

# Technical Guide for Subbasin Planners



*The suggestions in this guide are not mandatory.  
This guide was developed by a technical working group to assist planning technicians on  
specific issues that may be encountered in the course of developing a subbasin plan.*

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## Summary

Subbasin plans will be reviewed and adopted as part of the Council's Columbia River Basin Fish and Wildlife Program (Program), and will help direct Bonneville Power Administration (Bonneville) funding of projects that protect, mitigate and enhance fish and wildlife that have been adversely impacted by the development and operation of the Columbia River hydropower system. The Council, Bonneville, National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) intend to use adopted subbasin plans to help meet requirements of the 2000 Federal Columbia River Power System Biological Opinion. The NMFS and the USFWS intend to use subbasin plans as building blocks for recovery planning for threatened and endangered species.

Subbasin plans will be developed locally and in collaboration with fish and wildlife managers, local governments, interest groups and stakeholders and other state and federal land and water resources managers. The final subbasin plan adopted by the Council should enjoy a wide range of support from all interested parties. The information contained in subbasin summaries, other existing plans and documents should provide the basis for the subbasin plan. The development of the plans will be iterative, and the information will be updated during each funding cycle.

The information that follows provides the outline for developing a subbasin plan and a general description of each of the elements. Below are the elements of a subbasin plan with the three primary elements being: 1) Assessment, 2) Inventory of Existing Activities and 3) the Management Plan. An overview of each element follows this table.

<b>Subbasin Plan Outline</b>		
I.	Introduction	Introduction to the plan and subbasin overview
II.	Subbasin Assessment	Overview, Focal Species, Environmental Conditions, Ecological Relationships, Limiting Factors, Synthesis
III.	Inventory of Existing Activities	Summary of existing projects and programs
IV.	Management Plan	Development of subbasin <b>vision</b>
		Development of subbasin <b>biological objectives</b>
		Development and prioritization of subbasin <b>strategies</b>
		Research, Monitoring, and Evaluation plan
		Endangered Species and Clean Water Act considerations
V.	Technical Appendix	Assessment data, references, maps, supporting documentation

## I. Introduction

The introduction to the subbasin plan should describe the plan and the planning process used to develop it with regard to organization and participation, current local and regional socioeconomic conditions and the overall intent of the subbasin plan. Also, it should describe the planning group and identify coordinators, writers, contributors and reviewers and the technical team. It should also indicate local and regional support for the plan as well as persons or organizations opposed to the document, either in whole or in part, or its development.

## II. Subbasin Assessment

An assessment will form the scientific and technical foundation for developing subbasin vision, objectives and strategies. The assessment is based on a regionally developed assessment template. The Council has developed an analytical model (Ecosystem Diagnosis and Treatment) to complement this template for use in subbasin planning. The identification of limiting factors should derive from this assessment. The limiting factors should describe the problems that impede the desired biological performance.

An outline of the assessment template is provided below. Much of the data necessary for this process will be provided by the Council and is available for immediate review and refinement by technical experts within the subbasin. It will be important to assemble a group of local/state technical experts with biological, physical and management expertise to refine, validate and analyze data. The technical experts can then inform the planners in developing the management plan. Council staff will provide technical assistance in interpreting and analyzing preliminary data.

- A. Subbasin Overview
  - General Description
  - Regional Context
- B. Focal Species Characterization and Status
  - Focal Species Selection and Background Information
  - Population Delineation and Characterization
  - Population Status
- C. Environmental Conditions
  - Subbasin Habitat Conditions
  - Out-of-Subbasin Effects
  - Environment/Population Relationships
- D. Ecological Relationships
  - Interspecies Relationships
  - Processes and Functions
- E. Limiting Factors/Conditions
- F. Synthesis/Interpretation
  - Synthesis of Findings
  - Working Hypothesis
  - Species Abundance/Productivity
  - Desired Future Conditions
  - Opportunities and Challenges

### III. Inventory of Existing Programs and Activities

This element is intended to summarize fish and wildlife protection, restoration and artificial production activities and programs within the subbasin that have occurred over the last five years or are about to be implemented. The information should include programs and projects as well as locally developed regulations and ordinances that provide fish, wildlife and habitat protections. Compiling this information will help demonstrate: 1) current management directions, 2) existing and imminent protections, and 3) current strategies implemented through specific projects. The inventory will have its greatest value when it is reviewed in conjunction with the limiting factors resulting from the assessment. This review should help to identify gaps between actions taken and actions needed – “gap analysis”– and provide context to the needs within the subbasin, the types of projects underway to address them and the relationship between the activities. In addition, the inventory, reviewed in conjunction with the technical assessment, should help indicate the value and efficacy of current activities.

### IV. Management Plan

The management plan is the heart of the subbasin plan. The primary goal of the planning effort is to define the environmental and biological *vision, objectives and strategies* specific to fish and wildlife within the Columbia River Basin. The management plan should take on a 10-15 year planning horizon.

#### *Vision for the Subbasin*

The Vision describes the desired future condition in terms of a common goal for the subbasin. The vision is qualitative and should reflect the policies, legal requirements and local conditions, values and priorities of the subbasin in a manner that is consistent with the vision described for the Columbia Basin in the Council’s program. The vision will provide the guidance and priority for implementing actions in the future, therefore driving the development of biological objectives and strategies for the subbasin.

#### *Biological Objectives*

The initial assessments along with the vision will guide the focus of the biological objectives. Biological objectives should clearly describe physical and biological changes needed to achieve the vision in a quantifiable fashion. They will serve as a benchmark to evaluate progress toward the subbasin vision and should have measurable outcomes. Biological objectives should (1) describe and quantify the degree to which the limiting factors will be improved, and (2) describe and quantify changes in biological performance of populations that will result from actions taken to address the limiting factors.

#### *Strategies*

Strategies are developed to achieve biological objectives. Implementing strategies should be aimed at addressing the limiting factors that will accomplish the biological objectives. Strategies identified within the subbasin plans will be used as a basis for Council recommendations to the Bonneville Power Administration regarding project funding. There may be several different strategies with a subbasin that are selected to meet the biological objectives that will vary depending on the condition of the populations and habitat.

The strategies, as a package, will represent alternatives that stakeholders should use as a tool to evaluate as part of the planning exercise. Economic, political, social and cultural aspects should

be taken into account when evaluating the alternatives. From this evaluation, projects designed to address the strategies and the limiting factors should be proposed for funding. Individual project proposals will not be developed as part of the planning process, but rather as part of the Province Review process. Projects will be evaluated in part on their consistency with the identified vision, objectives, and strategies.

