapped by the lack of existing data and the

multi-jurisdictional nature of this artificial grouping of subbasins. Even given the constraints, more details need to be added to this section for it to be adequate.

To further improve this portion of the assessment, the authors need to clarify what systematic method they use to conduct the assessment. The authors found QHA “not suitable” because it was developed for tributaries. Instead, the planners use best professional judgment to rank limiting factors on a scale of 1 to 3. While this might be a useful method, it is important for the planners to provide detail on how they determined the limiting factors. This is a common observation of most plans that did not use EDT or QHA, but never present any systematic method for conducting the assessments. Thus, their discussions, plans, and presentations went directly to limiting factors, without validating how they were determined. This makes all the rest of the steps through the linkages to objectives and strategies difficult to justify scientifically.

The limiting factors section of the Assessment provides a good tabular display for aquatic species, but further work is warranted on this section. To improve upon the aquatic portion it would be helpful to add a more in-depth discussion on current and historic key factors. For terrestrial species, the limiting factor analysis is organized by focal habitat types. This would be improved by including an analysis that is also done by species.

The Assessment includes lots of potentially useful information. The incorporation of the Nature Conservancy’s Biodiversity Management Area Selection model results helps to identify high priority sites and is very useful. To further strengthen the utility of the assessment, judgments regarding conditions in a basin that probably cannot be changed should be included. That means acknowledging that a return to historic conditions is not a likely prospect. Given that, the planners should determine what restoration or protection activities have a reasonable chance for success given human population projections, water and property rights, etc. Including more information or details on working hypotheses, limiting factors, and inter-species relationships would improve the Assessment. In sum, the Assessment needs additional work before it can adequately direct and prioritize management actions.

### **Inventory**

The Inventory provides a worthwhile list of projects and plans but doesn’t adequately describe existing protections. To strengthen its utility it needs to include a careful examination of ongoing and past programs to justify support for either new recommendations or continuation of current actions. This interpretation and synthesis, in addition to a meaningful GAP analysis, would be beneficial. Existing plans for some areas likely include elements that would be useful in a subbasin plan. In sum, the ISRP/AB concerns with the Inventory are moderate. The Inventory provides useful information, but it must be strengthened to inform development of the Management Plan.

## **Management Plan**

The Management Plan deserves credit for providing a basic linkage between the described objectives and strategies. To further improve upon this aspect, it would be useful for the plan to make a stronger effort at tying this back to the assessment. Again, the plan is handicapped by a lack of specific data, but the generalized strategies for protection and restoration incorporated sound basic conservation principles - protect the best, restore those areas with greatest potential.

The objectives section of the Management Plan is generally adequate. As an objective, the planners recommend the highest priority for ESA species. To increase the efficacy of this portion of the plan more information, data, and references are needed on bull trout in Indian and Wild Horse creeks. It would also be helpful to know what the core and satellite redband trout populations are.

Although the plan provides a rough prioritization among habitats, more work is warranted on the prioritization of strategies and objectives, which are not prioritized. The plan notes that this process was carried out “collaboratively,” but does not specify how this was accomplished. It is important that this is defined, because the prioritization that does occur is done without reference data. The product is a long list of data gaps by species and by location that does not seem to follow a clear logic path and needs to be better linked to the assessment in order for this part of the plan to have substantial utility.

The plan includes a worthwhile start for a sound RME logic path that could result in adaptive management, but most of the RME elements called for in the technical guide are not fully addressed.

Overall, the planners have developed a sturdy foundation for their Management Plan. To improve it, the basic needs of native species regarding the distribution of core and satellite populations, and abundance targets needed for them to persist should be included, or at least calculated or estimated. A realistic assessment of what is likely to be attainable must be applied to this basin. The planners must find out what changes, such as the introduction of exotic species, are likely to be irreversible. What ecological reforms can be accomplished in the subbasin given water and land management policy? Finally, what outcomes are expected to be produced in terms of ecosystem structure and function, persistence of species, and harvestable surplus? Analyzing the answers to these questions could be a tremendous asset to this subbasin plan.

## **Malheur**

The Malheur Subbasin Plan meets many of the scientific elements of a subbasin plan described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide, but the objectives and strategies are not prioritized and the RM&E is incomplete. For the plan to be most useful in directing management actions, and soliciting, developing, and selecting project proposals, more work is warranted on prioritization of strategies. The plan provides a strong foundation on which to further prioritize strategies and the thorough, broad-based stakeholder involvement demonstrated throughout the planning process should facilitate future buy-in.

## **Assessment**

The Assessment is adequate and, compared to other subbasin plans, above average. The planners deserve kudos for their strong job of documenting how they developed their limiting factors and conditions and for incorporating results from relevant studies outside of the subbasins. The three limiting factors identified in the plan for aquatic resources were developed for the three main fish-bearing areas, and this was then linked to work at the watershed level. This demonstrates that the planners used good judgment to adopt the approach best adapted to the situation. The limiting factors section of the assessment would be further improved by a more coherent discussion of how low-temperature could act as a limiting factor for focal fish species.

The redband and bull trout life histories are well described, but the Assessment could be improved with more complete information for focal species - especially redband - regarding their genetic diversity, harvest levels and their historic status and trend data. The terrestrial section needs to be further developed to meet the level of the aquatic section.

For aquatic species, QHA was used for analysis and to make assertions on the likelihood of achieving improvements in habitat and population status. No long-term viability analysis, however, was done for conditions necessary to maintain populations. Including this information would be useful. The authors acknowledge that population abundance and trends are important end-products, so monitoring and evaluation are very important to provide a test of the relationship between numbers and habitat conditions.

In general, the terrestrial section of the Assessment takes a holistic or "ecological" approach, which if applied to the aquatic section, would improve the overall Assessment. Although the plan includes general comments on socio-economic and future population issues, they are brief, and it would be beneficial to expand these comments. The plan could be improved by providing a more complete assessment of land ownership for each watershed, putting the subbasin in a better regional context, including a more complete identification of significant plants, and providing a more thorough analysis of future human use trends. Although the existing Assessment could be improved it does provide the needed information to select and prioritize objectives and strategies.

## **Inventory**

Overall, the Inventory was adequate and very responsive to the Council's guidelines. To improve this section, gaps could be discussed in a more detailed manner including identification of specific areas (topical and geographic) where future work is needed.

## **Management Plan**

The Management Plan includes an excellent start at addressing the elements called for in the Council's program and the technical guide, but the prioritization sequence has not been taken to its logical conclusion. The planners suggest that QHA has identified priority objectives and strategies, but they have not made adequate use of this analysis. The plan indicates other factors must be considered, but those factors are not prioritized. For example, the strategy of protecting/recovering redband trout is not complete.

To improve the plan, the strategies need to be prioritized and more fully described, with rationales provided to justify the prioritization. To further develop the plan, the requirements for focal species to persist need to be estimated for this subbasin. The possibilities for meeting these requirements should then be described along with an assessment of whether or not the requirements can be met. That is, if they can be met, then the plan should explain how. If they cannot, then the plan should illustrate where the bottlenecks are and what has to happen if these bottlenecks are to be overcome. Although the plan now assumes that the vision can be attained, data corroborating that assumption would be desirable.

Obviously, data do not exist to be precise in setting these requirements, but modeling/expert systems can be used to make the estimates of what the projected potential is for preferred species in these basins compared to desired goals. Careful monitoring can help to provide the basis for identifying appropriate adjustments. In other words, a realistic look at this basin is needed to show what is likely to be attainable, given the changes in physical and biotic environments. What changes are likely to be irreversible (e.g., exotic species will likely continue to exist)? What can be changed given water and land management policy? What outcomes are expected regarding ecosystem structure and function, persistence of species, and harvestable surpluses? The plan should provide more information on monitoring objectives and indicators as well as identify who will collect monitoring information and where it will reside.

## **Owyhee**

The Owyhee Subbasin Plan provides most of the information and analysis needed to meet the scientific elements of a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. The plan will provide useful guidance in developing and selecting fish and wildlife management actions in the subbasin. The ISRP/AB concerns are mostly at a moderate level, and comments on specific elements are provided in the checklist below where further work could improve the plan. In sum, this plan is well developed, given the difficulties of working over three state jurisdictions. This plan is an earnest and worthwhile effort that has started an important consensus building process.

### **Assessment**

The Assessment provides a good overview of the subbasin and adequate context and analysis to develop a more complete Management Plan. Although the Assessment provides most of the information called for in the Subbasin Planning Technical Guide, information relevant to a particular plan element, such as listings of native and non-native species, is often scattered throughout the Owyhee plan documents. Consolidating and summarizing this information in one place would improve the plan.

The plan's discussion of out-of-basin effects on migratory wildlife is notable, as this has not been included in many subbasin plans. The Assessment describes the life history of redband trout and the use of QHA to conduct analyses and make assertions on the likelihood of achieving improvements in the redband trout's habitat and status. Although limiting factors for redband trout are developed by reach for 4th field HUCs in a large number of summary tables, an explanatory narrative would strengthen the limiting factors section of the Assessment. For the QHA procedure, the planners do an excellent job of describing who the team members were and the protocol they followed, which included substantial training and quality control. Personnel from three states were actively involved in this effort, and the coordination that facilitated this effort is impressive.

The redband trout assessment would be further strengthened by the development of a long-term viability analysis for the conditions necessary to maintain populations. The needs for focal species to persist should be estimated for the subbasin; the possibilities for meeting these needs should then be described; and an assessment should be made as to whether or not their needs can be met. If they can be met, how? If not, where are the bottlenecks, and what has to happen if they are to persist? Obviously, data do not exist to be precise in setting these requirements, but modeling/expert systems etc. can be used to make the "best" estimate and careful monitoring can help to provide the basis for identifying appropriate adjustments.

A more complete analysis of inter-species relationships of aquatic and terrestrial species and an appraisal of the potential for habitat and species restoration would also improve the plan. Although the Assessment includes a fine discussion on habitat requirements of sage grouse, a more complete quantitative assessment of terrestrial focal species would strengthen the Assessment. The presenters indicated that this was not done due to a lack

of time. Overall, this Assessment does a good job reaching general conclusions and is sound and mostly complete.

### **Inventory**

The Inventory identifies gaps and critical uncertainties; this helps to identify general limiting factors and provides insight into the adequacy of the plan. To improve upon this effort, the Inventory should specifically address and be more fully linked to the current Assessment.

### **Management Plan**

Although the Management Plan is long and could benefit from rewriting and editing, it is also a good start. The plan provides adequate internal consistency; the strategies and biological objectives are linked for redband trout. The plan describes circumstances and plans for the Owyhee subbasin as a whole, while many near-term objectives and strategies focus on activities on the Duck Valley Indian Reservation. Socio-economic issues are well considered and are embedded in the objectives and strategies. However, due to a lack of time and resources, the Owyhee Subbasin Planning/Technical Team used the Terrestrial Habitat Problem Statements, Objectives, and Strategies from the draft Bruneau Subbasin Plan (Accessed from the Eco-Vista web site, April 2004) as a “strawman” or model because the landscape and resource management issues are very similar to the Owyhee Subbasin. For this reason, the terrestrial section of the management plan should be carefully reconsidered and evaluated.

The Management Plan lays a foundation for prioritization, and objectives/projects are prioritized for the short-term and long-term. This effort would be augmented by further refinement and prioritization. For example, although the plan provides a detailed list of actions “needed” for redband trout, the plan should state which action would likely have the greatest benefit.

The research, monitoring and evaluation (RME) section describes monitoring aquatic objectives in general and provides good linkages on adaptive management throughout. The section could be augmented by a better description of the RME logic path and identification of the specific terrestrial and aquatic variables to be monitored and evaluated including data collection protocols. It is likely that the number of variables must be limited to create an economical plan that can be funded for, say, the next 50 years. The ISRP/AB review team was impressed by the commitment of the RME plan to coordinate aquatic activities among subbasins. In particular, the plan includes cooperation with the Action Agencies’ pilot projects for monitoring of status and trends of aquatic resources in the John Day, Upper Salmon, and Wenatchee subbasins. Unfortunately, there is not a corresponding plan for coordination of monitoring status and trends of focal terrestrial habitats among subbasins. In fairness to the Owyhee subbasin planners, there has been little progress within the Columbia Basin for development of cooperative plans for monitoring of status and trend of terrestrial habitat and species.

A strong aspect of this plan is that there was meaningful participation by local residents. The subbasin planning effort was useful in educating and alleviating the uncertainty of subbasin planning with some landowners who were not familiar with the Council and worried that the plan would regulate their activities and their ability to use natural resources. The result is a plan that people obviously care about as was demonstrated by the Owyhee citizens who attended the presentation to the ISRP and voiced their concerns.

However, lingering disagreements among stakeholders kept the plan from being broadly supported by all who have an interest in it. Specifically, as noted in the presentation meeting with the ISRP/AB review team, the Owyhee planners received a letter of dissent from the Owyhee Watershed Council, who at the presentation described their concerns with the plan's use of BLM data, the lack of time to comment on the final plan, and that the plan didn't adequately capture the planning implications of the lack data in the subbasin. These disagreements focused on the quality of data rather than the requirements or impetus of the subbasin planning process.

Despite the continued controversy over data, it is clear that a framework has largely been established to deal with fish and wildlife management issues in the Owyhee going into the future. The discussion at the presentation indicated that additional time and negotiations between the stakeholders might lead to a broader consensus support for the plan. By fostering these relationships, participants in the Owyhee planning process have hit upon one of the long-term goals of the subbasin planning process.

# **Subbasins with Anadromous Fish Access**

## ***Columbia Cascade Province***

### **Entiat**

Overall, this subbasin plan is quite nicely constructed. The Assessment is relatively complete and the strategies in the Management Plan are prioritized. The Inventory provides a very thorough list of projects implemented in the Entiat, although there is not much detail provided about existing regulatory or management programs. This good plan, however, seems to have missed the point of the Council's intent. It is oriented more toward watershed planning than to the Council's Fish and Wildlife Program. As a result, the plan may need to be revised before it can become the basis of a Council amendment.

### **Assessment**

The Assessment does a good job of offering a general overview of the Entiat Subbasin that is oriented to the public. There are, however, a few changes that would make it more user-friendly for both scientists and the public, such as including more maps in relevant sections. Effects outside the subbasin are discussed only in the appendix, not in the text. Incorporating the information from the appendix into the body of the text as its own subsection and expanding that information to include a concise examination of mainstem passage, ocean survival, and the effects of external fisheries would increase the usability of the plan substantially. All of these factors have the potential of adversely affecting the potential for success of proposed actions within the subbasin plan insofar as their success depends upon improved survival or productivity of the focal fish species within the subbasin. The plan would be enriched as well by consideration of the out-of-basin effects for migratory birds. Finally, the potential genetic or ecological effects of artificial production are not addressed in sufficient detail.

The Synthesis and Interpretation section provides a very nice link between the Assessment and the Management Plan. Although this section is very complete for the fish focal species, it is less so for the wildlife focal species and habitats. Some additional explanation of how the wildlife Assessment is used to identify objectives and strategies would have helped to make linkages across the various components of the plan as a whole. In addition, a more direct treatment of the assumptions used in the EDT analysis and the wildlife habitat interpretations is needed.

### **Inventory**

Little detail is provided about the current status of protections in place within the subbasin. Given the very high proportion of the subbasin that is managed by the Forest Service, the USFS plans should be described in more detail (salvage logging plans, erosion control measures, campground and roadway relocation, etc.). The plan also fails to mention the Habitat Conservation Plans of Douglas and Chelan County Public Utility Districts. These plans may be significant in terms of their potential effects on the subbasin. The HCPs call for the PUDs to undertake work to enhance fish populations in the tributaries to the extent that they are unable to meet survival goals for salmonids at the three mainstem dams: Wells, Rocky Reach and Rock Island. The HCPs are multi-

governmental agreements that satisfy requirements of numerous federal and state laws, while recognizing the treaty fishing rights of affected tribes. This plan should incorporate these HCPs to a greater extent.

### **Management Plan**

This Management Plan is well done. It is one of the few plans that have attempted to prioritize strategies. Some additional detail in the RME section and identification of the most critical RME questions, however, would help to focus this part of the plan. The RME description in the plan fails to mention other RME efforts in the region that may be helpful to the efforts in the Entiat. These efforts should have been included in the plan.

For additional detailed comments on the terrestrial approach taken by the Columbia Cascade Province planners, see the ISRP/AB reviews of the Methow and Upper Mid-Columbia Mainstem subbasins. Those comments apply to this plan as well.

### **Lake Chelan**

Generally, the Lake Chelan Subbasin Plan meets most of the elements for subbasin plans called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide. The plan should provide useful guidance in managing fish and wildlife resources in the Lake Chelan Subbasin and in assessing the effectiveness of management strategies. The overall goal of the plan is consistent with the Fish and Wildlife Program's target of returning native fish and fauna to the lake.

The Lake Chelan subbasin planning effort benefited from the fact that the Assessment and Inventory were mostly completed through a different process (FERC relicensing) before the Council's subbasin planning process was initiated. This allowed their process to be focused on developing a management plan.

The logic path from the limiting factors to the objectives and strategies and then, to the research, monitoring and evaluation (RME) is particularly well done. This approach and several other elements in the Lake Chelan plan could be used as examples for other planners as they revise their management plans. The RME section includes a matrix that links indicators with strategies. This is a logical and useful approach. In addition, the RME plan suggests agencies and other entities that should be responsible for various RME strategies and tasks. These specific assignments should prove to be a major asset in coordinating and implementing an effective RME plan. In addition, this plan's approach to addressing Inventory section II.C.4, assessing accomplishments and failures of past and ongoing management activities, may be an archetype for other plans. Many plans fell short on this section of the inventory.

Like other subbasin plans, the Lake Chelan management plan does not describe the potential for various strategies proposed for use on one species to impact other fish or wildlife species. The fish and terrestrial sections are often done as separate sections with inadequate description of their connection. For example, if the composition of the fish community in Lake Chelan is changed, then it is important to consider what effect that

change would have on wildlife species, especially those like the osprey and eagle that prey on fish. In addition, there could be a disconnect between this subbasin plan's focus on native fish species such as the westslope cutthroat trout and an existing WDFW stocking program that focuses on Chinook salmon, rainbow trout, and other recreational species.

There were some questions expressed by the reviewers regarding the history of one of the focal species, bull trout. The Assessment noted that bull trout disappeared from the lake in the 1940s. However, the possible reasons for their extirpation were not fully explored. The plan authors note the occurrence of a "great flood" that approximately coincided with the disappearance of the bull trout. However, no discussion of how a flood might have caused this effect is provided. The reviewers noted that there was a bounty on the bull trout in the 1920s, which certainly may have contributed to their demise. Also, many diversions were built in tributaries to the lake that may have disrupted spawning. The plan also mentions that a disease may have been introduced. However, there is no compelling evidence that one of these factors, or several in concert, was the primary culprit. A more thorough understanding of why bull trout disappeared from the lake would be valuable information in any effort to restore them. Some of the proposed RME questions regarding bull trout would address some of the factors. However, there is no mention of any attempt to determine if an introduced disease may have been a factor. If the disease hypothesis proves correct, and it is still present in the system, it may be that any attempt at reintroduction would prove futile.

The plan could better describe the US Forest Service and other entities' strategies for management of severe fires and recently burned areas. This discussion should cover the potential impacts to fish and wildlife. A discussion of this is especially important given the large percentage of land in the subbasin under federal ownership and its susceptibility to fire.

The planners noted that they did not incorporate the public process in their planning effort to the extent they desired (e.g., is there local concurrence with the choice of focal species?). Will this need be met through the Council's process and/or through the State Recovery Planning? This is an issue the Council will need to monitor and address as it proceeds in the program adoption process for the Columbia Cascade plans. Several of these plans were substantially affected by or based on the FERC relicensing process and the HCP development, both of which involved a lengthy and comprehensive public process. Further description should be provided on the issue whether that constitutes adequate public involvement.

In sum, there is a lot to like about this plan. The management issues that matter are well considered and well presented. The Inventory is very thorough. The Synthesis is particularly helpful and clearly presented. The prioritization of strategies and objectives is well done, although it could be more clearly presented.

Finally, the document has some rough edges — grammatical and proofreading errors — that should be addressed prior to adoption by the Council as part of the Fish and Wildlife Program.

## **Methow**

The Methow Subbasin Plan's Assessment adequately meets most of the scientific elements called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Technical Guide. The Inventory and to some extent the Management Plan, however, fall short in providing fully acceptable components. The planners should be encouraged to move forward in continuing to improve the plan. To accomplish that, strategies need to be prioritized, numerical targets or ranges established for the objectives, and the research, monitoring and evaluation section needs to be completed and explicitly linked back to the objectives and strategies.

## **Assessment**

Although this Assessment represents a reasonable starting point, a better presentation and clearer organization would help to create a more integrated document. The Assessment does provide an adequate general orientation to the subbasin, including a nice overview of jurisdictional authorities and a pretty good job of providing the geographical, demographical, and environmental context for fish and wildlife resources in this subbasin. Although the Assessment itself does not adequately describe the current status of fish and wildlife focal species, much of the needed information is included in Appendices in much more current detail. The terrestrial assessment depends on identification of focal habitats and is based on the general Washington document by Ashley and Stovall (2004). Information on individual focal species should be brought forward into the plan and considered specifically for this subbasin. Assessment of terrestrial focal habitats and focal species should be focused on this subbasin.

