

# **Tucannon**

## **Review Summary**

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.

## Review Checklist

<b>I. The Subbasin Assessment</b>		
(See generally pages 4-6, 9-10 of the Technical Guide; the checklist is derived from 18-24 of the Technical Guide.) Reviewers should consider the soundness, completeness, analytical approach, and transparency (documentation of methods and decision-making process) of the following components of a subbasin assessment.		
<b>I. A. Subbasin Overview</b>		
<i>General Question to be addressed: Does the assessment provide the geographical, demographical, and environmental context for fish and wildlife resources in this subbasin? The Council specifically asked that the independent scientific review evaluate whether the subbasin assessment was thorough and substantially complete. The following checklist is to aid reviewers in that determination.</i>		
<b>I. A.1. General Description</b>	(Y)es, (P)artial, (N)o	Need for additional treatment (0-4)
I.A.1.1	Does the assessment provide a general orientation to the subbasin (location, size, distinguishing natural and cultural features, land use, land ownership) and an overview of jurisdictional authorities (state, county, federal lands, tribal lands and fishing rights)?	
Reviewers: The subbasin is well defined, including jurisdictions. Less clear are fishing rights, but rights exist for the Nez Perce and Umatilla tribes. comment here		Yes
I.A.1.2	Does the assessment provide a general description of the subbasin's macro-environment (geology, climate and weather, land cover, vegetation) and of the subbasin's water resources (hydrography and watersheds, hydrologic regimes, water quality, riparian and wetland resources), water uses, and modifications to water resources (hydropower projects and operations, water diversions, channel modifications)?	
Reviewers: A general description is included.		Yes 0
I.A.1.3	Does the assessment provide a general description of anthropogenic disturbances to the aquatic and terrestrial environment, organized by the source of disturbance (urbanization, agriculture, forest practices, water development, mining, transportation, and other)?	
Reviewers: The Assessment is much the same as others in this Province and provides the history of disturbance in a descriptive manner.		2
I.A.1.4	Does the assessment provide a list of native and non-native fish and wildlife species present in this subbasin including those species that: a. have been designated as threatened or endangered under the Federal Endangered Species Act or state equivalents, b. have been recognized by applicable federal, state, or local resource management agencies, or by the Nature Conservancy or state heritage program, as being especially rare or significant in the local area, c. have special ecological importance within the subbasin, d. are recognized by Native American tribes as having special cultural or spiritual significance, or	

	e. are not native to this subbasin?		
Reviewers: There is a regional report on wildlife that lists species, including listed species. The Plan lists aquatic species as required		Yes	0
I.A.1.5	Does the assessment identify plants that have been designated as threatened or endangered under the Federal Endangered Species Act or state equivalents, and/or that are recognized by Native American tribes as having special cultural or spiritual significance, or (optional) that have special ecological importance within the subbasin?		
Reviewers: The plan discusses vegetation types only. There is no discussion of listed plants and plants of cultural or spiritual significance.		Partial	2
<b>I.A.2. Subbasin in the Regional Context</b>		<i>(Y)es, (P)artial, (N)o</i>	<i>Need for additional treatment (0-4)</i>
I.A.2.1	Does the assessment describe how this subbasin fits within its regional context (size in relation to the total Columbia Basin, placement within the ecological province and relationship to other subbasins in this province, qualities that distinguish this subbasin from others in the province)?		
Reviewers: There is a description of the regional context of this subbasin, and the significance of its position within the Columbia and in relation to the Snake River.		Yes	0
I.A.2.2	Does the assessment describe this subbasin's relationship to Endangered Species Act planning units (NOAA Fisheries-designated evolutionarily significant units (ESU) and U.S. Fish and Wildlife Service-designated bull trout planning units.) where this information was available during the planning process?		
Reviewers: ESA and bull trout sections are present in the plan.		Yes	0
I.A.2.3	Does the assessment summarize external environmental conditions that might have an effect on fish and/or wildlife in this subbasin (the ocean, the estuary, the mainstem downstream from the subbasin, and, as relevant, upstream areas and adjacent subbasins)?		
Reviewers: A well-written section is present on out-of-basin effects on fish but it could be improved by adding sections on the effects of reservoirs, details of dam passage impact, out-of-basin harvest, areas of migration in the ocean, and related topics. Wildlife issues are contained with a lengthy regional context, which includes mention of forces external to the subbasin, the province, and the basin.		Partial	
I.A.2.4	Does the assessment identify 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)?		
Reviewers: Macroclimate and human occupation trends are important in this subbasin because there is a significant demographic and climatological change expected.		Partial	

<sup>1</sup> The USFWS bull trout planning hierarchy includes, from large areas to small, distinct population segments, recovery units, recovery sub-units, core populations, core areas, and local populations. A subbasin would typically correspond to a recovery unit or sub-unit.)

