Mapping bathymetric change in Alviso Slough as salt pond restoration projects progress

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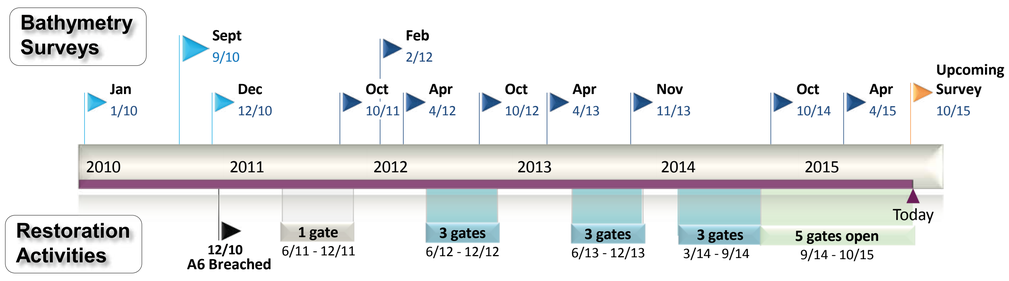
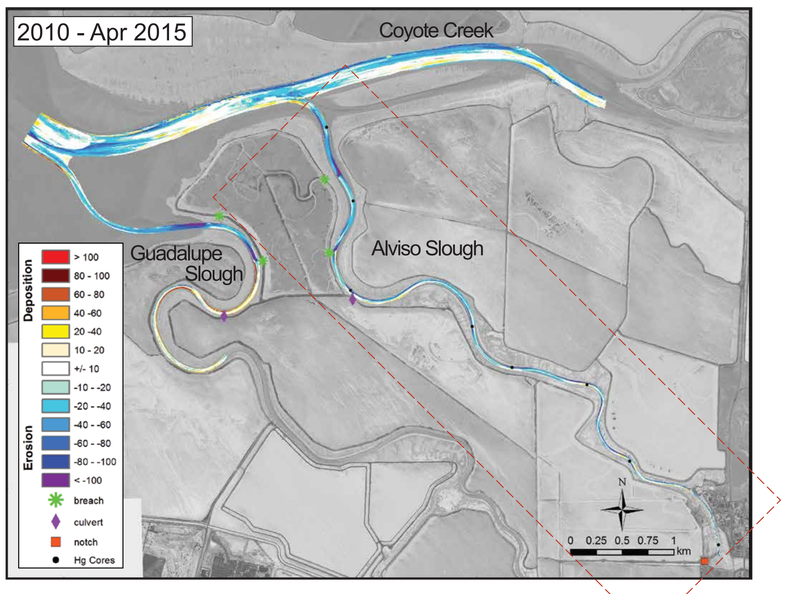
Introduction

In 2010 the USGS collected bathymetry of the far South Bay in the vicinity of the Alviso pond complex to establish baseline bathymetry prior to the breaching of Pond A6 levees and opening of gates at Pond A8 (Foxgrover et al., 2011). Interferometric sidescan swath mapping was used to generate high resolution (1 m cell size) bathymetric grids of the far South Bay extending east of Calaveras Point and into Alviso and Guadalupe Sloughs. Between October 2011 and April 2015 an additional eight surveys were conducted to monitor bathymetric change in this region as restoration progresses.