One area that needs attention is the inadequacy of the treatment of hatchery effects. The Assessment should provide a brief timeline of hatchery production and releases for each focal species and current production programs, finishing with the most recent discussion on potential competition with naturally produced fish and genetic analyses on the consequences of introductions. Finally, although this assessment is better than most in this area, the section on environmental conditions could benefit from a substantial editing and a more thorough consideration of what is known and believed about the environment in the subbasin. In general, although the Assessment can be improved in several areas, it does provide enough information to develop a useful management plan.

## **Inventory**

The inventory is inadequate as a starting point to evaluate successes, failures, uncertainties of past activities in the subbasin, to identify biological objectives or strategies needed to fix the limiting factors identified by the EDT and QHA analysis. Although a host of federal, state, and non-governmental programs and laws applicable to fish and wildlife planning in the Methow subbasin are provided, there is little synthesis to explain how they apply to the Methow subbasin. There is little or no explanation of the

effectiveness of past actions in the subbasin, something that would help greatly in making informed decisions about what projects should continue or not and what new project are needed. In addition certain topics are underdeveloped; i.e., the relationship between hatchery production and natural production is not treated adequately.

### **Management Plan**

The plan provides a reasonable outline of where the subbasin wants to go; only a lack of detail and clarification hinders its adequacy. Although the subbasin vision is consistent with the Council's 2000 Fish and Wildlife Program, linkage of the vision to the biological objectives and strategies is less transparent. In addition, the characterization of objectives and strategies is somewhat problematic in this Plan. For each focal species there is an overarching biological objective that reads more like a subbasin vision statement. That objective is followed by several other, more specific objectives, some of which are specific numerical targets for abundance and productivity levels desired for focal anadromous species. The time scale to achieve these objectives is not clear. Even though strategies to achieve these objectives are included, some of these strategies appear to be research topics, whereas others appear to be management activities. In the end, the Management Plan does not adequately describe the physical changes needed within the subbasin to achieve the vision. Strategies are provided for each of the "objectives" for each focal species, but their linkage is not explained explicitly. There is a diagram early in the plan that provides the planner's views on linkage in a general sense, but the specifics showing how any particular biological objective, strategy, or assessment outcome is linked are not presented. Furthermore, the strategies read more like projects than the broad conceptual strategies as suggested in the mainstem amendments and 2000 F&W program. Finally, the Management Plan does recognize that one function of RME is to resolve uncertainties and to provide the empirical basis for future decision-making. Although an explicit adaptive management loop is not discussed, the plan does discuss an iterative process, involving the Technical Team and other participants to refine the plan. If time and funding permits, the plan could be substantially improved by making it shorter and more concise.

### **Okanogan**

The Okanogan Subbasin Plan indicates significant effort in development of the introductory material, collation of aquatic habitat data for EDT, summarization of EDT results, and initial efforts at completion of the Inventory and Management Plan. However, as the report acknowledges, the Plan is incomplete — specifically the Inventory and Terrestrial RM&E sections are incomplete — and consensus has not been reached on the Management Plan or the related aquatic monitoring and evaluation program. Consequently, the Plan does not substantially meet all the scientific elements for a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide.

If comments on the level of community support and involvement are accurate, the incomplete portions of the Plan can likely be accomplished, but there remains significant work to complete this. Of concern from a scientific perspective is an apparent disconnect

between the founding principles and assumptions and the extensive discussion of the role of hatchery supplementation for spring and summer/fall chinook and summer steelhead. While reviewers recognize the importance of short-term harvest opportunities to these communities, the balance between restoration of natural populations and their habitats and the desire for harvest is not evenly presented through this plan. While there is reference to the desire for summer/fall chinook and steelhead harvest, the mainstem harvest of sockeye salmon is not even commented on in this Plan. Yet, the harvest of sockeye salmon in the Okanogan may be one of the most achievable objectives in the short-term.

In terms of usability, the Plan has been poorly edited and there are many sections that are repetitive. The Plan contains figures, tables, and appendices that are incorrectly numbered and/or have inaccurate captions. The plan includes maps and text that have been inserted from the Methow subbasin plan. The final plan must be very carefully edited, as the corrections are too extensive to expect reviewers to capture all of them.

In its present form, this Plan does not constitute an adequate technical basis for subbasin planning but extensive groundwork has obviously been laid for development of a more complete plan. The imbalance between what is achievable with sockeye salmon and what may be desired with other species, but is much more difficult and expensive, is an obvious issue in consideration of priority actions. Many sections of the plan refer specifically to Chinook salmon and steelhead but do not even discuss sockeye salmon. Although the inability to apply EDT to sockeye salmon may well have been a contributing factor, the plan could better address sockeye salmon.

### **Upper Middle Columbia Mainstem**

The Upper Middle Columbia Mainstem (UMM) Subbasin Plan lays the foundation for a science-based management plan that should be useful in restoring and protecting focal species in the subbasin, but additional work is needed before it substantially meets all the scientific elements called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide. In the Assessment and Inventory further work is needed to incorporate information on mainstem habitat for aquatic species. In the Management Plan, objectives and strategies need to 1) be considered relative to improvement of mainstem habitat for aquatic species, 2) strategies need to be prioritized, 3) numerical targets or ranges established for the objectives, and 4) the research, monitoring and evaluation section needs to be completed and explicitly linked back to the objectives and strategies.

### **Assessment**

The Assessment generally provides a useful introduction to the subbasin and summary of its important ecological and human issues. Considering the relatively sparse amount of historical data available for the focal species in the UMM subbasin, the Assessment does a good job of documenting the current health status of the focal species and their habitats. The primary weakness of the Assessment is the lack of treatment of the mainstem habitat for aquatic species.

More information concerning exotic species present in the subbasin, and the water and land needs of the projected (to 2020) growing human population should be provided in the Assessment to help inform the strategies and prioritization portion of the plan. The Assessment also needs to more thoroughly identify and discuss wildlife species in the subbasin. The wildlife assessment framework for the State of Washington (Ashley and Stovall, 2004) should be included as an appendix to the plan as was done for some subbasins in the Columbia Cascade Province.

More attention needs to be given to the Columbia River itself as the primary aquatic habitat in this subbasin. Because there is some spawning and potential rearing by anadromous species in the mainstem itself, there should be a description of the mainstem as habitat, including a description of the areas used for spawning, and effects of construction and operation of the hydroelectric system. Effects of current and future operations should be considered.

Similarly, since this mainstem reach is the first source of external effects on fish migrating to and from the Wenatchee, Entiat, Methow and Okanogan subbasins, there should be more detail provided on anadromous fish use of this subbasin, especially as to effects on their survival. This information could likely be extracted and summarized from available planning documents such as Habitat Conservation Plans (HCP). On a side note, the plan adopts by reference the HCPs. The Council should consider the implications of this. The Council recognized support for HCPs in Mainstem Amendments.

At the presentation to the ISRP/AB, the planners noted that they found water and fish in tributaries where they didn't expect them; this observation suggests that further inquiry, assessment, and monitoring of the subbasin is warranted and should be described as strategies in the Management Plan.

### **Inventory**

The Inventory generally does a good job in documenting existing protections, plans, and programs. Taking the next step by comparing and contrasting those plans, protections and programs with the subbasin assessment will increase the usefulness of this plan; i.e., the inventory should identify the gaps between actions that have been taken and actions that need to be addressed. The Inventory is incomplete relative to management programs for improvement of survival through the mainstem and improvement of the mainstem as fish habitat. Also, the Inventory does not include a complete discussion of hatchery programs that use this river segment for release, migration, or capture of returning adults. Some information is included elsewhere in the Plan, e.g., the RM&E section of the Management Plan. Adding this information will improve the Inventory.

### **Management Plan**

The aquatic sections of the Management Plan are potentially incomplete because of the lack of consideration of objectives and strategies for improvement of mainstem habitat for aquatic species and coordination with hatchery operations. Many of the Management Plan's objectives and strategies are intended to provide improved data for assessment that

would facilitate refining the biological objects (goals) and subbasin vision. The logic path from assessment, to objectives, to strategies is apparent. The biological objectives largely have measurable outcomes. Long- and short-term goals are identified but do not have explicit enough numerical targets at this time. The plan's strategies are presented as options that are laid out for future decisions and are not explicitly prioritized.

To increase the utility of the plan, adaptive management should be explicitly examined and a strategy developed to implement it. The RME logic path needs to be clearly described specific to the Upper Middle Mainstem Subbasin Plan. To provide the framework to do this, the components that are incomplete or missing from the Assessment and Inventory must be established. It is also critical that a data collection regime be implemented. Providing this information should create the basis for a complete RM&E plan and the beginning of adaptive management.

As a general comment to the Council, in this and in many other subbasin plans important information was included in appendices. How appendices are tied to the plans needs to be considered by the Council. If the appendices are part of an electronic library it might not be a concern but if the information in the appendices is critical to the analysis in the Management Plan then that information should be included in the body of the plan.

## **Wenatchee**

The Wenatchee Subbasin Plan is an important first step for implementing adaptive management in the Wenatchee subbasin. The Plan, however, needs additional development, especially in the Management Plan section, before it can substantially meet the scientific elements of a subbasin plan described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. It is regrettable that this plan seems to have missed the point of the Council's intent; it is oriented more towards general watershed planning than to the Council's planning process. Because this draft lacks adequate tie-in to the Council's Fish and Wildlife Program, this deficiency might need to be fixed before the Wenatchee subbasin plan can be the basis of a Council amendment.

According to presenters at the ISRP/AB review meeting, the County developed a good working relationship with the Yakama Nation, and the public has had meaningful input on various portions of the plan through the subbasin planning process. The public, however, has not been able to comment on the plan as a whole. As the subbasin planning process continues, these new collaborative relationships will be a valuable asset.

## **Assessment**

Overall, the Assessment is the strongest and most detailed component of the Plan. It provides a considerable amount of information on the past and current condition of the subbasin and the focal species. It offers a good, useful analysis and synthesis in general terms. Despite several shortcomings, it provides a suitable basis to develop a management plan by a diverse group of stakeholders with various interests. For the aquatic species, there is a good summarization by species, stock, and Assessment Units. The planners use bullets to highlight standard elements of their synthesis, a strategy that

is helpful. There is also a useful rating of confidence in the summary. There are good hypothesis statements for all of the Assessment Units, and tables are provided for the focal species, key life stages, degree of effort (on the hypothesis), and level of certainty. The fact that QHA was used for the aquatic assessment, rather than a more data-intensive tool, suggests that the information used to identify limiting factors and develop key findings was not very detailed or complete. There is a clear need to improve the quality of the information in this subbasin.

In addition, the Assessment needs to provide a better analysis of external effects on the productivity and sustainability of fish and wildlife in the subbasin. These issues are raised in the appendix material, but should be expanded on and incorporated in the Assessment. In addition, assessment and management information from other key documents pertaining to the Wenatchee subbasin should be better incorporated in the Plan including the Habitat Conservation Plans of Douglas and Chelan County PUDs, and USFS and ICBEMP reports.

The Assessment should highlight that the Wenatchee is an especially important subbasin in regard to recovery of ESA listed salmonids because of the presence of upper river Chinook, steelhead, and sockeye runs.

### **Inventory**

The Inventory appears to be rather thorough in that it includes numerous seemingly small projects. It only includes, however, minimal summaries of protection and restoration activities covered in the subbasin. More detailed information about relevant plans or past or ongoing management programs should be provided. Those programs, including the Council's Fish and Wildlife Plan, should be explicitly named and described. The authors state initially that they requested such information from the agencies and public, but got little response. Descriptions of these programs are readily available, and the authors could have obtained sufficient information on their own, despite the lack of response from the agencies. The planners relied heavily on information from the Upper Columbia Regional Technical Team. While their local knowledge is correct and useful, this inventory needs more detailed work to become adequate.

Although the Plan's overview mentions the Habitat Conservation Plans of Douglas and Chelan County PUDs in passing, these plans are much more significant in terms of their potential effects on the subbasin than would be suggested by that short reference. The plans call for the PUDs to undertake work to enhance fish populations in the tributaries to the extent that they are unable to meet survival goals for salmonids at the three mainstem dams: Wells, Rocky Reach and Rock Island. The HCPs are multi-governmental agreements that satisfy requirements of numerous federal and state laws, as well as recognizing the treaty fishing rights of affected tribes. This plan should incorporate these HCPs to a greater extent.

## **Management Plan**

The Management Plan does not contain sufficient details to serve as an effective plan and is whittled down to key points provided in outline fashion. It offers lists of some actions to take, but these were often obvious from the start (achieve lower temperature, remove blockages, reduce siltation, etc.). The plan suffers from a mix-up between strategies and objectives. Strategies are a means of attaining sought-after outcomes, objectives *are* sought-after outcomes; the plan lists outcomes as strategies. In other words, the Council's intention was that the process of developing a plan would start with identification of limiting factors, move to objectives aimed at ameliorating them, and then specify strategies and actions that might be undertaken to accomplish the objectives. An unfortunate impression is created by listing strategies first, thereby implying that no decision has been made about what outcome is desired. Moreover, because strategies aren't prioritized, the usefulness of this plan in directing management activities and research with limited resources is compromised.

The RME section provides almost no information on how the efficacy of management actions would be assessed. The Management Plan would benefit by a discussion in the aquatics section of how key uncertainties might be resolved and how effects of new information would be taken into account. The NOAA Fisheries organized RME pilot project on action effectiveness should be incorporated and described better.

For additional detailed comments on the terrestrial approach taken by the Columbia Cascade Province planners, see the ISRP/AB reviews of the Methow and Upper Mid-Columbia Mainstem subbasins. Those comments apply to this plan as well.

## ***Mountain Snake Province***

### **Salmon**

A substantive portion of the Salmon River Subbasin Plan meets the scientific elements for a subbasin plan as called for in the 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide. The Assessment, Inventory, and Management Plan are well done. In general, the elements of the Plan are well integrated. The Assessment effectively identifies factors affecting productivity, especially for terrestrial species, and adequately presents key findings. The Inventory provides information that should be useful for subbasin and regional coordination. The Management Plan is well organized, and a logical pathway from limiting factors to objectives and strategies is evident. Importantly, the planners recognize that the Plan could not only satisfy the Council's requirements but it also could be useful as a tool for congressional appropriations. While recognizing the good work of the Technical Teams, we identify several shortcomings in the subbasin plan.

### **Assessment**

In general, the Assessment is well done and thorough. We recognize that some of the information needed to address the following comments may not be available.

Nevertheless, the following shortcomings exist:

- 1) discussion of how the selected focal species serve as indicators or are representative in their linkages to habitat and environmental conditions. Selection of focal species is driven primarily by ESA considerations.
- 2) explanation of how activities to protect and restore focal species would affect the diversity of non-focal native and non-native fishes,
- 3) identification and characterization of bull trout population genetic structure,
- 4) description of the relationship between terrestrial conditions, especially riparian functions, and fish habitat,
- 5) treatment of westslope cutthroat trout, perhaps including it as a focal species due to its importance in the subbasin,
- 6) discussion of genetic diversity of focal species, incorporating current information from various labs,
- 7) analysis of possible genetic and ecological impacts of artificially produced fishes on native fishes and,
- 8) characterization of terrestrial focal species and plants, although the Plan provides a good Assessment of terrestrial focal habitats.

The subbasin plan uses expert opinion as the only approach for assessing limiting factors. Expert opinion is a qualitative method that relies on the judgment of professionals familiar with the Salmon subbasin. A quantitative method such as EDT would have been preferable, perhaps complemented by expert opinion. The lack of quantitative evaluation of the effects of limiting factors on population parameters leads to the following questions:

- 1) which factors are most limiting to production?
- 2) which factors are least limiting?

- 3) how much gain in production can be achieved from management intervention to lessen effects of limiting factors?
- 4) will strong out-of- basin influences overwhelm in-basin effects?

### **Inventory**

The Inventory provides a nice narrative describing what activities have been done in the subbasin or are taking place. The Inventory is a thorough listing of projects from which some specific information can be gleaned. The synthesis and interpretation of the Inventory is embedded in section four of the Assessment, where a thorough analysis and discussion is presented for each of the ten Assessment Units, as well as a larger Salmon subbasin GAP analysis. The Inventory should have value as a repository of institutional knowledge and be useful outside the subbasin.

### **Management Plan**

The Management Plan has many good elements. Vision, objectives and strategies are well articulated and logically linked. Appropriate emphasis is placed on the social and cultural aspects of the plan and how implementation might best be achieved in the future within the Salmon River subbasin. The major weakness of the plan is the failure to prioritize adequately. Prioritization is important so that restoration activities and funding can be appropriately directed. The aquatic Technical Team should build upon the priorities in the Recommendations and Conclusions, perhaps following the format for terrestrial prioritization. If available information is sufficient to develop a comprehensive listing of limiting factors within each 4<sup>th</sup> HUC, then it should be sufficient to develop a more through prioritization of activities and/or areas.

The RME program is a general framework and is on the right track (including its indications that M&E results be used in improving management), but it is incomplete in that it lacks clarification of data gaps, prioritization of research topics, and explicit identification of specific performance measures, indicators, and data collection protocols. In the Assessment, planners reported encountering difficulties in assessing limiting factors because of “information gaps, differences in information collection methods and/or interpretation, or to data limitations” (page 3-10). RME improvements are needed to prevent these problems from recurring in future. Protocols for regional cooperation on terrestrial issues appear to be limited.

While out-of-basin effects are having a substantive impact on anadromous species, they seem to be overemphasized, especially when there are obvious major environmental problems within the subbasin. Over-emphasizing out-of-basin effects raises the question of whether in-basin restoration activities will contribute to recovery and whether they should be funded simultaneously with out-of-basin projects.

## ***Blue Mountain Province***

### **Grande Ronde**

The Grande Ronde Subbasin Plan shows concerted effort to meet the requirements of the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide. However, significant scientific elements remain to be provided in the Assessment, the Inventory, and the Management Plan before the Plan can best guide solicitation, development, and selection of fish and wildlife projects.

A notable characteristic of this subbasin is its high proportion of privately owned land, which influences the approach to fish and wildlife restoration. An opportunistic approach is taken to developing restoration projects with willing landowners, and these projects then serve as demonstration projects to other landowners. Such collaboration with private landowners has resulted in major utilization of the USDA's CREP program, and it promotes the participation of landowners in fish and wildlife restoration. However, strict reliance on opportunity does not necessarily result in an integrated and effective management plan. A prioritized, strategic Management Plan is needed to guide evaluation of opportunities that arise, as well as to suggest where additional efforts are necessary. Such a Plan would promote a more systematic and science-based approach to addressing the limiting factors in the subbasin.

The Subbasin Plan should form a framework for selecting strategies that lead to projects that best benefit fish and wildlife, but the use of EDT in the Assessment seems to be of little value to this endeavor (see detailed comments below and in the Checklist).

Reviewers were confused by the presentation of the use of EDT in this subbasin, and were left with a strong sense that the EDT portion of the Assessment is incomplete and includes significant misunderstandings of how and for what EDT should be used. In its approach to management, the plan appears to be a step backward from the progress the ISRP has seen through the NEOH Master Plan and the provincial reviews. Reviewers are confident that fisheries scientists at NPT and ODFW have a better understanding of the subbasin than is evident in the draft Subbasin Plan. The subbasin has been extensively studied, and information from the numerous research studies of aquatic species and environments should be better incorporated into the aquatic Assessment.

Despite strong concerns about the use of EDT, and several other scientific shortcomings, the Grande Ronde Draft Subbasin Plan is thoughtful and has some strong elements. It has a stronger wildlife section than most draft plans. The documents provide considerable interpretive detail, and indicate appropriate inclusion of stakeholders. The Plan follows the Council's template outline, so includes at least some consideration of all of the requested elements. The planners acknowledge that information is vital to adaptive refinement of management, and they include gathering needed information as a prominent element of their Plan. Nevertheless, the reviewers strongly recommend that the procedures and results of the EDT assessments be reviewed independently before application of this subbasin plan.

The Management Plan provides biological objectives that are consistent with the Assessment, though direct linkage could be stronger and this would be facilitated by using the Assessment and Inventory to aid in prioritization of objectives, strategies, and areas in which efforts are focused. The Plan contains an extensive outline of how to develop a monitoring and evaluation program. The major parts of the plan have been developed, but it remains to prioritize tasks and approaches, and to develop an agreed process for acquiring and adjusting to new information.

Finally, the Plan is substantially flawed by typographical errors, unreferenced assertions, incorrect references to tables, figures, or appendices, unclear figure legends and table captions, and other sources of confusion. Many such errors are noted in the final section of this report (Editorial and Other Specific Reviewer Comments) and in comments in the Checklist, and the final Subbasin Plan must be much more carefully proofread and corrected if it is to be a clear, accessible, and useful public document.

### **Assessment**

The Assessment is reasonably well-developed, compared to many other subbasins, but, given the work that has already been done in this subbasin and the knowledge that exists, reviewers think this plan should have been more thorough. The Assessment generally describes and references the geographical, demographical, and environmental contexts for fish and wildlife within the basin. The treatment of current levels of degradation and impact is sufficient. However, the Assessment does not adequately cover conflicts and compatibilities between species. Even more importantly, it does not address human influences on ecological processes that may impede desired ecological functioning and biological performance. A sound analysis of these should be included and would augment the plan's usefulness.

