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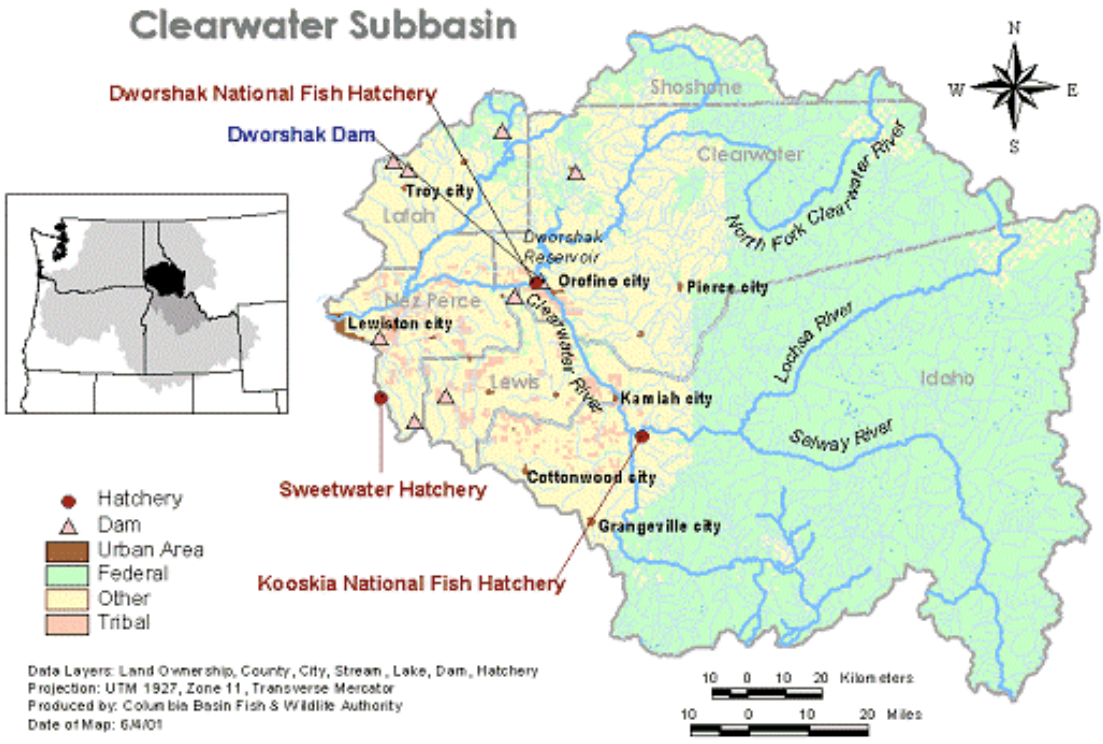
Review of Draft Clearwater Subbasin Plan

(November 2003 Version)



ISRP 2004-4
February 6, 2004

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Table of Contents

ISRP Review of Draft Clearwater Subbasin Plan: November 2003 version

I. Executive Summary

The November 2003 revised draft Clearwater Subbasin Plan is an improvement over the 2002 draft in that it is better organized and starts to link findings from the assessment and inventory into the management plan. It is more readable and cross-referenced than the earlier draft. However, it does not differ substantively from the 2002 draft; thus, many of the ISRP's major concerns with that plan's shortcomings remain. The 2003 revised plan did not build on the detailed comments provided by the ISRP in its review of the 2002 draft. The 2003 Subbasin Plan remains largely a "plan to create a plan". Nevertheless, the ISRP recognizes that this initial Subbasin Plan and the ISRP review of it will be scrutinized as a model for subbasin plans that are still in development and are to be submitted later in 2004. We encourage planners to recognize the strengths of the Clearwater Subbasin Plan, as well as the ISRP's criticisms of it.

The 2003 Draft Clearwater Subbasin Plan does not constitute a scientifically justified subbasin plan. It does not clearly set forth and scientifically justify the desired direction for the subbasin, nor does it describe a prioritized problem-solving approach to restoration and protection. The Management Plan does not adequately link the characteristics of the ecosystems (described in the Assessment) and how those characteristics will be managed (actively or passively) with current activities in the basin (the Inventory) or with the abundance, productivity, and diversity of organisms. It also does not adequately discuss how habitats develop and are maintained by physical and biological processes. Finally, the plan is weak in addressing adaptive and experimental ecosystem-based management and how they would be applied in the Clearwater Subbasin.

These shortcomings have resulted in a subbasin plan that does not identify a prioritized set of strategies and actions that is derived from its Assessment and Inventory. Consequently, the plan provides little decision-making guidance for planners and managers at immediate or longer-term time scales. Thus, subbasin planners still must provide such a prioritization before the next project selection process in order to justify ongoing projects and identify new needed actions, or subbasin/regional administrators will be forced to impose their own prioritization on projects proposed for funding in the Clearwater Subbasin.

The ISRP believes that the most important points we make concern (1) the need to adequately use available information, (2) the need to clearly link the Assessment, the Inventory, and the analysis of information in these two documents to the resulting Management Plan, and (3) the need to carry the planning process to scientifically justified, integrated, and prioritized conclusions in the form of realistic priorities for achievable "next steps" for managing the subbasin's fish and wildlife resources. This last step should be obviously drawn from explicit consideration of alternative possible actions and should show explicit use of, and consistency with, the Fish and Wildlife Program.

Despite the highly critical nature of this review, the ISRP believes that subbasin planners will be able to prepare subbasin plans that adequately meet the Council's expectations for completeness and scientific soundness, even given the constraints on available time and funding. Subbasin

planners should focus their efforts on the three points above in order to produce adequate subbasin plans within the time remaining available to them this spring.

II. The Review Process

A. Subbasin Planning and the Fish and Wildlife Program Amendment Process

In November 2003, the Council accepted delivery of the 2003 Draft Clearwater Subbasin Plan, a revision of the November 2002 Draft Clearwater Subbasin Plan produced in response to an ISRP review of the 2002 document (ISRP 2003-3). The 2003 Draft Clearwater Subbasin Plan is intended to guide future fish and wildlife projects in the Clearwater River subbasin of Idaho. The Draft Clearwater Subbasin Plan is the first subbasin plan to be submitted since the Council called (in 2000) for development of subbasin plans to guide implementation of its Fish and Wildlife Program. Development of subbasin plans is part of the Council's Amendment process for the 2000 Fish and Wildlife Program (FWP).

B. Subbasin Review Criteria

Subbasin plans adopted into the Council's 2000 Fish and Wildlife Program (FWP) must be consistent with the standards set out in Section 4(h) of the Northwest Power Act. The Act requires that for a subbasin plan to be adopted as part of the 2000 Program, the Council must find that the measures identified in the plan meet four criteria. Specifically, the plan should: 1) complement existing and future activities of federal and state fish and wildlife agencies and Indian tribes; 2) be based on the best available scientific information; 3) use least-cost alternatives when equally effective means of achieving biological objectives exist; and 4) be consistent with the legal rights of Indian tribes in the region. Additionally, subbasin plans should be consistent with other applicable laws, mainly the Endangered Species Act and the Clean Water Act.

The criteria of the Northwest Power Act are concerned with general categories of content for subbasin plans. These content categories relate to the general functions that the plans must serve. Specific guidance for the content of subbasin plans is provided in the Council's Subbasin Planning Technical Guide. While the general content of subbasin plans needs to be uniform across the Columbia River Basin, the specifics of that content will vary across subbasins reflecting differences in visions, objectives, data and scientific knowledge.

The 2000 Fish and Wildlife Program calls for independent scientific review of proposed subbasin plans to help ensure that subbasin plans direct successful fish and wildlife and habitat actions. In an August 2002 Notice of Request for Recommendations (for subbasin plans), the Council further described its expectations for the independent scientific review. The Council specified that scientific reviewers evaluate whether subbasin plans are consistent with the Fish and Wildlife Program and its Scientific Principles. The Council also identified a list of seven additional considerations to assist in evaluating the scientific soundness of subbasin plans. The considerations focused on assessing whether the parts of the subbasin plan (assessment, inventory, and management plan) are thorough and substantially complete, whether subbasin goals, objectives, and strategies are scientifically appropriate, whether linkages were identified among components of the subbasin plan, whether alternative response and actions were

considered, and whether adaptive learning and management procedures were identified. In Sections III and IV, the ISRP provides its evaluation of whether the 2003 Draft Clearwater Plan adequately addresses the Council's Fish and Wildlife Program and the seven review considerations.

III. Summary Comments

The November 2003 revised draft Clearwater Subbasin Plan represents a major new step in the Council's Fish and Wildlife Program. It is the first of approximately 60 forthcoming subbasin plans intended to provide for each subbasin up-to-date biological assessments of fish and wildlife populations, a synthesis of past and ongoing fish and wildlife management activities, identification of factors currently limiting fish and wildlife production, a description of strategies to address the limiting factors, and a prioritization framework for future fish and wildlife activities.

A. Strengths of the Plan

The November 2003 revised draft Clearwater Subbasin Plan and its development process have several laudable characteristics: a) Clearwater subbasin planners organized an aggressive effort to draft a subbasin plan and submit it ahead of schedule; b) the Clearwater Policy Advisory Committee (PAC) brought diverse public and private subbasin interests together for subbasin planning; c) planners attempted to establish specific fisheries, wildlife, and terrestrial goals, such as anadromous adult return objectives; d) the planners attempted to include socioeconomic factors to inform long-range planning, and e) the initial portion of the Clearwater assessment describes the subbasin setting and its general environmental conditions thoroughly and well, and will provide a rich source of reference material for people working in this subbasin for years to come.

