3. Project summary

EESLR 2015: Refining ecosystem model inputs for sea-level rise vulnerability in the San Francisco Bay Estuary. Dugger, Thorne, and Janousek; OSU and USGS; Total cost = $450,050

Sea-level rise (SLR) will alter the physical gradients in coastal salt marshes that help determine the structure and function of biological communities. Modeling the responses of these ecosystems to SLR is critical for informed future management of coastal resources. Previous modeling efforts in the San Francisco Bay estuary have successfully incorporated many of the physical and biological processes inherent in determining coastal wetland responses to elevated sea-level. However, local parameterization of such models is needed to accurately project likely outcomes of specific SLR scenarios and deliver actionable results to resource managers. In this proposal, we describe a research effort that builds on a strong foundation of existing data in the San Francisco Bay estuary by developing new targeted data collection to meet the following objectives: (1) development of improved estuary-wide LiDAR-derived data sets using remotely-sensed and on-the-ground vegetation and RTK GPS data, (2) assess the productivity and decomposition responses of major tidal marsh plant species to gradients in elevation and salinity in the San Francisco Bay estuary to improve productivity and decomposition functional relationships in SLR models, and (3) assess spatial and temporal patterns in sediment deposition as it relates to local plant species composition, season, storms and tidal elevation to improve parameterization of marsh SLR models. These objectives were highlighted as information needs by a stakeholder workshop held in September 2014. These objectives meet the science needs of the NOAA CSCOR EESLR program by developing and synthesizing local SLR modeling, and evaluating susceptibility of critical habitats to SLR. Our proposal focuses on two explicit EESLR research priorities: (i) improving predictive model parameterization, and (ii) inter-model comparison to evaluate model capabilities and uncertainties. Our research efforts will provide locally-relevant management tools such as vegetation-corrected digital elevation models (DEMs) and an improved models for San Francisco Bay estuary that can also be transferred to other tidal wetland sites nationally. Our research will also improve local understanding of marsh vegetation structure and sediment dynamics to assist in marsh restoration and augmentation decision making. Stakeholder engagement will culminate in a manager based workshop that will provide a forum for delivery of science results and collaboration with research managers to assess local and regional vulnerability of tidal wetland habitats to SLR, and in revised WARMER modeling results for selected salt marsh sites in the San Francisco Bay estuary.