### *Research, Monitoring, and Evaluation*

Each subbasin plan must have a monitoring plan component that describes how strategies to be implemented are achieving the stated biological objectives. The strategies are represented by a collection of individual actions, and the contribution of those efforts, collectively, is the focus of monitoring within the subbasin plan. The measures are the improvement in conditions of habitat or population overall – the trends within the subbasin. Essentially, a monitoring and evaluation plan is needed to: (1) ensure that the strategies selected and implemented are addressing the “limiting factors” as anticipated, and (2) verify that the “limiting factors” identified in the assessment are, in fact, the elements that are limiting the environmental expression and biological performance desired. The monitoring plan should not include project-specific monitoring. All projects proposed for Bonneville funding through province reviews must include a specific project-monitoring component which will be reviewed on a project-by project basis through the provincial review process.

In addition, each subbasin plan will contain a research agenda that would address critical uncertainties related to stated goals, biological objectives, and strategies. The research agenda recognizes conditions and situations identified within a subbasin that will require specific research to help resolve specific management uncertainties. A research agenda should identify elements such as: the hypothesis being tested; what is known about each and what the anticipated results might be; their intended management application; experimental design; definition of spatial and temporal scales; and a description of end products in terms of data and analytical results, access and distribution.

### *Endangered Species Act and Clean Water Act Requirements*

The subbasin assessment will include both status of water quality conditions and status of listed species. However, the management plan should describe how the objectives and strategies are reflective of, and integrated with, the recovery goals for listed species within the subbasin, and the water quality management plan within that particular state. Coordination with NMFS’s Technical Review Teams and the state agency charges with implementing the CWA will be an important step in ensuring consistency with ESA and CWA requirements.

### *Appendices: Supporting Documentation*

The background information and supporting documentation used in subbasin plan development can be included within a technical appendix to the plan. Items may include assessment data, analysis, project listings, maps, excerpts and other relevant documents.

*Note: The Council can provide additional detailed guidance for technical experts and planners who request further assistance in developing their subbasin plan. The guidance focuses on the technical assessment and the monitoring and evaluation elements. Please contact Council staff for more information.*

## Background

### ***Introduction***

These guidelines are not mandatory. The Council recognizes that each local planning group will approach subbasin planning in its own way. Provided a plan meets the basic requirements identified in the Council's 2000 Fish and Wildlife Program, the Council will consider the plan for adoption into its program. The Council's intention is to allow flexibility in how a planning group approaches subbasin planning, while assuring that the resulting plan addresses the relevant issues.

In our discussions of subbasin planning with technical staff in the region, it became clear that the broad, flexible requirements of the 2000 Fish and Wildlife Program would need to be translated into specific details as subbasin plans are developed. There has been a strong interest in having a technical resource that illustrates how some of the requirements might be approached, and that discusses how these can be integrated with the requirements of other agencies, including the federal agencies with Endangered Species Act responsibilities. This technical guide was developed by a regional working group in response to this interest, in the hope that it will provide a useful starting point for others.

The guidance material is based on the language in the Northwest Power Planning Council's 2000 Columbia River Basin Fish and Wildlife Program (Council document # 2000-19) and is intended to further describe the elements of a subbasin plan. This guide also incorporates elements from subbasin assessment template that was developed through the collaborative efforts of regional scientists (Technical Appendix, 2000 Fish and Wildlife Program).

Subbasin plans will be reviewed and adopted as part of the Council's Columbia River Fish and Wildlife Program (Program), and will help direct Bonneville Power Administration (Bonneville) funding of projects that protect, mitigate and enhance fish and wildlife that have been adversely impacted by the development and operation of the Columbia River hydropower system. The Council, Bonneville, National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS) intend to use adopted subbasin plans to help meet requirements of the 2000 Federal Columbia River System Biological Opinion. In addition, NMFS and USFWS would like to use subbasin planning as building blocks for recovery planning for threatened and endangered species. This planning process will work to define the goals for fish, wildlife, and habitat in each subbasin, define objectives that measure progress toward those goals, and establish strategies to meet objectives.

Subbasin plans will be developed locally, and in collaboration with fish and wildlife managers, local governments, interest groups and stakeholders and other state and federal land and water resources managers. The plans should be based on current scientific understanding of the subbasin and explicitly identifies the underlying data, assumptions and rules. The process of developing these plans will be iterative and the information updated during each funding cycle (every three years). The direction or vision for the subbasin should be consistent with the Council's program and reflect local policies and priorities.

The following is a statement of scope for what the Council expects the plans to address:

*Scope of Subbasin Plans: Subbasin plans need to integrate and coordinate Bonneville obligations under the NW Power Act, Endangered Species Act and Clean Water Act requirements and tribal trust and treaty based responsibilities. Beyond Bonneville specific responsibilities, subbasin plans should be developed broadly enough to take into account other federal, state, and local activities, objectives, and responsibilities. Including these other elements, though they may not be a funding responsibility of Bonneville, should enable planners and implementers to coordinate their activities in a more cost-effective manner and in a way that produces cumulative and synergistic benefits.*

The Council intends to adopt subbasin plans independent of an implementation plan and associated budget. In other words, a plan submitted for adoption should include vision, objectives, and strategies for the subbasin; and the implementation plan should be developed for the purpose of project review within the provincial review process. A subbasin planning team, comprised of fish and wildlife managers and local stakeholders should develop implementation plans. It should identify specific projects with associated budgets that are based directly on the strategies and priorities identified in the subbasin plan. The projects proposed for Bonneville funding within the implementation plan will be reviewed through the Council's Rolling Provincial Review Process once every three years.

### **Subbasin Summaries**

Subbasin summaries will have been completed for nearly all of the subbasins prior to initiating subbasin plans. Subbasin summaries, coordinated and developed through the Columbia Basin Fish and Wildlife Authority, are being used as interim documents to guide Bonneville funding for projects until subbasin plans are developed. The process used to develop the summaries, as well as the documents themselves will provide the starting point for plan development.

The summaries are generally comprehensive with regard to the existing conditions, programs, projects, and management activities. In many cases, information contained within the subbasin summary can be incorporated in the subbasin plan. Preliminary assessment information can be found in the summaries as well. The key distinctions between a subbasin summary and a subbasin plan are 1) the scientific foundation for the plan that is derived from a subbasin assessment; and 2) the management plan section where vision, objectives and strategies are developed and identified for a 10-15 year planning horizon. The points at which the plan takes off from the summary is primarily in the completion of the assessment and the development of the vision, objectives and strategies (management plan).

### **Future Use and Expectations**

An adopted subbasin plan is intended to be a living document that increases analytical, predictive, and prescriptive ability to restore fish and wildlife. At each three-year cycle of planning, the updated information will guide revision of the biological objectives, strategies and implementation plan. The Council views the assessment development as an ongoing process of evaluation and refinement of the region's efforts through adaptive management, research and evaluation. It will need maintenance over time that will need to be coordinated with other agencies and stakeholders. In addition, as relationships are made at a larger scale such as a province or ESU, adaptive management practices may be warranted to reflect priorities at the larger scale.