The Plan is an improvement over the 2002 draft. It is better organized, with more clearly articulated linkages among the assessment, inventory, and management plan. It includes a set of 21 "problem statements" (renamed and slightly revised "component hypotheses") and their related strategies. These changes make the 2003 draft plan clearer and more readable.

Other improvements in the revised Plan include specific section references that help to link the problems, objectives, and strategies in the management plan to the assessment and research, monitoring, and evaluation. A discussion section following each objective provides additional background or explanatory information to the issue addressed. The Inventory is a good recording of past and present actions. Documentation of data, sources, methodologies, and processes are more fully described, and scientific participation and review are more explicitly identified. Throughout the narrative, habitat and population descriptions are linked with watersheds, creek names, and Potential Management Units (PMUs) in the Clearwater Subbasin Inventory.

Another strength of the revised Plan is the attempt to include socioeconomic information to inform long-range planning. This is a laudable start that needs to be further developed.

B. Weaknesses of the Plan

Despite its several improvements, the November 2003 Draft Clearwater Subbasin Plan does not differ substantively from the 2002 draft and retains many of the shortcomings identified by the ISRP in its initial review. It does not yet constitute a scientifically justified subbasin plan that provides value to the Fish and Wildlife Program through the identification and justification of priorities to guide funding decisions.

The Plan is still insufficiently integrated and comprehensive to constitute a scientifically justified subbasin plan. It does not clearly set forth and scientifically justify the desired direction for the subbasin. It does not use available data and analytical tools to provide a scientifically justified and desired direction for the subbasin. It does not describe clear, problem-solving approaches to restoration and protection. It fails to justify why planned actions are likely to produce the desired outcome if implemented together over the Subbasin. Such a justification would require a more landscape-level analysis of ecosystem dynamics and linkages than the Plan presently provides. Moreover, the Plan still suffers from inadequate linkage between Assessment, fish and wildlife status, Inventory, goals, and strategies. The plan also fails to establish explicit linkages to the Fish and Wildlife Program's (FWP) Scientific Principles; detailed explanation of this comment is provided in III.C.

In general, the Plan lacks internal consistency and scientific soundness. The Inventory appears to be a thorough listing of past and present projects and programs, but falls short on describing the impacts and biological benefits of those actions. For some topics, the Assessment is quite comprehensive in presenting background information; however, the quantitative evaluation of fish and wildlife species and their habitats is insufficient. The Assessment emphasizes habitat classification and evaluation, but fails to make solid linkages from these to the abundances and distributions of fish and wildlife species that are of concern for ESA and resource management. The analysis of limiting factors should form the heart of the assessment and provide guidance and a foundation for working hypotheses concerning ecological response to human interventions. These hypotheses then shape the objectives and strategies presented in the management plan, which will in turn provide the basis for Council recommendations on project funding. In contrast, the Assessment offers only general descriptions of limiting factors for fish populations based on large land/water units and does not partition the limiting factor analysis by fish life stage. A quantitative assessment of focal species-habitat relationships (including identification of important habitat features and processes, etc.) was not presented.

A fundamental flaw in the Plan is the lack of description and justification for the proposed artificial production of fish in the basin. Artificial production lies so much at the core of the Clearwater Subbasin Plan and potentially has such high impact that it must be integrated with other subbasin actions and must be subject to external peer review for scientific soundness and consistency.

The Plan's aforementioned lack of well-developed and explicit linkages between the Assessment, Inventory, and Management Plan could be remedied by a more formal analysis of data provided in the Assessment and Inventory. The Plan is most critically deficient in the final

steps of Assessment and in linking the Assessment and Inventory clearly to specific management priorities.[1] These priorities could have been generated directly from the Assessment and Inventory, and the Management Plan's goals and objectives, using available analytical and planning tools, as well as guidance from the Fish and Wildlife Program in general and the Scientific Principles in particular. Available analytical and planning tools include both expert opinion and analytical tools, such as EDT and other population, landscape, or ecosystem models.

The 2003 Draft Clearwater Subbasin Plan, while more clearly written and presented than the 2002 draft, still lacks transparency (i.e., clear and explicit documentation of methods) in its description of the decision-making process, particularly with regard to the choice of specific strategies, goals, and actions among alternatives. It fails to adequately document analytical tools. Similarly, the Plan does not describe explicit actions (or budgets) to ensure coordination among actions and institutions.

Despite the inclusion of additional socioeconomic information, the Plan fails to extend this information into a landscape analysis to prioritize actions and determine a range of receptivity. For example, the Plan assumes that it wouldn't be possible to prioritize actions on private land, especially Potlatch Corporation lands, and so the Plan misses a significant opportunity to interact with Potlatch and influence management actions on a large portion of the Clearwater subbasin.

C. Consistency with the Fish and Wildlife Program and its Scientific Foundation

The 2003 Draft Clearwater Subbasin Plan shows some consistency with the eight principles of the Fish and Wildlife Program, but stronger and more explicit linkages to the Program's scientific foundation need to be developed. Particular concerns related to several of the Fish and Wildlife Program's Scientific Principles are described below.

The abundance, productivity and diversity of organisms are integrally linked to the characteristics of their ecosystems. The Plan implies an emphasis on habitat to support wildlife populations (but less so for fish). However, there is little direct linkage of fish or wildlife to specific ecosystem characteristics and little consideration throughout the Plan for potential food web and ecosystem linkages and dynamics. The Management Plan does not adequately link the characteristics of the ecosystems (described in the Assessment), and how those characteristics will be managed (actively or passively), with abundance, productivity, and diversity of organisms.

Ecosystems are dynamic, resilient, and develop over time. Some recognition of this principle is implied in the definition of habitats as early and late successional, but the Plan does not make clear whether landscape level dynamics of such habitat patches and seres are well-understood (or under study) and incorporated into the Plan. There is a tendency for the Plan to use Habitat Type language in discussing terrestrial communities; however, ecological science has strongly questioned the soundness of much of this approach. The Plan should be clear that it is not

[1] The Appendix. to this report provides an example of how the Clearwater Subbasin Plan's existing prioritization by PMU could have been extended into more global insights and a set of generalized priority actions at the subbasin level.

operating on a flawed conceptual framework for habitat and its dynamics. The Plan does not adequately discuss, in the management context, how habitats develop and are maintained by physical and biological processes.

Species play key roles in developing and maintaining ecological conditions. The Plan contains little recognition of species interactions or species-ecosystem feedbacks in general, although section 6.2 of the Assessment describes species with strong relationships with salmon and acknowledges the role that salmon played in transporting marine nutrients into the Clearwater ecosystem. Another scientific principle describes the linkage between biological diversity and ecosystem persistence amid natural variation; however, the plan fails to recognize and discuss this principle and its application to the Clearwater subbasin.

All of the italicized principles discussed in the paragraphs above should be explicitly integrated into the fish abundance targets that the draft Plan has stated but not yet justified.

Build from strength. Use native species wherever feasible. Restore ecosystems, not just single species. These principles are given inadequate consideration and application in the Plan. Habitat restoration targets are not justified on the basis of these principles. The terrestrial objectives focus more on saving rare and listed species, and the aquatic objectives seem to have completely ignored the "build from strength" dictum. The Plan espouses a lot of active management, but does not in fact justify the need for or desirability of active as opposed to passive restoration and preservation.

Habitat-based. While the wildlife portion of the Clearwater Subbasin Plan emphasizes habitat, it does not supply a good rationale for linking habitat preservation and restoration goals with wildlife outcomes. In regard to aquatic resources, in particular salmonids, the Plan falls far short of the need with respect to habitat. Details on this shortcoming are provided below in Section IV.

Experimental frameworks. The Plan is weak in addressing adaptive and experimental ecosystem management and does not convey a clear picture of how adaptive management would be applied in the Clearwater Subbasin. At times the Plan invokes experimental frameworks, but tends to only use the language, rather than presenting concrete approaches that provide sound experimental frameworks and clear adaptive feedbacks for modifying actions. That the actions proposed are often direct continuations of ongoing projects and management actions causes one to question whether evaluation and feedback are in fact given much role in the Subbasin.

D. General Comment for Subbasin Planners: the uses of EDT and other analytical tools

All subbasin planners should be encouraged to use a variety of formal mathematical analytical procedures, such as EDT or other analytical models, to assess and explore their resources. Such analyses are a necessary step in moving from the assessment and inventory to a prioritized set of activities (the core of the Plan) by a transparent, adaptive, and scientifically sound process. These analytical tools are commonly based on expert opinion, and they can be used in tandem with

local expert opinion, but they have the strong advantages of offering alternative analytical approaches and providing clear documentation of how information was used to estimate outcomes of potential actions. Even imperfect data can be used in such scoping exercises, as can a range of well-chosen values designed to explore what can happen under various desirable or likely scenarios. Agreement of the predictions of multiple independent assessment tools can build confidence that a strategy may be effective, and disagreement in the predictions of separate tools can be reason to exercise caution. The use of these models also provides a straightforward procedure for documenting the analysis and decision-making process that moves from the Assessment and Inventory to the Management Plan, using the best available scientific information.

IV. Specific Comments on the Assessment, Inventory and Management Plan

A. The Assessment

The Assessment is well organized and well written. However, from the standpoint of aquatic resources, in particular the salmonids, its focal fish species, the Assessment falls far short of the need with respect to its treatment of habitat, populations, and species status, and development of a prioritized set of recovery actions by species and habitats. Restoring and protecting stream habitat is an intended emphasis of the Management Plan (and indeed projects to restore structural habitat have been in progress for a number of years), but some of the most important aspects of the Clearwater system's stream habitat status are hardly mentioned in the Assessment.

