OWEB Prioritization Framework

Improvement Priorities at Basin and Watershed Scales

Figure 1.
Oregon Plan Basins

Introduction

OWEB contracted to develop a framework that establishes improvement priorities at regional geographic scales and evaluates the relative merits of proposed improvement projects at local watershed scales. The term *regional* (as used here) refers to the 15 basins described in the Oregon Plan Biennial Report (Figure 1). The purpose of the following report is to describe the product of contracted work.

OWEB is required by statute to establish regional priorities that will guide funding decisions by the Board (ORS 5431.371 (1) (c)). In addition, OWEB's Board clarified its funding goal in a "grant funding preference criterion" in September 2001. The Board agreed that, "Capital expenditure project funding priorities will primarily focus on addressing those factors in the watershed that directly limit the improvement of water quantity and water quality and the recovery of fish species listed under the state or federal Endangered Species Act." The contracted work developed a Prioritization Framework that reflects this preference. The framework is founded on principles of conservation biology and applicable to all basins. It has been tested in two pilot basins.

Most conservation biology literature encourages conserving high quality fish and wildlife habitats and key watershed processes as a first priority before restoration takes place. Protection of functioning habitats and watershed processes should take priority over habitat restoration because it is easier, less expensive, and ultimately more successful to maintain high-quality habitats than to attempt to recreate or restore degraded habitats (Beechie et al. 2003, Bilby et al. 2003, Roni et al. 2002).

The protection of functioning habitats is an important goal, and should work in concert with improvement actions; *however, this project concentrates on identifying watershed improvement project priorities and not habitat protection actions*. A separate and concurrent OWEB project designed to identify habitat protection priorities has been initiated. This prioritization project complements the identification of habitat protection actions developed through the *Land Acquisition Pilot* by providing a framework for identifying regional watershed improvement priorities.

This project was designed to create the following two products:

Part I. Project Prioritization Framework

The project prioritization framework describes a logical process for evaluating the relative merit (priority) of individual improvement projects. The framework was developed to categorize project types by the effect they will have on aquatic ecosystem function and evaluate the relative merit of different types of improvement projects and differentiate among (prioritize) several improvement projects at site-specific watershed scales. This will help identify project types that have the greatest enhancement benefit at the local basin scale. The methodology is developed from conservation biology literature and the experience of local watershed conservation groups.

The framework's project evaluation mechanism is based on watershed assessments and local knowledge of conditions and human communities and is designed to yield repeatable results. The framework is described so that it can be understood and applied by citizens in all basins. The framework will be used by OWEB Regional Review Teams to provide a transparent, publicly understandable process for making funding recommendations to the OWEB Board. (See project type examples in Appendix B).

Part II. Basin and Watershed Scale Improvement Priorities

To facilitate communication with public policy makers and stakeholders, the general nature of improvement needs across each of the 15 basins will be described as four to six short statements (see Restoration Issues at top of pages 4-6 in the 2001 - 03 Biennial Report). These bullets will be informative and facilitate conversations about improvement needs at large geographic and ecological scales. They are not precise enough to direct OWEB Board decisions regarding individual proposed improvement projects, however. In order to help direct OWEB board decisions, the framework also identifies more specific watershed improvement priorities.

Basin and watershed scale priorities are identified through a review of watershed assessments and conversations with local stakeholders where the most often reported local improvement needs identified are captured. Those improvement needs that address conditions as a result of historical (legacy) land management and those needs that address conditions under current land management practices can also be identified.

As an initial test of the applicability of the proposed framework, the process was applied in the Hood and Lower Columbia Basins. Examples of the products from these basins are included in this document.

Part I. Project Prioritization Framework

ORS 541.371 (1)(c) states that the OWEB board "*shall establish statewide and regional priorities that shall become the basis for funding decisions by the board. In adopting such goals and priorities, the board shall adopt priorities for grant funding based on the Oregon Plan and on measurable goals. In carrying out this function, the board shall consider local economic and social impacts among the criteria*."

BACKGROUND

The OWEB mission of *restoring, maintaining, and enhancing watersheds* implicitly recognizes that specific goals for improvement will vary between watersheds. The goal of this prioritization framework is to create a science-guided process that incorporates local priorities into regional (basin) improvement project priorities. The regional areas are defined as the 15 basins (Figure 1) identified by OWEB (similar to 3rd field HUCs).