Species lists for wildlife, plants, and insects are well done. The plan lists three focal fishes, thirteen focal animals (selected to represent ten habitat types and including a mix of mammals, birds, and an amphibian), and two focal plant species (representing two additional habitats of particular interest). The inclusion of focal plant species is unusual among the plans and is a thoughtful and valuable addition. The inclusion of one or more non-salmonid resident species, such as sculpin or dace, would improve representation of the breadth of ecologically important aquatic resources present in the watershed and would enhance the plan.

The terrestrial assessment provides summary descriptions of historical and current limiting factors (primarily assumed to be habitat extent or quality) for wildlife species, utilizing the IBIS and Oregon Natural Heritage Information Center (ONHIC) databases. The assessment provides more data on terrestrial habitats than terrestrial populations. Factors that affect terrestrial components are generalized by habitat types and types of human impacts.

For aquatic species, the Assessment describes historical and current limiting factors and conditions by watershed, the watersheds delineated according to unique population units of each focal species. There are good descriptions of historical and current artificial

production; however, sections on the *effects* of artificial production of fish are too limited and vague. There is allusion to "potential domestication effects" and to genetic effects on "both the artificially propagated population and the wild population" (p. 92), but the scientific literature on this issue is not cited. Unlike the wildlife analysis, the aquatic section does not effectively address human impacts on the subbasin. Adding this information would augment the efficacy of the plan.

The aquatic assessment uses EDT for spring chinook and summer steelhead, but does not quantitatively assess for bull trout. Four habitat attributes (sediment, temperature, flows, and channel condition) are identified as limiting factors for aquatic species, according to EDT analysis of 509 stream reaches, according to 46 attributes. The large number of reaches and attributes apparently challenged the use of EDT; for instance, only 20% of the data used were empirical. The authors do summarize a large volume of results into a good summary table (Table 46). The text then provides detailed comments by stream sections (pages 195-203), but the synthesis/interpretation (section 3.6.1) is weak because many of the statements are either unsupported assumptions or are not testable hypotheses. Thus, the Assessment includes many useful presentation strategies, but there are apparent problems with the EDT model output that is presented and with documentation of assertions and assumptions. For instance, EDT predicts no fish in areas where fish are indeed found; uncertainty in the EDT input values is not considered, and the effect of conducting EDT analyses on individual population units is unclear. The inability to maintain spring chinook in Catherine Creek should be investigated, and the effect of the analysis "bug" (page 191) needs to be examined and accounted for. Significant work has been invested in the aquatic assessment, but it needs to be verified and the assumptions should be reconsidered. This subbasin Assessment may demonstrate the difficulty of using EDT in such a large setting. In the end, confidence in its conclusions is limited.

Reviewers had a strong sense that the EDT portion of the assessment is incomplete, that it seems to be seriously flawed and thus may be misleading, and that planners in the Grande Ronde may have serious misunderstandings of the use of EDT. EDT is a modeling tool to examine habitat capacity (largely freshwater streams) and the expected changes in salmonid production, given certain changes to habitat conditions or availability. It may be a predictive tool in the sense of predicting the scale and direction of change, but it is not a forecasting tool that should be expected to predict actual returns. Unless there is much more empirical data than is evident in this subbasin, any expectation that EDT could be "calibrated" to current actual returns is likely very unrealistic. Thus, when the authors comment on the need for more calibration, it is unclear what they would propose. It could be possible to "tune" the habitat attributes and ecological rules in EDT to give reasonable estimates of natural production for a section of a stream, but this may actually defeat the general purpose of the EDT method. Once rules are "calibrated" to one section, could they be generalized to the next section and would they scale-up to larger streams or rivers? Several of the cautionary statements made about EDT by the authors are exactly the types of questions that EDT is capable of addressing, suggesting that the planners did not understand EDT and may have misused it and misinterpreted its outputs.

Further, there is a major omission in these EDT assessments: there appears to be no discussion and analysis concerning the releases of substantial numbers of supplementation smolts into streams within the subbasin. EDT could be used to examine interactions with the natural production, an important issue. If the hatchery-released fish immediately emigrate and do not compete with the natural, then excluding them would be understandable; however, if this is the case, then that should be clearly documented in the plan.

Despite concerns about the EDT analyses, the approach taken by the planners and their presentation of results have some positive attributes. The Assessment attempts to organize its analyses into meaningful biogeographic units, dividing the subbasin into stream groups that have unique population units of focal fish species, then presenting EDT results for each such stream group. It summarizes the extensive assessment results into key findings for aquatic species, and includes extensive reporting of outputs, both from EDT for each stream group and for wildlife by habitat. The wildlife summaries are excellent and include identification of data gaps. The planners make efforts to thoroughly interpret and present results of EDT analyses, including presentation of “consumer reports” diagrams that show which environmental attributes are most in need of attention in each stream. This biogeographical grouping and analysis of where management may be most needed went well beyond what was provided in many other subbasin plans.

### **Inventory**

The Inventory provides tables and maps of ongoing conservation and restoration activities throughout the subbasin, as well as a thorough listing of protection areas, plans, programs, and projects. However, it fails to relate these extensive listings to the Assessment and key findings, and it provides no information on accomplishment or failures, in terms of biological results.

The Inventory summarizes projects by restoration activity and amount of habitat treated, but does not evaluate success or failure of projects or whether topics have been adequately addressed (the gaps). Terrestrial data gaps are identified, but are based on the qualitative assessment of the planning team. Presumably, these are not being addressed in the subbasin now, but this is not evident from the text.

The Inventory makes a good effort to collate the projects (a database is maintained) and to summarize activity types. Further analysis to identify the most effective activities for restoration and fish production would be useful.

The Inventory adequately presents land use designations (wilderness, wild and scenic rivers) that confer protection. The map of the subbasin with four categories of protection is useful. Overall, protection status is well described and mapped and can be seen to have increased substantially over time.

The gap-assessment section of the Inventory details existing protections, plans, programs, and projects. It concludes that there are sufficient laws and activities to fulfill the fish and wildlife needs for the subbasin, but this conclusion appears to be at odds with the

depleted state of the subbasin's fish and wildlife. It would be more helpful if the gap assessment rated each protection for each limiting habitat variable in each watershed to clarify where protections are adequate and where existing rules are insufficient.

The Inventory identifies aggregate project funding by source. A good map of salmon restoration projects in the subbasin is provided. Additionally, the plan has extensive tables of restoration projects for species and task, with techniques, objectives, and benefits.

The Grande Ronde has a Watershed Planning Group, and is a model watershed for the Council. More than 400 projects have been executed in the subbasin. The Inventory contains virtually no assessment of the success of these efforts, which is a critical omission in evaluation of past actions and which constrains the ability to chart an effective course forward from what has already been done.

### **Management Plan**

The major parts of the Management Plan have been developed, but several important elements remain to be completed. Important features missing from the Management Plan include prioritization of objectives, analysis of which species are of the most concern, production/recovery goals for the aquatic species, a set of short versus longer-term goals, and a clear process for assessing progress and modifying the plan as more data are acquired. Additionally, the planners need a formal planning framework beyond what may arise as a passive consequence of acting on the opportunities supplied by landowners who are willing to participate in restoration or protection activities. Opportunistic selection of projects should be guided by a comprehensive and clearly reasoned, science-based Management Plan.

The plan's vision for the subbasin includes desired future conditions that are consistent with the Council's Fish and Wildlife Plan. The vision statement also expresses historical and present cultural and ecological values, as well as economic and social factors. Its guiding principles are based on an ecological, rather than single-species, approach. However, the verb "create [a healthy ecosystem]" could indicate lack of full appreciation of potential constraints to management actions and outcomes, given conflicting values (of humans and of various animals and plants) and dynamic underlying ecosystem processes.

The Management Plan provides biological objectives that are consistent with the Assessment (though reviewers comment above and in the checklist as to concerns about the soundness of the aquatic assessment), but does not adequately use results of the Assessment directly to develop related management strategies and priorities. Using EDT or other formal analysis to more clearly and directly inform knowledge and to craft and prioritize strategies would increase the scientific soundness of the plan.

Most of the plan's biological objectives are presented as formal null and alternative hypotheses. For the aquatic species, biological objectives are stated for four habitat attributes, summarized from the EDT results, and considered over the subbasin and for the three focal fishes. In recognition of advice from the ISAB, the authors are careful to

have their objectives acknowledge the dynamic nature of these environments; they state that the objectives are a "road map of how to arrive at the dynamically stable future condition that will support" the aquatic species. The biological objectives for aquatic species represent a step towards more natural conditions, recognizing the limits imposed by human conditions and natural variation. The biological objectives for terrestrial species are adequately presented. Quantitative measurable indicators of the objectives, however, are not stated, either for terrestrial or aquatic habitats or for focal species. In addition, strategies are not prioritized by action or location.

The plan's research monitoring and evaluation (RME) section is incomplete and confusing, and it does not follow through into adaptive management. A strength is its incorporation of the NEOH Draft Monitoring and Evaluation Plan as a foundation to assess the anadromous focal species and to investigate the uncertainties of using artificial production as a primary strategy. Weaknesses include lack of performance measures for habitat characteristics and wildlife, lack of agreement among co-managers on abundance and performance of hatchery and natural anadromous fish, lack of integration of habitat restoration and protection with salmon production objectives, and lack of a research section or research agenda. This section is especially limited for terrestrial species and habitats; the terrestrial RM&E section is only a bare beginning and would benefit from more detail and attention.

## **Imnaha**

The Imnaha Subbasin Plan amply demonstrates the unique nature of the subbasin and provides a good foundation for planning and meets many of the key scientific elements for a subbasin plan described in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide. More work is needed on the plan before it could guide solicitation, development, and selection of fish and wildlife projects. The plan does well in considering socioeconomic factors, and it makes earnest attempts to prioritize objectives. As yet, however, the prioritization is too broad to provide operational guidance.

The plan has yet to demonstrate the important ecological functions and processes that must be restored in the Imnaha subbasin. It is unclear how the plan will address natural variation of influences within the basin and outside it. It does not make clear how biodiversity would be protected and restored. Overall, this plan inadequately considers the dynamic nature of ecosystems and the role of disturbance in shaping aquatic habitats. Also largely missing from the plan are the effects of exotic species. The plan makes scant mention of them, and offers no biological objectives or strategies that pertain to them.

## **Assessment**

The Assessment provides a clear picture of the conditions and challenges faced by planners and managers within the subbasin. It is generally excellent with respect to aquatic fish population and habitat issues. It is very detailed in describing both aquatic and terrestrial species; this is a benefit of incorporating work done by several entities. Some key areas of the Assessment, however, need further development, especially the

synthesis, analysis of limiting factors, hatchery effects, and the role of non-native species. Bringing in PATH and CRI results more explicitly would strengthen the limiting factors section.

Overall, the planners do a good job of gathering information, but do not analyze and synthesize the information to the degree needed to make the plan most useful.

The Subbasin Overview is well done. It generally describes or references geographical, demographical, and environmental contexts for fish and wildlife. Land ownership is well described. A noteworthy feature of the subbasin is that The Nature Conservancy is the subbasin's second largest land manager because it acquired the Zumwalt Prairie (with Fish and Wildlife Plan funding). It would be informative to find out how having a large swath of land permanently excluded from development affects the Imnaha subbasin's fish and wildlife.

The Assessment describes the subbasin by ecoregions. The Assessment has an adequate geologic description, of climate, maps of subregions, and good soil descriptions and maps. The maps are well done, but the descriptions of vegetation cover are quite brief. The Assessment has a reasonable description of wildlife habitat types.

The treatment of aquatic species did not appear to be distinctly ecological because the Assessment treats the stream systems purely from physical, largely hydrologic, standpoints and almost ignores biological components and processes.

The Assessment has good description of the historical and current major human uses of resources, including grazing, transportation, timber harvest, water development, and mining. There is also a very good discussion of human influences on specific hydrological processes; peak flow generation (timber, grazing); base flow depletion (withdrawals, water rights); erosion. There is also discussion on terrestrial processes including fire, insects, timber harvest, grazing, noxious weeds, and exotics. This is well done with good maps that illustrate these problems.

The Assessment adequately describes the watershed within a regional context. While the subbasin is small, it has a number of unique features and is a potentially productive component of the province and the Columbia Basin. The subbasin's context within the Columbia River Basin is demonstrated in the usual geographic way, but with the addition of a well-done section on the particular qualities of the terrestrial and aquatic environment that distinguish the Imnaha.

The Species Characterization and Status Subsection is broadly descriptive and highly informative. Although the detailed information in this section is impressive, the Assessment does not quite arrive at the "bottom line" of providing a comprehensive synthesis for each species, especially spring chinook. As a result, conclusions about the species' status and trends are not clear.

The Assessment presents five aquatic focal species and fourteen terrestrial focal species. The Assessment generally describes selection criteria adequately. Focal species' habitat is analyzed via QHA and according to previous USFS work. The Assessment identifies, to the apparent extent known, the current and historic status of the focal species. For aquatic species, this is done by using information developed by the TRT. This is also thoroughly done for terrestrial species.

In general terms, the Environmental Conditions Section describes the effect of the environment on individual fish and wildlife populations by disturbance type. The Assessment has good descriptions of the relation between macroclimatic and hydrologic processes, and of sediment transport and erosion. The Assessment offers general discussion of current, past, and future conditions. Providing more detail on these three reference conditions would strengthen the Assessment.

Factors limiting focal species habitat is analyzed in detail for both past and current conditions by habitat type and by habitat attributes, such as habitat diversity, fine sediment, high and low flows, and oxygen. Restoration priorities are identified for each species. Likely trends with and without action are described for each species. This is done in detail throughout the document and again in the limiting factors section, by type of focal species (aquatic vs. terrestrial) and by individual focal species (and life stage) at a "local" (sub-subbasin) scale to reflect the variation within the subbasin.

The Assessment does not include a quantitative assessment of the relative importance of each limiting factor, although it does have a rough qualitative Assessment through QHA. This may be due to lack of good data. If out-of-basin factors are important, then the Assessment should discuss what gain in production would be achieved by various restoration or protection activities in-river. The Assessment has an insufficient examination of possible hatchery impacts.

### **Inventory**

The Inventory has a useful, categorized listing of activities and projects. The planners provide sufficient lead-in information to permit useful integration and prioritization for future fish and wildlife projects. The plan's Assessment includes interpretive discussion, but this is not carried forward to the Inventory. The Inventory presents a complete picture of subbasin programs, protections and projects, but no information on accomplishments (or failures) in terms of biological results.

The Inventory identifies some data gaps, but the links back to the Assessment are not adequately presented. The planners appear to have gotten the logic path out of order. They have derived the gaps from the Management Plan rather than from the Inventory.

### **Management Plan**

Overall, many areas of the Management Plan need elaboration and clarification, including prioritization of strategies, consistency of objectives and strategies, data needs, and research on stream-reach priorities.

The desired conditions in the subbasin are adequately described in the Assessment. In the Management Plan, tables link biological objectives to problems identified by the limiting factors analysis. The objectives are grouped according to aquatic, terrestrial, and socioeconomic categories. Some of the objectives in Table 4 are stated mainly in terms of performing procedures rather than in terms of desired outcome. Many of the biological objectives are stated qualitatively but not quantitatively.

The Management Plan's aquatic objectives present explicit abundance targets for fish, but provide no measurable outcomes for habitat. Most objectives would be measurable if they were to be stated in a more explicit form. The terrestrial habitat objectives are not expressed as specific acreage targets, but as trends, the Management Plan states that this is due to a lack of data. The terrestrial objectives are much more general than the aquatic objectives.

The reviewers applaud the attempt to include socioeconomic objectives. Most of the subbasins have not done this, and it is an important element. However, the socioeconomic objectives need more work to make them measurable and implementable.

All told, the Management Plan's biological and sociological objectives are not set forth in the detail necessary to be empirically measurable.

The planners prioritize reaches by the existence of multiple focal species, but they do not relate that prioritization back to the plan's objectives and strategies. It is unclear how the set of proposed objectives and strategies relate to reach prioritizations, and thus how the objectives and strategies are to function in the plan. In this sense, the plan lacks integration. The lack of prioritization of objectives and strategies coupled with the vague nature of the strategies leaves the door open for any management intervention to be implemented. The plan's monitoring objectives are described in detail but not prioritized. The plan's operating assumptions are included. Prioritization is presented later in the monitoring and evaluation plan in detailed tables. It is not clear if these monitoring objectives are implementable because it is not certain if they provide a clear direction of what to do in sequence. Providing a clear direction would strengthen the plan.

The planners acknowledge that information is vital to adaptive refinement of their management over short and longer-term time frames. The subbasin plan is large, but it appears that when finished it will follow a basic logic path from action to evaluation to adapting future management.

The aquatic RME section is organizationally confused, and it does not follow through into adaptive management—except perhaps by vague implication in some places. The aquatic RME plan should be better organized, and empirical measures that can be used in adaptive management should be added to it.

## **Snake River Hells Canyon**

The Snake River Hells Canyon Subbasin Plan covers many elements of a subbasin plan very well, such as the general overview of the subbasin, Inventory, and description of focal species. However, the plan does not take the next step of adequately synthesizing the information it has presented. The plan does not meet several key scientific elements called for in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide, but it does not adequately identify limiting factors for enough aquatic focal species to constitute an ecosystem approach, nor does it provide the logic path from limiting factors to identification of objectives and prioritization of strategies.

### **Assessment**

For the most part, the Assessment provides a clear understanding of the conditions and challenges faced by planners and managers within the watershed. However, several of the sections are either missing or need further treatment before the Assessment can be of best use in developing an ecosystem-based Management Plan.

The Assessment generally describes or references the geographical, demographical, and environmental contexts for fish and wildlife within the subbasin. This overview provides an abundance of pertinent data, is extensive, and describes the salient and unique canyon features of the watershed well.

The plan was particularly conscious of migratory corridor and transient population issues. The planners should, however, provide more information concerning the presence and effects of the four Lower Snake River projects on fish and wildlife in this subbasin. The authors focus on the hydroelectric projects of the Hells Canyon complex as the primary source of the subbasin's mainstem problems. Certainly, they are a big part of the problem, but the four Lower Snake River projects unquestionably have had and continue to have an adverse effect on fish and wildlife in the Hells Canyon subbasin as well as in the downstream subbasin. The importance of these projects is evident from Table 37 where problems of connectivity/passage appear prominently ("a principal or most influential factor") for each of the focal species. It is apparent that there must be coordination on an hourly basis between upstream water releases from the Hells Canyon complex and power operations at the four Lower Snake River dams (see ISAB 2003-1: [www.nwcouncil.org/library/isab/isab2003-1.htm](http://www.nwcouncil.org/library/isab/isab2003-1.htm)). The whole system is operated as a unit and should be considered as such with respect to its effects on anadromous fish.

The Assessment identifies nine aquatic and twelve terrestrial focal species. The twelve wildlife species are chosen to represent nine wildlife habitat types. The terrestrial species' habitat use by habitat type is well described. The plan's assessment of aquatic focal species populations is very thoroughly done and uses information developed by the TRT. The assessment of terrestrial focal species' populations is also thoroughly done. The plan makes good use of maps and cites relevant literature. The Species Characterization and Status Subsection is broadly descriptive and highly informative, but more detail needs to be added describing the relationships between artificially and naturally produced populations and harvest effects.

The Species Characterization and Status Subsection is broadly descriptive and highly informative, but more detail needs to be added describing the relationships between artificially and naturally produced populations and harvest effects. The Assessment's analysis of focal species information is generally excellent with respect to steelhead population and habitat issues, but the entire set of focal species is not adequately considered. Specifically, a limiting factor analysis was only done for steelhead. Life histories and habitat requirements of other species differ from steelhead. Is an action or management plan that is good for steelhead necessarily good for sturgeon? The argument to use steelhead to identify limiting factors for the subbasin is not convincing. This is a significant deficiency in the Assessment. Each focal species should have a limiting factors analysis. To facilitate this task, the planners should consider limiting the number of focal species.

The Assessment's section on aquatic limiting factors includes elaborate, often interesting discussions, which create confusion by diverging into prioritization among streams. The actual limiting factors should first be clearly analyzed and identified. This will help focus the Management Plan on limiting factors. Prioritization should be treated in a subsequent section.

The plan should also present a more comprehensive discussion of disturbance regimes and how they shape habitat and contribute to natural variation.

The Assessment provides little discussion of key assumptions and findings, or uncertainties. Working hypotheses and data needs are discussed more thoroughly in the Management Plan. They are presented in separate sections, but are not synthesized at the end.

### **Inventory**

The Inventory provides sufficient information to permit useful integration and prioritization for future fish and wildlife projects. The planners conducted a comprehensive public outreach and survey campaign to secure information about programs, plans, policies, and projects. Some effort might be expended to thoughtfully define and describe successes and failures by objective criteria. This is one of the better inventories that many reviewers have encountered.

The logic path of the Inventory's "gap identification" relating the Assessment to the existing activities and identifying the gaps is backward. Reference is made to the gaps identified in the Management Plan, rather than to the Assessment's role in this identification. A number of research, monitoring, and action priorities are identified without much explanation other than "the technical team says..." The link is not made to the Assessment's limiting factors. The synthesis is not done, although some of it shows up in the first part of the Management Plan in "problem statements."

