



Estuary Restoration

River delta estuaries form where river floodplains meet the sea, creating a unique and important environment where freshwater mixes with salt water and sediments collect. A diverse array of specially adapted plants and animals thrive and take advantage of the fertility there, moving in and out with the tides. Estuaries provide important feeding and resting habitat for young salmon, migratory birds, and many other species that cannot find these unique benefits in any other place in our landscape. For example, young salmon that can rear longer in delta estuaries grow faster and are more likely to survive their ocean migration.

Estuary Restoration

INDICATOR:
Estuary Restoration
 Indicator lead: Paul Cereghino (NOAA Restoration Center)

TARGET #1:
 By 2020, all Chinook natal river deltas meet 10-year salmon recovery goals (or 10% of restoration need as proxy for river deltas lacking quantitative acreage goals in salmon recovery plans)

PROGRESS:

IS THE TARGET MET?	NO	IS THERE PROGRESS?	N/A
---------------------------	-----------	---------------------------	------------



Salmon recovery plans are in the process of being updated, and measurable restoration goals are being defined.

INDICATOR:
Estuary Restoration
 Indicator lead: Paul Cereghino (NOAA Restoration Center)

TARGET #2:
 7,380 quality acres are restored basin-wide, which is 20% of total estimated restoration need.

PROGRESS:

IS THE TARGET MET?	NO	IS THERE PROGRESS?	YES
---------------------------	-----------	---------------------------	------------

CURRENT STATUS
 2011 = 2,350 acres restored to tidal inundation (32%)

2020 TARGET



0 acres 1,845 3,690 5,535 7,380 acres

As of 2011, approximately 2,350 acres of estuary lands have been restored to tidal inundation since 2006, about 32 percent of the amount needed to reach the 2020 target.

Progress Towards the 2020 Target

Neither of the two 2020 targets for estuaries have been met yet, but there has been progress on target 2 (number of quality acres restored). Although this may indicate progress towards salmon recovery goals, progress towards target 1 cannot be measured because recovery plans are in the process of being updated, and measurable restoration goals are being defined.

Approximately 2,350 acres of estuary lands have been restored to tidal inundation in the 16 major Puget Sound river mouth estuaries (Figure 1). Data summarized here are provisional because each watershed characterizes estuary restoration differently. The Partnership is working with other agencies and watershed groups to standardize how estuary restoration is measured and reported.

Significant restoration work has been implemented in the Nisqually, Skokomish, and Quilcene river delta systems, restoring a large proportion of area historically subject to tidal flooding. Substantial projects have also been completed in the Nooksack, Skagit, Snohomish, and Stillaguamish estuaries, but these remain modest when compared to the original historic extent of these larger river delta systems. Smaller projects have been completed in several deltas, including Duckabush, Dosewallips, and Dungeness.

The Duwamish and the Puyallup river deltas, two of the most industrialized in Puget Sound, have seen substantial activity associated with Natural Resource Damage Assessment efforts. But acreage gains there are modest in terms of restoring tidal inundation, and there are fewer options in those highly developed systems compared to some levee and dike setback opportunities in less developed systems.

