

Walla Walla Subbasin Aquatic Ecosystem Restoration Scenario Development

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Introduction

The Northwest Power and Conservation Council (NPCC) and Bonneville Power Administration (BPA) have requested, supported, and funded planning efforts to develop “Subbasin Plans” for the subbasins in the greater Columbia River Basin. The Walla Walla Subbasin Plan has been drafted, and has received public, technical, and policy review. The reviewers and Walla Walla Subbasin Planning Team (SPT) have identified a need to describe and analyze probable and significant scenarios for the identified strategies that may receive sufficient economic, social, and political support to be implemented in the Walla Walla Subbasin within the next 15 yrs. If implemented these strategies would most likely benefit fish populations directly or indirectly through a number of physical, biological, social, or economic pathways. Many of these strategies are in the planning or implementation phase, while other are just now or may soon be proposed by sponsoring entities and their collaborators.

From a planning perspective the intent of describing and modeling scenarios depicting the implementation of restoration strategies is to clearly describe linkages between the best current state of scientific understanding, and the local process for developing, proposing, funding, and implementing strategies and projects. Due to the advanced state of scientific understanding regarding salmon life history, the NPCC and their independent scientific review bodies have suggested that these linkages are best described mathematically using a model of salmon and their ecosystems. The Walla Walla Subbasin Planning Groups (WWBWC and WRIA 32 Planning Unit) will work with technical advisors to model scenarios using Moberland Biometrics “Ecosystem Diagnosis and Treatment (EDT)” model.

The goals of this modeling exercise are:

- 1) to demonstrate to funding agencies that planning entities are communicating and strategizing collaboratively to achieve subbasin objectives;
- 2) to show that the strategizing process has been conducted locally stakeholder input;
- 3) to serve as a technical reference tool during the prioritization framework development process;
- 4) to help ensure that reasonable, probable, and significant scenarios are publicly and technically considered by the planning and funding entities.

The objectives of the modeling exercise are:

- 1) to describe and analyze selected reasonable, probable, and significant restoration scenarios including strategies that may be implemented in the Walla Walla Subbasin within the next 15 yrs;
- 2) to describe this set of strategies quantitatively in the form of restoration “scenarios” that could hypothetically be implemented in the Walla Walla Subbasin in the next 15 yrs;

- 3) to describe any known potential assumptions, complications, benefits, or problems associated with this set of restoration scenarios; and
- 4) to describe linkages between selected scenarios and strategies.

What is a strategy?

For the purpose of fish restoration planning, a strategy is a plan to address factors that limit fish production in specific geographic areas by using a specific restoration tool. For example, the USDA in collaboration with a number of local management and planning entities is currently implementing a strategy to restore riparian areas through its Conservation Research Program (CRP). The approximate benefits of these programs to fish production are well understood, but poorly quantified. In other words, while it is clear that CRP sponsored riparian planting will benefit fish in the Walla Walla Subbasin, we do not have a good understanding of how much benefit should be expected for CRP plantings that have already taken place, or those that will take place in the near future.

While it is rarely possible to accurately predict the precise benefits of strategies, it is extremely useful to develop an understanding of the relative benefits of implementing the strategies identified in the Walla Walla Subbasin Plan. The Walla Walla Subbasin Plan identified numerous reasonable, probable, and significant strategies that might be implemented in the Walla Walla Subbasin (Section 7.3 Aquatic Strategies, pages 147-180, Walla Walla Subbasin Plan). While planning, education, and RM&E were mentioned in the WWSBP as specific strategies for restoration, these actions cannot be easily modeled using EDT. Instead it is assumed that each of the possible strategies requires careful planning, public outreach, review, and permitting to result in effective implementation, and each requires monitoring and evaluation to document effective implementation and any resulting benefits to fish production.

What is a scenario?

Scenarios are basically hypotheses. They are the hypothetical realization of a mixture of strategies implemented at some hypothetical (and reasonable) extent. By examining several scenarios simultaneously it is possible to determine which hypotheses appear to be most beneficial to fish and community stakeholders. This allows for thoughtful careful planning, and for the side-by-side comparison of different fish restoration pathways. In the Walla Walla Subbasin Plan a restoration scenario is a statement of three hypotheses.