Explanation of Functional Relationships

With respect to aquatics, the Assessment's main shortcoming is that the relationship of fish habitat to riparian and floodplain conditions and processes is not directly discussed or analyzed. Importantly, a healthy riparian zone usually supplies the stream with woody debris, a major factor in forming the channel features that fish need as habitat. This riparian-generated wood not only provides fish with concealment from predators and helps to shape the gravel beds in which salmonids spawn, but it also forms substrate for food organisms and even influences water currents that fish use in feeding. Riparian vegetation exerts much control on the stream's sediment load and on the streambank conformation, which is so important in salmonid habitat.

A large body of scientific literature exists on the functions of riparian vegetation and woody debris in relation to stream habitat for fish. A handy way to search for appropriate references is in the continually updated bibliographic database of the International Conference on Wood in World Rivers: www.riverwood.oregonstate.edu.

Riparian aspects enter into some of the Assessment's general material on soils, landform, and vegetational cover (and its more specific treatment of grazing), but this foundation is not built upon in the Assessment's sections on fish. Also, the Assessment includes extensive "modeling" analyses of land erosion hazard (with allusion to sedimentation hazard), water quality, and hydrologic conditions. These have strong implication for fish habitat, but with the exception of water temperature, the document fails to describe the functional connections of the modeled conditions and processes with the needs of the various fish species at critical life history stages.

The modeling and other compilation resulted in maps and tabular displays that show locations and magnitudes of sediment, water quality, and flow. Such modeling and display are useful, indeed often essential, but do not go far enough. The Assessment should *explain* functional relationships and effects on fish. If functional relationships are not adequately explained, it is likely that some, perhaps many, of those who must use the Plan will not understand why sediment, water quality, and flow regime are important.

Riparian conditions and the importance of woody debris do, however, receive extensive explanatory treatment (with abundant referencing) in the Assessment's sections on wildlife and on unique plant species. The wildlife discussions repeatedly and explicitly note the importance of riparian and wetland habitat to many wildlife species. Indeed, in choosing the Assessment's focal wildlife species, "three species were selected to represent those dependants on riparian and wetland habitats: harlequin duck, western toad, and Coeur d'Alene salamander" (p 209). Without the structural and biological influences of the riparian zone, the stream's water would be of little use to the Clearwater Subbasin's stream-dwelling fish.

Data and Information Adequacy

The Assessment's material pertaining to aquatic resources is generally not broadly based. It appears that local data were used for modeling without harkening to basic material or applicable information from outside the subbasin or region; at least that material was not referenced. For example, the large body of literature about riparian relationships of stream fishes was not drawn upon.

A major shortfall of the aquatic resources portion of the Assessment is that it fails to utilize existing aquatic resource data as part of the Assessment process and analysis. This failure apparently derives from the belief that only top quality data, that meet certain unspecified standards, can be useful in analysis and planning. However, existing historical documents, even if they may be imperfect, include data, plans, and published reports that resulted from millions of dollars of past efforts and regional investment. Such information, if the best available, should be used with appropriate caution and listing of uncertainties.

An example of how useful these kinds of data can be, and of the insights that can be gained from examining them, comes from the recent Umatilla Fish Hatchery Monitoring and Evaluation Project's (199000500) progress report, "Comprehensive Assessment of Salmonid Restoration and Enhancement Efforts in the Umatilla River Basin." An ISRP review of the report (ISRP 2003-10)[2] found it to be an impressive document with a forthright technical analysis. The project sponsors assembled a large amount of existing data into assessments for spring chinook, steelhead, and fall chinook. They also documented preliminary judgments about the value of the programs, unintended consequences, unrealistic earlier estimates and goals, and unmet expectations, as well as successes – important steps for planning future actions. These elements allow scientific review and facilitate adaptive management. As such they are key components of a scientifically sound planning process and resulting initial plan.

[2] ISRP 2003-10: Review of the Umatilla Fish Hatchery Monitoring and Evaluation Project (199000500) document, "Comprehensive Assessment of Salmonid Restoration and Enhancement Efforts in the Umatilla River Basin." July 2003. www.nwcouncil.org/library/isrp/isrp2003-10.htm

Other examples exist in which historical abundance or trend data were used to identify high priority habitat areas for aquatic species of concern. For instance, throughout the West, several successful preservation/restoration programs for cutthroat trout have used accumulated fish abundance (usually adult density) data over time to identify strongholds and locations where rehabilitation efforts would be most profitable, assess limiting factors by life stage, and develop a plan that takes advantage of opportunities as they arise.

In contrast to the aquatic resource section, the terrestrial and wildlife sections of the Assessment present stronger evidence for the points being made. Those sections are much more thoroughly referenced than the aquatic sections, include information about specific conditions in the subbasin, cite basic references about subjects, bring applicable data from elsewhere to bear, and then relate all this to the subbasin situation.

Focal Species Characterization and Status

The Assessment gives reasonable detail on the general ecology of focal species, but little specific detail on those species in the Clearwater Subbasin. This shortcoming may be in part a consequence of the choice of focal species, for which, in the case of wildlife, rather little information appears to be available. The decision to emphasize species for which little status and trend information exists compromises their use in evaluating success of implementation of the Plan.

The planning group's choice of focal species appears to be consistent with guidelines specified in the Technical Guide. However, we are concerned that the selection of only or primarily ESA-listed species as focal species may bias the Subbasin Assessment and long-term monitoring and evaluation towards those conclusions that can be drawn from species that are most difficult to sample well. This is likely to hamper monitoring, which would compromise evaluation and adaptive management. The wildlife focal species chosen in the Clearwater Assessment are rare, which makes getting good data on their abundance and productivity difficult, and many have other characteristics that make them inherently hard to sample (e.g., bats, top carnivores). The Assessment argues that these species have the most sensitive habitat requirements and so are the best indicators of ecosystem health. However, if only limited data are obtainable for them, they may not provide good evaluation tools. There also appears to be no plan to include biodiversity sampling as part of the Plan and its evaluation.

Including some focal species that are likely to be relatively easy to census and that may also indirectly provide some biodiversity information beyond the single focal species would be beneficial. For instance, trapping small mammals annually could provide data on a variety of species, some of which will be narrowly restricted or locally rare and others of which will be widespread or abundant. Such a census would be relatively easy to conduct, would require a minimum of taxonomic expertise to implement, could provide a variety of information on both single species and diversity of a local community (one which is an important food base for many carnivores), and would be very likely to provide reliable, high-precision data on abundances of some of the more readily trappable species across many habitats.

A key function of focal species is to provide data to monitor and evaluate the implementation effectiveness a Management Plan. We suggest that planners consider carefully both the quality of future data that are likely to be obtainable and the existing historical database when choosing focal species, and that they make the ease of obtaining quality data one of the criteria they use to select focal species. It will be important for the species abundance and performance data to be robust enough to convincingly show the success, failure, or counterproductive effects of actions. This will be hard to do if focal species are exclusively or primarily rare or hard to sample. Additionally, species that are relatively short-lived will be more likely to provide data in which background temporal patterns, due to such factors as climate or life-cycle dynamics, can be separated from patterns caused by response to actions implemented in the Subbasin.

The choice of focal species in the aquatic resources portion of the Assessment focuses exclusively on salmonids. Rather than being surrogates for many other species due to overlapping ecological requirements, the focal species seem to represent target species that are of great interest as an economic or recreational resource (or, in the case of brook trout, considered harmful to native aquatic fauna). Whether other fishes in the subbasin might better meet the focal species criteria should be analyzed. The Assessment and Management Plan may be best served by selecting a mix of focal species types, and by including consideration of ease of implementing a research and monitoring program that can be expected to generate useful data for evaluation.

Environmental Conditions

The Assessment provides a reasonable description of environmental conditions, but how these fit into subbasin-scale actions is not formally discussed. Current environmental conditions need to be linked to a plan to build from strength, solve critical problems/limiting factors, and achieve reasonable targets. Although the Assessment and Management Plan are often geographically structured (AUs and PMUs), it is not clear how these units will be used in implementing the Plan, or if they in fact were considered as geographic units, with some spatial and functional relationships to each other, in deciding what actions to emphasize and prioritize in the Plan.

As state above, the Assessment does not adequately treat structural habitat for stream fishes. Woody debris is one of the most important habitat components for stream fishes, but was not adequately considered or analyzed. This issue is particularly crucial because the stream restoration actions that form important parts of the Management Plan must deal primarily with structural habitat.

In contrast to the aquatic resources discussion in the Assessment, wood elements — logs, fallen trees, snags, etc., and indeed the term, woody debris *per se* — feature prominently in the information on habitat for terrestrial animals. Woody debris is mentioned in connection with harlequin ducks, and goshawk prey species, etc. One “wildlife and cultural value” in the section on black cottonwood trees was stated as its favorability to fish habitat by “periodically adding debris to the stream” (p 172). The omission of the role of woody debris in the habitat of stream fishes from the aquatic resources section of the Assessment is a serious flaw.

Ecological Relationships

The Assessment considers the relationships of species to salmon and the nutrient subsidies that may have been provided by salmon. It also considers the importance of habitat to wildlife. However, there was little application of this to whole ecosystem or foodweb function. The fish abundance targets seem to have been established arbitrarily and with little consideration of fish-fish, fish-food, or fish-habitat interactions.

