

## **A Tidal Habitat Restoration Success Story – The Union Slough Restoration Project**

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The Snohomish Estuary in central Puget Sound, Washington, lost over 70% of off-channel and slough habitats due to diking for agriculture in the early part of the 20th Century. Restoration of these productive habitats, primary rearing areas for juvenile salmonids during their outmigration from natal streams, is a major goal of planning to restore salmon populations in the system. Since about 1950, natural dike breaches, left unrepaired, and purposeful dike breaches have restored approximately 600 acres of the estuary to tidal influence. In February 2001, the Port of Everett breached dikes to restore tidal circulation to a ± 20-acre, former agricultural parcel along Union Slough in the lower Snohomish Estuary. Before dike breaching, the site was graded to provide desired elevations for brackish marsh development, and to provide a deep dendritic channel that would allow maximum accessibility by juvenile salmonids; also, a new inner dike was built to protect Interstate 5 from flooding. Three years of a planned 10-year monitoring program have been completed and the site is well on its way to meeting all ecological objectives. Physical structure of the site, which was designed to mimic a natural dendritic marsh channel system, has remained stable over that period.

Substantial numbers of small invertebrates and juvenile salmonids were using and feeding in the site as early as 2 months following dike breaching. Summer and fall seining demonstrated use by six species of juvenile anadromous salmonids with chinook and coho juveniles remaining in the site through November 2001. Additional seining during the 2003 salmon outmigration again found large numbers of fish using the site. Benthic productivity appears to be high; epibenthic zooplankton (a major prey group for juvenile salmonids) was abundant within the site in April 2001 (2 months after breaching) and in May 2003, with comparable species diversities and densities to an adjacent reference site. A variety of shorebirds and waterfowl have been observed using the site year-round. Marsh vegetation, including highly valued *Carex lyngbyei* has rapidly colonized elevations between about +7 and +11 feet MLLW around the margins of the site and eelgrass has colonized some of the deeper channel bottoms. Sub-adult Dungeness crab, an important commercial and recreational species in adjacent marine waters, move into the site in late summer when freshwater influence is at a minimum. During river floods in the past two winters substantial quantities of large woody debris has recruited to the site, adding important shoreline complexity. Because of the success seen at this site, the Port is planning to expand it by 5 acres and is considering plans to restore a 300-acre site on nearby Steamboat Slough as a mitigation bank. This and several other sites in the Snohomish Estuary clearly demonstrate that breaching dikes to restore tidal action is a relatively certain and economical means of providing real and immediate increases in habitat function.