- 1) A hypothesis that describes the factors that limit salmonid production in a given geographic area; e.g. “Sediment is limiting steelhead production on the North Fork Walla Walla River”.
- 2) A hypothesis that relates the implementation of strategies in a given geographic area to the attributes of a stream reach or geographic area; e.g. “Restoring X% of riparian areas on the North Fork Walla Walla River will reduce sediment inputs by Y%”.
- 3) A hypothesis that relates the realization of a given scenario to the biological response of each focal salmonid population; e.g. “Reducing sediment inputs by Y% on John’s Creek will increase annual steelhead production by Z%”.

Hypothesis 1 is derived from the subbasin assessment which has been included in the Walla Walla Subbasin Plan. Hypothesis 2 is derived by experts using the best available science describing the potential physical benefits of restoration actions. Hypotheses 3 is derived from the EDT model by running the scenario stated in hypothesis 2.

How scenarios are modeled using the Ecosystem Diagnosis and Treatment (EDT) Model

Scenarios will be modeled using the Walla Walla Subbasin EDT model. The EDT model uses the relationships among the factors that limit salmonid production, the current condition of habitat factors (attributes), and the average conditions of the Columbia mainstem and marine conditions to estimate the average production of salmonids for a given section of habitat. Scenarios are built and modeled in EDT using software called a scenario builder to alter habitat conditions for the purpose of describing and analyzing the impacts of implementing various strategies.

Who can propose a scenario or strategy to model using EDT?

Anyone can propose a scenario to be modeled using EDT during the timeframe for conducting the Walla Walla Subbasin Plan revision process (estimated to occur in October 2004). There are no political or legal ramifications of developing scenarios or analyzing strategies because these are just hypothetical statements regarding the potential productivity of the Walla Walla system. However, developing scenarios and analyzing strategies requires the investment of limited time and resources.

Utilizing strategies developed by the planning groups (WWBWC and WRIA 32 Planning Unit) for the Walla Walla Subbasin Plan, the Walla Walla Subbasin Planning Team have identified a preliminary set of scenarios that effectively describe many current and planned restoration activities in the Walla Walla Subbasin. It makes sense to base scenarios on these strategies reflecting existing or planned restoration actions, rather than selecting arbitrary action points to model somewhere between existing and historic conditions. Members of the planning groups and other public stakeholders are encouraged to suggest other scenarios for use in the subbasin planning revision process. Suggested scenarios must utilize strategies identified by the planning groups and will be reviewed to determine if it is reasonable, probable, and significant for fish production. Scenarios that meet these criteria, and are not duplicative of the scenarios described below, will be modeled using EDT, analyzed by the co-managers, and written into the subbasin plan (as time and budget allow).

What scenarios will be modeled using EDT?

The Walla Walla Subbasin Planning Team has identified a set of scenarios that are reasonable, probable, and significant to fish production in the Walla Walla Subbasin. These include restoration activities that target flow, fish passage, and essential fish habitat. The subbasin plan does not deal with artificial production (hatcheries, adult out-planting, captive brood programs, etc.) and so the use of artificial production is not modeled or quantitatively analyzed in the subbasin plan. Each scenario described below will be described in terms of a combination of specific strategies found in the Walla Walla Subbasin Plan. The following scenarios will be modeled using EDT and analyzed

by technical and consultant staff during the coming weeks of the subbasin plan revision process. Additional scenarios submitted by planning group members and other stakeholders will be modeled as time and budget allows for review by the Subbasin Planning Team.

Flow

In the Walla Walla Subbasin Plan, strategies are identified for flow improvement (Strategies MC7.1.1 through MC7.1.22) and temperature reduction (Strategies MC5.1.1 through MC5.1.20). Strategies are not prioritized and will be selected and implemented dependent on site-specific characteristics, benefits to fish, and further analysis by local resource managers and stakeholders. The scenario for modeling the implementation of these strategies is based on flow restoration targets proposed for various geographic areas as part of the many fish restoration planning processes that have occurred or are ongoing. The potential benefits from implementing this scenario are associated with the restoration of low flow, and corresponding restoration of temperature, habitat availability, and habitat quality, during the summer and early fall. For the Walla Walla mainstem, low-flow targets of 25, 50, 100, and 150cfs will be modeled using the flow monitoring site immediately downstream of Nursery Bridge Dam (M-4) as a measurement point, and the Walla Walla TMDL model to derive the impacts of flow on temperature. For Mill Creek, low flow targets of 25 and 50cfs will be modeled using the Yellowhawk diversion as a measurement point. For the Touchet River low flow targets of 15, 25, and 50 cfs will be modeled using the Dayton fish weir as a management point. The origin of these numbers come from various reports and projects such as IFIM studies, TMDL report and the US Army COE flow project target flows.