## Developing a Subbasin Plan

The remainder of this document provides the context and guidance to assist in developing your subbasin plan. It is organized in three parts: **1) Organization** (*table of contents*); **2) Background** (*for the Assessment, Inventory, and Management Plan*); and **3) Specific guidance** (*the “how to” for each section of the plan*). Each part is detailed below.

### **I. Organization**

Provided below is a recommended Table of Contents for the subbasin plan. The three required components of the plan include the Assessment, the Inventory of Existing Activities and the Management Plan. The Assessment will form the scientific foundation for the management plan. The management plan will include a vision for the subbasin, biological objectives, and strategies. State-specific information and considerations should be incorporated throughout the plan as appropriate.

<b>Subbasin Plan Table of Contents</b>		
I	Introduction	Introduction to the Plan and subbasin overview
II	Subbasin Assessment	Overview, Fish and Wildlife Species Populations, Interpretation and Synthesis (development of the working hypothesis)
III	Inventory of Existing Activities	Summary of existing projects and programs
IV	Management Plan	Development of subbasin <b>vision</b>
		Development of subbasin <b>biological objectives</b>
		Development and prioritization of subbasin <b>strategies</b>
		Research, Monitoring and Evaluation plan
V	Technical Appendix	Assessment data, references, maps, supporting documentation

## **II. Background: Assessment, Inventory, and Management Plan**

*This section is intended to provide background and information behind the three primary sections of the plan. The information presented is important as it provides further definition for the what the Council is asking for and how it will be used. It does not provide the instructions for how to complete the pieces – the products of the plan. Instruction and guidance on completion of the products begins on page 15.*

### Subbasin Assessment

The assessment is the technical evaluation of the biological and physical characteristics of the subbasin. Its primary purpose is to bring together technical information for the analysis needed to develop biological objectives. The Council has developed Ecosystem Diagnosis and Treatment<sup>1</sup> (EDT) to use as a subbasin planning tool and is providing planners with preliminary data sets to use for this tool. EDT is able to link habitat condition to responses in salmon and bull trout populations, and may be adapted for terrestrial wildlife.

The use of EDT tool allows the council a way of standardizing assessment data between 62 subbasin. However, other comparable analytical tools may be appropriate and more desirable in some instances. The assessment concludes with identification of a *working hypothesis* to be used as a basis for the management plan. A working hypothesis can take different forms, but is best suited to be developed around a scientific model such as EDT. However, the working hypothesis may contain analysis from other tools and the results can be incorporated within the EDT structure to result in an integrated working hypothesis.

*The Working Hypothesis:* The assessment and development of the management plan is based on the concept of a working hypothesis. A working hypothesis summarizes a scientifically based understanding of the subbasin at the time the management plan is developed and begins to bridge the gap between the science and strategies. By developing a working hypothesis, you will have an explicit scientific rationale to considering alternative biological objectives and strategies. It will be used to evaluate and derive biological objectives and strategies in relation to the subbasin vision. Finally, the working hypothesis provides the elements necessary for scientific review of the subbasin plan by the Council and the Independent Scientific Advisory Board.

The working hypothesis is a collection of component hypotheses – a set of key assumptions that are based on assessment data and analysis. The overall working hypothesis describes a scientific understanding of the subbasin and contains the key assumptions relating to species-habitat relationships and/or the effectiveness of strategies to modify the elements of the environment. For a key assumption example, if a strategy *were intended to reduce late summer water temperatures, the assumption relating to salmonid temperature requirements and the relationship to the proposed strategies would be described.* This assumption would be based on: 1) underlying data - *the data supporting the contention that late summer water temperature is a constraint on expression of life history diversity;* 2) supporting documentation - *reference to scientific studies that are the basis for the hypotheses;* and 3) analysis - *assumptions, data and information together that form a scientific rationale for the vision, biological objectives and strategies*

As part of the implementation of the subbasin plan, the working hypothesis will be tested and may be refined through monitoring and evaluation. Additional analysis and new information may be incorporated into the assessment, as it becomes available.

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<sup>1</sup> For more information on EDT and the data sets for each subbasin, visit [www.edthome.org](http://www.edthome.org).

*Development of the Assessment.* The various pieces of a subbasin assessment will be the responsibility of different entities including the local subbasin technical team, the Council, National Marine Fisheries Service (NMFS), and others. The Council will provide an initial set of assessment information to provide a basis for more detailed technical work. This includes a coarse-screen data set appropriate for use in Ecosystem Diagnosis and Treatment.<sup>2</sup> After review and refinement by subbasin experts, this data set, EDT model, and other analyses can be used as an assessment tool to describe the subbasin working hypothesis.

*Federal Agency Recovery Planning.* The subbasin assessment will contribute to the data and analytical needs of NMFS and U.S. Fish and Wildlife Service in the development of recovery plans for anadromous and resident fish listed under the federal Endangered Species Act. Both agencies are also developing additional analysis and research that will be incorporated into the assessments when it becomes available. Recovery plans are being developed to address anadromous fish at the level of the Evolutionarily Significant Unit (ESU) which is larger than the subbasin, but also at the population level. Bull trout are identified in Distinct Population Segments with a further subdivision into recovery units. Recovery units generally fit the subbasin structure, but can incorporate more than one subbasin. Definition of these units and their population subdivisions as well as technical standards for listed fish populations will be important contributions to the subbasin planning effort.

In developing the recovery plans for anadromous fish, the NMFS hopes to have particular questions answered through the subbasin assessment process. In other words, NMFS will, in part, be relying on the results of the local subbasin assessments to provide the information needed for NMFS to develop habitat recovery plans. The regional collaborative effort to develop the assessment helped foster consistency between the recovery planning process and the subbasin assessment process. The assessment results should be able to answer the following *draft* questions that NMFS feels are important to their recovery planning efforts. The questions include:

***Questions to be answered in developing a habitat recovery plan:***

***1. How might habitat changes have altered the abundance of individual populations?***

*What is the relationship between habitat quantity/quality and fish abundance?*

*What are current and historic habitat conditions for each population?*

*What are the estimated historic and current juvenile and adult capacities?*

*Which habitats appear to be limiting abundance of populations?*

*What/where are the largest losses?*

*Where are refugia?*

***2. How might habitat changes have altered the productivity of individual populations?***

*What is the relationship between habitat quantity/quality and fish productivity?*

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<sup>2</sup> For more information on EDT and the data sets for each subbasin, visit [www.edthome.org](http://www.edthome.org).