The framework is based on restoration strategies taken from recent summaries of conservation ecology related to watershed enhancement and adapted to establish general project priorities. In addition, watershed-specific information and local stakeholder input are used to develop specific improvement priorities for each of the OWEB basins. The final product is a list of priority watershed improvement actions for each basin. To provide statewide consistency, the OWEB *Restoration Project Types* inventory was used to organize and categorize potential project types. The current inventory is not inclusive of all project types and the framework allows local partners to propose alternative activities by defining specific project goals that fall into specific categories within the framework. The goal is to identify the key factors impacting watershed conditions, describe actions needed to address these factors, and help guide local restoration planning and regional funding decisions.

DEFINITIONS

The definition of terms relating to conservation practices that are intended to improve ecological conditions at the watershed scale is important to prevent misunderstandings. The following definitions have been taken from the following publications: National Research Council (1992); National Research Council (1996); and Williams, J.E., C.A. Wood and M.P.Dombeck (1997).

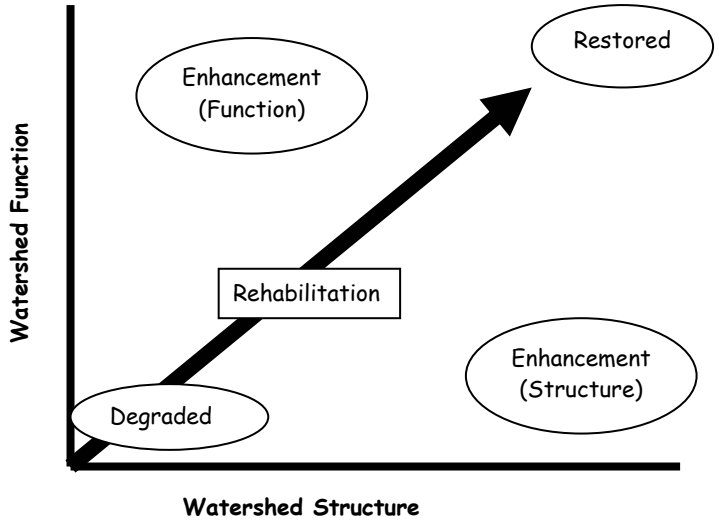
Restoration is defined as the return of an ecosystem (watershed) to a close approximation of its condition prior to disturbance. Others define restoration as the reestablishment of the structure and function of an ecosystem (watershed) including its natural biodiversity. Restoration can be achieved by passive means (e.g. removal of anthropogenic disturbance in aquatic-riparian/ watershed ecosystems to allow natural processes to be the primary agents of recovery). Restoration can also be achieved by more active means (e.g. restoration of dysfunctional aquatic-riparian/watershed ecosystems within the range of natural conditions by actively managing some aspects of habitat recovery). These activities are contrasted with *Rehabilitation* as defined below.

Rehabilitation can be defined as the reestablishment of naturally self-sustaining aquatic-riparian (watershed) ecosystems to the extent possible while acknowledging irreversible changes such as dams, permanent channel changes due to urbanization and roads, stream channel incision, floodplain losses, and estuary losses. Rehabilitation might permit only partial restoration of ecological functions.

Enhancement can be defined as deliberately increasing the abundance or functional importance of selected habitat characteristics as desired. Such modifications might be outside the range of conditions that would occur naturally at a site. The strategy involves technological intervention and substitution of artificial for natural habitat elements.

This report uses the inclusive term "*improvement*" to include all of the actions taken to address degraded conditions in a watershed. These distinctions are best illustrated in Figure 2.

Figure 2. Watershed Improvement as a change in the structure and function of a degraded watershed. This illustration shows the relationship between activities taken to address watershed structure and function. The model applies to watersheds that have been degraded through time.



THE SCIENTIFIC CRITERIA FOR PRIORITIZING WATERSHED IMPROVEMENT ACTIVITIES

Various approaches for restoring watersheds exist. While knowledge about the range of improvement techniques is incomplete, a growing consensus within the scientific community supports focusing actions initially on techniques that have a high probability of success, low variability among projects and relatively quick response time before other techniques or projects are attempted. The priority system established by the Bonneville Power Administration (Federal agencies, 2003) is structured geographically (e.g. priority ESUs and priority Subbasins) as well as by actions (e.g. increasing flows and removing migration blockages). This framework focuses on a number of key areas for restoration as the important initial steps: 1) *Restoration of habitat connectivity*; 2) *Restoration of key watershed processes* (Roni et al. 2002). Additionally, 3) *Restoration of habitats for ESA-listed species* is also a priority given OWEB's policy preference.

