Lower Columbia River Conservation and Recovery Plan
Setting ESU Wide Restoration Goals

Background

The Lower Columbia River Conservation and Recovery Plan serves as a roadmap for the conservation and recovery for 3 Lower Columbia River Salmon species (coho, chinook, chum) Evolutionary Significant Units (ESU's) and 1 steelhead Distinct Population Segment (DPS). The primary goal of the plan is to achieve delisting from the Federal Endangered Species Act (ESA) Threatened and Endangered Species List, followed by broad sense recovery. In order for a species to become delisted both the biological and the threats delisting criteria must be met.

The population structure of these ESU's and DPS are defined by **independent populations**: a group of fish of the same species that spawns in a particular lake or stream at a particular season and, which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place or in the same place at a different season. The State recovery plan considers 31 independent populations, 4 of which are not listed (SW Washington DPS steelhead) and 1 Upper Willamette River ESU population (Clackamas spring chinook). Groups of independent populations that share similar genetics and ecoregions as well as similar life history characteristics, mainly run timing, make up a **stratum.** There are 3 strata: Coastal, Cascade and Gorge. Independent populations within strata that are not genetically isolated and are connected by some degree of migration are considered to be in the same **ESU** or **DPS**.

The primary unit for federal ESA delisting is the independent population. To achieve the biological delisting component, 2 independent populations per strata need to meet the viability status in addition to an aggregate viability score for all independent populations per strata that is slightly less than viable status.

The planning team conducted a population status assessment using a population viability model which assessed the amount of total life cycle improvement needed for each population to reach each population's desired delisting status and thus meet the delisting goal. The amount of improvement needed in each population's total life cycle is called the **conservation gap**. The gap can be considered what is needed in terms of reducing each population's mortality rate.

The planning team then identified 6 major threat categories and limiting factors to each population and assigned, using best available science, current mortality rates associated with each threat. The planning team then ran **scenario analysis** for each independent population for a variety of threat reduction options in an attempt to close the conservation gap to be consistent with their desired delisting status.

Lastly the planning and stakeholder teams identified actions which when implemented are thought the best mechanism to close the conservation gap (reduce the mortality rates) per threat category. The focus of this paper is in regards to reducing the mortality rate associated with the general tributary habitat threat by setting habitat restoration goals for the ESU. When these goals are implemented it is believed that the mortality rate will be reduced by improving the viable salmonid population parameters of abundance, productivity, spatial structure and diversity.

Establishing Restoration Quantities

Every implementation plan within a recovery plan must contain estimates of time required and the cost to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal. Members of the planning team used scenario analysis to determine an approximate population-level estimate for cumulative restoration projects of five different, specific habitat restoration types for each independent population as part of plan cost estimation. The methods can be seen in Chapter 9 of the plan on pages 335-338 and Table 9-2 (p338) summarizes the quantity of specific restoration actions needed for all species within population areas of the lower Columbia River ESU and the associated restoration standards. For ease of review, the riparian restoration and the riparian restoration with fencing are combined in **Table 1** below.

The summary of quantities of restoration needed from Table 9-2 of the recovery plan contains more restoration needs than the delisting scenario recommends. Since Table 9-2 is for all species, it contains restoration needs for some populations of steelhead which are considered to belong to the SW Washington DPS, which are an unlisted species. Additionally, Table 9-2 lists needs that are beyond what the planning team thought were feasible given the quality or quantity of habitat available within the range of an independent population. Lastly, Table 9-2 contains restoration needs for the Sandy populations. The total restoration needs in the Sandy population, include habitat improvements that are required within the City of Portland's Habitat Conservation Plan (HCP) which is likely to occur and required for compliance of the HCP.

As a result of these findings, changes were made to the initial recovery plan scenario analysis to make the restoration quantities account for a most feasible and delisting scenario. The new scenario analysis was run by entering revised mortality rate reductions needed in association with the findings. All mortality rate changes in the revised scenario analysis were obtained from the recovery plan in tables 6-5 through 6-35. Changing the mortality rate needs within the scenario analysis ultimately changes the restoration action quantity needs (Table 1).