	<b>Summary comments and evaluation on the Subbasin Overview:</b> Does the assessment provide the geographical, demographical, and environmental context for fish and wildlife resources in this subbasin?	
Reviewers: The Assessment provides a general context for fish and wildlife resources in the subbasin. 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, are covered only superficially, and require more attention for these plans to become more useful.	Yes	2

<b>I.B. Species Characterization and Status</b>		
<i>General question: Does the assessment adequately describe the current status of fish and wildlife focal species?</i>		
Note to reviewers: for this section of the review, the checklist should be applied to each focal species. Please identify which species your evaluation applies to in the comment field. Use the ranking fields (Y,P,N; 0-4) to give an overall evaluation across all focal species. Note differences among approaches to species in the comment field. If necessary, once the plans are received, assignments will be made to cover an individual species or a series of focal species.		
I.B.1. Does the assessment identify a series of focal species that will be used to characterize the status of fish and wildlife species within the subbasin? These should include one or more wildlife, resident fish, and, where present, anadromous fish species. Anadromous fish may also be included in subbasins where they were historically present and where there is a reasonable probability that these fish could be restored to sustainable levels. Criteria suggested for selecting focal species include a) designation as Federal endangered or threatened species, b) local ecological significance, <sup>2</sup> and c) cultural significance.		
Reviewers: The presentation identifies focal fish species but the Assessment would be much improved by considering the assemblage structure of species. Non-focal species are virtually ignored (fish biodiversity). Non-native species are numerous and appear important in recreational fisheries (e.g., bass distribution, abundance, possible interactions with natives).	Yes	
I.B.2. Does the assessment identify and characterize focal species populations; i.e. delineate unique population units and, as applicable and where information is available, meta-populations, subpopulations and/or other genetic/behavioral groupings used by scientists or managers?		
Reviewers: 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. Possible metapopulation implications are not considered.	Yes	1
I.B.3. Does the assessment describe the current and historic status of each focal species population and summarize available population data (abundance, productivity, spatial structure, etc., with particular emphasis on trend data)?		

<sup>2</sup> Species that could be considered under the ecological significance criterion might include those that: a) are particularly rare within the subbasin (regardless of ESA classification), or b) perform a particularly important or unique ecological function.

Reviewers: There is a good summary from B. Ashe indicating survival trends and what value survival needs to increase to maintain the population (from <1% to >2.6%), and that limits on recruitment are mainly from out of the basin (hydropower and ocean). Estimated adult abundance includes hatchery fish, actual natural abundance likely 10X lower according to the report. Smolts per spawner should be expressed as a function of the spawner density, and this used with smolt-to-adult survival trends to characterize the population and to drive the vision.	Yes	1
I.B.4. Does the assessment describe the population's life history, including identifying distinct life stages?		
Reviewers: The Assessment provides excellent descriptions of population life history of the salmon and steelhead (only) but does not present adequate information and analysis on survival through life stages and clear indication of limitations within life stages.	Yes	1
I.B.5. Does the assessment characterize the genetic diversity of the population, especially regarding possible effects of artificial production? Specifically does the assessment describe the historic and current status of introductions, artificial production, or captive breeding programs in this subbasin or affecting the subbasin through straying or other means, and describe the relationship between the artificial and naturally produced populations?		
Reviewers: The goals for anadromous fish (p. 186) do not fully address the impact of hatchery fish on the remaining wild population but they suggest that research is being conducted elsewhere, and had this on their RME wish list (no design). A lengthy draft of the HGMP is attached. Hatchery fish are viewed as key to rebuilding the wild population, but it should build on its own to capacity if there is no harvest. Coho reintroduction is largely unsuccessful but spring chinook introductions have produced returns, yet they are likely unsustainable without continued hatchery operations. 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	Partial	
I.B.6. Does the assessment describe historic and current harvest, including both in-subbasin harvest and downstream or ocean harvest affecting the focal species?		
Reviewers: A table of harvest rates in the river, the ocean, and mainstem is required to assess possible management actions in these areas that may benefit fish in this subbasin. There should be catch numbers available. There is little harvest information given on terrestrial species.		
<b>Summary comments and evaluation on the Species Characterization and Status Subsection:</b> Does the assessment adequately describe the current status of fish and wildlife focal species?		
Reviewers: The current status of focal species is described numerically and the Assessment could be improved by a determination of the significance of these data, and their relation to population viability, i.e., further evaluation from that done in the past that is based on current levels and trends.	Yes	2