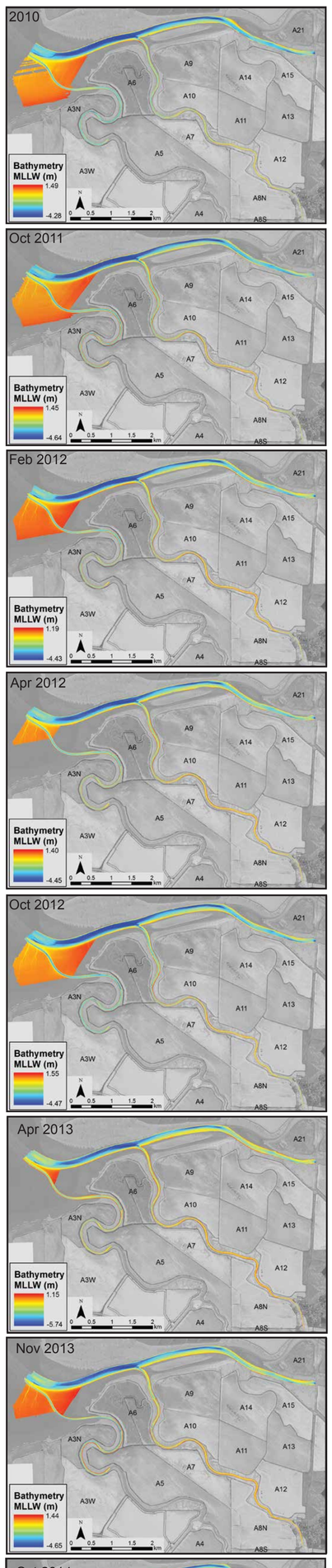
Bathymetric Change



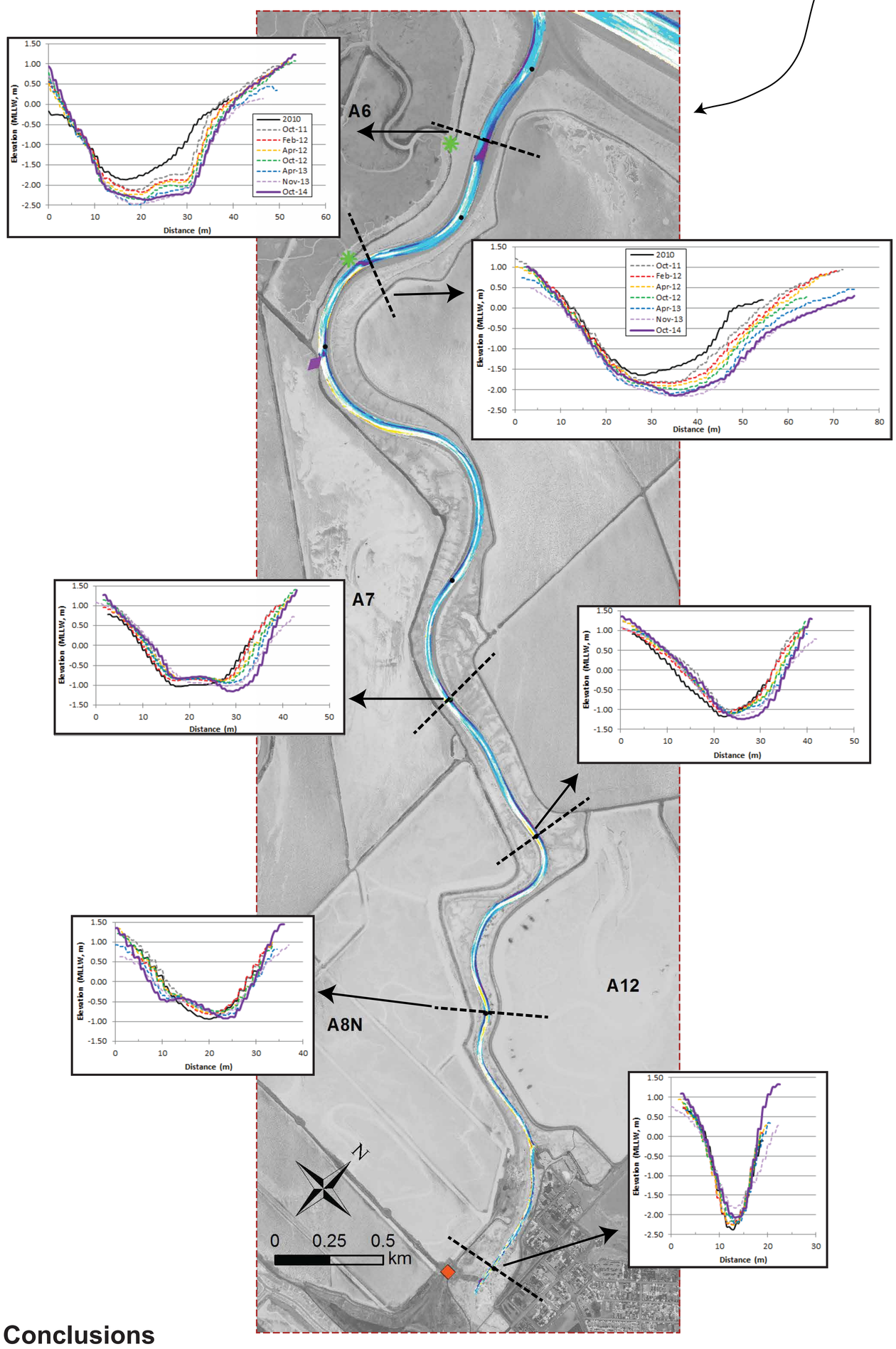

collecting swath bathymetry in Alviso Slough


A6 breach at high tide

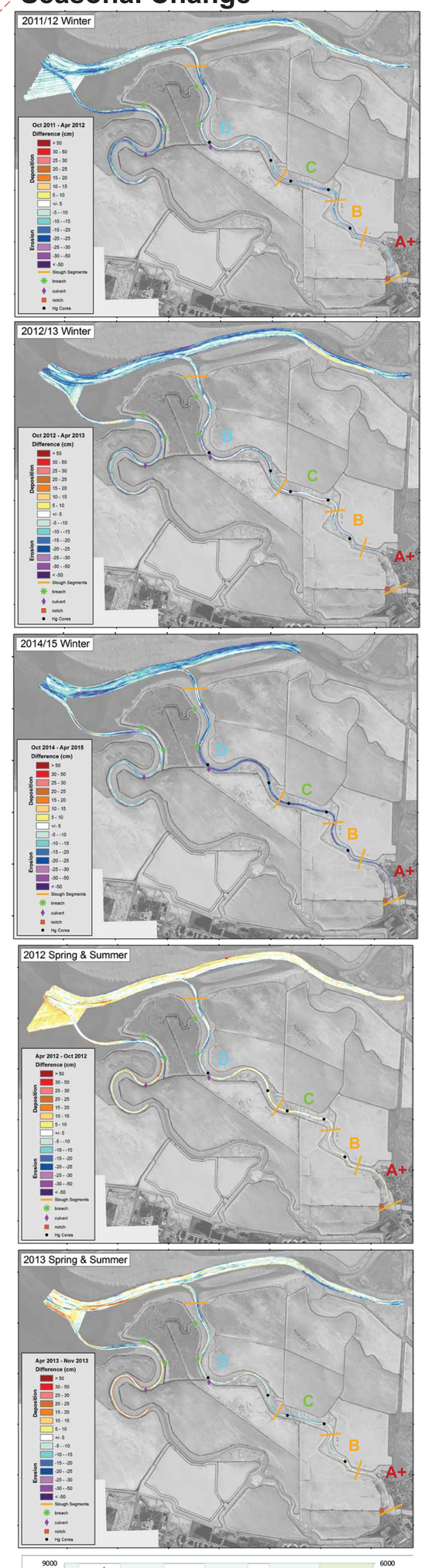
Bathymetry Surveys



Alviso Slough Cross-Sectional Profiles

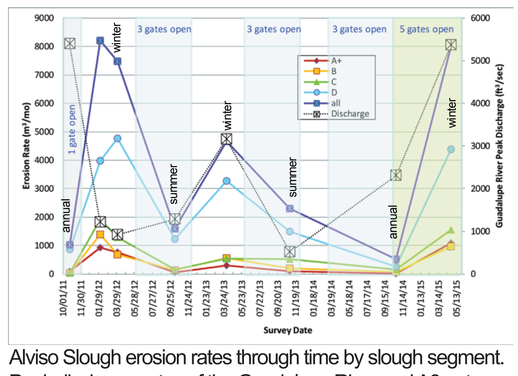


Seasonal Change



Conclusions

Thus far, the greatest amount of erosion has occurred within Alviso and Guadalupe Sloughs in the vicinity of the A6 breaches. From 2010 to 2015 the nearby intertidal mudflats have either maintained their elevation or even been slightly depositional. Although patterns of deposition and erosion vary along the distance of the slough and also thru time, there has been a dominant pattern of erosion in the winter and either no change or slight deposition with only localized areas of erosion during spring and summer months. Our measurements of scour within Alviso Slough, in combination with analyses of sediment cores by Marvin-DiPasquale and Cox (2007) enable a quantification of legacy mercury remobilized within the slough since 2010 (see poster by Fregoso et al., 2015), and provide critical insight into morphological evolution of slough/intertidal mudflat/bay systems as levees are breached and the tidal prism increased.



Alviso Slough erosion rates through time by slough segment. Peak discharge rates of the Guadalupe River and A8 gate operations are overlain for reference.

References

Foxgrover, A.C., Finlayson, D.P., Jaffe, B.E., and Fregoso, T.A., 2011, Bathymetry and Digital Elevation Models of Coyote Creek and Alviso Slough, South San Francisco Bay, California (ver. 3, Sept, 2015): U.S. Geological Survey Open-File Report 2011-1315, 23 p., http://pubs.usgs.gov/of/2011/1315/.

Marvin-DiPasquale, M., Cox, M.H., 2007, Legacy Mercury in Alviso Slough, South San Francisco Bay, California: Concentration, Speciation and Mobility: Menlo Park, CA , U.S. Geological Survey, Open-File Report number 2007-1240, 98p.