ATTACHMENT 1: Conceptual Model, ERTG Scoring Criteria, and Estuary Module

Conceptual Model

The Columbia River Estuary Conceptual Model (http://s458607291.onlinehome.us/FTP/Estuary_Model/START.htm) provides illustrations of the major natural ***ecosystem complexes*** in the estuary. These illustrations can serve as a useful vision for the proposed project. In the project description, please refer to the habitat or ecosystem complexes that will be restored or enhanced by the project. In addition, the information in the conceptual model can help identify and describe the processes and functions that will be restored or enhanced by the project. The conceptual model can also be used to summarize the expected changes in processes and functions realized on the site (i.e., the ***proximal changes***), and those realized off the site (i.e., the ***distal changes***).

ERTG Scoring Criteria

Purpose: The process the ERTG uses to assign survival benefits for habitat restoration projects in the lower Columbia River and estuary (LCRE) involves scoring for three factors:

- Certainty of success
- Potential benefit for habitat access/opportunity[1]
- Potential benefit for habitat capacity/quality[2]

This document provides criteria for scores (1 to 5) for each factor that will help standardize the review process.

Scope: The ERTG scoring criteria apply primarily to restoration and enhancement projects. Acquisition projects are also considered provided there is a vision for restoration in future phases of the project. In addition, conservation projects that have an obvious significant contribution to functioning of the broader ecosystem may also be scored. Ocean- and stream-type fish will not be scored separately because the Estuary Module already differentiates between the two life history strategies.

Certainty of Success

5 -- Restoring a natural process or landforms; proven restoration method; highly likely to be self-maintaining; little to no risk of detrimental effects; highly manageable *project complexity*[3]; minimal to no uncertainties regarding benefit to fish, minimal to no exotic/invasive species expected.

[1] *Habitat access/opportunity* is a habitat assessment metric that "appraises the capability of juvenile salmon to access and benefit from the habitat's capacity," for example, tidal elevation and geomorphic features (cf. Simenstad and Cordell 2000).

[2] *Habitat capacity/quality* is a habitat assessment metric involving "habitat attributes that promote juvenile salmon production through conditions that promote foraging, growth, and growth efficiency, and/or decreased mortality," for example, invertebrate prey productivity, salinity, temperature, and structural characteristics (cf. Simenstad and Cordell 2000).

[3] As used here, *project complexity* refers to the number of elements (i.e., steps or actions) required to achieve the anticipated restoration project habitat conditions and the degree of interdependence of elements to achieve the anticipated habitat functionality. More steps and greater interdependence leads to increased complexity, increasing the risk of not achieving the restoration goal. In addition, the amount of engineered control structures and maintenance necessary for project success adds to project complexity.

4 – Largely restoring a natural process or landforms; proven restoration method; likely to be self-maintaining; minimal risk of detrimental effects; manageable project complexity; minimal uncertainties regarding benefit to fish; minimal exotic/invasive species expected.

3 – Partially restoring a natural process or landforms; proven restoration method; potentially self-maintaining; minimal risk of detrimental effects; manageable project complexity; moderate uncertainties regarding benefit to fish; exotic/invasive species expected.

2 – Partially restoring a natural process or landforms; poorly proven restoration method; unlikely to be self-maintaining; risk of detrimental effects; moderate project complexity; moderate uncertainties regarding benefit to fish; exotic/invasive species expected.

1 -- Unlikely to restore natural processes and landforms; unproven or risky restoration method; will likely require intervention to maintain; some risk of detrimental effects; excessive project complexity; excessive uncertainties regarding benefit to fish; exotic/invasive species expected.

Potential Benefit for Habitat Access/Opportunity

5 -- High *connectivity*[4] of site for most species, populations and life history types coming down river at most water level stages; located in a mainstem area or a priority (TBD) reach; unencumbered access to site.

4 – Intermediate connectivity of site for most species, populations and life history types coming down river at most water level stages; located in a mainstem area or a priority (TBD) reach; unencumbered access to site.

3 – Intermediate connectivity; only accessible to a few life history types or species coming down river at most water level stages; located in a mainstem area, lower end of tributary or a priority (TBD) reach; moderate site access.

2 -- Intermediate to low connectivity; only accessible to specific life history types or one species coming down river at most water level stages; located in a mainstem area, lower end of tributary or a priority (TBD) reach; moderate site access.