Reconnecting isolated habitats that are still highly functional helps reestablish the movement of fish and wildlife species across the landscape through all of their life stages. Such "habitat connectivity" directly affects the productivity of fish populations and the aquatic system (Roni et al. 2002). These projects also meet the principles noted above (i.e. having a high probability of success, low variability among projects and relatively quick response time).

Watershed processes include the natural delivery and movement of water, wood, and sediment from uplands into and through the aquatic system. These processes create the complex array of habitat types to which fish and wildlife species have adapted (Naiman et al. 1992). Focusing on restoring watershed processes, including reestablishing natural disturbance regimes, accounts for natural environmental variation, differences in habitat requirements among species, or changes in habitat needs over a species' life cycle (Bilby et al. 2003). Such projects also meet some of the principles noted above (i.e. they have a high probability of success and low variability among projects). These projects, however, can have longer response times.

Since many of Oregon's fish populations are in trouble (ten salmon, trout and other fish species are listed under the state Endangered Species Act), improving watersheds for ESA-listed species addresses both political and ecological priorities. For instance, many ESA-listed species are indicators for the broader ecological health of a watershed. It is important to improve habitat connectivity, key watershed process, and habitats that sustain and control the distribution and productivity of these species. Watershed improvement actions for ESA-listed fish species should focus on creating the natural array of habitats and watershed processes that are essential for each stage of their life cycle – migration, spawning, and rearing. These watershed improvement actions focus on the current and historic habitats used by ESA-listed fish species.

In concert with actions that emphasize restoring habitat connectivity and watershed processes, addressing *symptoms* of impaired watershed processes that impact fish habitat or water quality, or key wildlife concerns, is also appropriate. Addressing symptoms of disturbance (enhancement of structure or function) can help provide important habitats while watershed processes are recovering. Many decades may be needed, for example, to restore large wood delivery to stream channels in order to provide quality habitats. In the short-term, habitat quality can be improved by placing wood in stream channels to improve pool complexity and accelerate other processes such as capturing and retaining spawning gravels, leaf litter and other nutrients, or addressing

specific wildlife concerns by placing wildlife guzzlers in strategic areas. Such actions are particularly effective when completed along with restoration of watershed processes, such as restoring riparian areas for forest canopy and large wood recruitment. Addressing symptoms of disturbance can be in line with the principles noted above because they often have a relatively quick response time, although the costs and variability among such projects can be high.

Maintaining or modifying upland vegetation to improve soil stability and the interception and infiltration of precipitation also has the potential to affect water storage in the soil, and delivery to streams. Soil stability is a key factor in the function of upland ecosystems. Soils in upland areas provide the foundation on which many other processes depend. Symptoms of soil disturbance are invasive plant species, excessive soil loss (rills, gullies, and pedestals), soil compaction, and loss of vegetation cover.

Encouraging management practices that focus on protecting and maintaining soil integrity through minimizing disturbance and erosion will help restore upland systems. These practices include but are not limited to rotational grazing systems, conservation tillage, conservation irrigation techniques, maintaining continuous plant cover, and selective timber harvesting (as opposed to clear-cut techniques). Such practices may have a relatively high probability of success but may also have long response times.

Addressing the symptoms of soil disturbance is also appropriate and may include methods such as weed control (using Integrated Pest Control, biological control, careful application of herbicides, or manual removal), planting native vegetation to minimize exposed soil, planting windbreaks, and planting native vegetation along waterways.

THE PROCESS FOR ESTABLISHING WATERSHED IMPROVEMENT ACTIVITY PRIORITIES

Information from watershed assessments, action plans, other studies, and input from local Watershed Councils and other stakeholders have been used to identify watershed improvement project priorities. Five general types of activities have been identified to address watershed function improvement:

1) Actions that restore habitat connectivity.
2) Actions that address impaired watershed processes that affect the aquatic system or water quality.
3) Actions that address key habitats and water quality for ESA-listed species
4) Actions that reduce human impacts and inputs to the watershed.
5) Actions that address symptoms of impaired watershed processes (e.g., placing large wood in streams) that impact fish habitat or water quality, or affect specific wildlife concerns (e.g. wildlife guzzlers).

PRINCIPLES FOR ESTABLISHING WATERSHED IMPROVEMENT ACTIVITY PREFERENCES

Analysts reviewed the range of activities funded by OWEB to identify common principles that can be used to assess the types of activities involved in watershed improvement. The principles

are taken from scientific and restoration literature. The following table describes each of the principles and the strategy to achieve these principles. The table also describes examples of the project types that can be used to address the principle.

Table 1: Strategy fro applying proposed watershed restoration principals.

