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Climate-related variation in plant peak biomass and growth phenology across Pacific Northwest tidal marshes

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1 CLIMATE-RELATED VARIATION IN PLANT PEAK BIOMASS AND  
2 GROWTH PHENOLOGY ACROSS PACIFIC NORTHWEST TIDAL  
3 MARSHES  
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13 **ABSTRACT**

14 The interannual variability of tidal marsh plant phenology is largely unknown and may have  
15 important ecological consequences. Marsh plants are critical to the biogeomorphic feedback  
16 processes that build estuarine soils, maintain marsh elevation relative to sea level, and sequester  
17 carbon. We calculated Tasseled Cap Greenness, a metric of plant biomass, using remotely sensed  
18 data available in the Landsat archive to assess how recent climate variation has affected biomass  
19 production and plant phenology across three maritime tidal marshes in the Pacific Northwest of  
20 the United States. First, we used clipped vegetation plots at one of our sites to confirm that  
21 tasseled cap greenness provided a useful measure of aboveground biomass ( $r^2 = 0.72$ ). We then  
22 used multiple measures of biomass each growing season over 20-25 years per study site and  
23 developed models to test how peak biomass and the date of peak biomass varied with 94 climate  
24 and sea-level metrics using generalized linear models and Akaike Information Criterion (AIC)  
25 model selection. Peak biomass was positively related to total annual precipitation, while the best  
26 predictor for date of peak biomass was average growing season temperature, with the peak 7.2

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