

RESEARCH ARTICLE

Insights into estuary habitat loss in the western United States using a new method for mapping maximum extent of tidal wetlands

Laura S. Brophy¹, Correigh M. Greene^{2*}, Van C. Hare³, Brett Holycross³, Andy Lanier⁴, Walter N. Heady⁵, Kevin O'Connor⁶, Hiroo Imaki⁷, Tanya Haddad⁴, Randy Dana⁴

1 Institute for Applied Ecology, Corvallis, Oregon, United States of America, **2** NOAA Fisheries, Northwest Fisheries Science Center, Seattle, Washington, United States of America, **3** Pacific States Marine Fisheries Commission, Portland, Oregon, United States of America, **4** Oregon Dept. of Land Conservation and Development, Salem, Oregon, United States of America, **5** The Nature Conservancy, Santa Cruz, California, United States of America, **6** Moss Landing Marine Labs, Moss Landing, California, United States of America, **7** Pacific Spatial Solutions Inc., Seattle, Washington, United States of America

* correigh.greene@noaa.gov



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Data Availability Statement: A packaged static geodatabase from which all analyses were based is available at <https://psmfc.sharefile.com/d-s5bf1b1efca24e7eb>. Updates to the geodatabase will be available at <http://www.pacificfishhabitat.org/data/>. Additional supporting data are within the manuscript and its Supporting Information files.

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Abstract

Effective conservation and restoration of estuarine wetlands require accurate maps of their historical and current extent, as well as estimated losses of these valued habitats. Existing coast-wide tidal wetland mapping does not explicitly map historical tidal wetlands that are now disconnected from the tides, which represent restoration opportunities; nor does it use water level models or high-resolution elevation data (e.g. lidar) to accurately identify current tidal wetlands. To better inform estuarine conservation and restoration, we generated new maps of current and historical tidal wetlands for the entire contiguous U.S. West Coast (Washington, Oregon, and California). The new maps are based on an Elevation-Based Estuary Extent Model (EBEEM) that combines lidar digital elevation models (DEMs) and water level models to establish the maximum historical extent of tidal wetlands, representing a major step forward in mapping accuracy for restoration planning and analysis of wetland loss. Building from this new base, we also developed an indirect method for mapping tidal wetland losses, and created maps of these losses for 55 estuaries on the West Coast (representing about 97% of historical West Coast vegetated tidal wetland area). Based on these new maps, we estimated that total historical estuary area for the West Coast is approximately 735,000 hectares (including vegetated and nonvegetated areas), and that about 85% of vegetated tidal wetlands have been lost from West Coast estuaries. Losses were highest for major river deltas. The new maps will help interested groups improve action plans for estuarine wetland habitat restoration and conservation, and will also provide a better baseline for understanding and predicting future changes with projected sea level rise.