Limiting Factors/Conditions

The initial portion of the Clearwater assessment provides a thorough description of the subbasin setting and its general environmental conditions. The 2002 draft assessment lacked sufficient quantitative evaluation of fish and wildlife species and their specific habitat conditions. The ISRP commented extensively on this in its review of the 2002 draft. The 2003 draft is improved considerably in its discussion of limiting factors at various scales, and includes several tables (e.g., Table 62) that summarize limiting factors by species and AU (Assessment Units). However, the Assessment does not directly relate limiting factors to population abundance and productivity of individual species or populations. Virtually no quantitative data on fish productivity are presented.

The analysis of limiting factors should form the heart of the assessment and provide guidance and a foundation for working hypotheses concerning ecological response to human interventions. These hypotheses then shape the objectives and strategies presented in the management plan, which will in turn provide the basis for Council recommendations on project funding. The Assessment offers general descriptions of limiting factors based on large land/water units, but it did not analyze limiting factors by fish life stage, as the Technical Guide suggests. A quantitative assessment of focal species-habitat relationships (including identification of important habitat features and processes, etc.) was not accomplished. Population dynamics of focal species in other subbasins could be incorporated into the assessment to provide context and fill in information gaps, but were not.

Neither the Clearwater Subbasin Assessment nor Management Plan made effective use of findings from a controlled study as evidence that a factor (sediment, temperature, etc.) was limiting. On page 19, the Plan states, "Based on a thorough review of existing data, it is currently not possible to quantitatively establish, with any degree of accuracy, life state specific determinations of survival, productivity and production for anadromous species in the Clearwater subbasin"[3]. A clearer statement is needed of how limiting factors were determined, e.g., local experts, regional experts, or models. Whether a factor was considered to be limiting or not was apparently based on local observations of environmental damage (see the QHA discussion on p. 123) and possibly some measurements of the factor itself, but those measurements or observations were not linked to direct population surveys. One example where a limiting factor was tied back to population surveys appears to be the factor "barriers", in which it may have been determined that a population occurred up to an impassable barrier, e.g., a road culvert, but not above it.

[3] This statement seems to call into question the validity of future fisheries population objectives in Table 3 of the Management Plan.

The best way to identify limiting factors is through controlled experiments, but these take time and may be difficult to conduct. However, unless it can be shown that the population responds in a demonstrable manner to manipulation of a particular factor, it is impossible to state with certainty that the factor is limiting. Unfortunately, these situations leave the question of how to proceed within a plan.

While local observations can be valuable, care should be taken to avoid calling something a limiting factor without direct evidence. Insights into parameters that could be limiting can come from experience from other watersheds and the scientific literature, but their extrapolation to new environments carries risks. The Assessment did not tap into experiences from other watersheds or the overall scientific literature as an avenue of exploring and explaining limiting factors in the Clearwater subbasin.

Nevertheless, there are probably many instances where local experience and indirect evidence is sufficient to justify designating a limiting factor and drafting preliminary work plans, whose uncertainties should be identified and addressed in future monitoring and evaluation of population trends. If these follow-up investigations are overlooked, a factor that is believed to be limiting tends to become an assumed problem and treated. The risk in this approach is that this could lead to a lot of well-intentioned, but expensive and ineffective, projects. The other significant benefit of conducting the studies is that assumptions and evaluation methods become explicit. Stating these within this Plan would have made it much easier to judge whether the presumed limiting factors and their hypothesized effects were reasonable.

Out-of-Basin Effects

The management plan contends that out-of-basin effects are an important factor, if not the primary factor, limiting recruitment of anadromous spawners to the Clearwater. The 2003 draft Assessment presents data by Petrosky et al. (2001) in support of this assertion (Figure 109). Adult passage data are available for the lower Snake River, as are data on reach survival of juvenile outmigrants. Out-of-basin effects conceivably could negate the benefits to anadromous fish of actions within the subbasin. For example, unless offshore and lower river fisheries are regulated to allow specified numbers of fish to escape the fisheries, it is unlikely that anadromous fish return goals established for the subbasin will be achieved, regardless of actions within the subbasin. Given the asserted importance of out-of-basin factors, it would be useful to know how much improvement in anadromous fish populations would accrue if the objectives of the Management Plan were accomplished or how they could be accomplished in the face of out-of-basin effects. The Assessment and subsequent Management Plan need to deal more explicitly with out-of-basin factors.

While out-of-basin factors affect Clearwater salmon and steelhead populations, within-basin factors such as water quality, habitat type, quantity, and quality, and the blockage of historical spawning areas also effect salmonid production in the subbasin. A strong subbasin plan would endeavor to partition recovery potential for anadromous stocks into the fraction that would be expected from in-basin vs. out-of-basin effort.

Socioeconomic Factors

We again commend the authors for including a section on economic, demographic, social, and cultural conditions in the Assessment (section 4.10.2). The main purpose of including socioeconomic factors is to understand the human dimension of fish and wildlife planning. Socioeconomic factors are the tie to potential beneficial or negative impacts of restoration activities proposed by the plan, and they also influence the cost-effectiveness of proposed management actions.

It would be helpful to have more extensive assessment and interpretation of the information provided. For example, what are the implications of unemployment levels and the decline of resource-based industries as a proportion of total economic activity? How are social and economic conditions changing for the people of the Clearwater Subbasin, and what are the implications of these changes for resource use and restoration? What are the main linkages to the economy outside the subbasin?

The socioeconomic section would also be strengthened by inclusion of information on specific cultural conditions, particularly those related to the Native American culture, as appropriate.

On a minor note, what are now separate sections at the same level as "socioeconomic" (i.e., demographics, industrial base, employment, urban development, recreation, roads, timber, agriculture, grazing, etc.) should all be included as subsections under a section titled "Socioeconomic."

Completing the Assessment

The ISRP has commented several times on the overall quality of the initial portion of the Assessment. However, to be complete, the assessment needs to better integrate limiting factors with population status and abundance of fish and wildlife and with subbasin fisheries and wildlife goals. It also needs a formal analysis of alternative management actions, a consideration that analytical assessment exercises could and should address. A formal analytical assessment would allow exploration among alternative management responses and provide a basis for the decisions that follow. The assessment can be iterative, updated, and reevaluated as more data and results of actions become available, but the lack of consideration of alternatives cripples justification of specific elements of the Plan and their priorities.

B. The Inventory

The Inventory presents descriptions of the subbasin's activities toward fish and wildlife recovery, as well as of applicable policies and plans. The inventory was useful in providing a listing of recent and ongoing relevant efforts in the Clearwater subbasin, but is more of an annotated listing of projects, than a synthesis of recent activities and a look into future needs. The Clearwater Subbasin Plan would benefit from a more integrated analysis of the Inventory and its subsequent integration into the Plan.

Limiting Factors and Priorities

The Inventory has added short descriptions by Potential Management Unit (PMU) or groups of PMUs of ongoing work, and in some cases limiting factors and priorities; however, the descriptions vary in the extent to which limiting factors and priorities are identified. They are also quite general when they do identify limiting factors and priorities, so that there is no clear picture of priorities and constraints. The origin of priorities is unclear. The discussion of limiting factors and priorities does not connect to an overall prioritization of activities within the Plan. The Plan would benefit from a more thorough analysis of the Inventory and its subsequent integration into the Management Plan.

The Inventory also includes an expanded compilation of the Subbasin Inventory Database (on CD) that will be an excellent administrative tool. Summaries of project and RME (research, monitoring, and evaluation) information are organized by geographical/hydrological "drainage groups". This amounts to about half a page for each drainage group (i.e. Lawyer Creek, Kelly/Cayuse creeks) and normally ends with the recommendation to continue existing projects and fill data gaps. While the summarization by drainage is useful and forms a qualitative basis for suggesting appropriate future management actions in that drainage, it is not based on a quantitative analysis of limiting factors by life stage for focal species and should not be considered a *de facto* prioritization for that drainage. The lack of clear, justified, and quantitative analyses to establish priorities results in a process that is biased toward recommending continued funding for ongoing activities, rather than identifying the most important, and perhaps new, approaches and projects.

Coordination

The Plan frequently refers to the need for better coordination, and it is clear from public comments at hearings (pp. 116-120) that improved inter-agency coordination is a top priority to many. Yet an examination of the implementation budget (Table 21) reveals that $225,000 out of annual habitat restoration budget of $14,300,000 (i.e., only 1.5%) is dedicated to improved coordination, and there is *no* coordination line item listed under the RM&E and "Other Programs" categories. The current estimate for coordination costs in the implementation budget is likely insufficient to meet the goal of improved coordination.

C. The Management Plan

The 2000 Fish and Wildlife Program characterizes the management plan as "the heart of the subbasin plan." It is intended to reflect what is learned in the assessment and inventory work, and from that, to merge policy, legal, and ecological considerations into the strategies that will be implemented at a local level (FWP 2000, p 41). While the 2003 draft Management Plan was reorganized and presented in a more readable and clear format than the 2002 draft, little of substance changed between the two versions. Thus, the extensive review comments made by the ISRP on the Management Plan (ISRP 2003-3, pp. 19-42) are still pertinent to the 2003 draft. We repeat the major points from that review below, but do not include here all the more specific review comments, which remain relevant.

Completeness
Throughout, the Management Plan does not adequately provide *substantiation from pertinent, basic literature or from the Assessment*. This compromises the plan's scientific soundness.

The 2003 Management Plan still reads like a "plan to do a plan", rather than presenting a strategic and prioritized approach to the resolution of limiting factors. The Plan does not provide strategic guidance for achieving specified objectives and lacks an adaptive component. Several strategies, in fact, are simply listed to "assess and prioritize." These activities should already have been done and led to the identification of strategic actions to address the highest priorities in the subbasin. Instead, the Plan is a long list of "priorities" that lack prioritization across problem areas.