## **Management Plan**

The Management Plan presents a very good start, but there are numerous areas that need elaboration and clarification. The plan does not include a synthesis or integration section. Prioritization issues need to be addressed. The consistency of objectives and strategies, data needs and research with reach priorities needs to be addressed. The aquatic RME section does not follow through into adaptive management.

The biological objectives appear to come from the Management Plan rather than explicitly from the Assessment. Little basis for these objectives is presented. Limiting factors identified in the Assessment are often not recognized in the Management Plan. The genesis of the biological objectives and their basis in the Assessment should be made clearer.

Prioritization is not done by strategies, but by reach based on its potential for restoration/protection and occurrence of multiple species. This prioritization is presented in the RME plan and was developed through the use of QHA. Prioritization rules used by the terrestrial technical team are presented in the RME section. However, it is unclear how the set of proposed biological objectives and strategies, and the information and research needs in the RME subsection relate to reach prioritizations. In this sense the plan lacks integration of key elements. Lack of prioritization of objectives and strategies coupled with the vague and general nature of the strategies leaves the door open for any management intervention to be implemented.

The RME subsection only very generally describes the kind of information needed to be collected to determine if the plan's visions and objectives are being met. The planners acknowledge that information is vital to adaptively refine management over short and longer-term timeframes. While the magnitude of the endeavor is large, the RME plan appears to follow a basic logic path from action to evaluation to adapting future management. To improve, the RME section needs to provide measurable variables to monitor and evaluate so progress in achieving objectives and goals can be tracked. The RME plan should also specify which entity or group of entities would be the responsible decision-maker in an adaptive management regime.

Although the diverse planning group appears to have captured the spirit and intent of the Council's eight principles of the Fish and Wildlife Program, the plan gives inadequate consideration of the dynamic nature of ecosystems and the role of disturbance in shaping aquatic habitats. It does not present the important ecological functions and processes that must be restored in this subbasin. It is unclear how the plan will address natural variation both in- and out-of-basin, or how it will allow biodiversity to be protected and restored. The Management Plan would be augmented by explicitly connecting its material with each of the eight principles. It could give attention to this in summary statements, particularly in a concluding section of the Management Plan. In sum, the Management Plan lacks some specifics regarding what action will be done first, to what extent, and to what expected outcome. Starting a conversation on these kinds of issues with the participants should help frame these decisions.

## **Asotin**

The Asotin Subbasin Plan is a very good initial effort that closely follows the planning guidance provided by the Council. The regional approach shared between the Walla Walla, Asotin, Tucannon, and Lower Snake Mainstem is a strong feature of the plans for those subbasins. The intent to integrate aquatic and terrestrial components is also a very good aspect of this plan. The plan substantially meets many of the scientific elements for subbasin plans called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide.

Wildlife assessments within the subbasin are not as strong as aquatic assessments. These wildlife assessments follow the template and process of other subbasins in this region, referring almost entirely to Ashley and Stoval (2004) and a southeast Washington framework. A regional approach to many of the wildlife species seems appropriate, but for plant and animal species unique to the subbasin or with unique attributes within the subbasin, a more local treatment would improve the planning exercise.

In general, review comments and scores on the review checklist for the four subbasins in this set (Walla Walla, Tucannon, Lower Snake Mainstem, and Asotin) are very similar, because similar approaches were used in preparation of the subbasin plans. This is particularly true for the terrestrial sections of the plans.

## **Assessment**

The Assessment provides a lengthy description of the physical, biological, social and economic conditions and history of the subbasin (as well as relationship with neighboring subbasins). The geographical, demographical, and environmental contexts for fish and wildlife within the basin are provided or referenced. Especially useful are the numerous maps providing spatially explicit detail to conditions and status.

The Assessment identifies a series of focal fish species. In most cases, inclusion was obvious, however, exclusion of any dace, sculpins, lamprey, suckers, etc. is avoided - although some attention will be paid as "Species of Interest". Inclusion of one or more non-salmonid resident species (e.g., sculpin or dace) would complete the breadth of ecologically important resources to the watershed.

Overall, this is a very good assessment except for the lack of use of QHA on bull trout and the need for more rigorous assessment of future conditions. However, the listing of complete documents as appendices made this plan difficult to review. The appendices were not well connected to the text and should be more completely synthesized in the Assessment.

## **Inventory**

Tables and maps indicate an extensive inventory of conservation and restoration activities ongoing throughout the basin. However, formal assessment of past activities (effectiveness) and synthesis for needed actions are not well-described, if undertaken. Again, extensive reference is made to information in appendices without adequate synthesis in the text. Some referenced material could not be found in the appendices.

## **Management Plan**

The plan is a good initial effort overall. The effort to combine aquatic and terrestrial portions of the planning is an especially good aspect of the plan. The primary strength of the Management Plan is a focus on land management activities to affect habitat characteristics that are likely to promote adequate ecosystem functions. The primary weakness of the Management Plan is a lack of performance measures for habitat characteristics.

The plan's fish objectives and strategies must be further developed and integrated with habitat objectives. Reviewers would like to see the plan proceed with quantitative numeric objectives for plants and animals in the basin. Numerical objectives for habitat and the ecosystem should be related to what it will take to assure viable populations. This process will help identify what habitat is needed to produce the needed distribution and abundance of focal fish and wildlife populations across the subbasin.

The draft Bull Trout Recovery Plan being developed by the U.S. Fish and Wildlife Service is not directly incorporated because it is still in draft form. The subbasin intends to consider incorporation of selected Bull Trout Recovery Plan strategies into the subbasin plan once the recovery plan is finalized.

A regional approach is followed for development of biological objectives and strategies for terrestrial focal habitats and wildlife species. This seems appropriate, but for plant and animal species unique to the subbasin or with unique attributes within the subbasin, a more local treatment would improve the planning exercise.

Further prioritization of strategies and development of a research, monitoring, and evaluation (RME) plan would improve the Management Plan. As it stands, however, the plan can effectively provide some direction on project development, funding, and review, and represents a document that will evolve to be more effective in assisting a decision process over time. The list of RME activities is comprehensive and complex and needs to be reworked to make some key observations.

## *Columbia Plateau Province*

### **Walla Walla**

The Walla Walla Subbasin Plan is a very good initial effort that closely follows the planning guidance provided by the Council. The regional approach shared between the Walla Walla, Asotin, Tucannon, and Lower Snake Mainstem is a strong feature of the plans for those subbasins. The intent to integrate aquatic and terrestrial components is also a very good aspect of this plan. The plan substantially meets many of the scientific elements for subbasin plans called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide.

Wildlife assessments within the subbasin were not as strong as aquatic assessments, and followed the template and process of other subbasins in this region, referring almost entirely to Ashley and Stoval (2004) and a southeast Washington framework. Nonetheless, it could be argued that this ecoregional planning effort is more appropriate for these migratory animals than watershed-based as used for fish. Review comments refer mainly to the aquatic environment. A number of the plan's elements need further treatment to increase the plan's effectiveness in guiding, soliciting, developing, and selecting fish and wildlife projects. Using the results from EDT to develop objectives and strategies needs to be better structured, re-examined, and validated. The research, monitoring and evaluation (RME) plan needs to be developed in cooperation with others in the Columbia Basin. Information and guidance related to bull trout is deferred to recovery planning, but the plan would be stronger — reflect a more ecological basis — if bull trout were treated in this plan.

Reviewers would like to see the plan proceed with quantitative numeric objectives for plants and animals in the basin. Numeric objectives for habitat and the ecosystem should be related to what it will take to assure viable populations. This process will help identify what habitat is needed to produce the needed distribution and abundance of focal fish and wildlife populations across the subbasin.

Further prioritization of strategies and development of a research, monitoring, and evaluation (RME) plan would improve the Management Plan. As it stands, however, the plan can effectively provide some direction on project development, funding, and review, and represents a document that will evolve to be more effective in assisting a decision process over time.

As an organizational note, much of the material necessary to review and use these plans is in the appendices. In many cases the three major components of the plan did not adequately summarize the necessary information from the appendices. The planners should incorporate the information from the appendices into the body of the plan in a concise fashion. There is a careful balance between making these documents detailed and thorough, and making them too large and unwieldy for readers.

In general, review comments and scores on the review checklist for the four subbasins in this set (Walla Walla, Tucannon, Lower Snake Mainstem, and Asotin) are very similar,

because similar approaches were used in preparation of the subbasin plans. This is particularly true for the terrestrial sections of the plans.

### **Assessment**

The Assessment provides a general context for fish and wildlife resources in the basin, but it leaves too much information in the appendices. Although the plan's treatment of the current levels of ecological degradation and impact are sufficient, major elements of the subbasin's context within the Columbia River basin such as future human occupation trends and outcomes, and ocean conditions are weak or missing. The plan should gather more information about the levels of human impact in the future, and develop a more comprehensive examination and consideration of these impacts. One of the main points of subbasin planning is to manage resources to meet these changes, rather than react to them. The data on projected human population and land use trends is likely available and is vital to this plan.

The plan uses EDT to summarize limiting factors and propose those conditions that inhibit populations from achieving the abundance and productivity expected with properly functioning conditions. Because EDT is not very transparent, the limiting factors are not currently validated. Moreover, the planners use EDT in a very prescriptive sense, but that is not the proper use of EDT. EDT outputs of numbers should not be used literally but should be used in a relative sense. In comparison, the Umatilla looked at relative outputs to identify limiting factors and opportunities for restoration and protection.

Bull trout are excluded from the analysis in spite of the fact that QHA is a tool that could be used to examine them. Historical factors are discussed well in the appendices. This plan virtually ignores fish assemblage structure and non-focal species (fish biodiversity). Non-native species' distribution, abundance, and possible interaction with native species also could be better described.

Wildlife assessments within the subbasin were not as strong as aquatic assessments, and followed the template and process of other subbasins in this region, referring almost entirely to Ashley and Stoval (2004) and a southeast Washington framework for terrestrial focal habitats. Nonetheless, it could be argued that this ecoregional planning effort is more appropriate for these migratory animals than watershed-based as used for fish. Review comments refer mainly to the aquatic environment. The distributions and status of wildlife species are assessed, but data are often lacking for terrestrial species. Habitat types are described in some detail, including current and historic representation. A regional approach to many of the wildlife species seems appropriate, but for plant and animal species unique to the subbasin or with unique attributes within the subbasin, a more local treatment would improve the planning exercise. Here, as in many plans, there is not a clear indication that the focal species selected are representative of the ecosystem and habitat types described.

The importance of key limiting factors that occur outside of the subbasin may not be adequately described or recognized in the plan. The relative effects of out-of-subbasin effects on anadromous fish compared to the reproductive potential within the subbasin

should be investigated further. The Assessment should determine if sustainable runs are probable if tributary habitat protection and restoration activities are put in place. Altogether, the out-of-basin limiting factors are not adequately addressed.

### **Inventory**

The Inventory is thorough. Its strength is that it summarizes past efforts, covers gaps, and considers whether past efforts are appropriately prioritized. Its primary weakness is in identifying specific projects that are either unsuccessful or successful and explaining why. The Inventory appears to be focused on trout and salmon, and provides little information on wildlife except for an additional document on elk, and references to WDFW plans.

### **Management Plan**

The plan describes biological objectives, as determined by the committee. The desired physical and biological changes for the subbasin are presented, but they may be inadequate to achieve the vision, and may take too much time to accomplish. Conversely, the vision for the subbasin is so broad that the subbasin may already have met it given the system's capacity.

The effort to consider objectives for aquatic and terrestrial habitat is an especially good aspect of the plan. The primary strength of the Management Plan is a focus on land management activities that affect habitat characteristics and likely to promote adequate ecosystem functions. The primary weakness of the management plan is a lack of performance measures for habitat characteristics.

In developing the objectives, the planner's use EDT in a prescriptive sense, but it is intended to be used in a relative sense. This creative use, perhaps misuse, of EDT raises issues regarding the scientific soundness of the Management Plan.

The plan lays out a reasonable and logical pathway for moving between working hypotheses, objectives to address the hypotheses, and strategies to accomplish the objectives that should be useful in implementing the plan. The objectives and strategies, as stated, are exceedingly prescriptive. There is a need for a level of objectives that are more general than the prescriptive ones and that describe what the specific objectives are intended to accomplish for each Geographic Area.

For example, hypothesis MC1 states that reduction in sediment will increase survival of various life stages of steelhead and spring Chinook. Objective MC 1.1 states that this will be accomplished, in part, by reducing embeddedness within the area to < 10%. A set of strategies is then proposed to accomplish the objectives. What is missing is a general objective that describes what is to be achieved at the population and ecosystem level by a reduction in sedimentation and a correspondent increase in survival. The general objectives should address desired changes in fish populations as well as habitat. For example, a general objective or purpose could be to restore spring chinook to areas A, B, and C where they have been extirpated, to increase the abundance and distribution of extant populations, to protect and increase abundance of core populations in stream X, Y,

and Z, to increase population diversity and connectivity, to increase life history diversity, and so forth. Each general objective should be followed by specific objectives and strategies defining how the general objective will be accomplished.

In essence, the general objectives define goals for protection and restoration in each geographic area. The general objectives do not need to be expressed solely as numeric escapement goals, although they could be. The general objectives should bridge the gap between the vision and the specific objectives, provide the Council with a broader picture of what the plan is intended to accomplish, and clarify, for purposes of project review, the principle purposes of the plan.

The Council's Fish and Wildlife Program is directed specifically at protection, restoration, and mitigation of fish and wildlife in the Columbia River Basin. Subbasin plans must provide biological objectives directly related to achieving the Fish and Wildlife Program goal. The objectives and strategies in the Walla Walla plan are aimed at habitat changes, with the assumption that these changes will enhance fish populations. Reviewers would also like to see the plan proceed with quantitative numeric objectives for plants and animals in the basin. Numeric objectives for habitat and the ecosystem should be related to what it will take to assure viable populations. This process will help identify what habitat is needed to produce the needed distribution and abundance of focal fish and wildlife populations across the sub-basin.

The lack of specification of the role of artificial production is particularly troubling.

Objectives and strategies are not explicitly prioritized, but the planners prioritize reaches based on EDT. A concern in this process is the use of the sum of diversity, productivity, and abundance to develop ranking scores. These three parameters are not independent and therefore cannot be summed. For example, abundance is dependent on both productivity and capacity, and diversity is dependent on productivity and abundance.

The clear and earnest discussion of disagreements is one of the strengths of the Walla Walla Subbasin Plan. The co-managers have yet to reach agreement on anadromous fish production goals. How to resolve this very central objective is not discussed. The anadromous fish production goals from previous planning may be unrealistically high. An approach to deciding on the balance of artificial and natural production of steelhead and salmon is absent. This will be a critical element of future planning. The difficulty in establishing this balance by subbasin planners underscores the need for basin-wide assessments of the impacts of enhancement/harvest hatchery activities on natural production. There also was a difference of opinion as to whether land acquisition should or should not be included as a strategy for enhancement of fish and wildlife.

Generally, the plan acknowledges the need to have an adaptive management loop to refine objectives and strategies. The RME logic path provides an initial attempt to link strategies to objectives through monitoring, but it is still preliminary and fragmented between two plans for monitoring and data management. The mechanism for implementing the loop and coordination is largely absent. The subbasin has a watershed

council but it is not clear that all stakeholders are willing to use that administrative vehicle for implementing the plan.

A regional approach is followed for developing biological objectives and strategies for terrestrial focal habitats and wildlife species. This seems appropriate, but for plant and animal species unique to the subbasin or with unique attributes within the subbasin, a more local treatment would improve the planning exercise.

The planners acknowledge that a regional RME plan needs to be developed. The list of RME activities is comprehensive and complex and needs to be reworked to make some key observations. This is too complex to develop from the bottom-up; direction from the Council, CBFWA, NOAA at a regional level is needed. The planners would likely agree with this observation.

As an organizational note, much of the material necessary to review and use these plans is in the appendices. In many cases the three major components of the plan did not adequately summarize the necessary information from the appendices. The planners should incorporate the information from the appendices into the body of the plan in a concise fashion. There is a careful balance between making these documents detailed and thorough, and making them too large and unwieldy for readers. The authors of the Walla Walla Subbasin Plan erred on the side of detailed and thorough. The resulting plan is unwieldy for users and reviewers.

The planning team was large and the public process was ambitious. They conducted 62 meetings, including six public scoping meetings, and four subbasin planning public meetings. Consequently, the subbasin has the makings of a strong planning infrastructure in place to refine the plan for the Fish and Wildlife Program Amendments and subsequent ESA recovery planning for Washington State and NOAA Fisheries.

## **Tucannon**

The Tucannon Subbasin Plan within the Columbia Plateau presents many of the scientific elements for a subbasin plan as called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide. The Assessment is generally thorough and planners present an understanding of the Assessment's information and implications for key issues related to in-basin and out-of-basin effects. This is a strong foundation for development of a good Management Plan that incorporates the possible and the uncertain.

The plan answers many of the questions posed in the guidelines, but presents information that leaves many others unanswered. Do trends in abundance of salmon and steelhead match trends in other nearby watersheds, such as the Asotin, with and without hatchery fish present? Do trends track positive and negative changes and past improvements in habitat or does some other factor limit production? Has smolt recruitment stabilized at a new level or is it continuing to decline to a point much lower than what models suggest? What is the time frame to improve production and capacity, and why has the

wild population not been rebuilding on its own to these levels as would be expected from a Beverton-Holt recruitment analysis? Data presented suggests that the ecosystem has changed to a state where production is limited, but the evidence and consequences of that limitation are not fully explored.

Wildlife assessments within the subbasin follow the template and process of other subbasins in this region, referring almost entirely to Ashley and Stoval (2004) and a southeast Washington framework. They are not as strong as the aquatic assessments. A regional approach to many of the wildlife species seems appropriate, but for plant and animal species unique to the subbasin or with unique attributes within the subbasin, a more local treatment would improve the planning exercise.

In general, review comments and scores on the review checklist for the four subbasins in this set (Walla Walla, Tucannon, Lower Snake Mainstem, and Asotin) are very similar, because similar approaches are used in preparation of the subbasin plans. This is particularly true for the terrestrial sections of the plans.

### **Assessment**

The Assessment is well organized and well written. The Assessment provides a general context for fish and wildlife resources in the basin. As in others, much of the presentation, perhaps too much, is in the appendices. Reviewers had difficulty finding some information as a result, or frequently had to check between the text and the appendices on topics. For example, out-of-basin effects are covered in several areas. A more concise report would either include relevant information in one place or provide clear reference to its location.

Subbasin plans need to be integrated and forward-looking. Macroclimate and human occupation and use trends that may affect hydrological or ecological processes in this subbasin over the long-term (50 years into the future and beyond), including climate change impact at the local and regional level, social and economic trends, were covered only superficially, and require more attention for these plans to more useful. This is important here because there is a significant demographic change expected; the location of this watershed makes it and the resources within especially vulnerable to changes in and outside of the subbasin.

The Assessment provides an excellent characterization of the populations of aquatic focal species. The characterizations of wildlife species are more general, and plant populations are discussed only briefly. Assemblage structure and non-focal species are virtually ignored, but the lists of species present and brief discussion of the recreational fishery indicates that species such as smallmouth bass, pickerel and others are currently important and have ecological implications. The history of stocking rainbow trout is noted. A historical perspective on fish biodiversity, including distribution, abundance, and interactions, and their role of exotics/introductions in the fishery might be discussed in more detail. Possible metapopulation implications are not considered.

Environmental conditions for aquatics are based mainly on EDT. The EDT assessment is completed and reported. It is based on expert advice for the most part, since data are found to be less than adequate and weaknesses are noted. Planners assume that EDT provides an adequate assessment of environmental needs for aquatics; they acknowledge that EDT will need calibration and regular re-working. They conclude that the predicted productivity at "optimum" could not support numeric goals for anadromous salmonids, yet they proceed with objectives and strategies for this in their Management Plan. They may find that it is out-of-basin effects that limit overall abundance. Their plans would also be improved by examining PDO and climate changes effects on the freshwater ecosystem. Research is identified to relate terrestrial and aquatic focal species to environmental conditions; this is a very large task.

A good summary of salmon and steelhead trends is provided, indicating survival trends and the amount out-of-basin survival must increase to maintain the populations (from <1% to >2.6%), and that limits on recruitment mainly occur out of the basin (hydropower and ocean). Estimated adult abundance includes hatchery fish; actual natural abundance is several fold lower (e.g., about 30,000 steelhead smolts annually over the last decade from a mix of wild and hatchery spawners, whereas carrying capacity is estimated to be five times higher, and wild steelhead returns of ~120 fish are far from the goal of ~1,000 wild fish). The majority of the return (90%) is hatchery fish and the planners appear to be aware that the long-term viability of the wild populations of salmon and steelhead are questionable, yet do not state this explicitly. A better presentation and an easier interpretation of the salmon and steelhead status and trends would involve data on the smolts-per-spawner ratio expressed as a function of the spawner density. This would be used with smolt-to-adult survival trends to characterize the population and to drive the subbasin's vision.

