

*Variation in the Floral and Faunal Structure of Freshwater Tidal Forest Ecosystems along the Columbia River Estuary Gradient: Applications to Ecological Restoration*

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Freshwater tidal forested wetlands are dynamic, complex ecosystems that typically occur prominently in large, floodplain river estuaries throughout the world. In the Columbia River estuary, forested wetlands were once abundant along the tidal freshwater-estuarine gradient but have been reduced dramatically since Euro-American development of the region. We quantitatively characterized a portion of the remaining forests and found that they vary in both floristic and faunal structure, species composition, and species richness across the scale of the estuarine gradient. In the lower estuary, Sitka spruce-dominated tidal forested wetlands are characterized by high vegetation species richness and complex forest and scrub-shrub habitat components. In the upper estuary, deciduous tree species including black cottonwood and Oregon ash dominate the forest component of the wetlands. A greater diversity of wetland habitat types (scrub-shrub, emergent, and aquatic) are associated with the forested wetlands in the upper estuary, but each component has relatively low species richness. A transitional area in the mid-estuary contains forested wetlands that display some similarities to both the upper and lower estuarine forested wetlands. Geomorphology and hydrological regimes of the estuary appear to be the factors controlling the variation in forested wetlands characteristics along the estuarine gradient. Recent restoration efforts in the Columbia River estuary have focused on forested wetlands, but alterations to the hydrological disturbance regime in the system have made restoration of forested wetlands a difficult task. Our quantitative characterization of the structure and composition of these systems provides insight into restoration design and the successional trajectory of these important but highly impacted habitats in the Columbia River estuary.