The Plan includes a number of references to the need for better coordination and integration, but lacks a clear indication as to how these would be accomplished. The plan indirectly communicates the lack of consensus within the subbasin on restoration objectives. Footnote 1 of Table 3 (p.16) indicates that quantitative objectives are derived from various plans. How? With what weighting? Do these have buy-in of the various entities? If the table "merely gives direction to managers," then the numbers aren't really quantitative objectives. Footnote 2 of Table 3 indicates that most values were derived from the Tribal Recovery Plan. How much agreement is there within the Subbasin with these numbers? This should be explicitly discussed.

Fisheries Goals
Fisheries numerical goals appear high and are not well justified. The long-term return objectives (Table 3, pp. 16-17) seem quite optimistic, e.g., increasing coho returns from 500 presently to 14,000 – a 30-fold increase. The basis for setting these high future return objectives is unclear. Formal analysis of information in the Assessment should have addressed this explicitly. Future harvest objectives also seem optimistically high. Spring Chinook would be harvested at a 75% rate, fall Chinook at a 70% rate, and B-run steelhead at a 60-80% rate. Such high harvest rates seem unsustainable even under the assumption that harvest will be directed only at hatchery origin fish and that escapements to fulfill hatchery needs will be adequate. Rebuilding schedules and goals for the Clearwater anadromous stocks are based on anticipated smolt-to-adult return rates (SARs) in the 4-6% range, which have been uncommon in the Snake River basin for several decades. This raises questions about how realistic and achievable the Management Plan goals are. Again, the analytical steps of the Assessment should have clearly addressed those targets and schedules, and they should have been presented in an integrated, subbasin-scale framework.

Description of Artificial Production Activities
A fundamental flaw in the Management Plan is the lack of description and justification for the proposed artificial production of fish in the basin. The authors acknowledge and justify this omission by stating it was not practical to include any meaningful discussion of artificial production at the subbasin level until the Hatchery and Genetic Management Plans (HGMPs) and Artificial Production Review and Evaluation (APRE) documents, currently "in their final draft iterations", are complete. However, existing information and expertise in the basin could have been used to describe and justify the proposed artificial production activities, define their relationship to existing and future natural production, and clarify their linkages to the proposed

fisheries goals and schedules in the Management Plan. Artificial production lies so much at the core of the Clearwater Subbasin Plan and potentially has such high impact that it must be integrated with other subbasin actions and must be subject to external peer review for scientific soundness and consistency. The lack of description of an integrated and scientifically justified natural and artificial production program for the Clearwater Subbasin is a major omission of the Management Plan. Without such analysis and discussion, the fisheries goals presented in Table 3 cannot be viewed as scientifically justified.

Biological Objectives

The 2003 Management Plan is easier to read and navigate than the 2002 version; however, the biological and environmental objectives in the 2003 draft are still general and mostly qualitative, a criticism the ISRP had of the 2002 draft. In only a few cases does the Management Plan give *quantitative objectives* and timeframes for accomplishing the objectives. The authors of the management plan assert that they lacked sufficient data and information to develop quantitative objectives, and the objectives in this Plan apparently are to develop methods and acquire the necessary data and information. Thus, the Management Plan is essentially a proposal to conduct background work, rather than a Plan with specific management objectives that will be accomplished within a specified timeframe. Although undoubtedly important information gaps exist, the Management Plan should provide more specific objectives and strategies, based on information given in the Assessment, even if many are tentative and preliminary.

Working Hypothesis

The Working Hypothesis (Management Plan 4.2.1; pp11-12) is a four-paragraph description of current conditions in the Clearwater subbasin, assertions about factors that have contributed to the difference between historical conditions and present conditions, and assertions about how existing initiatives and programs can be used to implement ecosystem and restoration initiatives outlined in the Management Plan in order to achieve the biological objectives defined in the Clearwater Subbasin Plan. Most of these statements are reasonable, but they stand as a list of assertions that require documentation, e.g., by reference to the Assessment and other literature for credibility.

One particular premise of the "Working Hypothesis" needs careful evaluation: "Hatchery production of anadromous fish is not thought to limit persistence of existing stocks within the Clearwater subbasin, . . ." This assertion runs contrary to the preponderance of scientific knowledge; thus the Plan needs to include greater justification. What is it about stocks and hatchery practices in the Clearwater subbasin that would lessen the potential for negative interactions between wild and hatchery produced fish? The ISRP raised this as a point of concern in our review of the 2002 draft, but it does not appear to have been addressed in the 2003 draft, which repeats the assertion and argument made in the 2002 draft.

It is well substantiated that imposing hatchery-produced salmonids, anadromous or otherwise, on wild salmonid populations can be detrimental in terms of ecologic interactions (Bachman 1984; McMichael et al. 1999; McMichael et al. 1997; Nickelson et al. 1986; Sholes and Hallock 1979; Berejikian et al. 2001; Levin and Williams 2002), pathogenic interactions (Coutant 1998; Goede 1986; Goede 1994; Moffitt et al. 1998), and, where interbreeding is involved, genetics (Hindar et al. 1991; Fleming and Petersson 2001; Berejikian and Ford 2003). The Management Plan's

assertion that hatchery fish do not affect anadromous stocks in the Clearwater ignores the probability that the genetic introgression mentioned in the very next sentence as limiting or threatening to resident fish could also affect anadromous fish; that introgression derives from fish introduced from hatcheries breeding with wild fish. It is also inconsistent with the existence of the Management Plan's proposed research program on interactions between hatchery and wild anadromous stocks with strategies "to develop stock specific knowledge of interactions between hatchery and wild fish," including the impacts of coho reintroduction on other species.

Problem Statements and Associated Objectives

The Management Plan moves from the narrative working hypothesis section (4.2.1) into a long section (pp. 13-60) of problem statements and their associated objectives and strategies. This core subsection of the Management Plan consists of 21 "Problem Statements"; previously labeled as "Component Hypotheses" in the 2002 draft. These are organized into three very general categories:

1. Biological: six hypotheses—three dealing with anadromous fishes, two with resident fishes, and one with terrestrial species. (Of the six, item III on coordination of hatchery and natural production is the only one stated as a hypothesis, but it is probably not a testable hypothesis. The problem to be solved is not clear.)
2. Environmental: 11 hypotheses—one affecting fish, eight affecting terrestrial species, and two affecting both aquatic and terrestrial species.
3. Socioeconomic: four hypotheses. (These are indeed expressed as hypotheses, not as statements of problems to be solved. Associated problems should be defined.)

Each problem lists from 1-7 objectives underneath it, and each objective lists from 1-8 strategies to employ under that objective. The items in this section need to be more clearly related to the Assessment by making better use of specific biology of focal species or considerations of biodiversity.

The problem statement section should tell what will be done and why. It should be the main explanation and guidance of management. The hypotheses, problems, objectives, and strategies must be justified through reference to the Assessment and to the primary scientific literature. Without this, the soundness of the Plan cannot be evaluated.

The "Problem Statements" and their associated objectives should *derive from the Assessment*. FWP (2000) stipulates that a management plan's biological objectives be "responsive to the subbasin assessment findings." For this section to serve as useful background, its points should be more fully developed and integrated. In the 2003 draft, problems, objectives, and strategies are cast as responses (solutions) to addressing the problems. However, the problems are not prioritized, nor are they justified by the Assessment. They are not necessarily wrong or bad, but they are not clearly justified, nor are they set up in such a way that one could readily see how to implement the strategies in the geographic context of the Subbasin. Most of the problems seem reasonable as very general statements, but their solutions will require specific actions in specific locations, which remain unspecified. Can all problems be solved simultaneously without conflicts? If not, how can these conflicts be resolved?

This section's content is particularly inadequate with respect to fish, because the material insufficiently specifies species and life history stages, does not adequately relate to population processes, and misses important stream habitat components and processes. The Management Plan needs objectives and strategies that are species-specific and life-stage-specific because the life histories and habitat requirements of each species differ. Sometimes species that have similar habitat requirements at a life stage can be grouped.

With respect to specific fisheries questions (Problems 1-3), we see three very important issues arising from the first two problem statements. The first involves Problem Statement 1: "out of subbasin factors are primary in limiting adult recruitment of anadromous fish species in the Clearwater subbasin." This problem statement revolves around adult return objectives – see Table 3, page 16, which we have questioned earlier in this review. Clearly, any plan should be based on reasonably accurate estimates of existing run size numbers as well as scientifically sound estimates of future targets. However, the Management Plan presents numbers without any discussion or justification. If the biological objectives are derived from the various plans noted in the table's footnotes (as implied), they need to be more fully discussed and justified.

The second issue stems from the following statement that was added to Problem Statement 1 in the 2003 draft: "Out-of-subbasin work combined with in-subbasin work is needed to achieve [adult run] goals in Table 3 and the SARs listed in this objective". Where is the documentation or logical argument that supports this assertion? Where is the evidence that out-of-basin improvements or in-subbasin improvements alone couldn't result in meeting future targets?

The third issue relates to the assertion added to the 2003 draft that "existing Snake River index stocks do not provide life stage specific information applicable to stocks within the Clearwater subbasin" and therefore new index stocks will be needed. Further, in Appendix T, Response to NOAA Fisheries Comments (p 150), the assertion is made that "both [existing] redd survey data and the [existing] Parr Monitoring database are [now] thought to be inappropriate for use in defining relative productivity of steelhead (or other species) throughout the Clearwater subbasin". Again, this assertion needs to be more fully explained and justified.