<b>I.C. Environmental Conditions</b>		
<i>General question to be addressed: Does the assessment adequately describe the effect of the environment on fish and wildlife populations?</i>		
<b>I.C.1. Environmental Conditions within the Subbasin</b>	(Y)es, (P)artial, (N)o	Need for additional treatment (0-4)
I.C.1.1	Does the assessment describe the current condition of the environment in this subbasin, and characterize the condition of the environment under the following reference conditions: a) historic, <sup>3</sup> b) potential, <sup>4</sup> c) future/no new action, <sup>5</sup> and the potential condition of aquatic and terrestrial habitats within the subbasin? Does the assessment include a determination of the difference between current conditions and the various reference conditions?	
Reviewers: An EDT assessment is completed although data are found to be less than adequate. Relation of terrestrial species and habitat is identified as a need.		Partial 1
I.C.1.2	Does the assessment classify 6 <sup>th</sup> field HUCs (or other appropriate assessment unit) within the subbasin according to the degree to which each area has been modified and the potential for restoration?	
Reviewers: Adequate.		Yes 0
<b>I.C.2. Out-of-Subbasin Effects and Assumptions</b>		
I.C.2.1	Does the assessment identify factors outside of the subbasin that have a significant effect on each focal species, with particular attention to bottlenecks? These might include effects associated with upstream conditions, downstream conditions, and, in the case of migratory wildlife, conditions in adjacent subbasins. Outside effects are particularly relevant for anadromous fish and may include mainstem passage and habitat, estuary conditions, ocean conditions, and harvest.	
Reviewers: Please see 1B3 and general comments. There is an interesting presentation in the report on elk issues.		Yes 2
I.C.2.2	For each focal species, does the assessment establish assumptions for each external effect that can be used to calculate the effects of external conditions on the productivity and sustainability of fish and wildlife within this subbasin?	
Reviewers: The calculation of population abundance as a function of external conditions is not presented, but likely involves extinction (R/S<2) unless conditions improve substantially.		2
<b>I.C.3. Environment / Population Relationships</b>		
For each focal species, does the assessment identify, for each life stage, environmental factors that are particularly important for the species' survival and determine the characteristics that constitute optimal conditions for species health? Does the assessment describe and make a finding regarding the environment's ability to provide such optimal conditions, or conditions that support the long-term viability of these populations.		

<sup>3</sup> The historic condition refers to the state of the environment at the time of European settlement, or 1850.

<sup>4</sup> The potential condition is defined as the optimal condition for the subbasin in the year 2050, but it acknowledges cultural modifications that are not reversible such as urbanization.

<sup>5</sup> The future/no new action condition is the state of the environment in 2050 assuming that current trends and current management continues.

Reviewers: Planners assume EDT provides an adequate assessment of environmental needs for aquatics. They had to conclude that the predicted productivity at "optimum" could not support numeric goals for anadromous salmonids. Research is identified to relate terrestrial and aquatic focal species to environmental conditions.	Yes	2
<b>Summary comments and evaluation on the Environmental Conditions Section:</b> Does the assessment adequately describe the effect of the environment on fish and wildlife populations?		
Reviewers: Much of the Assessment is based on assumptions regarding benefits of proposed actions and provides a subsequent assessment of these effects. The work would benefit from a more thorough consideration of PDO/climate change impacts in freshwater environment as well as from outside the watershed.		2

<b>I.D. Ecological Relationships</b> <i>Question to be addressed: Does the assessment describe the key inter-species relationships and the key functional relationships?</i>	(Y)es, (P)artial, (N)o	<i>Need for additional treatment (0-4)</i>
<b>I.D.1. Inter-species Relationships</b> Does the assessment identify important inter-species relationships or interactions, both positive and negative, with specific attention to relationships between anadromous fish and wildlife and specifically identify: 1) wildlife species and habitats that may be influenced, positively or negatively through direct effects of changes in fish abundance or fish community composition; 2) fish species and habitats that may be influenced, positively or negatively, through direct effects of changes in wildlife abundance or wildlife community composition; and 3) key species relationships within this subbasin based on the above?		
Reviewers: There is very little discussion of inter-species relationships, and especially lacking is discussion of the impact of exotic species.	Partial	
<b>I.D.2. Processes and Functions</b> Does the assessment identify key ecological functions for species within this subbasin and assess the current status of ecological processes and functions in the subbasin?		
Reviewers: The treatment on ecological functions is preliminary only, and predominantly EDT-based. Missing are the issues of the physical, chemical, and biological environment such as climate change, seasonality, nutrient distribution and availability, nitrogen and phosphorous limitations or excess, nutrient cycling, earlier spring freshet, pollution, water temperature trends seasonally, etc., denoting changes of significance.	Partial	2

<b>I.E. Interpretation and Synthesis / Limiting Factors and Conditions</b>
<b>I.E.1. Limiting Factors and Conditions</b> Does the assessment describe: 1) <b>Historic factors or conditions</b> that led to the decline of each focal species and of ecological functions and processes? 2) <b>Current key factors or conditions</b> within and without the subbasin that inhibit populations and ecological