The goals for anadromous fish (p. 186) did not fully address the impact of hatchery fish on the remaining wild population. Planners do point to research elsewhere, and had this on their RME wish list (no design). A draft (lengthy) HGMP was attached. Hatchery fish are seen as key to rebuilding the wild population. However, at the ratios of wild to hatchery fish currently, few truly wild fish may exist. Even so, in theory, the wild populations should build on their own to capacity if no harvest, unless there are other limitations. This may be the case, and is worthy of further exploration. Coho salmon reintroduction was largely unsuccessful, but spring Chinook introductions have produced some (very few) returns. The latter is likely unsustainable without continued hatchery operations (likewise for steelhead, perhaps). The system may become one that is almost entirely dependent on the hatchery to sustain harvest unless out of basin conditions change for the better.

The plan would be improved by providing a table of harvest rates in-river, in the ocean, and the mainstem. Estimates of these rates should be available, and may direct recovery options.

While life stage survival rates are not adequately presented, life histories are well described, with excellent photos. Determination of limiting factors should ideally be

derived from investigations of limitations to production within life stages (spawning, fry emergence, juvenile rearing, migration, etc.).

The Assessment would benefit from an identification of key ecological functions for species within this subbasin, including an assessment of the current status of ecological processes and functions. Nutrient dynamics (historic and current distribution and abundance, limiting nutrients, sources, etc.) and trophic interactions (including the role of exotics and introductions), as well as the role of climatology and seasonality are not well covered in an EDT-based approach, which is how this aquatic ecosystem is characterized. A synthesis of the Assessment should incorporate physical, chemical, and biological interactions, and future outcomes. It is this analysis that will provide a determination, or at least suggest hypotheses, of the key factors that impede this subbasin from reaching optimal ecological functioning and biological performance.

Using EDT does not adequately expose uncertainties, and has many assumptions built in. The plan recognizes the weaknesses of the EDT application in this basin, and the lack of field data at this time, but the presentation would be further improved by an explicit discussion of areas requiring work. The Assessment thus follows the same template/format for other subbasins in this Province. Conditions are described but a synthesis is required that includes societal goals and long term and future trends.

### **Inventory**

The Inventory is sound, complete, analytical, and well written. It includes an assessment of the adequacy of current legal protections, plans, and projects to protect and restore fish, wildlife, and ecosystem resources. The plan does less well at adequately synthesizing past activities and their biological achievements. A clearer description of past work and progress towards their goal, and lessons learned, would improve the plan and point to the potential of the path (restoration) to lead to desired outcomes. Planners are also requested to, as applicable, describe the extent to which these programs and activities extend beyond the subbasin to a larger scale (provincial and basin-wide). The addition of a section on the relation of their activities and its affect elsewhere would enhance the plan.

### **Management Plan**

The Management Plan for the Tucannon lays out a reasonable and logical pathway for moving among working hypotheses, objectives to address the hypotheses, and strategies to accomplish the objectives that should be useful in implementing the Management Plan. The objectives and strategies, as stated, are exceedingly prescriptive. The plan would be improved by describing what the specific objectives are intended to accomplish for each Geographic Area (GA). What is missing are general objectives that describe what is to be achieved at the population and ecosystem level. The general objectives should address desired changes in fish populations as well as habitat. Each general objective should be followed by specific objectives and strategies defining how the general objective will be accomplished. In essence the general objectives should define goals for protection and restoration in each GA. The general objectives do not need to be expressed solely as numeric escapement goals, although they could be. The general objectives should bridge

the gap between the vision and the specific objectives, provide the Council with a broader picture of what the plan is intended to accomplish, and clarify, for purposes of project review, the principle purposes of the Management Plan.

Biological objectives are stated where sufficient data is available, and are almost entirely based on EDT. Biological objectives should translate to numbers of animals and plants. Here, objectives are associated with changes in physical habitat. The Council's Fish and Wildlife Program is directed specifically at protection, restoration, and mitigation of fish and wildlife in the Columbia River Basin. Subbasin plans must provide biological objectives that are directly related to achieving the Fish and Wildlife Plan goal. The objectives and strategies in the Tucannon plan are aimed at habitat changes, with the assumption that these changes will enhance fish populations. Reviewers would like to see the plan proceed with quantitative numeric objectives for plants and animals in the basin. Numerical objectives for habitat and the ecosystem should be related to what it will take to assure viable populations. This process will help identify what habitat is needed to produce the needed distribution and abundance of focal fish and wildlife populations across the subbasin.

The planners need to be aggressive about defining the numeric needs for ESA recovery, in particular, from their perspective as well as from outsiders, such as NOAA, to include quantitative objectives for gaining the structure and abundances needed to be confident that these species will persist in the basin. The plan would be much improved by also explicitly stating specification of the role of artificial production.

Research, monitoring, and evaluation (RME) are presented in general terms only. Further prioritization of strategies and development of the RME plan would improve the Management Plan. Guidance is required to advance research and monitoring issues that are specific to this watershed. The RME plan is too broad as it stands, but the important components are included. There is a recognized need for a regional approach, as well as an approach for the basin. A regional approach for wildlife issues is appropriate. For the Tucannon, there are differences in the aquatic system that warrant special interest, related to the status of the wild populations and the relatively high abundance of hatchery fish in comparison to, for example, the Asotin. Nonetheless, an increased effort at data gathering, analysis, and storage seems warranted, particularly where it relates to a decision analysis framework that will drive efforts in the Fish and Wildlife Plan.

Overall, this Management Plan is a good initial effort to combine the subbasin plan's aquatic and terrestrial portions. However, it is questionable to choose species that are supplemented with hatchery products as focal species that presumably reflect "ecosystem health." This plan acknowledges many of these problems. For example, in its RME section it specifies the need to re-visit EDT in each planning cycle, and "to determine if a correlation does exist between focal habitat management conditions and focal species population trends." Also, it reports that the planners will document the "why, where, how much and whether habitat recovery actions" will produce viability. These are the elements of sound science in these planning efforts. The Fish and Wildlife Plan and the people of the Tucannon will benefit from this plan.

## **Lower Snake Mainstem**

The Lower Snake Mainstem Subbasin Plan is a very good initial effort that closely follows the planning guidance provided by the Council. The regional approach shared between the Walla Walla, Asotin, Tucannon, and Lower Snake Mainstem is a strong feature of the plans for those subbasins. The intent to integrate aquatic and terrestrial components is also a very good aspect of this plan. The plan substantially meets many of the scientific elements for subbasin plans called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide.

Wildlife assessments within the subbasin are not as strong as aquatic assessments, and follow the template and process of other subbasins in this region, referring almost entirely to Ashley and Stoval (2004) and a southeast Washington framework. A regional approach to many of the wildlife species appears to be appropriate, but for plant and animal species unique to the subbasin or with unique attributes within the subbasin, a more local treatment would improve the planning exercise.

Of key importance, the plan specifically omits consideration of the mainstem itself as habitat or as a migration corridor for fishes that are likewise not considered. The planners conclude that mainstem problems need to be addressed at a regional level and not in a subbasin plan. This conclusion leaves this part of the Snake River (Hells Canyon and Lower Snake River Mainstem Subbasin) out of the subbasin planning process, a result that ought to be unacceptable to the Council.

In general, review comments and scores on the review checklist for the four subbasins in this set (Walla Walla, Tucannon, Lower Snake Mainstem, and Asotin) are very similar, because similar approaches are used in the preparation of the subbasin plans. This is particularly true for the terrestrial sections of the plans.

### **Assessment**

The functioning of this subbasin is dependent upon operations of the Lower Snake River dams, but that part of the subbasin is not included in this plan. Beyond that, the assessment for steelhead in the tributaries is thorough. In fact, the planners had to conclude that the steelhead (primary focal species) probably cannot meet the requirements for viability. It seems likely that steelhead in these small basins are peripheral populations that occasionally go extinct as a result of stochastic processes. Perhaps bull trout or some other species is a more appropriate focal species here.

The plan calls attention to the need to verify inputs used for the EDT analysis. Nevertheless, this is a very good Assessment. Future conditions should be assessed more rigorously.

Like the other plans in this set, the use of EDT results to develop aquatic objectives and strategies needs to be better structured, re-examined, and validated. In addition, the research, monitoring and evaluation (RME) plan needs to be developed.

## **Inventory**

The Inventory is thorough. Its strength is that it summarizes past efforts, covers gaps, and considers whether past efforts are appropriately prioritized. Its primary weakness is in identifying specific projects that are unsuccessful or successful and explaining why.

Review comments for the terrestrial focal habitats from the other subbasins in this set (Walla Walla, Tucannon, and Asotin) apply to the Lower Snake Mainstem Subbasin.

## **Management Plan**

Reviewers are concerned that the subbasin plan does not include consideration of the mainstem Snake River.

For steelhead in the tributaries, this plan is highly responsive to the Council outline and requirements. If the overall working hypothesis - "fix it, or partially fix it, and they will come" - can be supported by sound scientific analyses, this would be, for the most part, a good plan for the subbasin. The plan does an especially good job of identifying realistic and useful strategies. It also identifies the importance of developing information regarding the critical quantitative needs of a species to persist. The terrestrial component, especially, attempts to address the need to understand and protect diversity in the ecosystem.

The choice of steelhead as the primary aquatic focal species in these basins may not be the best choice, because the Assessment shows they are likely not viable. The planners began development of a strategy to integrate the aquatic and terrestrial components of the plan - they are encouraged to continue the effort.

Reviewers would also like to see the plan proceed with quantitative numeric objectives for plants and animals in the basin. Numerical objectives for habitat and the ecosystem should be related to what it will take to assure viable populations. This process will help identify what habitat is needed to produce the needed distribution and abundance of focal fish and wildlife species populations across the subbasin.

Further prioritization of strategies and completion of a research, monitoring, and evaluation (RME) plan would improve the Management Plan.

## **Crab Creek**

The Crab Creek Subbasin Plan needs additional work in each of the three components of a subbasin plan before it can meet the scientific elements for a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide.

### **Assessment**

A unique feature of this subbasin is the fact that due to the Bureau of Reclamation's Columbia Basin Irrigation Project, more water is pumped into the Subbasin from the Columbia River than enters into it from all natural sources within the Subbasin. Return flows after irrigation use, excess water, and leakage from the project all contribute large amounts of water to the system. Although there is a general discussion of the Columbia River Basin Irrigation Project, the plan would be improved by a more detailed discussion of the hydrological environment, because it may change with different economic pressures and impact the needs of species. Specifically, discussion of human actions in the overview and regional context needs significant improvement. Past trends are presented, but there is no prediction into the future.

The Assessment provides an interesting perspective on the lack of restoration value for aquatic habitat since the current flow conditions are higher than historical conditions due to the influence of the Columbia Basin Irrigation Project. The Assessment indicates that the current conditions and habitats offer opportunities to do offsite mitigation. Specifically, the authors state that the irrigation project is a Columbia River diversion, so plan implementers could use that water to enhance fisheries to take pressure off other species. The ISRP, however, has often questioned whether providing fishing opportunity in one area actually takes pressure off another area.

The Assessment identifies nine focal species: summer/fall Chinook salmon, steelhead/rainbow trout, Kokanee salmon, smallmouth bass, largemouth bass, bluegill, black crappie, walleye, and yellow perch. The latter six of these species are non-native. Although their ESA or state listing status together with their value as a game species are the primary criteria used to select aquatic focal species, the selection could be better in a number of ways. First, the plan contains only very brief summaries for each species, their important life stages, and their relationship to other species, with only minimal information provided to explain the rationale for their selection. Second, the Assessment does not adequately describe species that have importance to Native American tribes. Third, the large number of non-native focal species presents an inherent conflict with goals to protect and restore native species. As a result, the plan needs to better describe how management of these non-native focal species may conflict with management of native species. Explanations could include discussion of closed basin management as compared to open system management; e.g., in warm water closed systems, substitution may be justified in terms of the Fish and Wildlife Program. Fourth, are there native resident salmonids in the headwater? If so, these may be likely choices for focal species. A survey of native fishes may be warranted.

The plan includes some information on wildlife in the Subbasin Summary and describes one large ongoing project in the subbasin, but on the whole, the treatment of wildlife is lacking. A formal wildlife assessment was not done for this plan. Although the planners made this fact clear at the plan presentation to the ISRP/AB, the plan itself does not make this clear, which was confusing for the reviewers. Most of the checklist below only applies to aquatic information/issues; i.e., inclusion of a real evaluation of the plan's treatment of wildlife would result in "No" or "Partial" 3s and 4s scores throughout the checklist.

In sum, the Assessment includes a lot of useful information and a reasonable amount of synthesis, but the coverage is mixed. There are some important gaps or omissions, particularly with respect to wildlife and to forming "a holistic view of the subbasin's biological and environmental resources." Historical and future conditions are not assessed rigorously. Reviewers also questioned the choice of a number of non-native species to serve as the majority of focal species, but they understand the situation in Crab Creek Subbasin is unique.

### **Inventory**

Although there is a fairly extensive coverage of activities, in total, the Inventory needs additional work before it can best inform development of a Management Plan. Where it lacked effort was in an overall synthesis and general conclusion as to the state of the subbasin.

### **Management Plan**

Overall, the inadequate organization and presentation of the Management Plan make it an unusable document for implementation of proposed actions. Although the strategies are linked generally, explicit linkage of strategies, objectives, and vision is not included. Furthermore, even though the plan appears consistent with the eight principles, its lack of analysis of trajectories of ecosystem change, wildlife species, critical evaluation of QHA results, and coordinated monitoring and data management program make it unlikely that it would be used to help implement the mitigation, conservation, and restoration efforts as effectively as possible.

To be an effective planning and guidance document, this plan needs to be rewritten and carefully edited for readability. For example, in the description of the Crab Creek watershed, it would have been better to take material from the subbasin summary and fit it into the format of the subbasin plan assessment rather than just cut and paste it in; specifically, text needs editing to reconcile the places where it says things like "explained earlier in the document" which doesn't refer to this document.

Although the presentation to the ISRP/AB described outreach and open meetings designed to involve the public, stakeholder participation is not evident in the plan. The solitary item of public comment provided is a letter from the group of irrigation districts indicating they were not part of the process. The planners presented that they developed the plan in four months from February to May 2004, which is a very ambitious timeframe

to complete a plan that will meet the scientific elements described in the Council's program and technical guide.

### **Palouse**

The plan appears to be severely limited by the lack of information on habitat and population conditions in this subbasin. Even acknowledging these data constraints, the plan falls short of adequately using what little information is available. The plan is hindered by the lack of a comprehensive Assessment section. The Assessment does not include a synthesis that identifies limiting factors and lists key findings. Consequently, assessment information is not subsequently linked in the Management Plan to identified objectives with strategies to meet them. In sum, this plan does not meet most of the scientific elements of a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide.

Because of the subbasin's data and funding/resource limitations, a revised edition of the plan should focus on the establishment of a process to gather needed information, improve its assessment, and ultimately develop a technically sound restoration strategy. A section indicating what information is still needed and an RME section detailing how this information will be gathered, archived, and interpreted should be included in the plan. The plan should highlight the few key restoration and protection strategies that could be justified given the data that is available.

Agency and public participation was attempted but is limited. The plan does not provide evidence of any public review comments; a revised edition of the plan should include such evidence.

## **Yakima**

The Yakima Subbasin Plan's Assessment and Inventory components adequately meet most of the scientific elements called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Technical Guide, but the Management Plan component falls short in providing prioritized objectives and strategies that are clearly justified by findings from the Assessment and Inventory. In addition, the description of the EDT assessment is unclear and the major restoration actions are not documented. Furthermore, the research, monitoring and evaluation component of the plan is incomplete. For all three components of this subbasin plan, there is a clear need to have an open and full treatment of the Yakima Klickitat Fisheries Program (YKFP); until it is included, this plan fails to cover the entire range of subbasin activities.

The relatively high quality of the Assessment and Inventory reflects the great deal of time and energy that went into these sections of the report. It appears that the planners ran out of time as they reached the later segments of the plan. Those end segments, however, are the most crucial because they define the goals set for the program, the actions to be taken, and the monitoring and evaluation to determine if the planned approach worked. Without more detail for those three issues, the rest of the report is less likely to have much real consequence.

As evidenced in the written plan and the presentation to the ISRP/AB, this planning process was a very positive social exercise, and the right people, agencies and entities were involved. Moreover, the documentation of public comment and response was impressive and very complete. The planners should be encouraged to move forward to improve the plan.

### **Assessment**

Overall, reviewers were favorably impressed with the Assessment. The significant amount of work that went into the Assessment was evident. The application of the conceptual foundation was particularly good, as was the separation of the subbasin into its components. The body of the assessment presents a summary analysis of key habitat attributes for each of the seven Assessment Units and the watershed as a whole. The data on flow and habitat were especially useful. Although the recognition that the altered hydrograph is a significant limiting factor is an important conclusion of this document, the planners need to take the analysis of the effects of flow a step farther. An analysis of the focal species and life history stages most impacted by the altered flow regime would provide some indication of what restoration actions (short of restoring the natural hydrograph) might address some of the flow effects. If there are no actions that would be effective for those sections of the subbasin impacted by current flow management, this finding would provide a strong rationale for either 1) focusing on actions that change the current flow management program before implementing other restoration actions or 2) concentrating on restoration in areas of the subbasin least impacted by the altered flow.

The overview is informative, concise, and provides adequate context for both current plan development and future plan users. In general, although the list of focal species was broad and adequately done, the reviewers have some general concerns and observations

with the approach taken to identifying and assessing focal species and habitats. The general concerns are described in the programmatic section of the ISRP/AB report. Specific to the Yakima Subbasin Plan, several of the focal species (sandhill crane, lamprey, sockeye salmon) were not considered by the reviewers to be good choices as focal species. The problems with the selection of these species are numerous. The available information about the current status of two of these species in the subbasin was generally very poor. The sandhill crane and the lamprey both seem to be very rare in the subbasin. Their limited distribution would suggest that changes in their abundance through time would not necessarily be a good indicator of the effectiveness of the overall restoration effort. The sockeye is an extirpated species in the subbasin, and the success of re-introduction may be due to factors other than the adequacy of the subbasin restoration plan. The goal to restore these species or to emphasize them in devising strategies for action is appropriate, but to use any of them as a "focal" species in an assessment is not particularly useful.

In regard to focal species, as the Yakima Plan's Research, Monitoring and Evaluation plan is developed in the future, the choice of focal species may need to be revisited to increase the likelihood that the intended effects of management strategies can be monitored. That stated, more can be done to characterize the biota beyond the selected number of focal species. Although this level of characterization may be beyond the guidance given for this round of subbasin reports, this problem must be rectified if we are to move to a broader consideration of all the biological implications of current patterns. The ISRP/AB describes this issue more fully in the programmatic section of this report.

To depict the ecological conditions of the subbasin accurately, the Assessment should include more details concerning artificial production and stocking activities in general, and the activities of the YKFP in particular. The reader was referred to Appendix J for information regarding the YKFP, and a review of those contents are given at the end. Because of the placement of information regarding YKFP in an Appendix, with little detail presented in the main body of this document, its relationship to the entire planning effort is confusing - that needs to be clarified.

The limiting factors discussion in the assessment and the plan was incomplete and inconsistent in some respects. Limiting factors for both terrestrial and aquatic systems are presented, but they are difficult to find because they are interspersed with other elements. Although the limiting factors were incorporated into the Management Plan as well, they were hard to relate back to the more detailed explanation in the Assessment. The procedure used to identify the limiting factors is not fully explained. The reader must assume that a reliable process was utilized to identify the limiting factors presented in the Key Findings in the Management Plan. For example, the assessment of limiting factors for the focal fish species by life stage and by stream reach was not described fully in the text. It appears that the limiting factors were derived during the gathering of ten years of EDT data, and the current report simply presents this information in a well-digested form. In the programmatic section of the ISRP/AB report, the review team offers comments that cut across subbasins on EDT and on the choice of focal species, but that are also relevant to the Yakima plan. Particularly important is the requirement that the results of

EDT are used appropriately, including a clear statement of the uncertainties and limitations of each specific EDT application, and that these limitations are clearly acknowledged when EDT products are presented.

The authors did follow the suggestion to apply EDT as a diagnostic tool in subbasin planning, and because the Yakima subbasin has worked with EDT for over 10 years (page 2-381), it was particularly well positioned to conduct this analysis. Although the authors identify three templates (historic, current, and restoration), the presentation of the results is confusing. The authors refer to “ladder charts” and present expected changes under columns described as Degradation and Restoration. The interpretation of these diagrams (based on EDT documentation), however, is very confused by their statement that the charts “only apply to the Restoration reference condition ...”. Although the reviewers were forced at first to interpret what had been conducted, subsequent e-mails with members of the Aquatic Technical Team clarified how the Restoration scenario had been compared to the Current conditions. Readers should not have to guess at methods or comparisons, and section 8.2.2 should be edited (particularly the 1<sup>st</sup> paragraph of page 2.384) to ensure subsequent users can understand exactly how the analyses were conducted, and what was the basis for the Key Findings.

Reviewers have some concern that the framing of limiting factors is not based in the most relevant and current understanding of the role that human actions can have in changing landscapes, and the physical structure and biota of rivers. The limiting factors discussion seems constrained by a long history of flawed conventional wisdom about what selected fish species require. Using the specific requirements for single species based on the current dogma as a target may not lead to management decisions that will broadly benefit the subbasin biota. What evidence is there that we are not making the same kinds of narrow conceptual mistakes that led to removal of woody debris for several decades to enhance fish passage? Reviewers are not convinced that these limiting factor analyses are as firmly grounded in the most current understanding of ecology and the biology of watershed ecosystems. How and why will the species-specific approach produce different results from application of the same kind of limiting factor analysis that was done three decades ago?