Finally, the aquatic parts of the management plan should clearly describe the ecological needs of focal species and how habitat functions to meet those needs—or how it could function better if anthropogenic impairment were reduced. The section should be more specific about stream habitat components (pools, riffles, etc.), and habitat processes (riparian plant succession, large woody debris recruitment, and the channel-forming action of flow regimes). The terrestrial portion of the revised management plan does a better job of making the case for protecting/restoring some specific habitats/ecosystems, such as native prairie grassland (Problem Statement [PS] 8, p 38), mature Ponderosa pine stands (PS 9, p 39), and wetland and riparian habitats (PS 10, p 41). However, as we noted in our review of the 2002 draft, nowhere in either the assessment or the Management Plan were the specific land acquisition targets justified or prioritized. The targets included restoration of 2,000 acres of grassland, development of 150,000 acres of Ponderosa pine, restoration of 500 acres of wetland, and protection/restoration of 300 miles of riparian habitat, all by the year 2017. Each problem statement has a sentence or two that begins a justification, but more thorough elaboration is needed.

Strategies

The greatest shortcoming of the "Problem Statements, Objectives, and Strategies" section involves its strategies. The Technical Guidelines define strategies as "sets of actions to accomplish the biological objectives." The essential purpose of a management plan is to set forth "the strategies that will be implemented at a local level" (FWP 2000, p 41). The Management Plan's strategies are only generally, rather than explicitly, related to the objectives, and they are worded too generally to support a management plan. They generally fail to develop *clear operational pathways toward biological outcomes*.

The instructions on strategies stipulate that the management plan include (a) an explanation linking the strategies to the established subbasin biological objectives and vision and the subbasin assessment; (b) an explanation of how and why the strategies presented were selected over other alternative strategies (e.g. passive restoration strategies v. intervention strategies); and (c) a proposed sequence and prioritization (FWP 2000, p 41). The Management Plan does not incorporate these important elements. It occasionally refers to linkages with the Assessment, but does not identify and explain them. Alternative strategies are not given. Activity lists do not have a proposed sequence. Prioritization, particularly a framework for spatial prioritization, is discussed in a special Management Plan section; however, each strategy should show the method by which efforts will be or have been prioritized.

Most of the "strategies" are not adequately developed. Often, a "strategy" is stated as a single activity, which may name a strategy, but does not provide adequate operational guidance. Further, strategies are "plans of action to accomplish the biological objectives" and "in developing strategies, the program takes into account . . . the desired outcomes . . . [and] the physical and biological realities expressed in the scientific foundation" (FWP 2000, p 19). It follows from this that each strategy should consist of an *integrated set* of actions, in the form of a logical sequence of actions for performance, probably often cast as a decision tree involving if-then branches (or terminations) and statements of contingencies that would trigger them. A decision tree also tends to reveal logical alternative options in a strategy, and the circumstances in which they would apply.

Further, the logical *series* of actions in each strategy should explicitly describe the design for achieving measurable benefits for target species at specific life stages. The strategies should be explained in terms of their effects on measurable biological objectives, e.g., the behavioral ecology or population dynamics of species, and, where appropriate, genetics. The Management Plan's activity-lists, in which the items are labeled as strategies, should be thoroughly reexamined and reworked to come up with genuine strategies. In some cases, a list of "strategies" that the Management Plan presents under an objective could constitute a strategy if the list itself were labeled as the strategy and the present items (and often others) were shown as steps in a sequence that constitutes a procedure toward achievement of the objective. In all cases, the linkage of steps, and possible alternatives, should be explained.

With regard to the removal of natural barriers to anadromous fish migration, implied in several sections of the plan, great care should be taken before allowing salmon, steelhead, or Pacific lamprey to enter streams where they have been blocked by a natural barrier. The impact of such an action on the native fauna should be thoroughly investigated in controlled field trials before

such actions are undertaken at the subbasin scale. Effects of newly introduced fishes on *all* aquatic organisms (including the potential for competition, predation, and disease introduction) should be evaluated before considering such an action.

Prioritization

The 2000 Fish and Wildlife Program explicitly calls for prioritization of biological objectives and strategies (FWP, p. 41) to facilitate project selection by the Council and BPA so that effort can be efficiently directed. However, the Management Plan does not present a prioritization of management actions to inform the next provincial review and provide guidance on new projects and redirection of existing projects. Instead, it discusses prioritization in the socioeconomic section as a future need (i.e., a plan for a plan), and again later in the plan (pp. 82-84 and Tables 7-9 [pp. 85-96]) where protection and restoration needs are prioritized by PMU (Potential Management Unit). While this exercise identifies restoration issues and related priorities for each individual PMU, the end result is a long list of PMU-specific actions that does not provide readers or managers with a prioritized set of actions for the subbasin or its major land types. We provide an example in Appendix 1 of how the existing prioritization by PMU (pp. 82-96; Management Plan) might have been extended based on expert opinion into a set of more global insights and generalized priority actions at the subbasin level. The actions listed as intended elements of the Management Plan appear to be mostly continuation of ongoing projects, rather than a clearly integrated and prioritized set of actions that responds to identified problems.

Consideration of Alternative Management Responses

The Clearwater Subbasin Management Plan seldom proposes actions from an array of alternative options. For example, strategies are presented to use a mix of hatchery and natural production within the subbasin without a rationale as to why they are the best approach or a description of alternative strategies that might be employed. No anticipated outcomes or adaptive management responses, such as predictions of how focal species abundance would change in response to a proposed activity, are suggested, proposed, or discussed in the Management Plan.

The lack of formal consideration of alternative management responses is a problem that assessment exercises could and should address. A formal analytical assessment is needed to explore and justify decisions among alternative management responses. The assessment can be iterated, updated, and reevaluated as more data and results of actions become available, but the lack of consideration of alternatives cripples justification of specific plan elements and their priorities.

Socioeconomic Information

Although the plan's authors make reference to the expanded socioeconomic assessment section and to the guidance provided by the IEAB January 2003 report ("Recommendations and Guidance for Economic Analysis in Subbasin Planning", Independent Economic Analysis Board (IEAB), January 2003) the socioeconomic section of the Management Plan does not reflect the content of the IEAB's recommendations.

The IEAB report notes that there are two general types of economic issues associated with subbasin actions, 1) economic impacts and 2) cost-effectiveness. The first has to do with assessing potential economic impacts of projects and strategies in order to anticipate and

minimize adverse impacts. The second has to do with assessing the potential for achieving objectives at least cost, in order to make maximum use of a fixed budget.

The Plan contains three "socioeconomic" objectives (pp.52-53.) None addresses the categories of economic issues summarized above. These objectives address the need to achieve better coordination and integration among entities in the subbasin, the need to identify high priority habitat, and the need to prioritize activities to protect that habitat. None of these objectives addresses the link between the socioeconomic context of the subbasin described in the Assessment with the identification of potential economic, cultural or social impacts, nor do they explicitly consider cost-effectiveness of alternative actions. This section suffers from the same lack of logical link to the Assessment and Inventory, as other sections.

Research, Monitoring and Evaluation

The research, monitoring and evaluation (RME) proposal presented in the 2003 draft Management Plan "is not intended to be a field-ready program; rather it represents a first step in program development and will be expanded over the course of the five-year iterative review process". This approach is a classic example of *plans to do planning* that the ISAB warned about in its review of Columbia River Basin salmon recovery strategies.[4] The list of proposed RME activities under 4.3.1 Aquatics appears more like a wish list of *multi-decade* experiments than a practical list. While it would be very desirable to undertake such experiments, a successful effort would take even more than the $23 million estimated in Table 21. The subbasin planners should instead prioritize projects from the large list and present a pared-down list, focusing on those topics that they justify as being the most important for monitoring and research.

The RME section of the 2003 Management Plan did not change, except editorially (e.g., changing table numbers), from the 2002 draft reviewed by the ISRP. Essentially none of the ISRP's recommendations concerning RME in the earlier review was addressed or countered; thus, all are still applicable. The sponsors should reread the initial review. To provide further guidance and emphasis, we repeat here our primary general recommendations for improvement of the RME component of subbasin plans.

1. The sponsors should show in each proposed research and monitoring project those aspects of the proposal that are met and unmet in existing projects listed in the inventory and in what ways the proposal would fill gaps of knowledge.

2. Development of the Management Plan offers a unique opportunity to better coordinate long-term monitoring of aquatic and terrestrial resources using common data collection procedures, storage of data in a system of distributed databases with common format and to fill data gaps to allow statistical inferences to be drawn to large subsections of the subbasin. The sponsors recognize the problem and we quote their understatement, "It is not apparent from the inventory if monitoring methodologies for like-purpose surveys are standard or similar between agencies." The sponsors should include plans for

[4] ISAB 2001-7. A Review of Salmon Recovery Strategies for the Columbia Basin. August 2001. www.nwcouncil.org/library/isab/isab2001-7.pdf

coordination and standardization of data collection protocols among agencies within and without the subbasin.

a. The ISRP agrees with the authors of the Management Plan that for estimation of many PMU or subbasin-wide parameters, study sites should be distributed probabilistically within a PMU or the subbasin. Use of index sites for estimation of such parameters is not appropriate. The sponsors should provide plans to develop and implement appropriate site selection procedures that allow statistical inferences to be made to watersheds or the entire subbasin.

b. The recommended model for development of probabilistic sampling plans is the EPA EMAP strategy proposed by the Action Agencies and NOAA Fisheries in their "Draft Research, Monitoring & Evaluation Plan for the NOAA-Fisheries 2000 Federal Columbia River Power System Biological Opinion" (The RM&E Plan, http://www.efw.bpa.gov/cgi-bin/FW/welcome.cgi).

c. The Pacific Northwest Aquatic Monitoring Partnership, an ad hoc group of biologists from state, federal and tribal agencies in the Pacific Northwest, has developed a draft document entitled "Recommendations for Coordinating State, Federal, and Tribal Watershed and Salmon Monitoring Programs in the Pacific Northwest" dated January 6, 2004. This document was released after the 2003 draft Clearwater Plan was submitted, but the final Clearwater Subbasin Plan would be significantly strengthened if it were consistent with and incorporated the principles of this document.