processes and functions relative to their potential.		
Reviewers: See 1.D.2. Historic and current ecological process and functions need more attention, with clear linkage to limitations within life history stages.	Yes	2
<b>I.E.2. Key Findings</b>		
Is the knowledge gained through the assessment synthesized in regard to: 1) the status of species, 2) the status of the subbasin environment, 3) the biological performance of focal species in relationship to the environment, 4) the health of the overall ecosystem, 5) potential conflicts and compatibilities between individual species and ecological processes, 6) a determination of the key factors that impede this subbasin from reaching optimal ecological functioning and biological performance?		
Reviewers: There is a general understanding of the key factors that limit species within this environment (e.g., discussion of Chinook salmon out-of-basin effects) but a lack of recognition that efforts of the past in habitat enhancement have not achieved expected results, or at least have not been documented to have done so. The planners are hopeful that an informed RME will help with the synthesis of the Assessment, but they need to contemplate the past and current evidence as well. There are several examples of management decisions that have had a detrimental impact, such as rainbow trout stocking in the river, and other introductions.	Yes	2
<b>I.E.3. Subbasin-wide Key Assumptions/Uncertainties (“Working Hypothesis”)</b>		
Does the assessment describe the key assumptions (including uncertainties) that have been made in the “Key Findings” above, and document the data sources and/or analytical tools relied upon?		
Reviewers: As in other subbasins in this region, the key assumptions are determined by EDT, for the most part, which does not adequately expose uncertainties and consider alternatives (e.g., species interactions) but has many assumptions built in that are not well specified. Recognition of the need for better inputs to the EDT model is present.	Yes	2
	<p><b>Overall impression and evaluation of the Assessment:</b>  Does the assessment adequately synthesize the information regarding the health and functioning of this subbasin ecosystem? Does it adequately: a) bring together the single-species and community assessments to form a holistic view of the subbasin’s biological and environmental resources, b) provide a foundation for the development of scientific hypotheses concerning ecological behavior and the ways that human intervention might prove beneficial? As needed elaborate on your evaluation of the various Sections enumerated above. If the plan provides additional analysis beyond what is laid out above in the checklist please comment here (e.g., socio-economic descriptions or analysis).</p>	
Reviewers: This Assessment follows same template/format as other subbasins in this province. Conditions are described but a synthesis is required that includes societal goals and the short and long term trends and expectations.	Yes	2

**II. The Inventory**  
*(This checklist section was developed from pages 11-12 of the Technical Guide.)*  
Reviewers should consider the soundness, completeness, analytical approach, and transparency (documentation of methods and decision-making process) of the following components of a subbasin inventory, specifically whether the

<i>inventory includes an assessment of the adequacy of current legal protections, plans, and projects to protect and restore fish, wildlife, and ecosystem resources. Does the inventory adequately synthesize past activities and their biological achievements? Planners were 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).</i>			
<b>II.A. Existing Protection</b>		(Y)es, (P)artial, (N)o	Need for additional treatment (0-4)
II.A.1	Does the inventory identify areas with protections through stream buffers, municipal or county ordinances, conservation designations, or water resources protection?		
Reviewers: Adequate.		Yes	0
II.A.2	Does the inventory assess the adequacy of protections for fish, wildlife, and ecosystem resources?		
Reviewers: More detail on the adequacy of protections would improve the Inventory.			2
<b>II.B. Existing Plans</b>			
II.B.1	Does the inventory identify and review applicable local, state, tribal, and/or federal fish and/or wildlife management plans and water resource management plans that affect fish and wildlife?		
Reviewers: Adequate.		Yes	0
II.B.2	Does the inventory assess the extent to which existing plans are consistent with the subbasin assessment and their adequacy in protecting and restoring fish, wildlife, and ecosystem resources? (It is possible that this analysis is done in another section of the plan, e.g. in the management plan.)		
Reviewers: Gaps in the Inventory are identified but there is difficulty in ascertaining the adequacy of existing plans or future plans. Tables are provided that link plans with the limiting factors from the EDT exercise.			2
<b>II.C. Management Programs / Restoration and Coordination Projects</b>			
Does the inventory identify management programs implemented through on-the-ground restoration and conservation projects that target fish and wildlife or otherwise provide substantial benefit to fish and wildlife? These include, at a minimum, those implemented within the past five years regardless of funding source.			
II.C.1	Does the inventory identify ongoing or planned public and private management programs or initiatives that have a significant effect on fish, wildlife, water resources, riparian areas, and/or upland areas? <sup>6</sup>		
Reviewers: Adequate.		Yes	0
II.C.2	For each management program (or project where not clearly part of an overarching management program), does the inventory describe the program, project or activity; identify the management or lead entity; identify how the program/project was authorized and who is responsible for implementation; identify the funding source; and identify the relationship to other activities in the subbasin?		
Reviewers: Adequate.		Yes	0
II.C.3	For each management program (or project where not clearly part of an overarching management program), does the inventory identify limiting factors or ecological processes the activity is designed to address?		
Reviewers: Adequate.		Yes	0

<sup>6</sup> Among other programs, the Technical Guide requested for artificial production programs that the inventory include and summarize relevant HGMPs (both BPA-funded and non-BPA funded programs) and Council APRE evaluations?

II.C.4	For each management program (or project where not clearly part of an overarching management program), does the inventory summarize accomplishments/failures of activity		
Reviewers: The Inventory would benefit from a review and presentation of lessons learned from failed projects.			3
II.C.5	Does the inventory relate the assessment to the existing activities and identify the gaps between actions that have already been taken or are underway and additional actions that are needed to address the limiting factors and meet recovery and other goals, and identify inadequacies in both design and implementation?		
Reviewers: As noted, the process of identifying gaps is largely through the use of EDT. The Inventory is not explicit in identification of gaps between existing projects and needed actions.		Yes	
<p><b>Overall impression and evaluation of the Inventory:</b> As needed elaborate on your evaluation of the various Sections enumerated above. If the plan provides additional information or analysis beyond what is laid out above in the checklist please comment here (e.g., socio-economic descriptions or analysis).</p>			
Reviewers: There is a listing of projects and agencies that serves as a valuable reference. A clearer review and presentation 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.		Partial	2

### III. The Management Plan

*(Derived from pages 12-16 of the Technical Guide.)*

Reviewers should consider the soundness, completeness, analytical approach, and transparency (documentation of methods and decision-making process) of the following components of a subbasin management plan.