**3. How might habitat changes have altered the diversity of life history patterns?**

*Is habitat diversity related to salmon diversity?*

**4. How might habitat changes have altered the spatial structure of populations?**

*How might this have affected connectivity among populations?*

**5. What are the causes of habitat loss and degradation?**

*What protection and restoration actions are necessary for recovery of the riverine ecosystem? (Identify corrective actions for each cause of habitat loss identified above.)*

*What is the relative importance of these restoration actions by population or watershed?*

*What are priority protection and restoration actions for recovery of listed species?*

**6. What scenarios of habitat characteristics would support a viable ESU (viable meaning adequate levels of all four Viable Salmon Population parameters)?**

**7. What are prudent interim actions and strategies for implementing actions over the short term?**

*What are some principles to be considered in implementing management experiments to help provide greater assurance that our actions will achieve desired goals?*

*Local Subbasin Technical Teams:* It is important at the local/state level to assemble a group of technical experts to work on the assessment piece of the plan. In some states and subbasins, these types of groups may be in existence and may cover more than one subbasin. The subbasin or regional technical team should have the biological, physical, and management expertise to refine, validate and analyze data that will inform the planners in developing the plan. A first step in the plan development is the review and refinement of the initial data set provided by the Council. The initial assessment data is being compiled for each subbasin and will be available in June 2001 for to subbasin technical teams.

The Council will provide some assistance to subbasin technical teams in review and refinement of the initial assessment data. The Council has formed a basin-level technical team (Regional Assessment Advisory Committee) that is currently evaluating and refining the EDT model and other analytical tools and is advising the region on technical aspects of subbasin assessment and planning. In addition, Technical Recovery Teams, established through NMFS will be able to interface with the local technical team to provide technical assistance related to anadromous fish populations and recovery goals. Both the Council's technical assistance and the TRT can help provide subbasin planners with analytical assistance, out-of-subbasin assumptions on anadromous fish, mainstem river passage, harvest, and larger scale climate and ocean conditions.

The initial assessments in some subbasins will encounter significant data gaps requiring additional information. The collection and validation of the assessment data is considered to be an iterative process and will continue throughout plan development. In all cases, it is expected that the body of information on which the assessment is based will continue to grow and that, as a

regular part of each project review and funding cycles, the assessments and plans will be updated. At a minimum, the assessment should represent the data and analysis for subbasin planners to agree on biological objectives and strategies for the subbasin.

### Inventory of Existing Activities

The intent behind collecting this information is to capture programs/projects underway that relate to watershed planning, restoration, and protection of fish and wildlife habitats and species recovery. It will help in understanding what the objectives and strategies have been to date. The information will not only illustrate the past and current *strategies* within the subbasin but also the utility and success of those activities. The planner should look at the relationship between the existing activities and the assessment to identify the gaps between actions already taken and actions that are needed. This “gap analysis” will provide context to the general needs within the subbasin, the types of projects underway to address them, and the relationship between the activities.

### Management Plan

The management plan sets forth desired direction for the subbasin on a hierarchical approach, taking into account the science, local conditions, concerns, Treaty rights, and applicable law and policy. It is where the science and the social aspects come together. The hierarchical approach begins with a *vision* for the subbasin, then outlines *biological objectives* describing the desired environmental conditions, and then identifies a set of *strategies* to achieve the objectives. In addition, the management plan includes a *monitoring and evaluation plan* for the strategies that may be implemented. Plans should have a 10-15 year horizon recognizing that additional information and analysis may indicate the need for periodic refinement.

Management plans adopted into the Council’s program must be consistent with the Northwest Power Act, and specifically section 4(h)(6) of the act, and with the Council’s fish and wildlife program. Management plans should also be consistent with other applicable law including the federal Endangered Species Act and the Clean Water Act.

*Using the Working Hypothesis.* The management plan will likely be developed in several iterations between planners and the technical team. A starting point for the development of the biological objectives should be the *working hypothesis* to provide a consistent scientific basis and to compare different alternatives. The vision and biological objectives of the management plan will need to reflect what is learned in the assessment and inventory work. It also must incorporate local concerns, conditions and priorities as well as applicable law and policy. Therefore, it is imperative that subbasin planners come to agreement on the working hypothesis, or a set of alternative hypotheses and an adaptive management process, in order to develop the management plan.

It is important at the local/state level to assemble a group of policy makers, managers, and planners, to work on the management plan. In some states and subbasins, these types of groups may be in existence and may cover one or more subbasins. The planning group should have strong interface with a technical team and represent interested governments, tribes and stakeholders within the subbasin. In some cases, coming to consensus on all biological objectives may be very difficult. Planners/policy makers may choose to “agree to disagree” on an issue, but move forward on mutual objectives. Describe these instances within your plan, and how you are dealing with them.

*Monitoring Plan.* Each subbasin plan must have a monitoring plan component that describes how strategies to be implemented are achieving the stated biological objectives. The strategies are

represented by a collection of individual actions, and the contribution of those efforts, collectively, is the focus of monitoring within the subbasin plan. The measures are the improvement in conditions of habitat or population overall – the trends within the subbasin. Essentially, a monitoring and evaluation plan is needed to: (1) ensure that the strategies selected and implemented are addressing the “limiting factors” as anticipated, and (2) verify that the “limiting factors” identified in the assessment are, in fact, the elements that are limiting the environmental expression and biological performance desired. The monitoring plan should not include project-specific monitoring. All projects proposed for Bonneville funding through province reviews must include a specific project-monitoring component that will be reviewed on a project-by project basis through the provincial review process.

*Research Agenda.* While monitoring investigates the progress in meeting biological objectives through implementation of strategies, research explores the relationships and uncertainties between subbasin vision, objectives and strategies. The EDT model developed by the Council as a tool to use in subbasin planning is structured around the vision, biological objectives and strategies identified in each subbasin. This model relies on the relationships between these elements. These relationships contain a great deal of uncertainties in need of testing and validation. Regardless of the model used in the assessment, each subbasin plans must an inventory of the research agenda that addresses specific uncertainties within the subbasin.

The Council is working to develop a set of basin-wide definitions and standards for uniform and consistent implementation of research studies. That guidance is anticipated to be available for review in the winter of 2001.

Throughout the basin, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service are administering the Endangered Species Act (ESA), which requires information gathering, planning, and mitigation actions. In addition, the Environmental Protection Agency, in cooperation with the states and tribes, is taking actions to achieve compliance with the Clean Water Act (CWA). There are many instances where subbasin and watershed planning initiatives are under way to address ESA and CWA concerns. Subbasin plans should be well coordinated with regional CWA and ESA efforts throughout the development of the plan.

This framework is not intended to pre-empt the legal authorities of any of these parties, but it does provide an opportunity for each of these regional participants to coordinate information gathering, planning, and implementation of recovery actions on a voluntary basis. That is, the Council’s program is designed to link to, and accommodate, the needs of other programs in the basin that affect fish and wildlife. This includes meeting the needs of the Endangered Species Act by describing the kinds of ecological change needed to improve the survival and productivity of the diverse fish and wildlife populations in the basin.

