

Appendix G
Determining Discounted Service Acre-Year (DSAY) Credits
For Example Habitat Restoration Projects

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August 22, 2001

Introduction

In order to compensate for natural resources damages, each potentially responsible party (PRP) will need to create or participate in a habitat restoration project or projects that generate a gain of a number of discounted ecological service acre-years (DSAYs) equal to the allocated loss of DSAYs for which they are liable. The DSAY gains credited to a project are the difference between the total DSAYs the site would generate after project completion, less the DSAYs the site would generate if the project were not constructed.

To determine the DSAYs with and without the project, the Trustees first evaluate the present condition of the site. Depending upon on-site contamination, conditions requiring baseline adjustments or classification of areas as degraded (see Appendix C), and the level at which existing habitats are currently functioning, the Trustees will determine the current ecological services being provided by the site. Taking into account the likelihood that site conditions would change if the project were not built and the timing and rate at which changes would be expected to occur, the Trustees calculate the DSAYs the site would generate without the project over the time period analyzed. To calculate the DSAYs the site would generate with the project, the Trustees evaluate a proposed project design, taking into account the timing of construction and assumptions about when the project will reach full function.

To explain this analysis more thoroughly, this appendix will step through the process of determining DSAY values for three example projects: two Hylebos Waterway projects already constructed by the Trustees (the Mowich project and the Squally Beach project) plus a hypothetical project.

Mowich Restoration Project

This project, located at the head of the Hylebos Waterway, is intended to restore estuarine functions to the mouth of Hylebos Creek. The creek runs between the former Wasser-Winters parcel and the Louisiana-Pacific log yard before it enters the waterway. Prior to construction, the banks along both sides of this stretch of the creek were steep-sided and covered with non-native invasive plant species. Under a settlement agreement with the Port of Tacoma, the owner of the Wasser-Winters parcel, the Port agreed to make a 100 foot-wide strip of the Wasser-Winters parcel adjoining the creek available to the Trustees for a restoration project, and to erect and maintain a cedar fence as a visual disturbance barrier along the upland side of the site.

The project design developed by the Trustees called for removing fill material from the site to soften the slope of the bank and to create three backwater sloughs. A second stream mouth was added in the area of the site that was an historical log ramp. The pools and adjacent terraces include large woody debris added to improve the habitat structure. In addition, the area between the pools was regraded to a high intertidal

elevation. The intertidal area was covered with “fish mix” gravel. Upland and intertidal areas were planted with riparian and marsh plant species native to Commencement Bay.

Determining DSAYs Without Restoration

The Mowitch Site is 2.68 acres. Initially, it consisted of 2.03 acres of unvegetated upland and 0.65 acres of intertidal habitat. There was no evidence of on-site contamination and therefore no contaminant-related service losses were assigned. To be considered fully functional, intertidal areas require an adjacent vegetated buffer or fully functioning marsh. Since the upland area adjacent to the intertidal habitat contained only sparse, poorly functioning non-native vegetation, it did not qualify as vegetated buffer and was assumed to provide no service value. The Trustees therefore assigned the 0.65 acres of intertidal habitat a baseline adjusted value of 0.75, and the 2.03 acres of upland a value of zero.

Appendix F describes how the HEA model uses inputs about project size and conditions and expected changes in site conditions to calculate DSAYs under different scenarios. For this project, using the mentioned service values and acreages and assuming no changes in the site, the HEA model calculated that the site would produce 16.25 DSAYs if the project were not constructed.

Determining DSAYs With Restoration

A similar process is employed for determining the DSAYs after the restoration project is developed. The project involved excavating 1.3 acres of upland to intertidal elevations and planting the remaining upland to develop a riparian buffer. This created 1.3 acres of intertidal habitat in addition to the 0.65 acres previously present on the site, bringing the intertidal habitat to 1.95 acres. The excavation diminished the upland acreage by 1.3 acres, leaving 0.73 acres of upland on the site. Native planting in the remaining upland qualifies it as a vegetated buffer.