Flow scenarios to be modeled for the Walla Walla Subbasin Plan include:

F-1: Development and Implementation of the Walla Walla ACOE Feasibility Study water storage project (Feasibility Flow Scenario) – CTUIR is currently sponsoring an ACOE feasibility study to determine viable alternatives for water exchange, storage, etc. that benefit fish production in the Walla Walla Subbasin without harming economic interests such as agriculture, municipal water requirements etc. This hypothetical scenario involves the restoration of stream flows using various storage and conservation options (including expansion of strategies 2 and 3 beyond what is already being initiated). Implementation of this strategy would help achieve the Walla Walla Subbasin Plan Objectives of increased summer flows, flushing flows, and total available habitat during summer rearing, as well as a decrease in summer temperatures.

F-2: Non-storage Instream flow improvements such as improved water conservation, irrigation efficiency, purchase/lease water rights from willing sellers (Conservation Flow Scenario) - This strategy will aid in improving streamflow and water quality by reducing the quantity of water withdrawn for agricultural, industrial or municipal purposes. Typical conservation projects include conversion of flood irrigation systems to sprinklers, piping and lining of irrigation ditch systems, decreased watering of lawns by municipalities, and improvement of municipal diversion facilities. Purchased or leased water rights from willing sellers would remain in stream. Objectives addressed include increased summer flows, flushing flows, and total available habitat during summer rearing, as well as a decrease in summer temperatures.

Passage

In the Walla Walla Subbasin Plan, passage improvement strategies address the imminent threat presented by obstructions and unscreened diversions. Despite a large number of fish passage restoration projects, unscreened diversions and aged fish passage structures remain in the Walla Walla Subbasin. The overall impact of the restoration of all of these structures has already been modeled in the Walla Walla Subbasin Plan. Individual scenarios will be developed to demonstrate the benefit received from the restoration of each of these structures independently, and in combination with various flow and habitat actions in each watershed. This will allow for the side-by-side comparison of the benefits of restoration of individual structures.

Passage scenarios to be modeled for the Walla Walla Subbasin Plan include:

P-1: Increase passage efficiency of instream obstructions including culverts, bridges, diversion structures, grade control structures, and unscreened diversions; maintain passage efficiency through ongoing O&M activities/add in gradient (Passage Scenario) - Correction of passage deficiencies should be corrected wherever they exist. Structural fixes installed to provide fish passage over irrigation dams, etc. require maintenance to operate within design criteria. All fish passage facilities should be maintained to provide optimal passage conditions. Objective is to reduce, and eliminate imminent threat of passage obstructions and unscreened diversions.

Habitat

In the Walla Walla Subbasin Plan, strategies are identified for the complex and diverse set of habitat restoration activities occurring and planned in the Walla Walla Subbasin. These strategies include those targeted at riparian function (MC4.1.1 through MC4.1.15 and MC4.2.1 through MC4.2.7), substrate embeddedness (MC1.1.1 through MC1.1.23), and channel function (MC2.1.1 through MC2.1.15, MC3.1.1 through MC3.1.13, and MC6.1.1 through MC6.1.11). Habitat restoration will be modeled throughout the Walla Walla Subbasin in all geographic areas. In geographic areas where appropriate and feasible, the scenarios may include modeling and analysis of:

- 1) The restoration of riparian conditions including riparian function and shade based on all implemented, planned, and future CREP and CREP related activities.
- 2) The establishment of long term or permanent easements based on CREP, CREP related, and non-CREP conservation activities.
- 3) The restoration of large woody debris and habitat complexity using direct habitat treatments.
- 4) The restoration of flood plain connectivity and sinuosity using direct manipulation of channel structure and function.
- 5) The restoration of sediment loads using direct manipulations of bank, bed load, substrate, and riparian attributes.
- 6) The restoration of all habitat attributes based on all implemented and planned habitat restoration activities throughout the Walla Walla Subbasin.

Habitat scenarios to be modeled for the Walla Walla Subbasin Plan include:

H-1: Active Instream Habitat Scenario (LWD, Boulder/Pool) - Where opportunities exist, work on public, federal, state, tribal and private lands will be

conducted to improve instream habitat. Placing large woody debris and large boulders directly increases habitat complexity and can improve habitat quantity by increasing the number of pools. Work will also be conducted to increase the quantity of pools and gravel dominated riffles (as opposed to cobble). Straightening and entrenchment of stream channels is a common problem in the Walla Walla Basin that leads to the reduction of pool habitat and gravel dominated riffles. Pools will be constructed by direct intervention, often concurrently with work to restore channel form and function, and the quantity of gravel dominated riffles will be improved by decreasing channel slope, reducing entrenchment and confinement, and restoring pool/riffle sequencing. Objectives addressed include reduced embeddedness, increased large woody debris, increased pools, habitat complexity, etc.