## Developing the Products

### ***I. Introduction***

This section should introduce the subbasin plan and the planning process in just a few pages. Briefly describe current subbasin, including the process used to develop the plan with regard to organization and participation; current local and regional socio-economic conditions, and the overall direction/goal of the subbasin plan. Also, it should describe the planning group and identify coordinators, writers, contributors and reviewers and technical team. It should also note local and regional support for the plan as well persons/organizations opposed to/disagree with the contents, either in whole or in part, of the document or its development.

### ***II. Subbasin Assessment***

*This assessment section provides a general overview of steps involved in completing the biological assessment. It is an abbreviated version of the more detailed guidance, which can be found in Attachment 1. Through workshops and other means of communications, the Council staff will provide technical assistance to subbasin technical teams in completing the assessment. In addition, much of the data identified below will be available within the coarse-data begin assembled by the Council. In general, here are the steps to complete a subbasin assessment:*

#### Subbasin Overview

*Provide readers with a brief orientation for the subbasin. Where subbasin summaries have been developed, much of this information has been compiled and can be incorporated into the plan.*

1. Subbasin Description (Geographic, biological and environmental)
2. The Subbasin in the Regional Context - to the greater Columbia River Basin and ocean

#### Fish and Wildlife Species/Populations

*This is one of a two-part assessment of subbasin biological resources. This part focuses on assessment of select species. This assessment serves two functions. First, it provides insight on the status of individual species that may warrant special legal consideration due to ESA or treaty right considerations. Second, assessment of an individual species can serve a diagnostic function, with the species used as an indicator of broader ecological health.*

1. List and describe native and non-native fish and wildlife species ecological importance, listing status under state and federal ESA, cultural significance.
2. From this list, fish and wildlife managers should develop a subset of focal species<sup>3</sup> that will be used to characterize the status, functions and management actions in the subbasin.

From this list identify a subset of focal species that will be used to characterize the status, functions and management actions in the subbasin. *These should include one or more wildlife, resident fish, and, where present, anadromous fish species. Criteria to be used in selecting focal*

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<sup>3</sup> A focal species has special ecological, cultural or legal status and will be used to evaluate the health of the ecosystem and the effectiveness of management actions. Federally listed ESA species will likely be considered as focal species. Others may be included that a) have special cultural significance, b) fulfill a critical ecological function, c) serve as an indicator of environmental health, and/or d) are locally significant or rare as determined by applicable state or federal resource management agencies.

*species include, in order of priority a) designation as Federal endangered or threatened species, b) ecological significance, c) cultural significance, and d) local significance.*

3. Delineate and characterize resident and anadromous fish populations (each focal species)
4. Describe population status of each focal species
5. Describe environment conditions (current condition of aquatic and terrestrial habitats within the subbasin).
  - Refine the EDT coarse screen data set for current condition.
  - Describe a reference condition – historic or potential. (*The desired end state or optimal condition*).
6. Describe environmental effects and assumptions (Out-of-Subbasin)
  - Factors outside of the subbasin (hydro effects, harvest levels, mainstem habitat, estuary conditions, and ocean climatic conditions) that have a significant effect on each focal species
7. Identify environment/species relationships (each focal species)
  - Key environmental correlates at each life stage
  - Habitat types associated with each life stage
  - Assess long-term viability of each focal
8. Describe the condition(s) limiting the populations of each focal species
9. Multi-population Conservation Scenarios

*This involves the development of multi-population conservation scenarios for each species within each ESU. The concept uses information on population status, environment/population relationships, and limiting factors to identify the range of scenarios that might be employed to ensure multiple population survival and sustainability within a given ESU.*

#### Interpretation and Synthesis: Development of the Working Hypothesis

*During this phase of the assessment the findings from the single-species and community assessments are brought together to form a holistic view of the subbasin's biological and environmental resources. This information in turn provides a foundation for the development of scientific hypotheses concerning ecological behavior and the ways that human intervention might prove beneficial.*

1. Develop subbasin-wide working hypotheses

Report the knowledge gained through the subbasin assessment. This should be presented in terms of the conceptual model from the Multi-species Framework. The result will be a scientifically rigorous “working hypothesis” regarding the condition and behavior of the subbasin ecosystem.



### **III. Inventory of Existing Activities**

Summarize and assess the current management strategies and restoration and protections projects that are complete or ongoing within your subbasin. Provide information on past and current activities (programs and projects within the subbasin going back five years. Much of the detailed information may have already been compiled for the subbasin summary.

Regional fisheries and hatchery managers are developing Hatchery Genetics Management Plans (HGMPs). Attach HGMPs within this section and summarize those programs as well. Submit an HGMP<sup>4</sup> for each artificial production initiative within the subbasin (include BPA-funded and non-BPA funded programs). From a completed subbasin summary, include completed HGMPs and finalize and submit any remaining that were not included in the final subbasin summary.

The Council will perform a review of all Columbia Basin artificial production programs in 2002. The review will help clarify the purpose, objectives and strategies of each artificial production program and evaluate its compliance with the Council's Program, federal biological opinions, scientific principles, and legal mandates. The review committee will provide the review results to the subbasin planning groups as they are completed. If the review has been performed on artificial production programs in your subbasin attach the completed evaluations.

#### Current Management Activities

*As applicable, describe the extent to which these programs and activities extend beyond the subbasin to a larger scale (provincial and basin-wide).*

##### 1. Existing Protection

- Identify areas with protections through stream buffers, municipal or county ordinances, conservation designations, or water resources protection.
- Assess the adequacy of protections in protecting fish, wildlife, and ecosystem resources.

##### 2. Existing Plans

- 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.
- 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.

##### 3. Management Programs

- 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.
- Assess a) the extent to which existing management programs are consistent with the subbasin assessment and b) their adequacy in protecting and restoring fish, wildlife, and ecosystem resources.

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<sup>4</sup> You can access HGMP forms at <http://www.nwr.noaa.gov/lhgmp/index.html>.

## Restoration and Conservation Projects

1. Project Identification and Description: *Project information lists are generally accessed through state/local funding entities.*

- Identify on-the-ground restoration and conservation projects that target fish and wildlife or otherwise provide substantial benefit to fish and wildlife. These include projects implemented within the past five years regardless of funding source.
- For each project: a) describe the project or activity, b) identify the management or lead entity, c) identify how the project was authorized and who is responsible for implementation, d) identify the funding source, e) identify limiting factors or ecological processes the activity is designed to address, f) summarize accomplishments/failures of activity, g) identify the relationship to other activities in the subbasin.