PRINCIPLE 1: *RESTORE WATERSHED CONNECTIVITY LIMITING KEY FISH AND WILDLIFE POPULATIONS*	
Rationale	**RESTORING ACCESS TO PORTIONS OF THE WATERSHED WITH QUALITY HABITAT IS THE APPROPRIATE INITIAL STRATEGY FOR THE LONG-TERM IMPROVEMENT OF WATERSHED HEALTH. THIS APPROACH PROVIDES ACCESS TO SUITABLE HABITATS FOR NATIVE AQUATIC SPECIES BECAUSE IT RESTORES SUCH CONNECTIVITY.** THESE TYPES OF PROJECTS ARE A PRIORITY BECAUSE THEY HAVE A HIGH PROBABILITY OF SUCCESS IN A SHORT TIME FRAME WITH RELATIVELY LOW COST, LOW VARIABILITY BETWEEN PROJECTS, AND LOW RISK OF FAILURE.
Project Examples	♦ Riparian corridor restoration ♦ Restoring fish passage by removing barriers ♦ Restoring stream flows by reducing or eliminating water diversions ♦ Restoring connectivity between the aquatic system and the floodplain ♦ Restoring wildlife habitat connectivity by eliminating roads or other barriers
PRINCIPLE 2*: RESTORE WATERSHED PROCESSES IMPACTING THE AQUATIC SYSTEM, WATER QUALITY-LIMITED STREAMS, AND WILDLIFE HABITAT*	
Rationale	In the long term it is important to address the causes of habitat degradation as a higher priority than restoring symptoms of disturbance. Restoring watershed processes that form, connect, and sustain habitats and water quality supports improving the long-term health of a watershed. Key watershed processes include the delivery and movement of sediment, wood, water, and nutrients to the aquatic system. **Restoring watershed processes often has a delayed response time. Costs of these projects can vary, however they have a high probability of success and low variability between projects.**
Project Examples	♦ Restoring hydrology to reestablish wetlands in the landscape ♦ Controlling sediment delivery to stream channels from roads and other sources ♦ Restoring native vegetation to lands with crop or exotic vegetation ♦ Removal of human structures that confine channels ♦ Removing roads or road related runoff
PRINCIPLE 3: *RESTORE KEY HABITATS AND WATER QUALITY FOR ESA-LISTED SPECIES*	
Rationale	Improving habitats for ESA-listed species addresses both political and ecological priorities, since many ESA-listed species are indicators for the broader ecological health of a watershed. Restoring these fish populations should focus on addressing watershed connectivity and the habitat-forming processes that sustain all of parts of their life cycle: adult and juvenile migration, spawning, and juvenile rearing. It is important, for example, to restore juvenile rearing habitat in concert with providing access (connectivity) throughout the watershed for migration and spawning. These actions, while focused on areas with current and historical populations of ESA-listed fish, will benefit other fish and wildlife populations.
Project Examples	♦ Improving fish passage barriers to allow access to high-quality spawning habitat for adult coho salmon. ♦ Reconnecting historic river side channels provides winter juvenile rearing habitat for spring chinook. ♦ Improving in-stream flows to improve water temperatures for bull trout. ♦ Reducing road-related sedimentation that impacts spawning gravels. ♦ Providing proper fish screens at points of water diversion to improve juvenile fish survival.

PRINCIPLE 4: ***REDUCE OR ELIMINATE HUMAN IMPACTS AND INPUTS INTO WATERSHEDS FROM LAND USE ACTIVITIES IN THE BASIN***	
Rationale	Many people manage the working landscapes of Oregon for different purposes. Many land management choices have different watershed impacts. Activities that reduce or eliminate human inputs (water, nutrients, sediment, pesticides, etc.) to the watershed are important for maintaining watershed ecological functions. These types of projects address the effects of human use of the landscape on watershed functions. **These types of projects often have a short-term response, but the costs can vary widely, and the probability of success depends on the specific goals identified.**
Project Examples	♦ Pesticide use alternatives (e.g. Integrated Pest Management, changes in application methods, etc.) ♦ Irrigation water use efficiency with instream flow protection ♦ Conservation tillage to eliminate sheet and rill erosion ♦ Irrigation water reuse to eliminate discharges ♦ Improvement of streams impacted by winter cattle feeding areas where cattle are managed
PRINCIPLE 5: ***ADDRESS THE SYMPTOMS OF DISTURBANCE THAT IMPACT FISH AND WILDLIFE POPULATIONS AND WATER QUALITY-LIMITED STREAMS***	
Rationale	Addressing the symptoms of human-related disturbance can help provide important habitats while key watershed processes are recovering. Many functions that create habitat operate at very long time scales. Many decades may be needed, for example, before large wood delivery to stream channels can be restored to appropriate levels to provide quality aquatic habitats. In the short-term, habitat quality can be improved by placing wood in stream channels to improve pool complexity and accelerate other processes such as capturing and retaining spawning gravels. Symptoms of human-related disturbance, for example, can include elevated levels of fine sediments, the lack of large wood in the stream from poor riparian conditions, altered peak flows, and confined stream channels from bank alteration. **These types of projects often have a short response time, but the costs can vary widely (potentially HIGH), and they are most effective when linked to watershed process improvement projects**
Project Examples	♦ Placing large wood in streams ♦ Creating natural channel and bank structure in an altered section of stream ♦ Installing water / sediment control basins to protect the riparian area ♦ Construction of bioswales in urban areas