Table 1. Summary of the quantities of restoration actions needed for listed species within all population areas of the LCR ESU and associated restoration standards based upon the maximum feasible and delisting scenario analysis

Population area	LWD Placement (miles)	Side channel increase (miles)	Riparian Planting (miles)	Off-channel Wetland Complex Increase (m2)
Youngs Bay	2.3	0	0.9	263.7
Big Creek	23.7	1.8	7.5	8445.0
Clatskanie	65.8	0	16.4	21358.0
Scappoose	23.2	7.5	8.1	2730.0
Clackamas	62.5	64.6	34.8	19780.3
Sandy	34.9	17.5	18.5	5446.6
Lower Gorge	15	8.8	8.4	6783.6
Upper Gorge	4	1.8	1.8	1422.0
Hood	33.6	20.1	19.2	15501.3
Total	265	122.1	115.6	81730.5
	*20 m3 of lwd/100m of stream		*30 m Width on each side of stream	

There are some important points to note when assessing the amount of restoration needs. First, ODFW conducted Aquatic Habitat Inventories (AQI) on streams from across the ESU. Stream habitat metrics which are commonly assessed are those associated with **Table 1**. The results of the surveys were compared against reference conditions. The reference conditions and habitat benchmarks were obtained from habitat characteristics representative of conditions in stream reaches with high productive capacity for salmonid species in relatively unaltered pristine habitat. When examining the results of the reference conditions it was determined that not all habitat is high quality and proportioned as 25% high quality, 50% moderate quality and 25% poor quality habitat. From the AQI surveys taken across the ESU, an analysis was run to determine what percentage of existing habitat was in poor, moderate and high quality conditions per independent population.

Once the planning team members knew the conservation gap per independent population, the proportion of habitat quality in reference conditions and the existing habitat quality across the ESU, they were then able to estimate the additional miles of properly functioning habitat needed to close the conservation gap by moving low and moderate quality habitat to moderate and high quality habitat via habitat restoration. This exercise was revised under the max feasible/delisting scenario.

The second point to note is: there are other types of habitat restoration actions that could be employed, such as increasing water quantity that would offset a portion of one or more of the restoration metric needs. Additionally, conducting more restoration quantities/type than what is listed in **Table 1** could offset quantities needed in other restoration type actions.

The last point is: the habitat restoration quantities depicted in **Table 1** do not represent a target or goal in which threats delisting criteria will be evaluated, but habitat trends will be evaluated. The listed restoration quantities should be reviewed with caution due to the limited amount of information existing during plan development and the uncertainty about the quality and functionality of restored habitat and fish use in restored habitats. The habitat restoration quantity needs will ultimately be determined by fish response, and possibly change from estimates made during cost estimation and subsequent revisions. **Table 1** identified habitat restoration needs are useful as a starting point to visualize the relative amounts and types of restoration work needed in tributaries. Even when the restoration quantities appear to be met, implementers are encouraged to continue to conduct these types of projects until biological listing (Viable Salmonid Populations-VSP) factor parameters are fully met as fish response to habitat restoration improvements will be the ultimate factor in any delisting decision.

Timeline for Implementation

The scheduled timeframe of 15 years for implementation is consistent with those timeframes used in SLAM modeling to determine the effect of time lags for recovery actions on achievement of desired status. Although this modeling indicated that lags in tributary habitat would have the most significant negative impact on extinction risk, the longer implementation period for tributary habitat actions was used as the schedule due to the inability to actually immediately conduct the amount of restoration needed. Thus, for tributary habitat action schedules, the number of years indicated for the action should not be considered the time when projects get implemented, but the time when all projects are implemented. Implementation should occur as soon as possible.

Knowing that full implementation of all the restoration quantities will take significant funds that are most likely beyond the capacity of most watershed enhancement practioneers to obtain/conduct in one

year, **Tables 2** through **5** depicts habitat type implementation scenarios on a yearly basis. If the yearly targets are met for 15 consecutive years then the habitat restoration quantities in Table 1 will be met.