2. Project Assessment: *Identify the gaps between actions that have already been taken or are underway and additional actions that are needed.*

- Summarize existing management strategies. Relate the assessment to the existing activities and identify the gaps. This perspective can help determine whether ongoing activities are appropriate or should be modified and leading to new management activity considerations.

## **IV. Management Plan**

The management plan consists of five sub-elements described in the Council's program: 1) vision for the subbasin; 2) biological objectives; 3) strategies; 4) research, monitoring, and evaluation program; and 5) ESA and CWA requirements. Refer to the Council's Program for basin-level vision, biological objectives, and strategies.

### The Vision for the Subbasin

The Vision describes the desired future condition for the subbasin. It incorporates the conditions, values, and priorities of the subbasin in a manner that is consistent with the Vision described for the Columbia Basin in the Council's program. The Vision drives development of the biological objectives and thereby the strategies that are incorporated to change conditions within the subbasin.

### Biological Objectives

Definition: Biological objectives describe physical and biological changes within the subbasin needed to achieve the vision. The Council has defined biological objectives to have two components: (1) biological performance, describing responses of focal species to habitat conditions, described in terms of capacity, abundance, productivity and life history diversity, and (2) environmental characteristics, which describe the environmental conditions needed to achieve the desired biological performance. Where possible, biological objectives are intended to be empirically measurable and based on an explicit scientific rationale (the working hypothesis). Identify long-term and short-term objectives.

Biological objectives should:

- Be consistent with basin-level visions, objectives, and strategies adopted in the program.
- Be based on the subbasin assessment and resulting working hypothesis.

- Be 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. Where there are disagreements among co-managers that translate into differing biological objectives, the differences and the alternative biological objectives should be fully presented.
- Be complementary to programs of tribal, state and federal land or water quality management agencies in the subbasin.
- Be consistent with the Endangered Species Act recovery goals and Clean Water Act requirements as fully as possible.
- Be quantitative and have measurable outcomes.

### Strategies

*Definition:* Strategies are sets of actions to accomplish the biological objectives. In developing strategies, take into account not only the desired outcomes, but also the physical and biological realities expressed in the working hypothesis. 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.

The strategies must:

- Explain the linkage of the strategies to the subbasin biological objectives, vision and the subbasin assessment Explain how and why the strategies presented were selected over other alternative strategies (e.g. passive restoration strategies v. intervention strategies)
- Describe a proposed sequence and prioritization of strategies
- If necessary, describe additional steps required to compile more complete or detailed assessment (see Data Gap Strategy below)

### Consistency with Endangered Species Act/Clean Water Act Requirements

The subbasin assessment should include both status of water quality conditions and status listed species. However, the management plan section should describe how the objectives and strategies are reflective of and integrated with the recovery goals for listed species within the subbasin, and the water quality management plan within that particular state. (See *Resources* section on page 23 for information sources on both federal Acts and related state efforts.)

*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).

- Check the state TMDL representative, schedule, and Water Quality Management Plan. Assess and describe consistency/coordination/findings of Water Quality Plan with subbasin plan. If TMDL work has not yet begun, or is in progress, integration and coordination with the subbasin planning process may be better investigated from a more technical perspective by the technical team.

*Endangered Species Act:* The USFWS and NMFS are developing recovery plans for listed species.

- Describe coordination/consistency/integration with recovery plans and performance measures described in the Federal Columbia River Power System Biological Opinion.
- Coordinate with the federal Technical Recovery Teams established by NMFS.

### Research, Monitoring and Evaluation

#### *Research:*

Develop a research agenda that describes the specific conditions and situations identified in the subbasin that will require specific research studies to help resolve management uncertainties. The research agenda should be framed around the relationships between the assessment data and the stated vision, biological objectives, and strategies in describing uncertainties. There are important elements to consider in developing the research agenda for the subbasin plan. Address these elements to the extent possible and include these in the plan.

1. The hypotheses being tested.
2. What is known/unknown about each proposed hypotheses.
3. Anticipated results and possible interpretations.
4. Potential management application of the anticipated research results.
5. Experimental design, or approach for hypotheses testing.
6. Statistical analyses or other proposed analytical evaluation.
7. Spatial scale: where will the research take place? What is the geographic scope of the study?
8. Temporal scale: when will research start and end? At what intervals will research occur?
9. Application of research results to specific species or conditions.
10. Budget considerations.
11. End products or data formats.
12. Data storage, access, and distribution.

#### *Monitoring and Evaluation:*

This section proposes a logical sequence of five steps to consider during the design of monitoring and evaluation (M&E) plans for subbasin implementation strategies. For this task, the focus should be on the strategy level rather than individual project level. The sequence is intended as a generic template to structure a standard M&E plan, regardless of what monitoring approach or model is used. The actual steps will be tailored to the particular conditions and interests for each

plan. The logic path should be in place for how to test if the strategies are helping to reach stated vision and objectives.

The Council recognizes that especially in areas with endangered species, the listing agencies will be identifying specific attributes of concern for populations and habitats. The Council encourages subbasin planners to include these in their monitoring and evaluation plans when they become available.

The approach presented can be consolidated into four fundamental questions: (1) what indicator variables will actually be monitored? (2) Who collects the information and how is it obtained? (3) How is the information evaluated and used? (4) How much will it cost? We are very interested in knowing the thought process behind the plans – the detailed monitoring parameters, geographic scale, etc. to help characterize the monitoring that you will engage in. The five steps are listed below in an overview format.

*Step 1. Adopt elements of an ecological management framework:*

Recognize and acknowledge the biological vision, objectives, and strategies that are identified in the management plan. Refer to the specific vision, objectives and/or strategies throughout your plan as they are referenced in your plan.

*Step 2. Define monitoring objectives:*

What kind of information needs to be collected in order to determine if vision and objectives are being met? This question defines the purpose of the observations, cost-effectiveness, and potential application to management decisions. The following elements need consideration to address these issues:

- Indicators - long list: identify and consider all possible indicators that describe structural and functional attributes of the subbasin of interest – a “wish list” developed by monitoring practitioners.
- Management needs: determine which data, from the long list, are most informative and for what purposes.
- Resolve scale issues: Determine the scale and level of detail provided in your monitoring plan that will address the overarching questions.
- Early planning of the evaluation component: Three aspects should be determined for plan evaluation: (1) who is responsible for the scientific evaluation, (2) who is responsible for the decision-making evaluation, and (3) what are the mechanisms for public evaluation.

*Step 3. Establish monitoring needs:*

Develop of a short list of measurable indicators of physical, chemical, biological, or socio-economic conditions that may act as environmental signposts by which progress towards achieving the stated vision can be evaluated.