The Assessment contains certain broad simple statements that contradict other statements in the documents. Some of these statements are demonstrably false (see Checklist Item I.E.3). Some of these specific statements seem to be constructed to ease the movement of a particular section of the plan without placing the statement in the broader context of empirical evidence and scientific understanding needed for a coherent plan. The plan would benefit from a revision that addresses these inconsistencies.

In summary, although it provides just enough information to develop a scientifically based management plan, the Assessment can be improved in the several areas addressed above.

## **Inventory**

The Inventory contains a great deal of excellent work, including a well-conceived strategy to relate projects to assessment findings. There are, however, several significant items that need further treatment to make the Inventory most useful. Most notably, a comprehensive description of the YKFP and its relationship to the subbasin needs to be provided; i.e., information needs to be summarized and synthesized from the appendices. The inventory of restoration programs is quite general. There is little or no specific description of the effectiveness of past actions. Completing this description would greatly increase the ability of future plan users to make informed decisions about what kinds of projects should continue, what kinds should end, and what new project types are needed to accomplish the stated goals.

The planners deserve full marks for the effort that this subbasin has invested in the gap analysis and its design. The gap analysis was innovative and proactive. The effort could be made more understandable, however, by providing tables of key words that link the Assessment's Key Findings and the Inventory. Specific recovery goals under the ESA are not adequately covered. Moreover, the value of the gap analysis depends on the limiting factor analysis having been done (in the Assessment) correctly and appropriately, which is not clear (see comments above). Better links between the Inventory and the Assessment and more specific detail would help identify gaps or future needs.

## **The Management Plan**

The Management Plan is not nearly as well organized or as complete as the Assessment or the Inventory. Its organizational structure is more difficult to follow, and the RME portion is poorly developed. More work is needed to bring the Management Plan to the level of the first two parts. The sole explanation of the proposed management plan is contained in one huge table. While the table summarizes a lot of information from a large complex watershed, the table is unfriendly to readers, and, therefore, not very usable. Because of this problem, it was difficult for the reviewers to assess whether or not this table was accurate and/or effective. Beyond basic usability issues, the principle issue for revision is that the Management Plan contains insufficient synthesis. There is no prioritization of restoration strategies or actions, which should have been the primary purpose of this section of the document. Little explanation is provided for the selection of any given strategy over others, and the logic behind some choices was not obvious and even questionable in some circumstances.

The RME component of the plan needs significant work to capitalize on the good overall effort in the Assessment and Inventory. The RME for the diversity of issues and size of this basin will be a daunting task, but some general description of ongoing efforts, including a few examples, could have been presented along with identification of key uncertainties in the plan that are not currently being addressed through existing RME efforts. The ISRP/AB is aware that the YKFP is capable of developing a large-scale RME program, but the subbasin plan participants will need to work together to develop an overall plan. The lack of integration of this plan with the YKFP that has already been developed and reviewed was conspicuous and is a clear indication of the work remaining in the RME sections.

## **Umatilla**

The Umatilla Subbasin Plan, including Willow Creek, is one of the most complete plans from within the Columbia River Basin. This likely in part reflects the fact that this subbasin had a pre-existing planning structure that was used effectively as a basis for the subbasin planning. The plan includes a thorough Assessment, an adequate Inventory, and a workable Management Plan. The entire document is well organized and clearly reasoned and presented, thus quite user-friendly. The plan includes many features that could serve as good examples for others to follow.

The Umatilla Subbasin Plan substantially meets a majority of the scientific elements for subbasin plans called for in the 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide, with the exception that the research, monitoring, and evaluation plan is incomplete. The RME plan is in need of refinement, integration, and prioritization, although even these initial elements of an RME plan are extensive by comparison with other draft subbasin plans.

### **Assessment**

This is one of the more thorough assessments done in the Columbia River Basin, and the planners have used the Assessment well in their Inventory and Management Plan. Reviewers were impressed with the overall breadth of the Assessment, which brings together appropriate information and includes a thoughtful integration of human factors. The Assessment clearly recognizes future needs and acknowledges the limits of current data, which often are lacking. The Assessment's evaluation of results under a set of hypothesized scenarios is well done and should be helpful in deciding upon strategies. Uncommon to most other subbasin plans is a fairly cogent application of economic data to integrate human and wildlife uses in the subbasin. The Assessment provides a generally thoughtful, extensive, and apparently candid discussion of human-caused disturbances over time. The analysis of the relative benefits that predicted by the EDT to result from alternative management scenarios is particularly informative. The planning and technical teams from the Umatilla Subbasin are to be applauded for producing one of the more thoughtful and clearly presented Assessments.

Terrestrial and aquatic focal species are identified, along with a rationale for inclusion. For aquatic salmonid species, the Assessment generally identifies listed units under the US Endangered Species Act. An enhancement of the description to include the role and potential contribution of the populations to the status of ESUs or Planning Units would be an appropriate next step in the discussion. Additionally, missing is the inclusion of non-salmonid species, other than Pacific lamprey, such as the Umatilla dace or marginated sculpin, for instance. The inclusion of "taxa of interest" may address part of this latter concern, as it will motivate effort to collect more general ecological information on the species of interest. The terrestrial assessment takes a more habitat-based approach, which works well for both landscape and wildlife. The subbasin is strongly affected by agriculture, and there is a good description of the impact of land conversion, exotic plant introduction, forestry practices, grazing, urbanization, and water development.

Although the Assessment is generally well done, planners could make a greater effort in determining what is feasible and what each species is likely to need (core and sub-populations, connectivity, distribution, population sizes etc.) to persist. Assessments are always based on insufficient data, so modeling, data from other species, or "best available assessments" will have to provide the starting point for an adaptive management strategy, with monitoring providing the basis for corrections. Species' needs can be compared to the distribution of appropriate habitat (including biologically important details such as nutrients) in the basin to see if the needs for persistence could be met by protected habitats. If not, areas that can provide adequate hydrology, etc., but are somehow otherwise degraded, should be considered to see if needs can be met. If the projected needs cannot reasonably be expected to be met, that fact should be identified. In this plan, the numerical goals for anadromous species are projected from an assumption that all habitat can be modified to comply with EDT standards, which seems to be an unrealistic assumption.

### **Inventory**

The Inventory is mostly complete for the subbasin as a whole, but consideration of individual projects or programs by stream reach or subwatershed is less complete. The Inventory should attempt to clarify what is possible (and by when) for each portion of the subbasin. The requirements for viability (distribution and abundance of core and sub-populations) should be considered to ensure that the plan addresses these requirements first. Among alternatives for meeting needs, the option with the greatest chance of success in the near-term should be pursued. This observation applies to the Assessment and Management Plan as well. Overall, the Inventory was not as thorough an accounting as the rest of the plan. A better representation of projects from the past five years would enhance the plan.

### **Management Plan**

The Management Plan is thoughtful, well developed, and well supported by the Assessment. It gives a reasonable and clearly stated prioritization of objectives and strategies, and identifies areas in which to focus actions; thus, the document can guide funding decisions. It is one of the few management plans to complete an extensive strategies section that includes prioritization. Prioritization is, in many ways, the crux of the subbasin planning process, and the Umatilla Subbasin Planning Team deserves credit for completing this crucial part of the plan.

Despite its many strengths, the Management Plan could be improved in a number of ways. In most cases, the plan generally explains the linkage between its biological objectives, vision statement, and assessment. There remains, however, a subtle cart-before-horse effect with supplementation and outplanting. It appears that the planners have committed to supplementation and will support its use to permit harvest for recreational and cultural purposes, regardless of its effectiveness at restoring natural productivity. Another exception is the odd separation of natural and artificial production objectives and strategies, as well as the separation of the overall discussion of fish from the two categories. A statement of harvest management targets for hatchery fish is

needed, along with the goal for wild smolt production to offset poor survival out of the basin.

In addition, explicit identification of the populations, including structures and abundances, that are needed for the viability (health) of the focal species would increase the Plan's scientific credibility. It is easy to assume that, if the quantities of habitat are protected/rehabilitated, then greater densities and viable populations will result. The goal, however, is to gain healthy ecosystems, with the focal species serving as indicators; the quantitative elements of viability (health) for these indicators need to be defined and set as program objectives. These objectives provide guidance for identification of habitat needs, selection among alternative hypotheses, specific guidance for monitoring, and numeric endpoints for adaptive management.

A theme that appears repeatedly throughout the text is an emphasis on the so-called "Phase III" project that is proposed to pump additional water from the Columbia River to supplement flows in the Umatilla River for the benefit of irrigators and fish. There is inadequate discussion of the potential costs of this proposed measure, such as the annual cost of electricity required to pump the water, in addition to the capital costs of facilities needed to accommodate the water. During the ISRP review several years ago, we learned that the cost of the "Power Repay" project amounted to \$600,000 in the previous year – a very large and perpetual economic subsidy. This cost-effectiveness of this proposal for development of Phase III, including the alternative of buying water rights from willing sellers, should be assessed by the IEAB. This would provide a basis for economic comparison of costs and benefits. The alternative of buying water rights is listed in the text, but is not evaluated formally with EDT, as are three other scenarios considered in the Management Plan. From the analysis provided, it appears that additional benefits to steelhead provided by Phase III are not expected to be large, relative to other habitat improvement measures that might be undertaken.

The initial elements of the RME plan are extensive, though still incomplete and in need of refinement, integration, and prioritization. Nevertheless, the draft RME plan is thoughtful in presenting the major issues that are of concern in an effective RME plan. The terrestrial components are better developed than are the aquatic, and these are commendable in drawing upon and attempting to incorporate and coordinate with existing RME efforts in the region. The planners acknowledge that more work is required and state that they are in the process of doing that work. A more complete M&E plan apparently will be available shortly and will reflect regional, in addition to subbasin, needs; that integrated and coordinated approach should be encouraged. It was apparent that the authors of the subbasin plan know the key issues that need to be addressed and are seeking help to complete their RME plan. Consequently, the RME plan is likely to be completed and should contribute to improved knowledge of the biological resources and the mechanisms underlying their dynamics, as well as being useful for adaptive management. Reviewers encourage guidance from the Council in coordination of a basin-wide RME plan; material provided in this Umatilla plan can assist in the process.

It is a strength of this plan that species outside of the standard charismatic megafauna and endangered salmonids are considered. It is also a strength that monitoring of biodiversity is included in the RME plan.

The implementation of strategies from this plan could impact other subbasins. For instance, fish released from the hatcheries may create carrying capacity concerns downstream, mixed harvest problems, etc. Consideration and discussion of such concerns would improve the presentation.

Overall, the planners have provided a thoughtful plan, regardless of reviewers' reservations regarding supplementation levels and potential impacts in and out of the subbasin.

### **John Day**

The John Day Subbasin Plan is a good start, but it is not complete. Generally, it is responsive to the Council's Subbasin Planning Technical Guide and is consistent with the eight principles of the Council's 2000 Fish and Wildlife Program. The plan lacks an analysis of the trajectories of ecosystem change, its synthesis of existing information from the basin is incomplete, and a weak monitoring and data management program make it unlikely that the plan will effectively achieve its conservation and restoration goals. The late start in preparing the plan was a major hindrance, especially in the John Day where face-to-face discussion with stakeholders is important to work through differences and reach consensus on issues.

The Assessment overview provides a good general context for fish and wildlife resources in the John Day subbasin and for its economic base. It is one of the better assessment overviews; however, some information that belongs in the overview and assessment is found in the Management Plan and in the presentation on bull trout. Discussion of future trends and outcomes, and discussion of the effects of ocean conditions are weak or missing.

The Assessment is generally well done for the ESA listed species, but incomplete in the treatment of resident aquatic focal species. The text does not adequately discuss the status and ecology of terrestrial wildlife and plants. The plan omits large amounts of existing information on aquatic and terrestrial ecosystems in the John Day basin.

Although the Assessment provides a general discussion of the effect of the environment on fish and wildlife, it is brief and did not include important information from published research done in the John Day Basin. Quantitative analyses and syntheses are incomplete or lacking for aquatic species.

The Assessment provides a general description of the subbasin and its fish and wildlife species. The John Day planners did address viability needs for some aquatic species, but they should make a greater effort in determining what each species is likely to need to persist (core and sub-populations, connectivity, distribution, population sizes etc.) as a

basis for assessing alternatives to meet these needs and to establish program priorities. Historical and future conditions are not assessed rigorously. EDT analyses are incomplete and QHA analyses are missing for aquatic focal species. Overall, the Assessment does not provide an adequate basis for planning the conservation and restoration of aquatic resources. The Assessment is relatively complete for terrestrial resources.

The Inventory contains thorough lists of projects, but the effectiveness of projects and their remaining gaps need to be better assessed and summarized. Some information on socio-economic issues is given in the Management Plan.

## **Deschutes**

The Deschutes Subbasin Plan is extensive and detailed, with many objectives and strategies for each of its many units. However, it is not clear how this plan can be implemented without supplying clear priorities or specific guidelines for prioritization. Priority areas are identified in the near-term, but these are not small or simple areas; the planners need to show what strategies should be implemented first and explain why. Additionally, objectives and strategies are not yet linked to an explicit monitoring and evaluation plan.

Given the complexity of the basin, the narrow choice of focal species has resulted in large parts of the ecosystem being underrepresented in the subbasin plan. Using additional focal species to serve as indicators for parts of the ecosystem that are not currently considered is likely necessary to make this an ecosystem-based Management Plan rather than just a salmon recovery plan.

The Guiding Principles cited in the plan also are very fish-centric, and seemingly too narrow for a subbasin plan that embraces fish and wildlife and habitat, and in which these are viewed as interactive components of dynamic ecosystems. Terrestrial habitat and species are given secondary consideration in this plan and need more thorough attention at every stage of the plan.

At times, it appears that this subbasin plan is primarily the Deschutes' on-going salmon recovery plan, edited into the subbasin planning format, with the addition of only a token terrestrial component and an incomplete Research Monitoring and Evaluation (RME) plan.

The planners provide little rationale for how they use EDT, how they prioritize reaches, and how they arrive at many of their conclusions.

The plan deserves credit for choosing beaver as a focal species, for selecting some focal habitats of interest, and for prioritizing reaches. For the parts of the aquatic ecosystem on which it so far has focused, it has gone farther towards being an adoptable plan than have many other subbasin plans. The major shortcomings identified in the review are largely a reflection of the plan's narrow choice of focal species that do not reflect the whole of the ecosystem, and its inadequate terrestrial component.

## **Assessment**

The Assessment provides a general description of the subbasin and a clear picture of the conditions and challenges planners and managers face, and it gives a very general context for fish and wildlife resources in the basin. However, major elements of that context, such as the Deschutes' relationship to other subbasins, the effects of population growth (e.g., near Bend), and an overview of wildlife and its habitat, are given only limited examination. The Assessment does not provide an adequate discussion of jurisdictional authorities, especially fishing rights. This section is concise, however, and describes well the salient features of the watershed. Anthropogenic disturbances are described in general. A positive aspect of this section is the discussion of beaver trapping and its effects. Historical conditions and changes, however, are described too generally.

The information that the Assessment provides on wildlife and their habitat is not adequate for creating a plan (although significantly more information is in the appendices, but it is not apparently used yet in the Assessment or Management Plan). Wildlife and habitat associations are adequately addressed for only a few Assessment Units such as the Lower Crooked River and the Upper Crooked River.

The descriptions of the subbasin within a regional context, and of the important ecological functions of the subbasin, are not adequate. The section on regional context is brief and deals more with jurisdiction than function and relationships. More specific information would be very beneficial, because the Deschutes is a critical subbasin, with mainstem coldwater habitats that are vital for many migrating fish, and it is also a large subbasin with a fast growing metropolitan area and diverse wildlife. The Deschutes subbasin's importance within the region and the management problems it faces need further development in the plan.

The Assessment has a general discussion of human population factors. Although the rapidly increasing human population in the basin is described, the likely future changes in human population, land use, water availability, and pollution are not addressed. The Bend area, specifically, is growing speedily, but the pressure this urban center may put on the subbasin is not discussed.

The Assessment provides no scientifically credible (quantitative or qualitative) assessment of future trends. Historical trend analysis is largely limited to the focal species.

The Species Characterization and Status Subsection adequately assess aquatic species, but the wildlife species are not thoroughly assessed. Also, the set of focal species chosen by the planners may pose some problems for effective monitoring and evaluation, and for supporting the goals of ecosystem-level protection and restoration, because the focal species do not represent the whole scope of the ecosystem, and some of them are extirpated, while others are quite rare. The exclusion of any non-salmonids leaves Pacific lamprey as the sole non-commercially important focal species. The inclusion of one or more non-salmonid species might better represent the breadth of ecologically important

resources in the watershed. It appears that the planners have set up this subbasin plan as a threatened and endangered species recovery program, and this leads to a problem with the plan's consistency with the goal of overall habitat recovery, because actions that are aimed at the focal species may not be of maximum value to the whole ecosystem.

The Environmental Conditions Section describes the effect of the environment on fish and wildlife populations in general terms. The analytical tools are relied on to provide these general terms, but a species-by-species description is, for the most part, absent. Once again, the description is narrow due to the choice of focal species for both fish and wildlife that do not represent the whole ecosystem.

It appears that the planners have set up this subbasin plan as a threatened and endangered species recovery program, and this leads to a problem with the plan's consistency with the goal of overall habitat recovery, because actions that are aimed at ESA listed focal species may not be of maximum value to the whole ecosystem.

The Assessment discusses key limiting factors and provides extensive lists of them for specific subbasins. EDT is utilized to determine key limiting factors for anadromous fish. QHA is *not* used to determine key limiting factors for resident fish. Employing QHA to do this would augment the plan. There is some quantification from the EDT model in the plan, but cumulative effects are not considered. The scale at which the EDT run is conducted is not clear.

The consideration of key findings centers strongly on issues of primary importance for focal stream-dwelling fish and flowing water. Wildlife and terrestrial habitat almost disappear from consideration at this point of the plan. There is also little attention paid to the explicit resolution of conflicts and compatibilities between species or ecological processes; thus, insufficient attention is paid to the resolution of conflicts between the management tactics and the outcomes that they might suggest and be chosen to facilitate. It does not appear that key factors are thoroughly summarized or interpreted in a manner that is consistent with the Council's Fish and Wildlife Program, which gives attention to whole communities and ecosystems, as well as to the roles of species within them. The availability and uses of water seem to be overwhelmingly of concern to the Deschutes Subbasin Plan, to the detriment of its attention to species, communities, and other aspects of ecosystems. This could be correctable, as much of the Assessment and Management Plan state a watershed-level approach, but the analysis and action sections will need to be broadened accordingly so that a more full range of species and communities are given attention.

### **Inventory**

The planners conducted a comprehensive public outreach and survey campaign to secure information about programs and plans. They provide sufficient lead-in information to permit useful integration and prioritization for future fish and wildlife projects. This plan appears to have been very responsive to the Council's guidelines at least down through the development of quantitative objectives. The underlying assumption here is that

improvements are needed across the basin and if completed fish and wildlife goals will be met.

The Inventory is adequate for fish and streams, but it largely ignores wildlife species and habitat. A more complete accounting of terrestrial species and habitat is necessary to maximize the utility and efficacy of the plan.

The Inventory describes ten high profile or high priority projects in considerable detail, aside from those listed in the Table I.1. While the planners indicate that these projects are scattered across the subbasin, they still receive considerable attention, effort, and expenditure. The results of the projects have demonstrated some improvement in riparian areas and channel condition.

### **Management Plan**

The plan's biological objectives are most explicit for the subbasins within the Deschutes, but they offer little specific consideration of uplands and wildlife. A thoughtful and thorough consideration of biological objects that pertain to wildlife species and habitat would strengthen the plan. Additionally, many of the biological objectives are not specific or measurable and are narrowly focused. They do not embrace ecosystem process and do not offer enough quantitative endpoints.

The strategies are explicitly linked to the subbasin's biological objectives in some sections and then listed by subbasin in the Management Plan, but many of this plan's strategies are really goals or are stated as tools to be used across the basin rather than as strategies (i.e., specific actions) aimed at solving specific problems.

The plan prioritizes reaches for protection and restoration, posing ten key areas that are the most important for immediate action. However, there is not enough prioritization of the extensive proposed list of fish strategies, and specific sites within reaches are not prioritized. Some criteria for judging and comparing proposals that suggest implementation specifics need to be presented in the plan. The top ten priorities remain very broad and general, and there are not priorities given among or within them.

The plan states a philosophical preference for building from strength, preserving core areas and populations, and clustering projects out from these strongholds. These choices are a good start and are consistent with the Fish and Wildlife Program, but these principles (and perhaps others) should be more formally developed to define criteria that can be used to prioritize projects in the future or to prioritize further the strategies that are in this plan.