After construction and planting the site contains 1.95 acres of intertidal area, which will generate service values of 0.9 once fully functional, due to the presence of a vegetated buffer. The remaining 0.73 acres of upland vegetated buffer, once they reach full function, will generate a value of 0.4.

As explained in Appendix C, the Trustees assume that restored habitats take some time to reach full function. For intertidal habitat, for instance, the area begins with a value of 0.75, reaches 91.6% of its fully functional value in four years, and reaches 100% of its service value (0.9) within eight years. Vegetated buffer begins with a value of 0.15, reaches 50% of its fully functional value in four years, and reaches fully functional status (0.4) within eight years. Inputting these service values, acreages and time values into the HEA calculations provides a total DSAY value of 64.96 for the site after restoration.

Calculating DSAY Credits

To determine the DSAYs created by the Mowitch project, the 16.25 DSAYs for the site without action were subtracted from the 64.96 DSAYs for the site after restoration, which yielded a gain of 48.71 DSAYs resulting from the project. A PRP who constructs an identical project which achieves a fully functional status would be entitled to a credit of 48.71 DSAYs to offset against its allocated share of DSAY liability.

Squally Beach Restoration Project

The purpose of the Squally Beach restoration project is to restore an intertidal area in the middle of the Hylebos Waterway to full function in order to support shorebirds and juvenile salmon and the bottom-dwelling and benthic creatures that form the base of their food chain. The Squally Beach site is owned by the Puyallup Tribe of Indians and is on the north shore of the waterway, on Marine View Drive, just to the west of 11th Street. Originally, this area had remnants of logging operations, including logs and pieces of drowned wood, as well as pilings on this site. The steep upland area was vegetated by non-native plants such as blackberry bushes, and the steep grade of this land allowed runoff of freshwater into the Hylebos, encouraging the growth of species that tolerated more brackish conditions.

The restoration plan for this site included excavating and regrading of the upland area to a more gentle transition into the intertidal area and planting the upland area with native plants. The runoff from the upland area was redirected into a dendritic channel pattern in order to avoid brackish water conditions. The plan also included planting of intertidal vegetation and substrate enhancement in order to restore the intertidal area.

Determining DSAYs without Restoration

The Squally Beach site originally consisted of 0.66 acres of unvegetated upland area and 0.06 acres of intertidal area. The site as a whole is 0.72 acres in size. There was no discernable contamination present at the site, and no losses were assigned to the service values for these habitats. It is assumed that the site conditions would not have changed if the restoration project had not been built. The 0.66 acres of unvegetated upland did not provide habitat services and were assigned a value of zero. The 0.06 acres of intertidal habitat, because they were not adjacent to a vegetated buffer or fully functioning marsh, were assigned a baseline adjusted value of 0.75. These values were input into the HEA model, resulting in a final DSAY value of 1.5 in the absence of restoration action.

Determining DSAYs with Restoration

The restoration at Squally Beach involved excavating 0.31 acres of upland area to intertidal levels, and regrading and planting the remaining upland in order to form a vegetated buffer. These actions created a total of 0.37 acres of intertidal area and 0.35

acres of vegetated buffer at the site. The new vegetated buffer was assigned a value of 0.4 at full function, and the intertidal area was assigned a fully functional value of 0.9 due to the presence of an adjacent vegetated buffer. Inputting these habitat values and each habitat's acreage into the HEA model along with time to full function data for each habitat type generated a DSAY value of 14.81 after restoration.

Applying Created DSAYs to Liability

The 14.81 DSAYs the Squally Beach project will generate represent an increase of 13.31 DSAYs over the service values the site would produce if the project had not been built. A PRP who built an identical project would therefore be entitled to a credit of 13.31 DSAYs against its allocated share of DSAY liability.