Using this framework to establish project priorities should not be interpreted, however, to mean that a "one size fits all" approach is appropriate, or encouraged. On the contrary, different high priority projects should be identified in different ecological regions, and in areas with differing land use patterns. For example, in the pilot project area, the project actions identified as "high priority" in the shrub-steppe habitats of the eastern Hood Basin are quite different from the high priority project actions identified in the lower, wetter, elevation areas of the Lower Columbia Basin. Such regional differences should be anticipated when project type priorities are established for a large spatial scale (basins).

OTHER CRITERIA USED FOR PRIORITIZING WATERSHED IMPROVEMENT PROJECTS

In addition to the scientific criteria for prioritizing improvement projects, OWEB weighs other watershed issues and local considerations in the selection process and funding of improvement projects. Watershed-specific, socio-economic, and other factors are evaluated through OWEB's regional review of grant applications (Appendix A).

This prioritization process not only sought local advice on restoration project types based on the scientific criteria, the process also solicited input on other factors that influence the evaluation of watershed improvement project priorities. The series of meetings with stakeholders provided input on local issues influencing the selection of improvement project types, including watershed-specific, socio-economic, and other issues used to modify the selection of regional improvement priorities. The tables below list some of the possible issues that can modify improvement priorities.

THE SCALE FOR ESTABLISHING PRIORITIES

The selection of projects to meet priorities is dependent on the scale of discussion. At the project scale, focus is on design and other tactical considerations. At a watershed scale, the focus is on the processes (sediment transport, organic material transport, precipitation interception, storage and delivery to streams, etc.) that are affected by current land uses and historic (legacy) conditions. Watershed scale priorities have been established through local processes, especially watershed assessment. At the basin scale, improvement priorities can be established by compiling local priorities and addressing principles for prioritizing watershed improvement activities. Figure 3 illustrates the spatial relationships between basins, watersheds and sites. Most people are aware of site, and perhaps watershed scale priorities. Basin priorities are more synthetic and derived from priorities established at a finer spatial scale.

Figure 3: Spatial Framework for Identifying Improvement Priorities

Basin Level

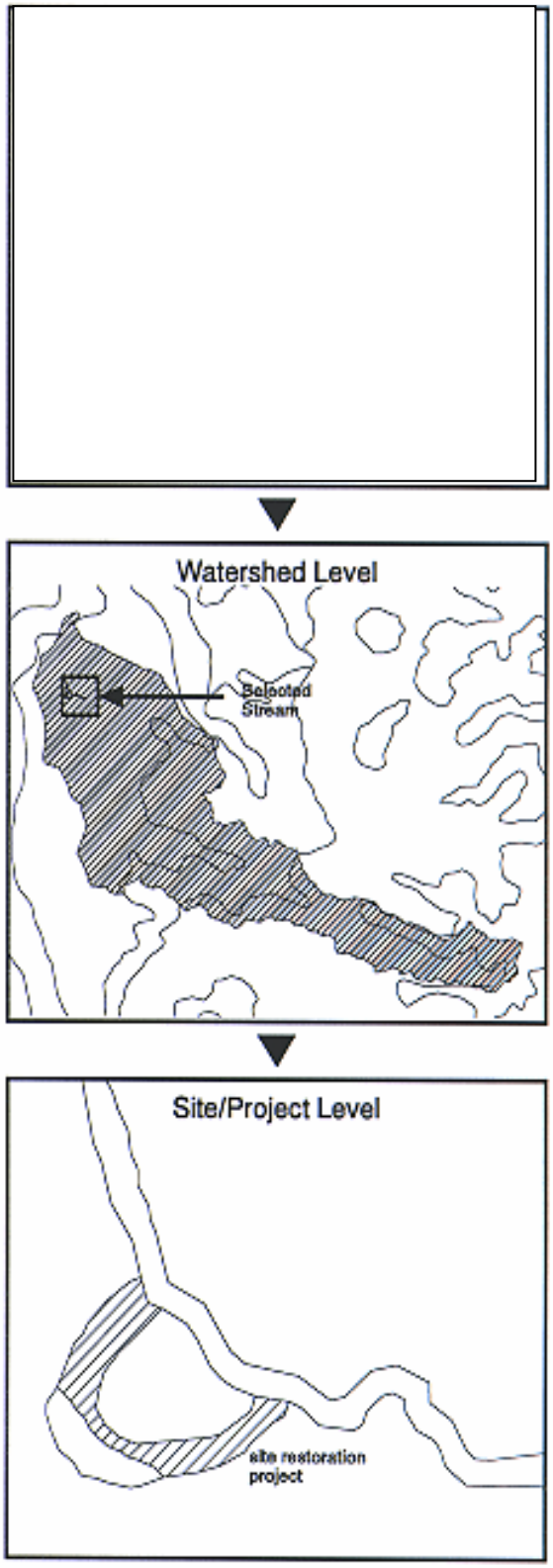
- Similar to third field HUC and ESU identification
- Spatial scale for reporting improvement activities
- Similar scale for subbasin planning
- Improvement priorities established at this scale