1 – Low to no connectivity for any species, populations or life history types coming down river at most water level stages; located in areas far from main stem or lower ends of tributaries; poor site access.

Potential Benefit for Habitat Capacity/Quality (C/Q)

5 -- Maximum natural habitat *complexity*[5]; well-developed natural disturbance regime and ecosystem functions; extensive channel and edge network and large wood; much prey resource production and export; no invasive species or nuisance predators; water quality/temperature quality excellent; site relatively large (> 100 acres).

4 – Very good natural habitat *complexity*; natural disturbance regime and ecosystem functions; very good channel and edge network and large wood; much prey resource production and export; minimal invasive species or nuisance predators; water quality/temperature quality very good; site moderate to large in size (30-100 ac)

3 -- Moderate habitat complexity; moderately-developed natural disturbance regime and ecosystem functions; some channel and edge network and large wood; moderate prey resource production and export; moderate potential invasive species or predators; water quality/temperature quality moderate; site intermediate in size (~30 to 100 acres).

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[4] As used here, *connectivity* refers to the degree to which water and aquatic organisms can move between the project site and the surrounding landscape. Typical barriers to movement include dikes and levees (complete barrier), tidegates and culverts (complete to partial barriers depending on configuration), jetties, groins, etc. Site proximity to population sources or to migratory corridors also affects connectivity. Assuming no barriers to organismal movement or water flow, sites near tributary junctions to the mainstem Columbia River have high connectivity; likewise sites surrounded by river distributaries are highly connected. Connectivity may also be seasonal. Sites where connectivity occurs only during occasional high flow conditions are less connected than those that are connected during low flows.

[5] As used here, *habitat complexity* refers to the diversity of habitat types and structures within a given area.

2 – Moderate to low habitat complexity; moderately-developed natural disturbance regime and ecosystem functions; some channel and edge network and large wood; moderate to low prey resource production and export; moderate potential invasive species or predators; water quality/temperature quality moderate to low; site intermediate to small in size (≥30 acres).

1 – Low habitat complexity; poorly developed natural disturbance regime and ecosystem functions; poor channel and edge network and large wood; moderate to poor prey resource production and export; moderate to high potential invasive species or predators; water quality/temperature poor; site small in size (<30 acres).

Estuary Module

Actions, Subactions, and Restoration Goals from the Estuary Module That Are Applicable to the ERTG Process

Action	Subactions
CRE-1: Protect intact riparian areas in the estuary and restore riparian areas that are degraded.	CRE-1.4: Restore and maintain ecological benefits in riparian areas; this includes managing vegetation on dikes and levees to enhance ecological function and adding shoreline/instream complexity for juvenile salmonid refugia.
CRE-6: Reduce the export of sand and gravels via dredge operations by using dredged materials beneficially.	CRE-6.2: Identify and implement dredged material beneficial use demonstration projects, including the notching and scrape-down of previously disposed materials and placement of new materials for habitat enhancement and/or creation. CRE-6.3: Dispose of dredged materials using techniques identified through the demonstration projects and region-wide planning.
CRE-8: Remove pilings and pile dikes	CRE-8.2: Remove priority pilings and pile dikes.
CRE-9: Protect remaining high-quality off-channel habitat from degradation and restore degraded areas with high intrinsic potential for high-quality habitat	CRE-9.4: restore degraded off-channel habitats with high intrinsic potential for increasing habitat quality.
CRE-10: Breach or lower dikes and levees	CRE-10.1: Breach or lower the elevation of dikes and levees; create and/or restore tidal marshes, shallow-water habitats, and tide channels. CRE-10.2: Remove tide gates to improve the hydrology between wetlands and the channel and to provide juveniles with physical access to off-channel habitat; use a habitat connectivity index to prioritize projects. CRE-10.3: Upgrade tide gates where (1) no other options exist, (2) upgraded structures can provide appropriate access for juveniles, and (3) ecosystem function would be improved over current conditions.
CRE-12: Reduce the effects of vessel wake stranding in the estuary	CRE-12.2: Design and implement projects that are likely to result in the reduction of ship wake stranding events.
CRE-15: Reduce noxious weeds	CRE-15.3: Implement projects to address infestations on public and private lands.