3. The sponsors should clearly separate Tier 3 research from Implementation Monitoring, Tier 1 (trend or routine) monitoring, and Tier 2 (statistical monitoring).

4. It is not cost-effective to implement an intensive research project to explain, "why changes occurred" on most habitat improvement projects. In general, individual projects should depend on larger cooperative monitoring programs, such as the Action Agency's status monitoring program, to establish changes and trends in populations and habitat on a larger scale.

5. We believe the following statements contain the essential elements for development of an appropriate RME plan in subbasin planning.
   a. Cooperate with Columbia Basin-wide attempts to develop common Tier I trend monitoring procedures based on remote sensing, photography, and data layers in GIS. Landscape changes in terrestrial and aquatic habitat and land use should be monitored for the smallest units possible.
   b. Cooperate with Columbia Basin-wide attempts to develop common Tier 2 probabilistic (statistical) site selection procedures for population and habitat status monitoring.
   c. Cooperate with Columbia Basin-wide attempts to develop common protocols for on-the-ground or remotely sensed data collection.
   d. In so far as possible, data collection efforts should be collocated on the same sites (water quality, presence-absence of focal species, etc.).

e. Develop empirical models for prediction of abundance or presence-absence of focal species and other end-points. Potential predictor variables include not only physical habitat variables (woody debris, flow, temperature, etc.), but also measures of habitat recovery actions that are currently in place or are implemented in the future.
f. Finally, propose new research in the spirit of the State of Washington's Intensive Watershed Monitoring Program on intensively studied watersheds.

Several places in the RME plan identify developing environmental standards, e.g., temperature (p. 65), streamflow (p. 66), and those implied in the sediment discussion (p. 68). These standards would, for the most part, be based on the needs of focal species, but the goal of protecting ecosystem processes will likely not be served by attempting to define and enforce fixed standards for the benefit of a few species. Natural variability (droughts, El Niño/La Niña events, floods, etc.) and differing habitat needs of various species (e.g., steelhead vs. Pacific lamprey) will thwart the success of a fixed-standard approach, as pointed out in the recent ISAB review of tributary habitat recovery.[5]

The strong emphasis on genetic monitoring and interest in assessing the effectiveness of exotic species (brook trout) eradication were appropriate, given the issues facing Clearwater fisheries management.

Adaptive Management

The Management Plan does not 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. The Management Plan implies the use of adaptive management, but does not include a procedure for conducting it, thus such statements cannot be subjected to scientific review. The Plan does not include synthesis of current information and statements of biological objectives at the level needed to facilitate adaptive management, nor does the Plan describe how adaptive management would feed into prioritization of research. Thus, the Management Plan is not currently in the form envisioned by the Fish and Wildlife Program.

[5] ISAB 2003-1 A Review of Strategies for Recovering Tributary Habitat. March 2003. www.nwcouncil.org/library/isab/isab2003-2.htm

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VI. Appendix 1. Prioritization in the Clearwater Subbasin

The Clearwater Subbasin Management Plan presents an attempt at prioritization in Tables 7-9 in Section 4.4: *Spatial Definition and Prioritization of Protection/Restoration Needs* on pages 82-96. The Plan recognizes 23 PMUs in three land ownership categories (Figure 113:Assessment). The prioritization by PMUs may have been a useful step, however, it doesn't appear to have been taken to its logical end, to where major restoration and protection issues are summarized for federal, mixed, and privately owned lands, and for the Clearwater subbasin as a whole.

In this Appendix, we provide an example of how the existing prioritization by PMU (pp. 82-96; Subbasin Management Plan) might have been extended, based on expert opinion, into a set of more global insights and generalized priority actions at the subbasin level. The summary statements for each land ownership type and the overall summary at the end were generated by the ISRP as examples of the kinds of patterns that emerge from the assessment prioritization of protection/restoration needs by PMU. Our summary provides a very rough cut of factors that might limit fish and wildlife production in different habitat types throughout the Clearwater Subbasin. Further analysis beyond the PMU tables would be needed for integration of the priority issues with fish and wildlife population status and recovery/management objectives, and to provide strong links between all of the habitat analysis, fish and wildlife status, and proposed implementation actions.

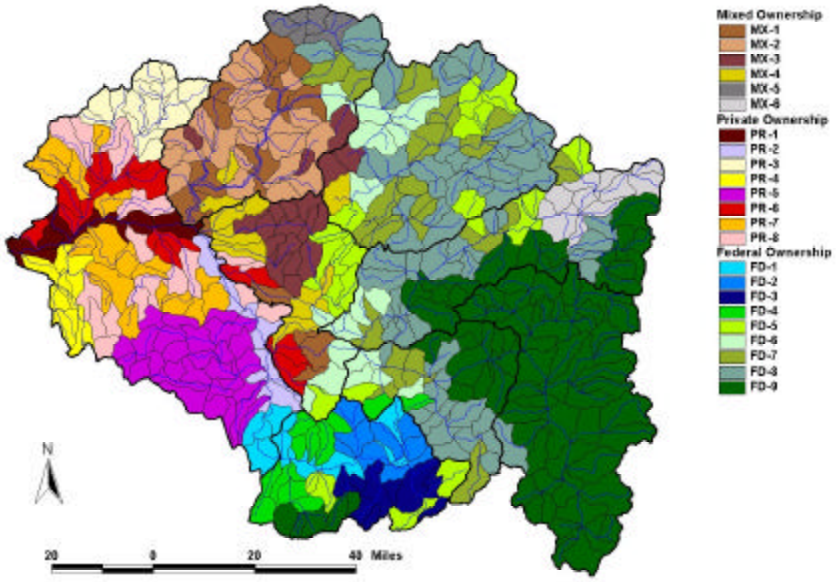

Figure 113 from Assessment: Potential Management Units (PMUs) delineated throughout the Clearwater subbasin.

Tables 7-9 in the Clearwater Subbasin Management Plan show restoration issues and priorities by PMU and land ownership. Colors shown in the data matrices in the following pages show the priority assigned to the restoration issue assigned by the management plan: yellow = highest, red = high, green = medium, and blue = low. The Management Plan does not describe in detail how the technical committee arrived at the priorities. We take the priorities at face value; however, details on methods should have been provided and reviewed. Colors assigned to the Restoration Issue column are our own best guess as to the consensus priority from the matrix and reflect the same priority rankings.

Federal Lands – Clearwater Subbasin

Figure 116: from Assessment

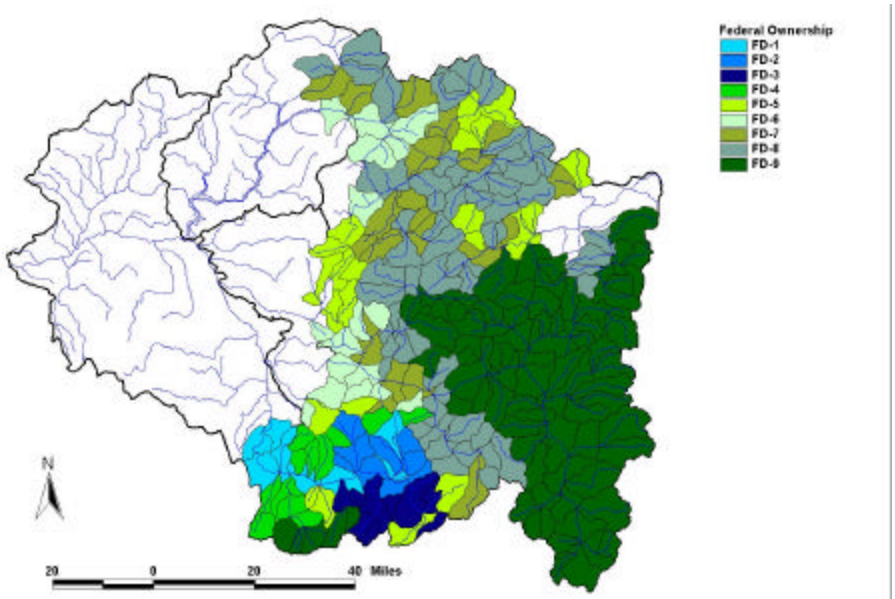

Table 1. Federal Land Ownership PMUs, restoration issues, and priorities by PMU from the Clearwater Subbasin Management Plan. ***Inferred Priority Ranking***: **yellow = highest, red = high, green = medium**, and **blue = low**.