The RME process is preliminary and not adequately described. This section is very limited and probably needs major expansion and then prioritization to serve the subbasin's needs. The RME logic path is linked to some strategies, objectives, and research needs, but the soundness of this logic path is not demonstrated. The plan is seriously deficient in terms of coordinated monitoring and data management. The research agenda is tabularized, but it is not developed in any detail. It identifies three

thematic areas of research needs: 1) life histories; 2) straying; and, 3) habitat treatments. Monitoring for bull trout and spring Chinook, steelhead, and redbands appears adequate; fall chinook is more difficult.

Overall, the RME plan is too general to meet ecosystem-monitoring needs. It only superficially describes what indicator variables will be monitored; the emphasis on restoration and the narrow choice of focal species make this especially essential, as there is no reason to expect that managing for a small number of mostly rare or extirpated species will result in diverse and productive ecosystems.

### **Lower Mid-Columbia Mainstem**

The Lower Mid-Columbia Mainstem Subbasin Plan meets many of the scientific elements of a subbasin plan described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide, but the plan does not adequately identify limiting factors for the aquatic focal species to constitute an ecosystem approach, with the exception of white sturgeon. Furthermore, the plan focuses almost wholly on the Rock Creek watershed and fails to cover the other major watersheds in the subbasin (Pine and Glade Creeks) as well as the mainstem portion including the Hanford Reach. The Inventory and Research Monitoring and Evaluation (RME) sections of the plan are also incomplete.

#### **Assessment**

The Lower Mid-Columbia Mainstem Subbasin Overview's general description of the subbasin is adequate, but the description of the subbasin in a regional context is incomplete. The introduction indicates that Rock Creek and Pine Creek watersheds will be concentrated on in the plan, but in the overview and throughout the remainder of the plan Rock Creek almost exclusively dominates the plan. In future drafts the Pine Creek and Glade Creek watersheds plus the mainstem portion of the subbasin should be more fully described, assessed, and included in the Management Plan.

The fish focal species assessment section does an adequate job in describing the past and current status of the focal species, especially for the white sturgeon, considering the limited information available. The plan includes an excellent brief summary of the current status of redds, the management attempts to protect redds, and the management plans aimed at reducing the stranding of juvenile fall chinook in the Hanford Reach. The juvenile fall chinook the rear in the mainstem habitats of the John Day reservoir are not described.

The wildlife focal species assessment section is very strong and provides good descriptions of wildlife focal species, including their distribution, relation to focal habitat, relation to other species, habitat needs at different life stages, and major disturbances. This section also includes good maps showing potential habitat.

The overall Assessment is well developed and provides a good foundation for development of an effective Management Plan. However, more information is needed on

the physical environment of the remainder of the subbasin (other than Rock Creek) and the mainstem. Also out-of-basin effects for migratory birds need to be described. Given the lack of information, uncertainties should be identified as research needs in the RME plan.

### **Inventory**

The Inventory section of the plan is incomplete. Existing protections are not listed. Existing plans and management programs are provided in a table as "projects," but the information about the projects is very general and does not identify the gaps that should be covered in a comprehensive Management Plan.

### **Management Plan**

For the Rock Creek portion of the subbasin, the Management Plan presents a reasonable synthesis of objectives, limiting factors, and strategies designed to address the limiting factors. The wildlife section of the plan is better developed than the fish section. Objectives could be specified in a more measurable form. The plan does not have a lot of detail about its implementation processes. It would have been good to see more of the "how to effectively deal with anthropogenic factors" section addressed.

A Management Plan has not been adequately developed for the mainstem portion of this subbasin, including the Hanford Reach, home to the most significant fall chinook population in the basin. Although the Assessment includes an excellent, brief summary of the problems encountered by fall chinook in the Hanford Reach and the management strategies that have been undertaken to date to minimize the effects of fluctuations of flow on killing of juveniles by stranding, The Lower Middle Columbia Mainstem subbasin plan offers a disclaimer that it does not include a set of proposed new management strategies for the Hanford Reach. Reviewers have recommendations below on the need for modification of the existing strategy in the Hanford Reach and for an additional RME element in the portion of the subbasin below the Reach. Strategies to be used for fish protection at three of the four PUD projects (Wells, Rocky Reach and Rock Island dams) in the Upper Middle Columbia Mainstem Reach are somewhat open-ended in that survival standards have been agreed upon, leaving it up to the project operators to develop strategies that will accomplish those survival standards.<sup>6</sup> The HCPs and standards are referred to in the plan, along with descriptions of some strategies being undertaken.

Current measures for protection of fall chinook in the Hanford Reach depend upon agreements dating back to 1980 in the settlement of a lawsuit before FERC among Grant County PUD, the fishery agencies and tribes for provision of stabilized flows out of Priest Rapids Dam. At that time, the FERC process undoubtedly was the appropriate (and perhaps only) venue through which to accomplish this protection. However, implementation of stable flows out of Priest Rapids Dam depends upon the provision of stable flows out of upriver projects operated by the Corps of Engineers, because of the lack of water storage capacity in the mid-Columbia Reach. Therefore, in order to be able

---

<sup>6</sup> These standards appear in Habitat Conservation Plans (HCPs) that have been formally adopted by the Federal Energy Regulatory Commission (FERC) as part of the operating licenses of the projects.

to live up to their agreements, Grant County PUD has had to develop, as a second step, hourly coordination agreements with the Corps for upriver releases. Recent progress reports from Grant PUD demonstrate a frequent failure on the part of the Corps to live up to the requirements for a schedule of upstream water releases that would satisfy the agreed upon stability below Priest Rapids Dam.<sup>7</sup>

The Lower Middle Columbia Mainstem Subbasin plan fails to discuss the Council's 2004 Mainstem Amendment that calls for changes in upstream reservoir operations. The BiOp requirements affecting those reservoir operations are for the purpose of providing flows to increase the survival of juvenile salmonids in that lower reach of the mainstem below the Hanford Reach. The Council justified this change in the BiOp requirements by calling for a study of the effects of the change. Council asked the ISRP to review a proposal from Montana Department of Fish and Wildlife for a study of the effects in Hungry Horse Reservoir. The proposal was recommended by the ISRP for funding, but the ISRP pointed out that a missing element from the study is an evaluation of the effects of the changes on survival of juvenile salmonids during passage through the lower mainstem. The Lower Middle Columbia River Mainstem is the reach wherein such effects are thought to occur. No study or proposal has been submitted that would measure the effects of this change on survival of juvenile salmonids in the lower mainstem.

#### Recommendations

1. It is now time for the Council to direct its strategy in the Hanford Reach to the Corps of Engineers rather than to Grant PUD. The Corps should be the lead entity in providing stable flows through the Hanford Reach. The mid-Columbia PUDS, including Grant County PUD should be cosigners, rather than originators of the agreement. The Council, in its Mainstem Amendments has already called for the Corps of Engineers to provide an annual report to the Council on results of the so-called "reimbursable program," which is reviewed by the ISRP. The mechanism for Council to assert authority is there.
2. A management plan specific to the Snake River Mainstem needs to be developed in order to provide a foundation of scientific soundness to the subbasin plans that deal with fish and wildlife in the tributaries that empty into the Snake River below the Hells Canyon complex. It should encompass the mainstem portions of the two subbasins, the Snake River Mainstem Hells Canyon and the Lower Snake River Mainstems.
3. Currently, the lowermost boundary of the Upper Middle Columbia Mainstem subbasin is located just below Wanapum Dam. The boundary should be redrawn to include Priest Rapids Dam and the Hanford Reach, so as to incorporate in one subbasin the strategies for protection and enhancement of fall chinook there. That stock of fish is arguably the healthiest stock of anadromous fish remaining in the Columbia Basin. Its continuing good health can only be ascribed to management strategies that have been undertaken to protect redds during and after spawning, during incubation of the eggs, as well as emergence and migration of juveniles. Hatcheries have contributed, but to a lesser degree than natural production in the river.

---

<sup>7</sup> If I control the spigot at the house, my wife may not be able to water her garden by opening the nozzle at the other end of the hose.

### **Research, Monitoring and Evaluation**

The wildlife RME section is more directed at a suite of projects than as part of the overall logic path, although the projects are tied to the strategies. For the fish species the RME section is primarily a general guide taken from the Washington State Salmon Recovery Funding Board documents and is not specifically focused on this subbasin.

## ***Columbia Gorge Province***

### **Klickitat**

The Klickitat Subbasin Plan partially meets the scientific elements of a subbasin plan as described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. The Assessment is strong on its ecological focus and provides good detailed descriptions of the physical environment, selected focal habitats, and characterizations of focal species in the subbasin. However, the Management Plan is quite incomplete and offers few biological objectives, limiting factors are frequently stated as outcomes or impacts (not active factors leading to degraded conditions), and there is no indication of any prioritization of the objectives.

The Klickitat River is a rather unique environment within the Columbia. As noted by the authors, it is one of the largest un-dammed rivers in the Northwest and approximately half of the land ownership is protected in the Yakama Nation Reservation. Plus, with the recent completion of the Castile Falls project, a large area of the upper river is now more accessible to anadromous fish. Unfortunately, even with these habitat features, the status of the fish resource is not good. The plan identifies that the historical background of spring chinook is unknown, fall chinook have been introduced and are largely a hatchery-based production, coho are hatchery produced, and the background of steelhead is unknown, but summer steelhead are heavily influenced by hatchery production. Winter steelhead is likely the only non-enhanced stock in the Klickitat River. Resident fish are not much better off given that bull trout are suspected to be present in only one tributary shared with brook trout. The status of Westslope Cutthroat seems better, but they are not a major feature of this plan? The Council should be concerned for achieving a balance of hatchery, harvest needs, and natural production but this seems to be the major challenge for this subbasin.

Two major concerns of the reviewers are (1) the assumption that the Klickitat will continue to be managed primarily for hatchery production to support harvest (this is a potential conflict with Council's Fish and Wildlife Program and the ESA), and (2) the plan appears to give little thought or effort for integrating the results of the EDT analysis or applying these results to identify the priority key findings in the subbasin or the limiting factors.

Nevertheless, the plan does a good job of summarizing limited data, and its restoration matrix is a good beginning approach for future development of an effective management plan.

## **Assessment**

The Assessment's background work is well developed and is the strongest part of the plan, but it still has some deficiencies. The wildlife summary tables do not identify limiting factors correctly. The work done on the focal fish species is fragmented and more effort needs to be directed towards integrating the results of the EDT analysis or applying these results to identify the "priority" key findings in the subbasin or the limiting factors. While the groundwork has been laid for a strong management plan, the important synthesis and interpretation is weak and not technically supportable in this state.

The Klickitat Subbasin Overview provides an adequate general description of the subbasin, but the description of the subbasin in a regional context is incomplete. The Assessment does not explain why conserving spring chinook, bull trout, and summer and winter steelhead is important in a regional context. The wildlife overview was quite similar to the one for the Yakima. The lack of trend data and consideration of human population projections and usage are notable omissions. More detail could certainly be provided.

The description of the physical environment of the subbasin is excellent. It is detailed and systematic, and synthesizes across elements, e.g. geology, hydrological patterns, water quality, and riparian habitat. The plan would have benefited from a more complete discussion of water uses, particularly the location and amount of water withdrawals. It is always helpful to have a map showing diversions, waste water discharges, etc.

The plan offers a good discussion of focal habitats and their changes over time under various influences. The text includes a discussion of the rationales for focal species selection, historic conditions, current conditions, and stresses. There is an excellent table summary of human disturbances and their effect on ecosystem components by focal habitat type.

Overall, the planners have tried to be as accurate as they can in describing the effect of the environment on fish and wildlife populations, but they have limited data to work with. The background for the wildlife species is quite well presented. For focal fish, the EDT work is apparently complete for spring chinook and steelhead, although there is no indication of different concerns for winter or summer steelhead, and there is nothing presented for bull trout. The reporting of EDT results is weak (there are no EDT results presented in the text or appendices). This draws into question whether the planners understand the appropriate use of this model. The planners have not considered how to effectively summarize their analysis for the subbasin. From their experience with EDT and the knowledge in the subbasin, it seems they could go farther in their assessment. The plans agenda appears to be focused on three major goals related to supplementation and passage projects at Castille Falls and Lyle Falls. Habitat work above Castille Falls needs to be emphasized.

The planners discuss ecological interaction in a general way that was comparatively more attentive than other plans.

Limiting factors are identified for each focal habitat and for each focal species within a habitat type. Working hypotheses are tied to these. The description of the findings on limiting factors is difficult to fully understand. The limiting factors are stated as symptoms. The comparison for historical, current, and restoration is only conducted for spring chinook and steelhead trout. The summary comments in the tables and the text seem to be a re-iteration of the EDT output, but without any description of methods used or assumptions etc. Extensive text tries to present information on “priority” reaches, but the selections differ by species and there is no overall assessment at the subbasin scale.

The planners have a logic path problem; some key findings are not justified in the Assessment. The majority of the key findings appear to be more like a list of belief statements or desired issues to address, such as hatchery supplementation and Pacific lamprey (neither of which are addressed in the assessment). Biological objectives are not stated for all of the key findings and the strategies refer to the Klickitat Fisheries Master Plan several times. This latter report is another 100+ page report that has only recently been completed and not reviewed to our knowledge. The authors should be able to state the objective and a strategy without referring to another proposed plan.

### **Inventory**

The Inventory section of the plan is simply incomplete and inadequate. Existing protections are not listed. Existing plans and management programs are provided in Table 27 as "projects," but the information about these projects is general and does not identify the gaps that should be addressed in a comprehensive management plan. Inadequate effort is made to relate the Inventory to the Assessment.

### **Management Plan**

The Management Plan presents a partial synthesis of objectives, limiting factors, and strategies designed to address the limiting factors. Objectives could be specified in a more measurable form. The plan does not provide a lot of detail about its implementation processes. The explicit recognition of ten-year monitoring is informative, but the plan is weak on funding, coordination and implementation, and data management issues.

The biological objectives aspect of the Management Plan is difficult to understand. For wildlife, the plan is marginally related to the Assessment, but there is no indication of it having a relation to the Inventory. The plan offers few biological objectives, and limiting factors are frequently stated as outcomes or impacts (not active factors leading to degraded conditions), and there is no indication of any prioritization of the lists of objectives. The summary tables for fish species do not provide the requested information. The 'Strategies and Objectives' in column number 1 of the summary tables are combined as a listing of desired outcomes or actions, but includes topics that are not addressed in the Assessment. There is no indication of any working hypotheses. The fish tables are not related to the focal species and make no reference to the Council's Fish and Wildlife Program.

The RME section identifies what kind of information needs to be collected in order to determine if the plan's vision and objectives are being met in a general way by project. The planners have a long list of factors that would need to be monitored, but no indications of how these data would be collected. There is no consideration of monitoring sites or needed sampling capabilities, or any consideration of the need for reference streams (controls) or how to assess natural production. This list of factors to be monitored should also be prioritized.

An RME section specific to the needs of monitoring and evaluating the strategies implemented in the subbasin management plan should be developed. The RME section is more directed at a suite of projects than as part of the overall logic path, although the projects are tied to the strategies. The critical data gaps are not identified, although there are many. Specific recommendations for research to address the acknowledged limits of available information are significant omissions.

The Management Plan mentions adaptive management, but offers few details regarding how monitoring information will be used to alter management plans. The Management Plan also does not describe a data and information archive infrastructure.

### **Conclusion**

The state of preparation in this subbasin is very difficult to assess given the presentation of work in this report. The absence of the appendix of EDT results and presentation of the reaches mapped in Assessment Units makes assessing the data impossible. The presentation of the wildlife habitat assessment was better than the aquatic portions, but the use of wildlife focal species seemed confused in the management plan presentation. Overall, a better basis for planning likely exists in the Klickitat than is presented in this report. Substantial revision is required to clarify what that plan might be, and evidence of community consultation and agreement is needed.

### **Big White Salmon**

The Big White Salmon Subbasin Plan substantially meets many of the scientific elements for a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and the Subbasin Planning Technical Guide, but certain elements of the Inventory and Management Plan would benefit from further treatment. The Assessment is generally well done and provides a strong foundation for development of a good Management Plan. The Inventory, however, is incomplete and not of a quality to do justice to the other components of the plan. The Management Plan is also incomplete and needs a more thorough rationale for the biological objectives, biological objectives which are more quantitative with measurable outcomes, further prioritization of strategies, and development of a sound research, monitoring, and evaluation (RME) plan. The plan centers on an analysis of the effects of the removal of Condit Dam that has blocked upstream anadromous fish access since 1913, and if Condit Dam is indeed removed, this offers a great opportunity for research.

## **Assessment**

The Big White Salmon Subbasin overview provides a general description of the subbasin. However, the description of the subbasin in a regional context is incomplete. Overall, the Assessment does a good job with species characterization.

The fisheries assessment section does an exceptionally good job in describing the past and current status of the focal aquatic species. The wildlife assessment section is also thorough, considering the lack of available data. Relative to others, this Assessment is exceptionally thorough and well developed. It does provide a holistic view, and is explicitly ecological in its focus. It offers good descriptions of what is known about the subbasin, although it could go further in its interpretation of existing knowledge and in its assessment of the potential for future conditions.

The planners perform an assessment under the scenario of Condit Dam being in place and under the scenario of Condit Dam being removed. A key assumption for fish species is that Condit Dam will be removed and anadromous habitat will gradually become available. These changes have been assessed, at least qualitatively, for different life stages. There is a good synthesis of the habitat and watershed processes that affect Chinook salmon productivity by life stages.

## **Inventory**

The plan's Inventory provides only a cursory description of ongoing efforts in the subbasin and is quite incomplete. Existing protections or plans are not listed; if they do not exist, a statement to that effect should be inserted. Existing plans and management programs are provided in Table 30 as "projects." Information provided about these projects is very general and does not identify the gaps that should be covered in a comprehensive management plan.

## **Management Plan**

The Management Plan incorporates some of the basic requirements for an acceptable plan, but needs a more thorough development of quantifiable biological objectives and needs to be more fully integrated with the Assessment and Inventory. Prioritization is done in terms of short-term feasibility, but the prioritization is not done in terms of what actions would have the greatest impact towards meeting the plan's objectives. Such strategizing is better done for wildlife than for fish. Some sections of the Management Plan, especially the RME section, are incomplete. The Big White Salmon subbasin also presents a great opportunity for research if Condit Dam is removed.

The Management Plan is not without its strengths. It is strong on its ecological focus, this is especially appropriate because the subbasin sits on the Cascade crest and shares a diversity of habitats from both east and west sides. It also offers both primary and secondary tier locations for strategy implementation according to whether they can be implemented in the next five years, and the plan addresses significant limiting factors and the degree of likelihood of implementation success.

As indicated in the introduction of the Management Plan, at the time of its submission to the Council, the plan was primarily a WDFW plan because the Yakama Nation and Klickitat County did not have time to participate in crafting it or reviewing it. This issue needs resolution.

## **Columbia Gorge**

The Columbia Gorge Mainstem Subbasin Plan adequately meets many of the scientific elements of a subbasin plan described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide, especially for white sturgeon. However, the plan does not adequately identify limiting factors for enough aquatic focal species to constitute an ecosystem approach, nor does it adequately identify and discuss out-of-basin factors that may be limiting focal species. Despite these several deficiencies, the plan provides a sound starting point from which to further develop and prioritize biological objectives and strategies.

### **Assessment**

The overview could pull in more detailed material from other parts of the plan, and provide more discussion of the listed species that migrate through the subbasin and of the relevance of the hydrosystem affecting them.

Ecological functions for the focal species are discussed only in general terms in the descriptions section and in the limiting factors section. The plan does not adequately cover interspecies-relationships and function of other species in the reservoir, such as American shad and aquatic macrophytes. However, the plan covers the environmental requirements for white sturgeon very well. Although they were not chosen as focal species, the description of freshwater mussels as indicators of habitat quality and historic use by Native Americans presents a good case for considering an invertebrate as a focal species.

The description of the reservoir environment, outside of sturgeon habitat, is inadequate. A discussion of the effects of the hydrosystem as a limiting factor for the aquatic focal species is lacking.

### **Inventory**

The Inventory should be more specific in relating programs back to the assessment of limiting factors. A section addressing gaps is included, but is incomplete as it only identifies several needed actions for white sturgeon. The Inventory misses a discussion of the significant effects of the hydrosystem on the focal fish species, as well as other ESA listed salmonids (juveniles and adults) migrating through this subbasin.

### **Management Plan**

For the most part, the Management Plan is adequate for the focal species, especially white sturgeon, but the plan fails to put the subbasin into an ecosystem context. The Research, Monitoring and Evaluation (RME) section indicates general information that will be needed but does not identify specific indicator variables. The RME is

discussed in general terms in reference to ongoing plans that are either out of the subbasin or will cross subbasins. It is unclear what data exist for the reservoir and who has the responsibility for collecting the data. The plan should include a discussion of this. The executive summary of the subbasin plan is a little confusing in its current form, as the reader is walked through the same sections as the full plan. It would be more effective to pull out the key points in narrative form for the assessment, inventory and management plan. It would also be more useful to include tables and figures in the text so that they are right at hand with the text discussion, rather than having them in an appendix at the end of the document.

### **Fifteenmile**

The Fifteenmile Creek Plan, including Chenowith, Mosier, Rock, and Three-mile Creeks on the Oregon-side of the Gorge, substantially meets the scientific elements of a subbasin plan as described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. The Management Plan is comprehensive and clearly applicable to on the ground conditions as would be widely understood. The plan is more thoughtful than most in terms of giving contextual information, which likely reflects participation by the watershed councils. The plan is internally consistent; strategies in the Management Plan are directly linked to the limiting factors identified in the Assessment.