Watershed Level

- Watershed assessment identifies priorities
- Community-based, local leadership by watershed councils, cities, or counties
- Current, historic, desired future conditions, based on benefit-cost analysis, guide planning
- Problem-solving and need-centered priorities
- Product: Action plan—network of priority sites for watershed improvement
- Implementation: voluntary through watershed councils, cities, counties

Project Site Level

- Projects selected based on watershed priorities and willing landowners
- Willing public and private landowners plan and carry out projects with technical assistance
- Aquatic Habitat Restoration and Enhancement Guide assists design
- Monitoring and evaluation conducted to ensure implementation and effectiveness



BASIN SCALE PRIORITIES

Basin scale priorities were derived from a close review of local watershed analytical products (including watershed assessments, action plans, SWCD work plans, etc). Consistent themes that emerged from these local analyses were then identified and analyzed through the prioritization framework for their relative importance in the context of restoring habitat connectivity, watershed processes or addressing symptoms of decline. Finally, these themes were assessed in the context of more watershed specific and socio-economic considerations important to local groups and to OWEB.

The basin scale priorities that emerged through this process are a *synthesis* of the specific ecological issues identified for each watershed within the basin. As such, these priorities reflect the needs of large geographic areas and may not reflect the specific demands of any individual watershed. Consequently, basin scale priorities characterize the general nature of improvement needs of a basin. They are informative and intended to facilitate discussions regarding improvement needs at large geographic scales. However, due to the synthesis of the ecological needs of multiple watersheds within the basin, these priorities are not spatially explicit enough at the stream reach or project site scale to inform decisions by the Board or Regional Review Teams regarding the merits of specific watershed improvement project proposals. However, they help provide some context for decision-makers regarding the watershed needs of a basin.

Part II Watershed Improvement Priorities:

HOOD BASIN

The Hood Basin includes the Hood River watershed, Fifteenmile Watershed, and a number of smaller drainages that flow into the Columbia River from the Columbia Plateau. The Dalles, Fifteenmile, and Mosier Watershed Councils in Wasco County each have conducted a watershed assessment identifying conditions affecting the function of the individual drainages in the basin. The Hood River Basin Council has conducted an assessment and action plan prioritizing improvement and enhancement actions to address conditions in that basin. The small drainage in Sherman County has not been assessed and is assumed to have similar restoration and enhancement priorities to the small drainages to the west.

LOWER COLUMBIA BASIN

The Lower Columbia Basin includes the Skipanon, Youngs Bay, Nicolai-Wickiup, Lower Columbia and Sandy watersheds. Watershed assessments have been completed for each of these drainages that identified conditions affecting the ecological function. In addition, the Sandy Watershed has completed an action plan and an EDT analysis identifying habitat problems in the watershed, and action plans have been completed for the Skipanon, Youngs Bay and Nicolai-Wickiup Watersheds.

The following tables identify the issues and the watershed improvement priorities for both basins.

Table 2: Hood River Basin: Watershed Improvement Priorities.