Restoration Issue	***Federal Land Ownership – PMU's***								
	FD-1__	FD-2__	FD-3__	FD-4__	FD-5__	FD-6__	FD-7__	FD-8__	FD-9__
Wilderness_____				H+___					H+___
Roadless_____				H+___	H+___		H+___	H+___	
Road Density___	H____	H____	M____	H____	H____	H____			
Landslides						H____	H____		
Sediment						H____			
Mining	H-M__	H____	M____						
Grazing_____	H-M__	H____		H____	L_____	L_____			
Erosion	L_____				L_____				
Dworshak									
Water Use									
Hydrology									
Ponderosa Pine	H-M__					H-M__			
Prairie Grasses									
Vegetation Types	M____	H____	H____	H____	H____	H____	M____	M____	L_____
Habitat Fragment									
Water Temp____	L_____	M____	M____	M____	M____	M____	L_____	L_____	L_____
Instream Work		H____	H____			M____			
Riparian			H____						
Exotics Load____	L_____	M____	M____	M____	M____	L_____	M____	H____	H____

Federal Lands Prioritization

Based on a cursory evaluation of Table 1, the highest priority in the federal lands is for continued protection of wilderness and roadless areas. This is followed in priority order by addressing impacts on habitat from high road densities in FD-1 to FD-6, with the attendant landslides, sediment, and erosion related to high road density in steep forested lands. Another high priority issue is the lack of vegetation structural or successional diversity through most of the PMUs. Increased water temperatures and the presence of exotics occur throughout most of the federal PMUs and were judged to present moderate restoration problems. Certain PMUs had specific high priority restoration issues, such as mining impacts (FD-1, FD-2, and FD-3), grazing impacts (FD-1, FD-2, and FD-4), protection and restoration of Ponderosa Pine stands (FD-1 and FD-6), and the need for specific instream and riparian restoration projects (FD-2 and FD-3).

Mixed Ownership Lands – Clearwater Subbasin

Figure 115: from Assessment

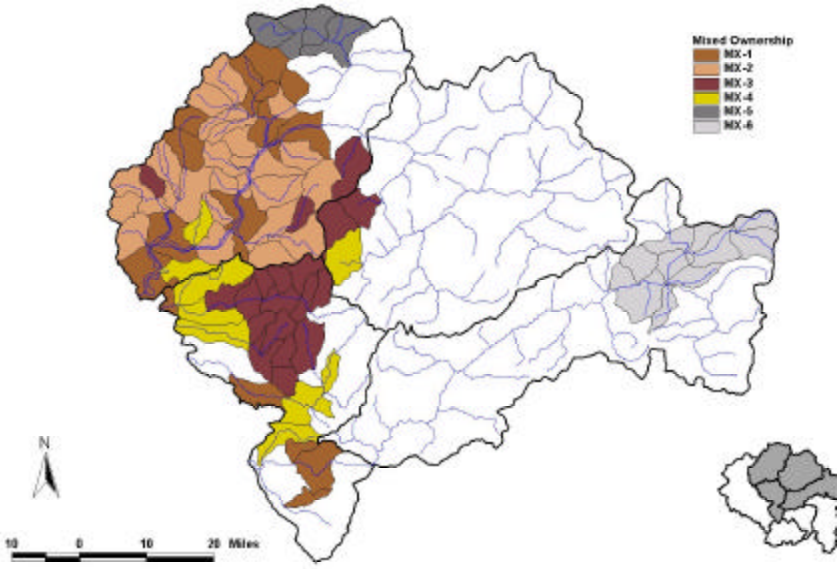

Table 2. Mixed Land Ownership PMUs, restoration issues, and priorities by PMU from the Clearwater Subbasin Management Plan. ***Inferred Priority Ranking***: **yellow = highest, red = high, green = medium**, and **blue = low**.

	Mixed Land Ownership – PMU's					
Restoration Issue	**MX-1__**	**MX-2__**	**MX-3__**	**MX-4__**	**MX-5__**	**MX-6__**
Wilderness						
Roadless						
Road Density___	H-M__	L_____	M-L__	H____	M____	M____
Landslides_____	H____	H_____				
Sediment_____	H____	H_____			L_____	L_____
Mining						
Grazing_____	M____	L_____	L_____	L_____		
Erosion				H_____		
Dworshak						
Water Use						
Hydrology						
Ponderosa Pine__	H-M__	H-M__	H-M__	H-M__		
Prairie Grasses						
Vegetation Types	M____	L_____	L_____	M____	M____	M____
Habitat Fragment						
Water Temp____	M____	H_____	H-M__	H-M__	M____	?____
Instream Work	H_____	L_____		M____		
Riparian						
Exotics Load____	M____	M____	L_____	L_____	H____	

Mixed Ownership Lands Prioritization

Based on a cursory evaluation of Table 2, in the mixed land ownership category, the highest priority is for protection and restoration of Ponderosa Pine stands and in dealing with widespread increased water temperatures. This is followed in priority order by addressing impacts on habitat from high road densities throughout the mixed ownership PMUs, with the attendant landslides, sediment, and erosion related to high road densities. These issues are particularly pertinent to the MX-1, MX-2, and MX-4 PMUs. Another widespread priority issue is the lack of vegetation structural or successional diversity through most of the PMUs. The presence of exotics is also a moderate priority concern throughout the mixed ownership PMUs. Grazing impacts occur throughout this ownership category, but appear to be of low priority concern.

Private Land Ownership – Clearwater Subbasin

Figure 114: from Assessment

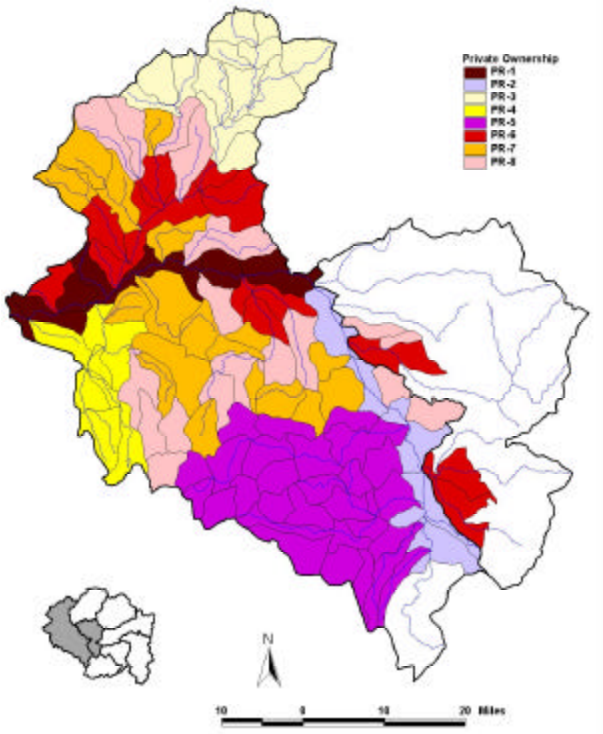

Table 3. Private Land Ownership PMUs, restoration issues, and priorities by PMU from the Clearwater Subbasin Management Plan. ***Inferred Priority Ranking***: **yellow = highest, red = high, green = medium,** and **blue = low**.

Restoration Issue	***Private Land Ownership – PMU's***							
	PR-1__	PR-2__	PR-3__	PR-4__	PR-5__	PR-6__	PR-7__	PR-8__
Wilderness								
Roadless								
Road Density			H____					
Landslides_____	L_____	M____				M-L__		
Sediment_____	L_____	L_____	H____			H_____		
Mining								
Grazing_____	L_____	L_____	H____	M____	M____	M____	L_____	L_____
Erosion_____				H____	H____		H____	H____
Dworshak	H_____							
Water Use				H____				
Hydrology					L_____			
Ponderosa Pine__	H-M__	H-M__		H-M__	H-M__	H-M__		H-M__
Prairie Grasses__	H_____	H____		H____	H____	H____	H____	H____
Vegetation Types			M____					
Habitat Fragment								
Water Temp____	H_____	L_____	H____	M____	M____	H_____	H____	H____
Instream Work__			L_____	L_____	L_____	L_____	L_____	L_____
Riparian_____				M____	H____	?____	?____	?____
Exotics Load						L_____		

Private Lands Prioritization

Based on a cursory evaluation of Table 3, in the private land ownership category, the highest priority is for protection and restoration of Ponderosa Pine stands, Prairie Grassland habitats, and in dealing with the widespread risks of erosion and increased water temperatures. The risk of surface erosion is a high priority concern in a number of PMUs, coupled with apparent impacts from grazing, landslides, and sediment load throughout all or most of the PMUs. Certain PMUs had specific high priority restoration issues, such high road densities (MX-3), grazing impacts (MX-3), impacts from Dworshak Dam (MX-1), and impacts from water use (abstractions) (MX-4). The need for riparian protection and instream habitat work appears common to many of the private land ownership PMUs, but of lower priority.

Subbasin-Level Prioritization Summary

Federal lands occur primarily in the headwater portion of the subbasin, mixed ownership lands in the north middle portion, and private lands in the lower portions of the subbasin (Figures 113-116 Assessment).

In the upper portions of the subbasin, which are primarily higher elevation forested lands, some of which are wilderness or protected areas, it seems to the ISRP that the highest priority is for continued protection of wilderness and roadless areas. Other priority impacts on habitat (and supposedly on resources) are apparently from high road densities with the attendant landslides, sediment, and erosion related to high road density in steep forested lands. Another concern appears to be the lack of vegetation structural or successional diversity through most of the upper basin. Site-specific high priority restoration issues apparently include mining impacts, grazing impacts, protection and restoration of Ponderosa Pine stands, and the need for specific instream and riparian restoration projects.

Similarly, restoration and protection concerns in the middle (mixed ownership) and lower (private ownership) portions of the subbasin include a common set of problems focusing around the protection and restoration of Ponderosa Pine stands and in dealing with widespread increased water temperatures. The risk of surface erosion appears to be a high priority concern in a number of PMUs, coupled with apparent impacts from grazing, landslides, and sediment load throughout all or most of the PMUs. The presence of exotics may also be a moderate priority concern throughout the middle portion of the subbasin.