The Assessment is thoroughly executed, well documented, and thoughtful. It includes a clear explanation of the planners' use of EDT and QHA. The use of EDT to forecast the magnitude of fish population responses from evaluating different future conditions is the kind of action this exercise is intended to foster. The information needed to help determine whether achieving optimum conditions is possible is identified. Steelhead receive the most complete analysis in this section, and the discussion was adequate given that this is a rather data-poor subbasin. Giving a similarly detailed analysis of the other focal species would further enrich this portion of the plan. In addition, because EDT is a species-centered analytical tool that does not really address ecosystem health or interspecies compatibility, elements of the key findings are not thoroughly discussed. Using other means to further examine these key findings would further enrich the plan.

Overall, the Assessment provides an intelligent discussion of the modeling methodologies used and indicates knowledge of their strengths and weaknesses; e.g., the Assessment includes a useful section on "confidence in the data." Scientists and managers may or may not agree with the EDT analytical method, but the EDT rules were followed, and that is commendable.

The Inventory is more useful than that of many other subbasin plans. The Inventory described the gaps between existing and potential actions well by comparing them to limiting factors and discussing the geographic extent of riparian, in stream, and upland conservation protections. Adding a socio-economic analysis would further augment the Inventory.

The Management Plan provides a good discussion of incentives needed for actions on private lands, which is important because 81% of the acreage in the Fifteenmile subbasin is privately owned. About 37% is cropland and 21% is rangeland. The fact that in the past five years nearly half the agricultural acreage has been converted to direct-seed/no-till systems shows a receptivity in the subbasin to alternative agricultural practices that offer potential biological benefits. This conversion to no-till deserves further discussion in the Management Plan, in terms of conditions enabling this conversion, plans for monitoring its biological impact, and the potential for continued adoption of no-till practices.

The Management Plan includes a reasonable start to an RME section, given the available resources. The RME section could be improved by a more detailed discussion of funding, coordination and implementation, and data management issues.

Overall, the plan presents a sound logic path and describes what should be done. To build upon this sturdy foundation, the planners must decide what will be done in the RME section and provide details regarding how information will be used to alter their management plan and tie their monitoring back to EDT. The level of monitoring needed in this smaller subbasin should be determined with consideration of regional needs, opportunities, and economies of scale; i.e., the region does not need intensive and comprehensive monitoring everywhere.

Where does Fifteenmile Creek fit into an overall monitoring strategy for the Basin? The fact that there are no hatcheries or dams (yet) in Fifteenmile Creek makes it an attractive subbasin for comparing the efficacy of habitat restoration with other subbasins in this province that rely heavily on artificial production.

## **Hood**

The Hood River Subbasin Plan, which includes the lower Oregon Columbia River Gorge tributaries, is readable, beautifully organized, and of high quality. It reflects the longstanding existence of an active and effective watershed council. The plan lays a good foundation for future management and substantially meets the scientific elements for a subbasin plan called for in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. The Assessment and Inventory and biological objectives are very thorough and useful.

The treatment of the Gorge tributaries is not as comprehensive as for the Hood subbasin. For the Gorge tributaries, the QHA analysis could be further refined and more detail added regarding future research, monitoring, and evaluation (RME) activities.

## **Assessment**

The Assessment is of very high quality, is thoroughly done, and provides a strong basis to develop a management plan and identify and prioritize objectives and strategies. The Assessment's analyses and conclusions are technically based. The Assessment goes beyond description to include evaluation and interpretation and provides an excellent example for other subbasins.

The Assessment provides a good overview that includes an excellent introduction to the planning process and a good look at human uses, disturbances, and hydrology. More attention to population and water use projections would further enrich this plan. The treatment of environment and populations relationships is particularly well done, for aquatic and terrestrial species as well as for current and future conditions. The QHA analysis for the Gorge tributaries ranks stream reaches for steelhead and rainbow trout but does not identify the habitat attributes that were most important in determining these rankings. Adding these important habitat attributes would improve the Gorge tributaries' QHA analysis.

The Assessment describes both historic and current conditions well for aquatic and terrestrial species. EDT was used to identify five limiting factors for focal aquatic anadromous species (steelhead and Chinook salmon): channel stability, flow, habitat diversity, sediment load, and key habitat quantity. The effects of these are summarized for each focal species by life stage. This effort is very well done. There is also a good discussion of limiting factors that can and cannot be corrected through human intervention.

This is one of the few subbasin plans the reviewers have seen where EDT was used as envisioned, and all of the steps were followed. The appropriateness of EDT for a system such as the Hood that has frequent catastrophic events such glacial landslides on Mt. Hood is worth exploring further. This plan demonstrates that the EDT model can be useful, but the results (overestimates, albeit relative) suggest to reviewers, as well as Hood River planners, that there is something missing from the understanding of the Hood system.

In addition, smolt yield is highly variable in systems such as the Hood. Estimating capacity is a key decision in such systems as the estimate is central to selecting strategies in the basin. Specifically, decisions on whether to proceed with supplementation or harvest augmentation strategies hinge on the estimates. For example, is the winter steelhead hatchery program a harvest augmentation strategy and the summer steelhead program a supplementation (restoration) strategy? This characterization will affect hatchery practices, especially with winter steelhead.

### **Inventory**

The Inventory is well done, goes beyond just a simple listing of projects, and meets the intent of the inventory section by producing an effort that is a valuable component of the Management Plan. This subbasin's Inventory is testament to the usefulness of active watershed councils. In other small subbasins, with less active watershed councils, the subbasin planners often did not know of existing projects. The number of projects in the Hood and the tributary streams is small enough that a more thorough linkage of inventory and assessment could be completed, and would strengthen the overall presentation. The Inventory could also be improved by linking its gap analysis to the finer points made in the Assessment.

This plan concisely summarizes accomplishments and failures in tables that describe ongoing projects. Most other subbasin plans do not do this, so the Hood subbasin planning team deserves credit for taking this step. The gap analysis provides a good detailed discussion on gaps between ongoing projects and what is needed to address the limiting factors. The gap analysis does not, however, link the Inventory to the Assessment. The analysis is a narrative, but it seems to only cover the major issues identified in the Assessment. The result is an inability to associate projects and project types to the Assessment results and priorities identified by their analyses in the assessments. The thoroughness of the plan to this point provides some confidence that the gap analysis results are adequate, but this relationship cannot really be assessed or reviewed without a more technical linkage between projects and the subbasin assessment. To augment the gap analysis the planners could make a summary table that cross-references the major findings of the assessment with projects by reach and topic. Although the Hood's Inventory could be improved, its approach is a good example for other subbasins.

### **Management Plan**

The plan's treatment of biological objectives benefits from the previous development of the Hood River Watershed Action Plan. The plan's internal consistency is very well presented. The discussion sections given with each objective provide detail on the environmental conditions needed to achieve each objective. Strategies are prioritized and related to the Assessment and described for protection and restoration objectives.

In general, the RME plan is very well integrated. In the Hood subbasin, the RME strategy will provide the data needed to evaluate the subbasin plan over time, and the objectives do state interim targets that the results can be assessed against. The issue of adaptive change is not discussed but would be inferred from the logic path. The RME plan does not address or define the "healthy economy" to be compatible with the biological objectives. The planners also need to more fully describe how the likely removal of the Powerdale dam will affect monitoring of wild and hatchery fish in the subbasin.

The RME discussion for the Gorge tributaries is incomplete and will need substantial expansion and revision. The Gorge RME plan generally needs more of an emphasis on future monitoring plans and indicators and more detail on data collection.

The plan presentation to the ISRP/AB emphasized the potential impacts on fish and wildlife of human population projections and recreational use including second home development, illegal trails, and interference with game corridors. However, the plan itself doesn't cover these issues to the extent that the presentation indicated is necessary. The presenters of the Hood team stated that one of their goals is to "balance a natural jewel with human recreation use." This will be a growing challenge and is a worthy goal for the entire Columbia River Basin and for the subbasin planning process.

## *Lower Columbia and Estuary Provinces*

### **Willamette**

The Willamette Subbasin Plan is of very high quality, and is impressive and exemplary overall. The plan reflects the reality that the Willamette Basin “is a big and complex place” and does a good job of describing how it will work within that context to improve the Willamette watershed and ecosystem. The plan substantially meets the scientific elements for subbasin plans called for in the Council’s 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. The plan did not complete some components such as a detailed prioritization of strategies or the Research, Monitoring and Evaluation section. However, the plan provides a sound logic path and describes a thorough process for how it will address these incomplete elements. The plan should prove very useful in directing and selecting fish and wildlife management actions in the Willamette Basin.

### **Assessment**

The Assessment represents an expansion of the Willamette Restoration Strategy (part of the Oregon Plan for Salmon and Steelhead) into a more detailed identification of fish and wildlife conservation priorities and environmental planning. It places a strong emphasis on local implementation which, given the extent of private ownership in the Willamette, is a necessary and appropriate focus. There is a strong emphasis throughout the subbasin plan on collaborative work with agency and organizational partners.

The Assessment provides a complete and detailed description of the subbasin. Especially useful are the discussions of human uses and the alterations on the subbasin made by human occupation. Useful "institutional" limiting factors are described, addressing the problems presented by complex and fragmented authorities and the challenges of providing environmental protections in a subbasin with extensive private land ownership. The relationship between the Willamette subbasin and the larger region is clearly presented.

The plan does a thorough job identifying limiting factors. The limiting factors section splits the Willamette Subbasin into seventeen (sub)subbasins. Four are assessed using EDT. The use of EDT and other tools to assess limiting factors is accompanied by a good study of the strengths and limitations of EDT for the Willamette subbasin. This provides context for the modifications that have been made or need to be made to ensure EDT’s relevance to conditions in the Willamette.

The Assessment followed a good strategy to expand knowledge beyond data-rich areas by conducting surveys of less well-studied areas. Watershed councils, existing programs, local governments, ODFW biologists, and other technical experts were deployed to identify limiting factors and conservation needs. Historical context of the effects on focal species and ecosystem processes are also provided.

In sum, the Assessment presents a large amount of information in a format and writing style that make it easy to digest. The examination of historical and current conditions in a

large and complex subbasin is of very high quality. The Assessment provides an excellent foundation for selecting and prioritizing strategies and management actions.

### **Inventory**

The Inventory is done very well with useful evaluative content, including identification of gaps that will be useful in identifying and prioritizing management actions. This is one of the best inventories of all the subbasin plans.

### **Management Plan**

The Management Plan is developed logically from the Assessment and Inventory. The biological objectives section begins with a narrative summary of the basin-wide changes needed to address the limiting factors and implement the vision. The need for more work is recognized and the plan's current objectives will be revised following the completion of EDT. This is a good plan of action, but until the biological objectives are finalized they can't be fully assessed.

The biological objectives are stated in terms that provide a basis for measurement. Objectives for terrestrial species are detailed and specific. Objectives for focal habitats are specified in acreage. Objectives for listed stocks are contained in the respective recovery plans and are specific. Other objectives are in the form of achieving properly functioning conditions. The biological objectives would be improved by the inclusion of explicit quantitative targets with time lines.

The Management Plan establishes guidelines for setting priorities in the Conservation Guidelines and in the City of Portland Guide for Implementation (pp. 5-21.) There is a good discussion of a process to derive priorities and make decisions about implementing subbasin-wide strategies at a local scale. However, the Management Plan presently does not get to the detail of prioritization that will ultimately be of the highest use in soliciting, developing and selecting management actions. Despite the absence of prioritization, the plan does provide a sound process to do this, and given the constraints of the time available for planning and the size of the subbasin, the status of the prioritization effort is adequate.

The plan states that the task of developing a comprehensive research, monitoring and evaluation (RME) program for a subbasin of the size and complexity of the Willamette is too large an undertaking for this time period. Instead it provides a strategic framework for monitoring and evaluation. The RME section stresses collaboration with existing projects, and begins with a description of ongoing RME in the subbasin that describes the research agenda in a general way and relies heavily on existing monitoring and research programs such as the Oregon Plan for Salmon and Watersheds. A more specific description would augment this part of the plan. The entire plan is based on a logical framework that should lead toward adaptive management, but the details are not yet in place.

## **Lower Columbia Fish Recovery Board Plan: Elochoman, Grays, Cowlitz, Kalama, Lewis, Washougal, Little White Salmon, Wind**

The presentation of the Lower Columbia Fish Recovery Board's (LCFRB) plan was generally well received by the panel of reviewers. The presentation gave a relatively complete and coherent picture of what the LCFRB is trying to accomplish. Unfortunately, the reviewers were more impressed with the presentation than with the actual written document, and it is the written document that determines whether the plan can or will be effectively used.

This is not a subbasin plan as envisioned by the Fish and Wildlife Plan. It is a recovery plan with a narrow focus on listed anadromous species. The wildlife component is nearly entirely missing. Wildlife are not included as focal species except at the provincial level (Volume 1). The individual subbasin plans should be stand-alone documents with supporting technical details located in appendices. The Management Plan should have biological objectives, strategies and Research Monitoring and Evaluation (RME) sections that reflect the needs and condition of the ecosystem, are logically related and coherent, and tied specifically to needs and conditions in the subbasin. Placing major parts of the Management Plans under the Provincial Plan (Volume 1) does not capture the unique features, conditions, and needs of the individual subbasins. For example, the Lewis River fall Chinook may have unique life histories that may be adapted to the effects of external factors (see McIsaac, D.O. 1990. Factors affecting the abundance of 1977-79 brood wild fall chinook salmon (*Oncorhynchus tshawytscha*) in the Lewis River, Washington. Ph.D. dissertation, U. of Washington, 174 p.). Fragmentation of some subbasins, such as the Cowlitz and Lewis into parts works against an ecosystem approach to recovery. The approach used in the plans makes it difficult to ascertain how priorities will be determined among the actions listed for the various subbasins. Whether this approach is adequate for purposes of amending into the Fish and Wildlife Program is a question for the Council. The ISRP/AB recommends a major revision to make the plans consistent with the Technical Guide for subbasin planners.

The Provincial Context is well done and could have provided a useful guide to the preparation of the individual subbasin plans. Volume 1 sets up a good approach at the provincial level, but that approach is not carried through to the subbasin level. All of the documents in aggregate contain a lot of good information, but it is scattered among several files and not organized for easy and efficient use. The information in the plans is arranged in a manner that is so confusing that the reviewers had to spend much of their time searching through the myriad documents of the plan to find specific pieces of information. The Council's recommended format is designed to prevent this, and the documents should be formatted to conform to that outline.

The premise of the plan is that it serves as a recovery plan for Washington Lower Columbia salmon and steelhead populations while also satisfying the requirements of the Northwest Power and Conservation Council Fish and Wildlife Plan for a subbasin plan for eight full and three partial lower Columbia subbasins. It likely does the former but does not do the latter.

The negative comments about the organization and format of the plan should not reflect poorly on the tremendous amount of work that evidently went into the collection and preparation of the information contained in the documents. The presentation of information derived from EDT in the subbasin plans is very well done, although it needs more synthesis. The authors could have effectively used the information on recruits per spawner to better make assumptions about productivity in the habitat. The technical foundation's examination of genetics and natural spawning is very good, but in the individual subbasins it is not clearly expressed. The external environmental factors are not given enough attention.

### **Mainstem Lower Columbia and Estuary (Bi-state Plan)**

The geographic scope of the Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan includes the Columbia River plume and extends 146 river miles to Bonneville Dam. The scope of the plan does not extend past the confluence of the tributaries that drain into the Columbia River, with the exception of the western-most Oregon tributaries (WOTs), including the watersheds of Youngs Bay, Nicolai-Wikiup, Lower Columbia-Clatskanie River, and Scappoose. These watersheds have been included in the plan because they are not already covered under other subbasin planning efforts. The two subbasins are within the jurisdictions of both Oregon and Washington. The states have agreed to combine the two subbasins in a single plan. The geographic area of the two subbasins aligns closely with that of the Estuary Partnership, which was asked by the Governors of Washington and Oregon to coordinate federal and state efforts to recover threatened and endangered species. The subbasin plan carries a heavy bias toward anadromous fish recovery.

In theory, the Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan is generally consistent with the scientific elements of a subbasin plan as described in the Council's 2000 Fish and Wildlife Program and Subbasin Planning Technical Guide. In implementation, however, the plan could differ from the Council's scientific elements. At the moment the strategy statements create uncertainty about the specific procedures to be followed, but the measures and research identified could form the elements of a progressive plan to assist recovery and restoration. The plan could be broadened to be an ecosystem-based subbasin plan that addresses the subbasins beyond anadromous issues. The planners feel that these subbasins are unique to all others in the Columbia River Basin because they are located at the river's end.

The plan needs to be organized according to the Council's format from the technical guide. Currently, the plan contains a greater level of detail and overall consistency than many other subbasin plans, but its organization is so confusing that reviewers could not find key pieces of information in the document and its appendices. A thorough analysis of the plan's organizational shortcomings is included at the end of the checklist.

## **Assessment**

The plan's emphasis on anadromous species has created an Assessment that is thorough for them, but weak for other species. The "analyses" that are conducted, however, are well presented and once the organization is discerned the logic process can be followed. Adding text describing the QHA analysis and condensing the hypotheses would augment the Assessment.

The Assessment offers a generally adequate overview of the subbasin. The plan provides a good history of land and water uses in the subbasin, but its description of current uses is thin. Because the river and estuary are heavily developed, competition with existing human activities will be an issue for any restoration activity, so the omission of descriptions of land use and population projections is significant. A significant feature of the ecosystem is the abundance of hatchery fish that annually migrate through the system. The information presented tends to be of total returns of wild and hatchery adults; there is essentially no data on the number of hatcheries and releases.

The mainstem Columbia River between Puget Island (upper estuary) and Bonneville Dam remains largely un-assessed even after this process. This limitation has been identified before but it still persists. Approximately 100 miles of river is either a gauntlet common to all up-river and Willamette River salmonids, or could be viewed as a hundred miles of restoration opportunities. At this time there is apparently insufficient information to assess the importance of this large and highly modified subbasin.

This plan's presentation of historic and current limiting factors differs from that of other subbasins. In this case, the authors conducted the Assessment and then prepared a series of working hypotheses that "collectively represented our current understanding of the primary issues in the estuary and mainstem" (this is also done for the WOT). The hypotheses complete the Assessment sections and then lead to tables of limiting factors that are included in the Management Plan chapter. Limiting factors for anadromous species include severe channelization in the lower mainstem, the resulting subsequent loss of backwater habitat, and riparian degradation. An equally detailed examination of limiting factors for terrestrial focal species would strengthen this plan.

## **Inventory**

The Inventory section is hard to read and does not include the information requested, although much of this information appears in the Management Plan. The Inventory needs to be reorganized to compare current programs and projects with the limiting factors identified in the Assessment. A concise comprehensive Inventory would be useful for generating project solicitations and for developing and reviewing proposals. In addition, further effort on the Inventory could lead to a better understanding of the system.

The subbasin plan makes a start at relating the Assessment to existing activities and identifying the gaps between past actions and actions needed to meet recovery and other goals of the Management Plan. In the introduction to the Inventory, the authors note that a database of projects and programs had been compiled and could be queried for additional information. A more empirical assessment of projects and assessment

outcomes could have been developed. Without such a link, reviewers are unable to identify critical uncertainties or to accurately assess how completely they are being addressed by ongoing projects.

### **Management Plan**

The Management Plan includes the best content of the subbasin plan, but the logic path is difficult to follow and the biological objectives should be clarified. The information is embedded in the plan, but the overall presentation should be re-organized for readability and clarity.

Additional focus on the mainstem, Portland, Vancouver, Astoria, etc. would strengthen the plan. The needs of the non-anadromous species would benefit from more attention, as the present plan fails to address management of anything but anadromous stocks. There also remains a significant role for research in these subbasins and a continued need for a full habitat inventory and assessment in the fluvial mainstem. The reviewers note the need for greater research emphasis on the mainstem portion of the river is consistent with previous ISRP comments.

The plan relates each strategy to one or more objectives and describes how it would be implemented by one or more measures (or actions). Strategies are related to the subbasin Assessment via the objectives and limiting factor analyses. Strategies are "tiered" according to their ability to address key objectives, relationship to the ESA, relationship to focal species of the subbasin, and socio-economic considerations as stated in the vision. The measures should get to a more useful level than "No net loss," which is a goal, not a strategy. The plan's strategies are prioritized only at a general level, without a clear identification of the few highest priority actions.

Research, monitoring, and evaluation (RME) efforts that are developed specifically to implement this subbasin plan are included as part of the LCFRB Lower Columbia Salmon and Steelhead Recovery Plan. The subbasin plan states that this, along with substantial ongoing RME planning efforts, can be used to evaluate this plan's strategies and measures. However, the subbasins will need more focused RME programs. The basins have many species of value and host all upriver salmon production, but the focus on the mainstem and, until recently, estuary habitats has been inadequate. The implementation of a comprehensive RME program could be very expensive. The plan's RME logic path and its adaptive management component are found in Chapter Eight Volume One of the LCFRB report.

---

w:\em\ww\isrp\1 final isrp reports\isrp&isab 2004-13 subbasin plan review.doc