TIER	Key Principles	Issues (watershed location)	Watershed Improvement Priorities
A	***Actions that restore habitat connectivity*** ***Actions that address impaired watershed processes that affect the aquatic system or water quality*** ***Actions that address key habitats and water quality for ESA-listed fish:*** Winter Steelhead Summer Steelhead Spring Chinook Fall Chinook Bull Trout	Fish Passage Barriers due to Roads and dams, including Clear Branch Dam Irrigation diversions create low summer flows and dewater some reaches (Hood, Fifteenmile, Mosier) Retain water and soil in upland areas, particularly Fifteenmile Creek In stream sedimentation, particularly Fifteenmile Creek Water quality concerns: temperature	Restore / improve fish passage at road crossings, irrigation diversions and dams Restore instream flows, increase irrigation efficiency or water leasing Promote ecologically sound range management to improve vegetative cover in grasslands and reduce grazing pressure on riparian areas Encourage conversion to no-till or perennial crops Restore riparian conditions for habitat and aquatic shade
B	***Actions that reduce human impacts and inputs to the watershed*** ***Actions that address symptoms of impaired watershed processes that impact fish habitat or water quality, or affect specific wildlife concerns***	Channel Modifications – roads, historic splash damming & large wood removal Pesticide contamination from orchards and other land uses (Hood River & The Dalles) Irrigation systems/interbasin transfer of glacial, silt-laden water to clear streams (Hood River) Falling groundwater levels (Mosier Valley) Invasive weeds impairing habitat quality	Improve stream complexity Reduce contaminants to meet water quality guidelines Reduce sediment to meet water quality guidelines Create ongoing education and awareness projects on watershed issues and projects Support city, county and federal noxious weed control efforts

Table 3: Lower Columbia River Basin: Watershed Improvement Priorities

TIER	Key Principles	Issues (watershed location)	Watershed Improvement Priorities
A	***Actions that restore habitat connectivity***	Extensive loss of historic estuarine and wetland habitats in Columbia River and tributary systems, particularly in the Lower Columbia estuary	Improve connectivity and productivity of estuarine, diked, and lowland areas
	Actions that address impaired watershed processes that affect the aquatic system or water quality		
	Actions that address key habitats and water quality for ESA-listed fish: Winter Steelhead Summer Steelhead Spring Chinook Fall Chinook Chum	The lower Columbia estuary contains important habitats for fish runs throughout the Columbia River Basin	Re-establish historical stream and river channels
		Extensive fish passage barriers, including road crossings, hatcheries and dams	Restore / improve fish passage at road crossings, tide gates, dams, and dikes
	In addition, other ESA-listed salmonids from up-river basins use the lower Columbia estuary for migration and juvenile rearing.	Water quality concern: Temperature	Restore riparian conditions for habitat and aquatic shade
		Inadequate instream flows, particularly in the Sandy Subbasin	Improve Instream flows
B	***Actions that reduce human impacts and inputs to the watershed***	Water quality concern: Road-related sedimentation	Reduce sediment delivery
	Actions that address symptoms of impaired watershed processes that impact fish habitat or water quality, or affect specific wildlife concerns	Loss of aquatic habitat complexity from channelization and limited in-channel wood	Improve stream complexity
		Invasive weeds / animals impairing habitat quality	Prevent and reduce aquatic and terrestrial invasive plant and animal species

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Appendix A: Socio-economic and stakeholder considerations

Evaluations of projects that are submitted to OWEB for funding also include factors other than watershed and ecological priorities. A number of considerations relating to the partnerships and community outreach elements of the project are taken into consideration.

Promote collaboration	
Rationale	Voluntary local partnerships between watershed residents and others are critical for making improvements to watersheds on private lands and in local communities. Projects with direct evidence of collaboration between stakeholders and agencies will generally be given preference over single-party projects. **(OAR 695-020-0045-3d)**
Project Examples	♦ Multiple landowners and agencies collaborating to restore fish passage barriers ♦ Schools, industry, and the local watershed council cooperating on a watershed educational project.
Promote education	
Rationale	Education and outreach are essential for providing watershed residents and others with the knowledge they need to make wise choices to conserve and restore the health of their watersheds. Watershed and riparian education projects that provide peer education about watershed processes for landowners will be given priority over creation of new curriculum materials. **(OAR 695-020-0045-3f)** **(Note:** Every local watershed group with which the consultant team met within the pilot project area considered education a high priority, both as a component of improvement projects, as well as general outreach and education to the broader community).
Project Examples	♦ The development of outreach materials and demonstration projects emphasizing the proper improvement of riparian and flood plain habitats
Restore a mix of land use types	
Rationale	Restoring a mix of habitat types requires working on a range of land uses that have altered the variety of historical habitats: for example lowland and wetland habitats that often include urban land uses; and upland areas in agricultural, forestry, and other land uses.
Project Examples	♦ Improvement of urban riparian lands ♦ Improvement of wetlands on agricultural lands

Appendix B: **Watershed Improvement Priorities Project Examples**

The following tables list watershed improvement projects that have been identified in the Lower Columbia and Hood Basins which address at least one of the principles used in this framework. As such, these projects provide examples of the project types that can be identified. These projects are shown for illustrative purposes only, since many watershed improvement projects can address more than one principle.