Hypothetical River Oxbow Restoration Project

This hypothetical project involves the restoration of a cut-off river oxbow once part of the original river channel. The site before the project is constructed is 7.1 acres in size, comprised of 5.6 acres of unvegetated upland and 1.5 acres of shallow subtidal habitat. The restoration plan calls for excavating a 1.8 acre bay designed with a curvilinear edge at high intertidal elevations, protected by two armored spits forming a mouth opening to the river. Soil amendments of silts and clays with high organic content are to be distributed over the basin. The slopes of the intertidal area are to be planted with emergent marsh plants. Transitional shrub/scrub plantings are to be introduced between the intertidal marsh, upland meadow and forested habitat.

Determining DSAYs without Restoration

The 5.6 acres of unvegetated upland are given a habitat service value of zero. The remaining 1.5 acres of the site consist of shallow subtidal land. The shallow subtidal area has a baseline-adjusted value of 0.55, due to the absence of adjacent fully functioning intertidal habitat. The site is presumed to have no hazardous substance contamination and it is presumed the site values will be unchanged if the restoration project is not constructed. The total value for this hypothetical site without any restoration action is calculated to be 27.50 DSAYs.

DSAYS with Restoration

This project would involve excavating 1.8 acres of upland area to intertidal and shallow subtidal elevations. In combination with the planting and the addition of silt and clay substrate to the basin, these restoration activities create 1.5 acres of mudflat in the intertidal area, 1.4 acres of mudflat in the shallow subtidal area, 1.2 acres of marsh and 3.0 acres of vegetated buffer. The mudflat areas would each receive a habitat value based on their elevation. The shallow subtidal mudflat has a value of 0.7 and the intertidal mudflat a value of 0.9. Both of these values reflect a designation of fully

functional because the mudflat areas would be bordered by a marsh. The marsh area would also be fully functional because it is bordered by a vegetated buffer, and would have a value of 1.0. The vegetated buffer would have a value of 0.4 at full function. The creation of these new habitats on the site would raise the total DSAY value after restoration to 147.45.

Applying Created DSAYs to Liability

The restoration project on this site would result in the production of a gain of 119.95 DSAYs (147.45 DSAYs with the project less the 27.50 DSAYs the site would produce without the project). A PRP who developed a project identical to this one would therefore be entitled to a 119.95 DSAY credit against its allocated share of DSAY liability.

Project	Site Without Restoration Project				Restoration Actions	Site With Fully Functional Restoration Project				DSAYs Credit
	Habitat Type	Acres	Ecological Service Value/acre	DSAYs		Habitat Type	Acres	Ecological Service Value/acre	DSAYs	
Mowitch	Unvegetated Upland	2.03	0	16.25	Excavate 1.3 acres of upland to intertidal depth. Form sloughs, add large woody debris. Add fish mix. Upland and intertidal planting.	Vegetated Buffer	0.73	0.4	64.96	48.71
	Intertidal	0.65	0.75			Intertidal	1.95	0.9		
	Totals	2.68				Totals	2.68			
Squally Beach	Unvegetated Upland	0.66	0	1.5	Excavate and regrade 0.31 acres of upland to intertidal depth. Add substrate enhancements. Upland and intertidal planting.	Vegetated Buffer	0.35	0.4	14.81	13.31
	Intertidal	0.06	0.75			Intertidal	0.37	0.9		
	Totals	0.72				Totals	0.72			
River Project	Unvegetated Upland	5.6	0	27.5	Excavate 1.8 acres of upland to intertidal and shallow subtidal depths. Add substrate enhancements. Upland and intertidal planting.	Vegetated Buffer	3.0	0.4	147.75	120.25
	Marsh	0				Marsh	1.2	1.0		
	Intertidal	0				Intertidal	1.5	0.9		
	Shallow Subtidal	1.5	0.55			Shallow Subtidal	1.4	0.7		
	Totals	7.1				Totals	7.1			