Estuary Acres Restored to Tidal Inundation by Year

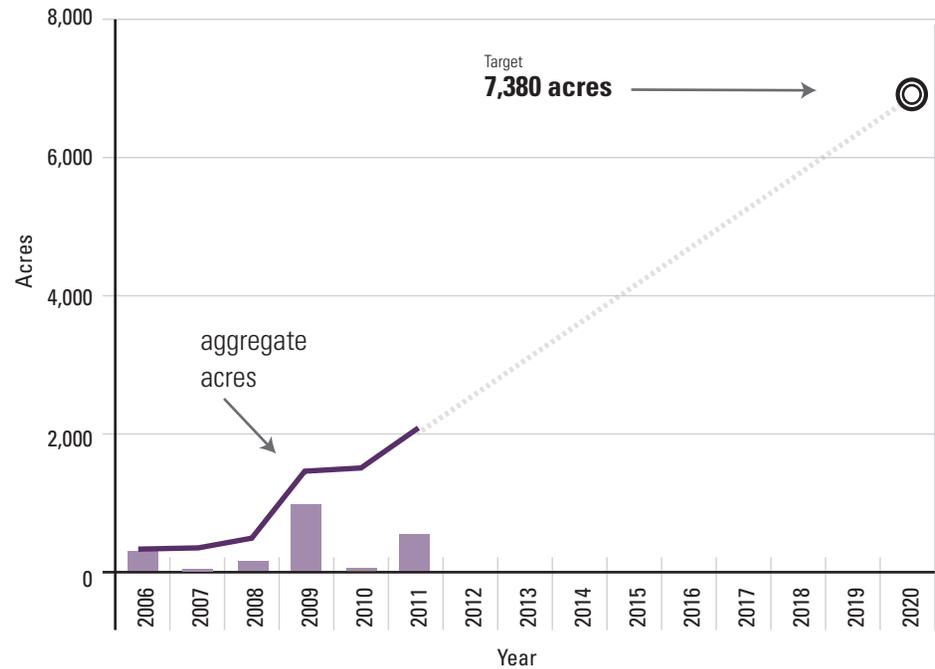


Figure 1. Approximate acres of estuarine lands where tidal flow has been restored for projects completed between 2006-2011 in the 16 major Puget Sound river mouth estuaries (data for 2009 includes the Nisqually estuary refuge restoration project of 762 acres). Columns show annual amounts, and the line shows the cumulative acres.

Source: National Estuary Program Online Reporting Tool (NEPORT), Environmental Protection Agency

Estuary Restoration

What is This Indicator?

The estuary restoration indicator tracks the amount of land returned to tidal inundation. Until more robust measures become available, we generally assume that restoring tidal flooding to historic estuarine lands will improve the natural habitat functions and productivity of those lands.

Many estuarine restoration projects have been undertaken in Puget Sound. However, they have been planned, funded, and implemented over a decade or more by many different organizations, including local governments, state and federal agencies, watershed groups, tribes, and private organizations and landowners. Unfortunately, project reporting is scattered and inconsistent, mapping and survey methods are not standardized, and the accuracy of completed (“as-built”) project reporting is highly variable.

Consequently, the data reported here represent only a rough estimate of the actual area treated. Project reporting has been subject to considerable variability over the years, and our results were obtained from several different and inconsistent databases designed to collect project data (including PRISM, Habitat Work Schedule, and NEPORT). Efforts are underway to standardize how estuarine restoration efforts are reported and characterized. The intent is to eliminate inconsistencies and gaps in data and improve our ability to track actual net gains and losses of estuarine habitat.

Interpretation of Data

Historic trends

In Puget Sound there are 16 large river-mouth estuaries: nine larger deltas drain the Cascade Mountains, and seven smaller deltas drain the Olympics. These estuaries and wetlands were a cornerstone of the Puget Sound ecosystem and served as a critical nursery for historically large populations of now-threatened Pacific salmon.

Over the last 150 years, the region has suffered dramatic losses of intertidal wetlands. Of the approximately 62,000 acres of mapped historical swamp and marsh, only an estimated 14,640 acres remain. The swamps of the Skagit and Snohomish once contained over 37,000 acres alone (compared to around 1,620 acres for all the Olympic deltas combined). In the most highly developed river mouth estuaries, such as the Duwamish and Puyallup Rivers, estuarine habitat has been reduced to only a tiny fragment of its original extent, and may never be recovered.

Much of the loss can be attributed to the development of natural waterways for economic and commercial purposes. Across the region, estuaries and tidal wetlands have been diked, drained, or filled. They have been converted to farms and agriculture, or developed into modern ports and industrial sites. Loss of intertidal wetlands has contributed to the decline of many species, including especially Chinook and chum salmon that depend on river delta estuaries for essential juvenile rearing habitat.

Bridge Over Stillwaters

Carpenter Creek Estuary Restoration

Located at a critical crossroads for migrating salmon from river basins throughout Puget Sound, Carpenter Creek estuary near Kingston, Washington, is the last significant functioning estuary before leaving Puget Sound. This important salmon nursery provides young fish a place where they can eat, grow, and prepare for the long journey to the Pacific Ocean, including Chinook and coho salmon as well as steelhead and cutthroat trout.

For decades, an undersized culvert on South Kingston Road created a barrier for migrating fish that trapped juvenile salmonids at low tide, where they become easy prey. The culvert also prevented adequate water flow between the salt marsh and estuary. As a result, significant portions of the marsh were filling in with sediment, and fresh-water wetland species were encroaching into the upper saltmarsh.

In 2010, the Washington State legislature provided \$2.7 million through a state capital budget appropriation to

restore Carpenter Creek estuary because it provided critical habitat for endangered fish. Kitsap County used the funds to replace the culvert with a 90-foot single span bridge that restored natural tidal flow to estuary and saltmarsh habitat and allowed fish to move into and out of the 30-acre forested estuary habitat. Tide pools behind the culvert were also eliminated, making fish less vulnerable to predators.

Completed in February, 2012 the new South Kingston Road bridge was officially named the Stillwaters Fish Passage in honor of the advocacy work of Stillwaters Environmental Education Center.



Carpenter Creek Estuary



The new 90' span allows a more gentle flow for fish passage