

## Evaluating regional resiliency of coastal wetlands to sea level rise through hypsometry-based modeling

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### ABSTRACT

Sea level rise (SLR) threatens coastal wetlands worldwide, yet the fate of individual wetlands will vary based on local topography, wetland morphology, sediment dynamics, hydrologic processes, and plant-mediated feedbacks. Local variability in these factors makes it difficult to predict SLR effects across wetlands or to develop a holistic regional perspective on SLR response for a diversity of wetland types. To improve regional predictions of SLR impacts to coastal wetlands, we developed a model that addresses the scale-dependent factors controlling SLR response and accommodates different levels of data availability. The model quantifies SLR-driven habitat conversion within wetlands across a region by predicting changes in individual wetland hypsometry. This standardized approach can be applied to all wetlands in a region regardless of data availability, making it ideal for modeling SLR response across a range of scales. Our model was applied to 105 wetlands in southern California that spanned a broad range of typology and data availability. Our findings suggest that if wetlands are confined to their current extents, the region will lose 12% of marsh habitats (vegetated marsh and un-vegetated flats) with 0.6 m of SLR (projected for 2050) and 48% with 1.7 m of SLR (projected for 2100). Habitat conversion was more drastic in wetlands with larger proportions of marsh habitats relative to subtidal habitats and occurred more rapidly in small lagoons relative to larger sites. Our assessment can inform management of coastal wetland vulnerability, improve understanding of the SLR drivers relevant to individual wetlands, and highlight significant data gaps that impede SLR response modeling across spatial scales. This approach augments regional SLR assessments by considering spatial variability in SLR response drivers, addressing data gaps, and accommodating wetland diversity, which will provide greater insights into regional SLR response that are relevant to coastal management and restoration efforts.

### Full Text:

[http://ftp.sccwrp.org/pub/download/DOCUMENTS/JournalArticles/1056\\_CoastalWetlandResiliencySLR\\_Hypsometry.pdf](http://ftp.sccwrp.org/pub/download/DOCUMENTS/JournalArticles/1056_CoastalWetlandResiliencySLR_Hypsometry.pdf)