These checklist tables incorporate Council Question 4, Consistency with the Provincial- and Basin-level Program: Are the vision, objectives, and strategies proposed in the subbasin management plan consistent with those adopted in the program for the province and/or basin levels? This is a three-part question and reviewers must be familiar with the vision, objectives, and strategies described in the 2000 Fish and Wildlife Program (pp. 13-33) and, for mainstem subbasin plans, the Mainstem Amendments (pp.11-28).

#### III.A. The Vision for the Subbasin

Does the Vision Section of the Management Plan 1) describe the desired future condition for the subbasin; 2) describe a vision that will drive development of the biological objectives and thereby the strategies that are incorporated to change conditions within the subbasin; and 3) incorporate the conditions, values and priorities of the subbasin in a manner that is consistent with the Vision described in the Council's 2000 Fish and Wildlife Program? (Council Question 4 to the ISRP):

(Y)es,  
(P)artial,  
(N)o

Need for  
additional  
treatment  
(0-4)

Reviewers: The vision statement is very broad. The vision should grow from the past assessments and the most likely future states, and not be an attempt to recreate reference conditions. Guiding principles of the plan's vision are tabled, and could be expanded to objectives/goals, strategies, and tactics.

Yes

1

#### III.B. Biological Objectives

Does the Biological Objectives Section of the Management Plan describe physical and biological changes within the subbasin needed to achieve the vision?

<p>Reviewers: 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 AC 1 states that reduction in sediment will increase survival of various life stages of steelhead. Objective AC 1.1 states that reducing embeddedness within the area to 10%, etc will accomplish this, in part. 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.</p> <p>In essence the general objectives 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 plan.</p>	<p>Partial</p>	<p>3</p>
<p>III.B.1. Are the biological objectives consistent with basin-level visions, objectives, and strategies adopted in the program? (Council Question 4) The 2000 Fish and Wildlife Program, pages 16-18, provides general descriptions for basin-level goals, objectives, and strategies. The Mainstem Amendments provide additional biological objectives as well on pages 11-14.<sup>7</sup></p>		
<p>Reviewers: 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 Plan's goal. The objectives and strategies in the Tucannon Subbasin 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</p>	<p>Yes</p>	<p>2</p>

<sup>7</sup> Given the Fish and Wildlife Program's emphasis on building from subbasin level management plans upward into provincial and basin level objectives, reviewers should evaluate whether the plans have a framework that will facilitate the development and linkage of objectives from the subbasin to the province to the basin.

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 lack of specification of the role of artificial production is particularly troubling.		
III.B.2. Are the biological objectives based on the subbasin assessment? (This question relates to the Logic Path in the subbasin plan. Question III.C.1 is a similar question for the Strategies Section.)		
Reviewers: The objectives are derived from the Assessment (mainly EDT) and prioritized so that imminent threats are addressed, and then others are. Fish information from the Assessment is not incorporated into the biological objectives.		
III.B.3. Where possible, are the biological objectives empirically measurable and based on an explicit scientific rationale; i.e., quantitative with measurable outcomes?		
Reviewers: Biological objectives should be presented as they relate to the numbers of animals and plants. Planners assumed this to be a habitat-related exercise so objectives are associated with change in physical habitat. They did provide numeric goals for anadromous species developed in other programming efforts. They conclude that numeric objectives will likely be developed in the future by the court system.	Yes	1
III.B.4. Are biological objectives identified for both the short and long-term?		
Reviewers: A ten to fifteen year planning horizon is presented (this is the standard EDT approach) that is for habitat objectives, and thus indirectly for biological objectives. For further review, please see the comments on Walla Walla and other nearby subbasins that also took this approach.	Partial	2
III.B.5. Are the biological objectives complementary to programs of tribal, state and federal land or water quality management agencies in the subbasin?		
Reviewers: At the time of presentation, the plan had not been thoroughly reviewed by all stakeholders, but representatives are present and an effort to gather further input from others is in process.	Yes	
III.B.6. <i>Clean Water Act</i> : Does the management plan describe how the objectives and strategies are reflective of and integrated with the water quality management plan and Total Maximum Daily Load schedule within that particular state? I.e., does this subsection of the management plan assess and describe the consistency-coordination-findings of the Water Quality Plan with the subbasin plan? <sup>8</sup>		
Reviewer: Adequate.	Yes	1

<sup>8</sup> *Clean Water Act*: The Water Quality Management Plans developed for watersheds within each state includes the following information: 1) Management measures tied to attainment of TMDL; 2) Timeline for implementation; 3) Timeline for attainment of Water Quality Standards; 4) Identification of responsible parties; 5) Reasonable assurance of implementation; and 6) Monitoring and evaluation. The status of Total Maximum Daily Loads (TMDLs) is generally the responsibility of the state, which is delegated the responsibility for implementing the CWA. Each state has a schedule for completing TMDLs, which include a Water Quality Management Plan that describes how the allocations in the TMDL will be met. Basic information on TMDL's can generally be found on the web (see Resources).