Table 2. LWD Scenario: Total and yearly miles of LWD enhancement needed to meet restoration goals

	Total Miles							
Population	Delisting or (max feasible)*	Miles/year over 15 yrs	key pcs needed/yr over 15 year (delisting or Max Feasible)	Volume of Key pcs only (logs)/yr over15 yr (delisting or max feasible)	Total volume needed /yr over 15 year (delisting or Max Feasible	Additional Volume needed/yr for 15 yr (assuming only key pcs added)	** Additional bundles of slash needed/yr for 15 yr (delisting or max feasible)	**Additional key pcs/15 yr (delisting or max feasible
Youngs Bay	2.3	0.2	7	21	49	28	5	10
Big Creek	23.7	1.6	76	216	509	293	51	104
Clatskanie	65.8	4.4	212	600	1412	812	141	287
Scappoose	23.2	1.5	75	211	498	287	50	101
Clackamas*	62.5	4.2	201	570	1342	772	134	273
Sandy	34.9	2.3	112	318	749	431	75	152
Lower Gorge*	15	1.0	48	137	322	185	32	65
Upper Gorge*	4	0.3	13	36	86	50	9	18
Hood River*	33.6	2.2	108	306	721	415	72	147
Total	**265**	**17.7**	**853**	**2415**	**5688**	**3273**	**567**	**1157**

*Max feasible

**To meet the restoration standards of 20 m3/100m of stream, additional amounts of LWD or course woody debri will need to added to sites beyond adding key pieces

Typically watershed enhancement practioneers use the Oregon Aquatic Habitat Restoration Guide in planning LWD enhancement projects. These guidelines are often included as permit conditions (USACE NW 27) and for Oregon Division of State Lands Aquatic Habitat Restoration exemptions. The guidelines read that for each restoration site 2 conifer logs that meet certain length and diameter at breast height requirements are needed for each enhancement location. These guidelines, in addition to the ODFW benchmark standard of >3 key pieces of LWD/100m, are frequent standards used by practioneers. These standards are applicable but do not meet the restoration standard used within the recovery plan. The recovery plan standard is based on volume/100m. **Table 2** lists the number of key pieces needed based upon the yearly mileage targets. Additionally **Table 2** lists the volume needs and two additional ways to potentially achieve those volume standards, through additional key pieces or bundles of slash. A bundle of slash for this report is considered approximately 10'X4'X4'. These bundles when placed in association with key pieces should accelerate filling of interstitial spaces and accelerate the function of the LWD jam.

Table 3. Side Channel Scenario: Total and yearly miles of side channel opened/created needed to meet restoration goals

	Miles of Side Channel	
Population	Delisting or (max feasible)*	miles opened up/yr over 15 year (delisting or Max Feasible)
Youngs Bay	0	0
Big Creek	1.8	0.12
Clatskanie	0	0.00
Scappoose	7.5	0.50
Clackamas*	64.6	4.31
Sandy	17.5	1.17
Lower Gorge*	8.8	0.59
Upper Gorge*	1.8	0.12
Hood River*	20.1	1.34
Total	**122.1**	8.14

Table 4. Riparian Scenario: Total and yearly miles of riparian planting needed to meet restoration goals

	Miles of riparian	
Population	Delisting or (max feasible)*	miles planted/yr over 15 year (delisting or Max Feasible)
Youngs Bay	0.9	0
Big Creek	7.5	0.50
Clatskanie	16.4	1.09
Scappoose	8.1	0.54
Clackamas*	34.8	2.32
Sandy	18.5	1.23
Lower Gorge*	8.4	0.56
Upper Gorge*	1.8	0.12
Hood River*	19.2	1.28
Total	**115.6**	7.71

The restoration standard for riparian planting is restoration of a 30m band on each side of the stream.

Table 5: Off-channel Habitat Scenario: Total miles and meters squared of off-channel habitat created/restored needed to meet restoration goals

	Miles of off-channel		
Population	Delisting or (max feasible)*	Convert to M2*	m2/yr over 15 year (delisting or Max Feasible)
Youngs Bay	0.3	263.7	18
Big Creek	7.5	8445	563
Clatskanie	23.6	21358	1424
Scappoose	4.2	2730	182
Clackamas*	49.7	19780.6	1319
Sandy	11.3	5446.6	363
Lower Gorge*	21.4	6783.8	452
Upper Gorge*	4.5	1422	95
Hood River*	48.9	15501.3	1033
Total	**171.4**	81731	5449