Lower Columbia Basin

- ✓ = **High Priority: Address key issues identified in assessments & other documents**
- • = **Other identified projects**

Watershed Improvement Categories (ranked)	OWEB project types (Codes) (NOT RANKED WITHIN CATEGORIES)	LOWER COLUMBIA SUBBASIN				
		Skipanon	Youngs Bay	Nicolai - Wickiup	Lower Columbia	Sandy
Restore Habitat Connectivity (Short term response; low cost; high probability of success; low variability between projects)	Fish passage structures (FPS)	✓	✓	✓	✓	✓
	Correcting road / stream crossings (CRSC)	✓	✓	✓	✓	✓
	Tidegate removal / improvement (TRI)	✓	✓	✓	✓	
	Dike breaching / removal (DBR)	✓	✓	✓	✓	•
Restore Watershed Processes (Long term response; variable costs; high probability of success; low variability between projects)	Road removal (RR)	✓	✓	✓	✓	✓
	Road drainage improvement (RDI)	✓	✓	✓	✓	✓
	Water gap development (WGD)	•	•	•	•	•
	Livestock water / off-channel (LWO)	•	•	•	•	•
	Brush / weed control / eradication (BWCE)	✓	✓	✓	✓	✓
	Invasive species management (ISM)	✓	✓	✓	✓	✓
	Riparian vegetation planting ()	✓	✓	✓	✓	✓
	Riparian fencing (RF)	✓	✓	✓	✓	✓

Watershed Improvement Categories (ranked)	OWEB project types (Codes) (NOT RANKED WITHIN CATEGORIES)	LOWER COLUMBIA SUBBASIN				
		Skipanon	Youngs Bay	Nicolai - Wickiup	Lower Columbia	Sandy
Restore Watershed Processes (cont'd.)	Re-establish historical channel (RHC)	●	●	●	●	✓
	Instream water enhancement (IWE)	●	●	●	●	✓
	Wetland enhancement (WE)	✓	✓	✓	✓	✓
	Develop meanders / side channels (DMSC)	●	●	●	●	● ✓
	Large wood placement (LWP)	✓	✓	✓	✓	✓
Address Symptoms of Disturbance (Short term, variable cost-- potentially HIGH),	Off-channel habitat creation (OCHC)	●	●	●	●	●
	Log, boulder structures (LBS)					●
	Fish screen improvement / replacement (FSIR)					●
	Salmonid carcass placement (SCP)	●	●	●	●	●
	Channel reconfiguration (CR)					●
	Reduce septic tank contamination*					●
	Reduce animal waste runoff*	●	●	●	●	●
	Restoring areas impacted by off-road vehicle use*					●

*Not listed as an OWEB improvement project category

Hood Basin

✓ = High Priority: Address key issues identified in assessments and other documents

• = Other identified projects

Watershed Restoration Categories (ranked)	OWEB project types (Codes) (not ranked within categories)	HOOD SUBBASIN		
		Hood River	Fifteen Mile	Mosier
Restore watershed connectivity	Fish passage structures (FPS)	✓	✓	✓
	Correcting road / stream crossings (CRSC)	✓	✓	✓
	Irrigation efficiency projects (IEP)	✓		
Restore watershed processes	Road drainage improvement (RDI)	✓	✓	✓
	Brush / weed control / eradication (BWCE)	✓	✓	✓
	Invasive species management (ISM)	✓	✓	✓
	Riparian vegetation planting (RVP)	✓	✓	✓
	Instream water enhancement (IWE)	✓		
	Reduce Tillage (RT)		✓	✓
Address symptoms of disturbance	Groundwater Level*			✓
	Large wood placement (LWP)	✓	✓	✓
	Log, boulder structures (LBS)	✓	✓	✓
	Fish screen improvement / replacement (FSIR)	✓	✓	✓
	Salmonid carcass placement (SCP)	●		

*Not listed as an OWEB restoration project category