III.B.7. <i>Endangered Species Act</i> : The USFWS and NOAA Fisheries are developing recovery plans for listed species (bull trout, white sturgeon, salmon). Recognizing that those ESA-based efforts are in various states of completion across the Columbia basin (some efforts are well underway, others just beginning), does the management plan describe how the objectives of the subbasin management plan are reflective of and integrated with the ESA-based goals for listed species within the subbasin? <sup>9</sup>		
Reviewers: Knowledge of ESA goals is best in the local area, with assistance from experts. The present planners need to be aggressive about defining the numeric needs for ESA recovery. The Management Plan would be improved by additional work on what these goals should be, and an analysis of their likelihood.	Yes	1
III.B.8. If there are disagreements among co-managers that translate into differing biological objectives, are the differences and the alternative biological objectives fully presented? (The Council’s review will examine whether the plan is consistent with legal rights and obligations of fish and wildlife agencies and tribes with jurisdiction over fish and wildlife in the subbasin, and agreed upon by co-managers in the subbasin.)		
Reviewers: There is no indication of disagreement among co-managers yet issues here and in the neighboring Snake River are clearly controversial (e.g., dam removal). Nonetheless, there appears to be a united front in this subbasin.	na	na

<b>III. C. Strategies<sup>10</sup></b>		
III.C.1. <b>Internal Consistency of the Plan.</b> Does the Strategies Section of the Management Plan explain the linkage of the strategies to the subbasin biological objectives, vision and the subbasin assessment? (Council Questions 2 and 3) <sup>11</sup>		
Reviewers: The plan’s strategies are generally linked to the stated habitat objectives, but an explicit linkage of strategies to viability of fish populations in the Assessment and vision is not included in the plan.	Yes	
III.C.2. <b>Consistency with the Fish and Wildlife Program.</b> Are the Strategies proposed in the subbasin management plan consistent with those adopted in the program? (Council Question 4)		
Reviewers: Please see comments above on III.B.1.	Yes	

<sup>9</sup> E.g. NOAA Fisheries has provided interim targets in a letter from NOAA Fisheries to the Council, Bob Lohn to Larry Cassidy: [http://www.nwcouncil.org/library/2002/nmfstargets2002\\_0404.pdf](http://www.nwcouncil.org/library/2002/nmfstargets2002_0404.pdf).

<sup>10</sup> *Definition*: Strategies are sets of actions to accomplish the biological objectives. Strategies are not projects but instead are the guidance for development of projects as part of the implementation plan. Strategies identified within the subbasin plans will be used as a basis for Council recommendations to the Bonneville Power Administration regarding project funding. Proposed measures will be evaluated for consistency with biological objectives and strategies. The strategies may be organized by categories of habitat, artificial production, harvest, hydrosystem passage and operations, and wildlife.

<sup>11</sup> This is one of the most important review questions. The set of seven questions from Council asks the ISRP to evaluate the internal consistency, scientific soundness, and thoroughness of subbasin plans. Internal consistency means there is scientific support for the conclusion that the strategies proposed in a subbasin plan will in fact address the problems identified by the subbasin assessment; i.e., does the Strategies Section take into account not only the desired outcomes, but also the physical and biological realities of the subbasin environment. The ISRP’s Subbasin Plan Logic Path flow chart, attached below, provides a straightforward illustration of the logic path reviewers should look for in subbasin plans. Rick Williams, ISRP chair, developed and has presented this flow chart to subbasin planners around the basin, emphasizing the importance that subbasin plans demonstrate a clear logic path.

