

US EPA ARCHIVE DOCUMENT

HABITAT RESEARCH AT THE WESTERN ECOLOGY DIVISION

Determining Biota-Habitat Associations in Pacific Northwest (PNW) Estuaries

Habitats Serve Different Roles

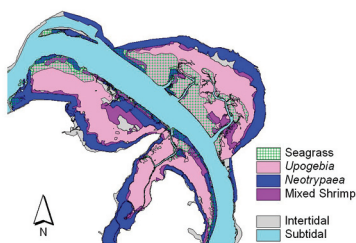
Some estuarine habitats play more crucial roles than others by, for example, providing a special niche for rare or endangered species, high diversity, or important ecosystem services, such as food production, erosion protection, or nutrient cycling. Eelgrass provides protection from erosion and is an important feeding and nursery ground for many finfish and shellfish of commercial and recreational importance. Oysters are harvested for human consumption and help prevent eutrophication. Little is known about the roles and ecologic and economic values of other PNW estuarine habitats. A variety of different habitats may provide the fullest, sustainable complement of valued ecosystem services. But how can one judge their relative importance or the best mix of habitats if the roles of most habitats are unknown?



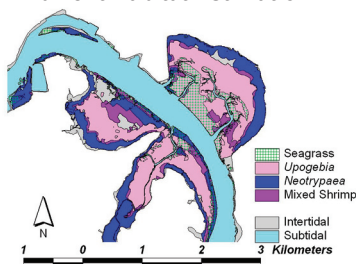
Habitats Change in Response to Stressors

Habitat alterations occur in response to the kind and magnitude of the stressors put upon them. Native oysters, once abundant and widely distributed throughout PNW estuaries, have been reduced to small isolated populations probably due to historical over-harvesting and pollution. Eelgrass is in decline nationally for reasons not fully understood. Historical change analysis has shown that filling and diking and the introduction and spread of Atlantic cordgrass has resulted in large habitat changes in PNW estuaries. The major stressors in PNW estuaries today are excess sediments and nutrients, due to logging, agriculture, urbanization, and other human land-use practices, and the introduction and spread of invasive non-indigenous species, such as Atlantic cordgrass. Some habitat-altering effects of these stressors are predictable on theoretical grounds. Predictive habitat-stressor-response relationships are an active area of current research.

Historic Habitat Estimation



Current Habitat Estimation



Effects of Habitat Changes

Many biological effects occurring in the environment are mediated by changing habitats. Habitat alteration is a major cause of species endangerment and declines in ecological resources. As habitats expand, contract, or are lost, biological populations and communities associated with them, along with the ecosystem services they supply, expand, contract, or are lost. The Clean Water Act and the Estuaries Restoration Act provide legislative authority for estuarine habitat protection. But what are the benefits of habitat protection? Which habitats are critical? And what are the effects of habitat changes on the estuarine system as a whole?

WED Research on Biota-Habitat Associations in PNW Estuaries

The Western Ecology Division's Habitat Project seeks to develop simple empirical models of the relative ecological resource values of major PNW estuarine habitats with respect to nekton (free-swimming fish, crabs, etc.) and benthic macrofauna (sediment-dwelling invertebrates). WED research is focused on answering the following questions at the estuary scale:

- What is the most relevant and efficient habitat classification scheme for habitat biocriteria?
- What habitats are critical to healthy nekton and benthic macrofaunal communities?
- What is the relative value of different habitats with respect to a variety of important ecological endpoints such as nekton and benthic macrofaunal species richness, biomass, and abundance?
- Are relative habitat values about the same or different over time and for different estuaries?
- What scientifically sound, cost-effective models can be developed for biota-habitat associations?

The answers to these questions will help resource managers and ecological risk assessors identify critical habitats, prioritize habitats for environmental protection, and translate observed or predicted changes in the types and areas of habitats into their ecological effects.

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