H-2: Passive Instream Habitat Scenario (Riparian) – Improve riparian zone habitat and function by fencing and planting riparian zones and modifying detrimental land use activities, including problematic roads. Where opportunities exist, work on public, federal, state, tribal and private lands will be conducted to improve riparian habitat. Fencing is installed to manage use of the riparian zone by livestock and planting of native vegetation is done to speed the recovery process once grazing or other land uses have been modified. Where opportunities exist, change land use activities leading to degradation of habitat, thereby allowing stream attributes impacted by these activities to recover without intervention. A common example of this kind of work is riparian buffers where streamside areas are protected from uses such as livestock grazing or agricultural crops. Modification of land use activities would come from participation in CREP and CCRP, as well as from specific, targeted, BPA funded habitat restoration projects and from volunteer land-use modifications. Riparian structure and species composition will both be addressed. Where opportunities exist, work to maintain, relocate or remove roads on public, federal, state, tribal and private lands will be conducted to address problems caused by roads. Roads in riparian areas are a source of sediment and a means of rapidly routing sediment to streams, occupy historic riparian zones, and often result in stream confinement. Riparian habitat improvements can directly impact stream temperature, large woody debris inputs, habitat availability, and sediment inputs through stabilizing stream banks and filtering runoff, water quality, and habitat availability for fishes.

H-3: Modify channel and flood-plain function. Where opportunities exist, work on public, federal, state, tribal and private lands will be conducted to improve form and function of stream channels. This work involves directly or indirectly returning stream channels to a functional state that is determined by the valley form, geology, soils, vegetation and climate, and the restoration of beaver populations and beaver dams that facilitate proper stream function. By working to improve zoning ordinances to reduce development of riparian areas and floodplains, better riparian function and channel-floodplain connection can be attained and/or maintained. Specific objectives often targeted by this type of work include channel width and depth, sinuosity, slope, flood prone area, ratio of channel features, reduce confinement, backwater habitat, etc.

H-4: Protect High Quality Habitat ~ Rainwater . Where habitats have high value due to their current productive capacity or general importance to particular species, they should be protected to maintain their value. This can be accomplished by

easements and other kinds of natural resource protection agreements, or on public lands by varying kinds of protections authorized by statute or rule. Multiple objectives achieved include protection and improvement of riparian habitat, instream habitat, uplands conditions, etc.

H-5: Restore upstream or headwater attributes to improve downstream conditions (Uplands Scenario). In particular, water quality problems are cumulative in a downstream direction. Sources of water quality problems at a particular location can often be sourced to areas upstream. This is also true of large wood debris. The source of large wood debris for some reaches can be primarily from upstream reaches. Limiting factors such as fine sediment, water temperature and large wood debris should be addressed at the watershed scale as well as the reach/geographic area scale. Understanding of these problems at the watershed scale is necessary, however, to effectively work at this scale. Actions such as restoration of riparian vegetation and channel function upstream of areas limited by temperature, sediment and/or large wood should be particularly effective.

What this modeling exercise does not do

There are no legal implications associated with the description of scenarios. For the Walla Walla Subbasin Plan, scenarios are built upon the stakeholder-reviewed strategies that may or may not be implemented pending technical, social, political review and funding at the project level.

It is not the purpose of the Subbasin Planning Process to endorse, propose, or permit specific projects that would be used to implement strategies. It is not the intent of this planning process to permit the implementation of any strategy in any geographic region of the Walla Walla Subbasin. Implementation of strategies will occur under mandated processes associated with community planning, policy development, project funding, environmental permit review, and public review. The intent and focus of the hypothetical modeling process is to analyze identified reasonable, probable, and significant strategies that may receive sufficient political, social, and economic support to be effectively implemented in the next 15 yrs in the Walla Walla Subbasin. The focus is on inclusivity: the exploration of the largest number of reasonable strategies possible so as to facilitate careful planning and the most effective development of fish restoration funding in the Walla Walla Subbasin via any number of unilateral, collaborative, and cooperative channels that involve NPCC, CBFWA and BPA planning and support.