<p><b>III.C.3. Consideration of Alternative Management Responses.</b> Does the Strategies Section explain how and why the strategies presented were selected over other alternative strategies (e.g. passive restoration strategies v. intervention strategies)? (Council Question 5)<sup>12</sup></p>		
<p>Reviewers: Alternative management responses are rarely considered in this plan, other than a brief discussion of active and passive restoration strategies. Perhaps there are few alternatives. An adequate decision process would consider alternatives and model outcomes, and this plan would benefit from such an approach if it incorporated the full life history.</p>	<p>Partial</p>	<p>3</p>
<p><b>III.C.4. Prioritization.</b> Does the Strategies Section describe a proposed sequence and prioritization of strategies?</p>		
<p>Reviewers: The planners made good use of EDT in identifying limiting factors. The EDT analysis is consistent with other analyses of limiting factors conducted for the subbasin. EDT results are used to rank protection and restoration potential of each reach based on the sum of the of the percentage gains in diversity, productivity, and abundance. This ranking provided the first step in identifying priority areas but is modified where needed by several additional considerations. 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.</p> <p>The objectives have not been prioritized relative to each other.</p>		<p>2</p>
<p><b>III.C.5. Additional Assessment Needs.</b> Does the Strategies Section describe, if necessary, additional steps required to compile more complete or detailed assessment?</p>		
<p>Reviewers: The additional assessment needs are EDT related and include a more comprehensive EDT examination that focuses on life stages and bottlenecks.</p>	<p>Partial</p>	<p>3</p>
<p><b>III.C.6. Clean Water Act:</b> Does the management plan describe how the strategies are reflective of and integrated with the water quality management plan and Total Maximum Daily Load schedule within that particular state?</p>		
<p>Reviewers: Adequate.</p>	<p>Yes</p>	<p>1</p>
<p><b>III.C.7. Endangered Species Act:</b> Recognizing that ESA-based efforts are in various states of completion across the Columbia basin, does the management plan describe how the strategies of the subbasin management plan are reflective of and integrated with the ESA-based goals for listed species within the subbasin?</p>		
<p>Reviewers: The planners should consider and present quantitative objectives for gaining the structure and abundances needed to be confident that these species will persist in the basin.</p>	<p>Yes</p>	<p>2</p>

<sup>12</sup> The 2000 Fish and Wildlife Program directs that the subbasin management plan’s strategy section must include an explanation of how and why the strategies presented were selected over other alternative strategies (e.g. passive restoration strategies v. intervention strategies). The Council does not expect subbasin plans to be structured like an Environmental Impact Statement with a list of alternative actions and descriptions of why each were not recommended. The Council’s primary interest is on why and how a strategy was selected -- the rationale for the selected strategy -- which necessary includes some discussion of alternatives.

### III.D. Research, Monitoring, and Evaluation

This RME Checklist Section provides the review elements necessary for the ISRP/ISAB to answer *Council Question 6. Plan for Assessing Progress toward Subbasin Goals*. The ISRP/ISAB is asked to determine whether a subbasin plan includes a procedure for assessing how well subbasin objectives are being met over time. This question focuses on accountability and self-assessment, and reflects on the adequacy of the Management Plan’s research, monitoring and evaluation component. This RME component needs to be closely connected to a limiting factors analysis and the biological and environmental objectives. A prioritized RME agenda reflecting the critical uncertainties and limiting factors should be developed and presented with the detail requested below (Technical Guide pp. 14-16). *NOTE: The focus of the RME component should be on the strategy level rather than individual project level.*

Subbasin planners were encouraged to incorporate, or link their RME framework and strategies with the “regional” RM&E strategies being developed by the Pacific Northwest Aquatic Monitoring Partnership and the Columbia Basin-Wide Research, Monitoring and Evaluation (RM&E) Program, a coordinated effort developed by State, Federal, and Tribal entities in response to the Basin-wide Salmon Recovery Strategy 2000 and the FCRPS 2000 Biological Opinion. Products from these regional RME efforts could be used to meet elements of a subbasin plan’s RME section (Technical Guide pp. 14-16), particularly in the areas of monitoring protocols and methodologies. The subbasin plan should also explain how they incorporated existing monitoring guidance from state programs.

III.D.1	<b>Research:</b> Does the RME section of the plan describe a research agenda with specific conditions and situations identified in the subbasin that will require specific research studies to help resolve management uncertainties? Is the research agenda framed around the relationships between the assessment data and the stated vision, biological objectives, and strategies in describing uncertainties? Does the RME section prioritize research topics that are of critical importance to the subbasin?	(Y)es, (P)artial, (N)o	<i>Need for additional treatment (0-4)</i>
Reviewers: The RME plan is a wish list but includes important components. There is a recognized need to take a regional approach, with guidance. The RME plan appears to be in draft form.		Partial	2
III.D.2	<b>Monitoring Objectives:</b> Does the RME subsection identify what kind of information needs to be collected in order to determine if the plan’s vision and objectives are being met? I.e., what indicator variables will be monitored?		
Reviewers: Monitoring objectives are in general terms only; a clearer selection of response variables and a decision analysis framework would be useful.		Yes	2
III.D.3	<b>Monitoring Indicators:</b> Does the RME subsection identify measurable indicators of physical, chemical, biological, or socioeconomic conditions that may act as environmental signposts by which progress towards achieving the stated vision can be evaluated? E.g., does the RME subsection describe performance standards or quantitative benchmarks for reference conditions against which observations can be compared? Does the plan prioritize which indicators are most needed to answer management questions (include a short list)?		
Reviewers: As above, monitoring indicators are presented in general terms only; a clearer selection of response variables and a decision analysis framework would be useful.		Partial	3
III.D.4	<b>Data and Information Archive:</b> Does the RME subsection describe an infrastructure to archive relevant data and meta data generated through monitoring efforts in existence for the subbasin (e.g., locally or at a regional Fish and Wildlife Program funded database such as StreamNet, the Fish Passage Center, or DART)? Specifically, does the RME subsection include discussion of quality assurance/quality control (QA/QC), data management and analysis, and data reporting?		