- Sampling design: (1) identify appropriate level of effort, with location, frequency, and duration of sample collection; (2) describe methodologies; (3) determine statistical considerations such as controls, sample sizes, replicates, and levels of significance. Design around specific testable hypotheses when possible.

- Indicators - Short list: Reduce the “long list” (in Step 1) of indicators down based on the previous steps depending on the specific management goals, environmental conditions, and actions considered for the system.
- Performance standards: Develop performance standards or quantitative benchmarks for reference conditions against which observations can be compared. Establish ecological models, focus on pristine conditions, expert consensus, reference sites, historical data, or experimental results.
- Pilot studies: Consider conducting a pilot or feasibility study test large-scale data collection.

#### ***Step 4. Data and Information Archive:***

Well-structured monitoring plans result in the collection of extremely valuable data. Devise an infrastructure to archive all relevant data generated through monitoring efforts in existence for the subbasin of interest. Address the following:

- Quality assurance/Quality control (QA/QC): develop a QA/QC element to determine the reliability of records and for meaningful comparison of data collected through different programs, groups, or techniques. The subbasin level monitoring and evaluation information is *not* limited to Bonneville funded activities and should include activities funded through other sources.
- Data management and analysis: Determine where the data will be stored, how it will be updated and accessed by stakeholders. Describe the data formats and custom products and how they meet the needs of multiple users in the subbasin of interest.
- Report preparation: Determine how the results will be reported among technical/scientific staff representing different agencies, decision-makers, stakeholders, and the public.

#### ***Step 5. Evaluation:***

Evaluation consists of the interpretation of the information collected through monitoring. 1) interpret information gathered from monitoring, (2) assess the deviation from particular target goals or anticipated results, and (3) recommend modifying policy or management activities where appropriate. Three elements of evaluation should be recognized:

- Scientific evaluation: this stage consists of objective and independent scientific interpretation of the strengths and weaknesses of available information.
- Decision-making evaluation: apply this monitoring information to decisions on alternative approaches to fish and wildlife recovery. (1) Who should be responsive to triggers that suggest alternatives are needed? And (2) what is the management response to changes detected in ecological indicators?
- Public evaluation: Develop a review and comment plan with the mechanisms and opportunities for evaluation by the public.

## ***V. Appendices***

This section should include any reference material, maps, graphics, or other relevant information that needs to be included within the plan.

## **Resources**

### Contacting the Northwest Power Planning Council

Northwest Power Planning Council  
851 SW Sixth Ave. Suite 1100  
Portland, OR 97204-1348  
NWCouncil.org

(503) 222-5161 Portland Central  
(800) 452-5161 toll free  
(503) 820-2370 FAX

Council Staff available for questions are:

Lynn Palensky, Subbasin Planning Coordinator  
Peter Paquet, Subbasin Assessment Coordinator  
Kendra Phillips, Fish and Wildlife Division  
Administrative Assistant  
Carol Winkel, Public Affairs

(503) 222-5161 ext. 341  
(503) 222-5161 ext. 338  
(503) 222-5161 ext. 329  
(503) 222-5161 ext. 310

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Technical Appendix to 2000 Fish and Wildlife Program

### Endangered Species Act/Clean Water Act Requirements Resources

*Oregon:*

The state's water quality assessment report required under Section 305 (b) of the CWA:  
<http://waterquality.deq.state.or.us/wq/305bRpt/305bReport00a.pdf>

The state's list of water quality impaired waterbodies (Section 303 (d) of the CWA):  
<http://waterquality.deq.state.or.us/wq/303dlist/303dpage.htm>.

State TMDL schedules:

<http://waterquality.deq.state.or.us/WQLData/TMDLTargetsMap.htm>

Flow Restoration Priorities

<http://www.dfw.state.or.us/hcd/FlowRestore/index.html>

### NMFS

NW Fisheries Science Center website: [www.nwfsc.gov](http://www.nwfsc.gov) (provides scientific and technical support for the management, conservation, and development of the Pacific Northwest anadromous and marine fishery resources.)

Lower Columbia Technical Review Team:

Patty Dornbusch: [patty.dornbusch@noaa.gov](mailto:patty.dornbusch@noaa.gov)

Mid-Columbia Technical review Team:

Elizabeth Gaar: [Elizabeth.Gaar@mercury.akctr.noaa.gov](mailto:Elizabeth.Gaar@mercury.akctr.noaa.gov)

Tom Cooney: [tom.cooney@noaa.gov](mailto:tom.cooney@noaa.gov)

## Attachment I

### Subbasin Assessment Development-Detail

#### A. Subbasin Overview

*Question to be addressed: What is the geographical, demographical, and environmental context for an assessment of fish and wildlife resources in this subbasin?*

##### 1. Subbasin Description

- Provide a general orientation to the subbasin (location, size, distinguishing natural and cultural features, land use, land ownership).
- Provide an overview of jurisdictional authorities (state, county, federal lands, tribal lands and fishing rights).
- Provide a general description of the subbasin's macro-environment (geology, climate and weather, land cover, vegetation).
- Provide a general description 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).
- 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).
- Provide a list of native and non-native fish and wildlife species present in this subbasin. From this list identify those 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.
- 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. At the option of subbasin planners, identify plants that 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, and/or that have special ecological importance within the subbasin.

*Where subbasin summaries have been developed, much of this information has been compiled and can be incorporated directly into the plan. Species lists are available from the Council's subbasin assessment web site.*



## 2. The Subbasin in the Regional Context

- 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, including qualities that distinguish this subbasin from others in the province).
- Describe this subbasin's relationship to Endangered Species Act planning units (National Marine Fisheries Service-designated evolutionarily significant units (ESU) and U.S. Fish and Wildlife Service-designated bull trout planning units.<sup>5</sup>)
- 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).
- 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).

### **B. Species Characterization and Status**

*Question to be addressed: What is the current status of fish and wildlife focal species and what biological conditions would need to be met to ensure long-term sustainability/viability for populations within this subbasin?*

*Tasks:*

#### 1. Species Selection and Background Information

- Select 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 to be used in selecting focal species include a) designation as Federal endangered or threatened species, b) local ecological significance,<sup>6</sup> and c) cultural significance.
- For each focal species, provide the following background information:
  - a) Summarize available population data (abundance, productivity, etc., with particular emphasis on trend data). Provide a confidence rating for these data as tools for making management decisions.
  - b) Describe current and historic distribution. It is particularly important to identify areas that were accessible historically but have been rendered not accessible due to anthropogenic modifications.

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<sup>5</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.)

<sup>6</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.

- c) 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. Describe the relationship between the artificial and naturally produced populations.
- d) Describe historic and current harvest, including both in-subbasin harvest and downstream or ocean harvest affecting this subbasin.