Reviewers: While this segment is missing from the plan, the planners are undoubtedly aware of these databases, and would do so given adequate guidance and advice for RME that should be coordinated across subbasins.	No	3
III.D.5	<b>Coordination and Implementation:</b> Does the RME subsection describe who will collect the information and data collection methods whether collection is done by a subbasin, provincial, state, or a regional entity, or a combination of entities? This should include a description of coordination with regional RME efforts in the basin (Regional Partnership, Action Agencies Research, Monitoring, and Evaluation Plan, etc) with standardization of data methods. It should also include estimates of how much the proposed M and E will cost.	
Reviewers: Not completely included in the draft.		Partial 3
III.D.6	<b>Summary Question. RME Logic Path (Evaluation and Adaptive Management):</b> Does the subbasin 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? (Council Question 7) Specifically, does the RME subsection describe a scientifically sound logic path for how to test if the subbasin plan's strategies are helping to reach the stated vision and objectives? I.e., Is the RME agenda adequately framed around the relationships between the assessment data and the stated vision, biological objectives, and strategies in describing uncertainties?	
Reviewers: The RME subsection requires further development to provide the information requested.		Partial 3
<b>Overall impression and evaluation of the Management Plan:</b> As needed elaborate on your evaluation of the various Sections enumerated above. If the plan provides additional analysis beyond what is laid out above in the checklist please comment here (e.g., socio-economic descriptions or analysis).		
Reviewers: The Management Plan presents a good initial effort to combine aquatic and terrestrial portions of the planning effort. It is perhaps questionable to choose species that are supplemented with hatchery products as focal species. The focal species presumably reflect " ecosystem health." This plan acknowledges many of the problems of subbasin planning and provides a sound scientific approach for assessing relationships between habitat conditions and focal species population trends and viability.  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. 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 sub-basin.  The lack of specification of the role of artificial production is		Partial 2

<p>particularly troubling.</p> <p>Alternatives are rarely considered in this plan, other than a brief discussion of active and passive restoration strategies. An adequate decision process would consider alternatives and model outcomes, and this plan would benefit from such an approach if it incorporated the full life history.</p> <p>A concern in the use of EDT in determining limiting factors 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.</p> <p>In the RME section, clearer selection of response variables and a decision analysis framework would be useful. Information and data archives are missing from the plan.</p>		
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<p><b>General Council Question. Consistency with the Fish and Wildlife Program and its Scientific Foundation</b></p> <p>The Council asks the ISRP to evaluate a subbasin plan for its consistency with the Scientific Foundation adopted as part of the Program and with the requirements for “biological objectives” as described in the program. The core of the Council’s Scientific Foundation is a set of eight Scientific Principles:</p> <ol style="list-style-type: none"> <li>1. The abundance, productivity, and diversity of organisms are integrally linked to the characteristics of their ecosystem.</li> <li>2. Ecosystems are dynamic, resilient and develop over time.</li> <li>3. Biological systems operate on various spatial and time scales that can be organized hierarchically.</li> <li>4. Habitats develop, and are maintained, by physical and biological processes.</li> <li>5. Species play key roles in developing and maintaining ecological conditions.</li> <li>6. Biological diversity allows ecosystems to persist in the face of environmental variation.</li> <li>7. Ecological management is adaptive and experimental.</li> <li>8. Ecosystem function, habitat structure and biological performance are affected by human actions.</li> </ol> <p><i>See 2000 Fish and Wildlife Program, pages 14-15 for full detail.</i></p> <p>Questions on consistency with the objectives and strategies section of the Fish and Wildlife Program are incorporated in the table above. Consistency with the Program’s scientific foundation is interwoven throughout the checklist, and this comment table provides reviewers a place to specifically summarize and identify how well the eight principles were addressed.</p> <p><b>Summary comments and evaluation of the subbasin plan’s consistency with the eight principles of the Fish and Wildlife Program’s Scientific Foundation:</b></p>		
<p>Reviewers: The abundance and diversity of organisms in this subbasin are presented as linked to the characteristics of the ecosystem, given the tools of EDT and the availability of stock information to guide this linkage. The dynamics and eventual outcomes of these dynamics are not fully addressed, and it is not difficult to see that several fish populations are in a precarious state, and not rebuilding as expected. Further, current actions, such as continued hatchery intervention, may not be assisting in</p>	<p>Partial</p>	

<p>the reproductive success of wild anadromous fish. Reviewers felt there is an inadequate consideration of the dynamic nature of ecosystems and the role of disturbance in shaping aquatic habitats. A lack of analysis of trajectories of ecosystem change and a well-coordinated monitoring and data management program make it unlikely that implementation of the appropriate conservation and restoration efforts will be as effective as possible.</p> <p>A plan based in science would proceed with quantitative numeric objectives for plants and animals in the basin. The numeric objectives would be related to what it will take to assure viable populations, and then identify what habitat is needed to produce the needed distribution and abundance across the subbasin. An overall hypothesis of "fix it, or partially fix it, and the fish will come" provides no endpoints for assessing program success, nor does it answer "how many and from where?"</p>		
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