## 2. Population Delineation and Characterization (each focal species)

- For each focal species 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. For the purposes of this assessment, if these data are unavailable it will be assumed that all naturally reproducing individuals within the subbasin constitute one population.
- Describe the population's life history, including identifying distinct life stages.
- Characterize the genetic integrity of the population, especially regarding effects of artificial production.

## 3. Population Status (each focal species)

- Determine the current status of each focal species population. Ideally this should be structured in terms of a) abundance, b) capacity, c) productivity, d) life history diversity and structure, and e) genetic integrity.<sup>7</sup> The overall risk of the population should be determined using the following risk rating system as derived from WDF (1993) and the Wilderness Society (1993): critical, depressed, healthy, unknown, extinct.
- Estimate the historic status for each focal species.
- Identify a theoretical reference condition that would ensure long-term sustainability for this species/population.<sup>8</sup>

## C. Environmental Conditions

*Question to be addressed: What is the effect of the environment on fish and wildlife populations?*

*Tasks:*

### 1. Environmental Conditions within the Subbasin

- Describe the current condition of the environment in this subbasin.

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<sup>7</sup> Originally this list only included a through d. Genetic integrity was added to be consistent with the latest NMFS thinking on the subject.

<sup>8</sup> This is a key component of the NMFS and USFWS ESA delisting evaluation. For listed ESA species, these determinations will be made by the appropriate recovery team.

- Characterize the condition of the environment under the following reference conditions: a) historic,<sup>9</sup> b) potential,<sup>10</sup> c) future/no new action,<sup>11</sup> and the potential condition of aquatic and terrestrial habitats within the subbasin.
- Determine the difference between current conditions and the various reference conditions.
- Classify 6<sup>th</sup> field hucs within the subbasin according to the degree to which each area have been modified and the potential for restoration. The classification should follow the class 1-5 system as described in Table 8-1 in *Upstream* (National Research Council, 1996).

## 2. Out-of-Subbasin Effects and Assumptions (each focal species)

- 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.
- 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. Assumptions will be determined by a region-wide team and will apply to the entire basin rather than to an individual subbasin.

## 3. Environment/Population Relationships (each focal species)

- For each life stage identify environmental factors that are particularly important for the species' survival. (These are often referred to as "key environmental correlates" or KECs.) For each life stage and KEC, determine the characteristics that constitute optimal conditions for species health.
- Assess the environment's ability to provide these KECs. This is accomplished by comparing key environmental correlates to current and reference conditions.
- Assess the long-term viability of each population based on habitat availability and condition. :

### **D. Ecological Relationships**

*Question to be addressed: What are the key inter-species relationships and the key functional relationships?*

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<sup>9</sup> The historic condition refers to the state of the environment at the time of European settlement, or 1850.

<sup>10</sup> The potential condition is defined as the desired end state or optimal condition for this subbasin in the year 2050. This is similar to the historic condition but it also considers cultural modifications that are not reversible such as urbanization.

<sup>11</sup> The future/no new action condition is the state of the environment in 2050 assuming that current trends and current management continues.

*Tasks:*

1. Inter-species Relationships

- Identify important inter-species relationships or interactions, both positive and negative, with specific attention to relationships between anadromous fish and wildlife.
- Identify wildlife species and habitats that may be influenced, positively or negatively through direct effects of changes in fish abundance or fish community composition.
- Identify fish species and habitats that may be influenced, positively or negatively, through direct effects of changes in wildlife abundance or wildlife community composition.
- Based on the above, identify key species relationships. Within this subbasin.

2. Processes and Functions

- Determine key ecological functions for species within this subbasin.
- Using "functional redundancy" as the key indicator, assess the current status of ecological processes and functions in the subbasin.

*Data on inter-species relationships and ecological functions are available on the Council's subbasin assessment web site.*

## **E. Limiting Factors and Conditions**

*Question: What factors or conditions have been most responsible for fish and wildlife declines in this subbasin?*

*Tasks:*

- Describe the factors or conditions that historically led to the decline of each focal species and of ecological functions and processes.
- Determine key factors or conditions within and without the subbasin that currently inhibit populations and ecological processes and functions relative to their potential. Identify the root causes of these disturbances.
- Distinguish between those factors or conditions that can be corrected or influenced by human intervention from those where human intervention would have little if any effect.

## **F. Interpretation and Synthesis**

*Question to be addressed: What does this assessment imply regarding the health and functioning of this subbasin ecosystem?*

Explanation: During this phase of the assessment the findings from the single-species and community assessments are brought together to form a holistic view of the subbasin's biological and environmental resources. This information in turn provides a foundation for the development of scientific hypotheses concerning ecological behavior and the ways that human intervention might prove beneficial.

*Tasks:*

1. Key Findings

- Report the knowledge gained through the subbasin assessment. Include a) the status of species, b) the status of the subbasin environment, c) the biological performance of focal species in relationship to the environment, d) the health of the overall ecosystem, e) potential conflicts and compatibilities between individual species and ecological processes, and e) a determination of the key factors that impede this subbasin from reaching optimal ecological functioning and biological performance.

2. Subbasin-wide Working Hypothesis

- Define a scientifically rigorous “working hypothesis” regarding the condition and behavior of the subbasin ecosystem. Include a) the identification of key assumptions that have been made in creating the working hypothesis and the areas where there continue to be uncertainties, and b) documentation for key decisions including the identification of data sources and analytical tools.

3. Reference Conditions

- Determine the extent of the loss of individual animals from historic conditions.
- Estimate the species abundance and productivity that would be present under specified reference conditions (current, historic, potential, and future/no new action).
- For each anadromous fish species, identify a) the number of adult fish that would need to return to this subbasin and b) the overall productivity to meet one or a series of predefined Basin-wide goals, including the Council’s interim goal of 500,000 returning anadromous fish and the NMFS’s interim standards.<sup>12</sup> This information will be provided from a regional source .
- Identify where this goal would fall on the continuum of historic to future/no-new action and the degree to which action will be required to meet identified goals

4. Near-term Opportunities

- Identify properly functioning habitats with stronghold populations (refugia) that should receive high priority for protection.
- Identify properly functioning habitats where access is restricted due to blockage, flow limitations, or other environmental factors.

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<sup>12</sup> This number is determined by defining the approximate production capacity of each subbasin within the Columbia Basin and then allocating a percentage of the total production to each subbasin based on capacity. A goal or a series of alternative goals for total fish production could then be defined and contributions to meeting the goal ascribed to the various subbasins. For example, assuming a hypothetical goal of 1,000 fish, a subbasin having 10% of the total capacity would have an allocation of 100 fish.

- From these, identify areas representing the range of habitat type within the subbasin and that might serve as reference sites for future monitoring and evaluation (Upstream, p. 216).
- Identify compromised habitats that have had significant population losses and that should be considered high priority for restoration.
- Identify prudent interim strategies and actions.

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