

Restoration with Accelerated Sea Level Rise- Sediment Limited?

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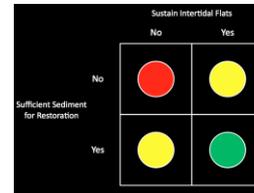
Restoration with Accelerated Sea Level Rise- Sediment Limited?

Main Points

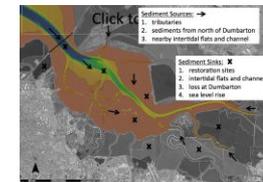
- 1) In the recent past, the far South Bay was a sediment magnet. However, for high rates of sea level rise successful restoration will require sediment volumes that approach or exceed historical levels
- 2) Restoration at A6 is causing local scour in sloughs; intertidal mudflats are gaining sediment
- 3) Key unknowns for predicting restoration success during high rates of sea level rise are future exchange of sediment at Dumbarton and in-Bay scavenging as sediment sources

Outline

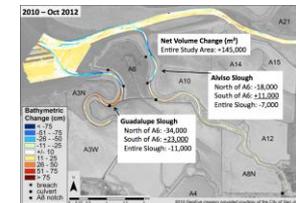
- Conceptual model



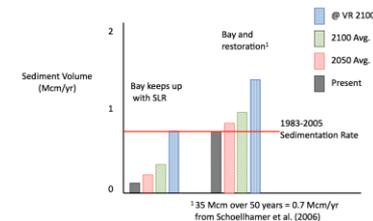
- Sediment budget framework



- Alviso slough initial response to breaching levees at A6



- Sediment demand from sea level rise



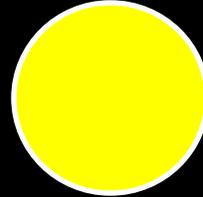
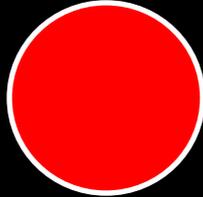
- Summary and conclusions

Do No Harm

No

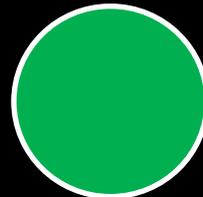
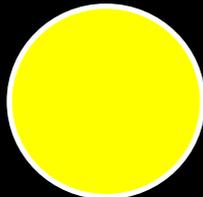
Yes

No



Restoration
Successful

Yes

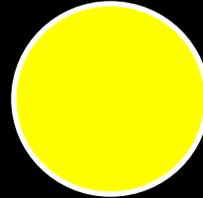
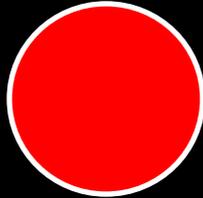


Sustain Intertidal Flats

No

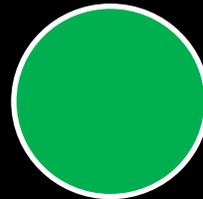
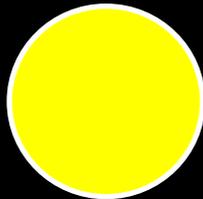
Yes

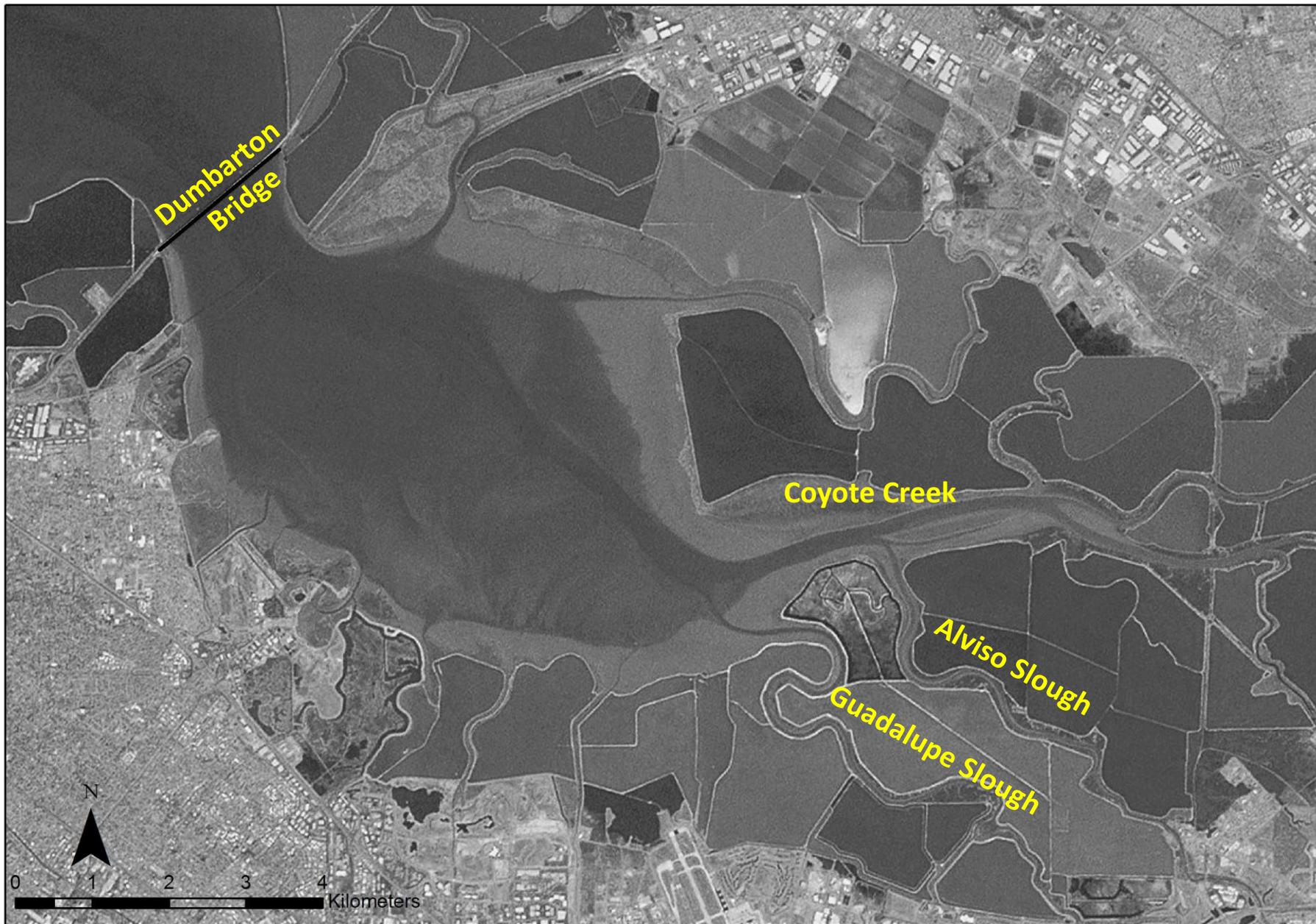
No



Sufficient
Sediment for
Restoration

Yes





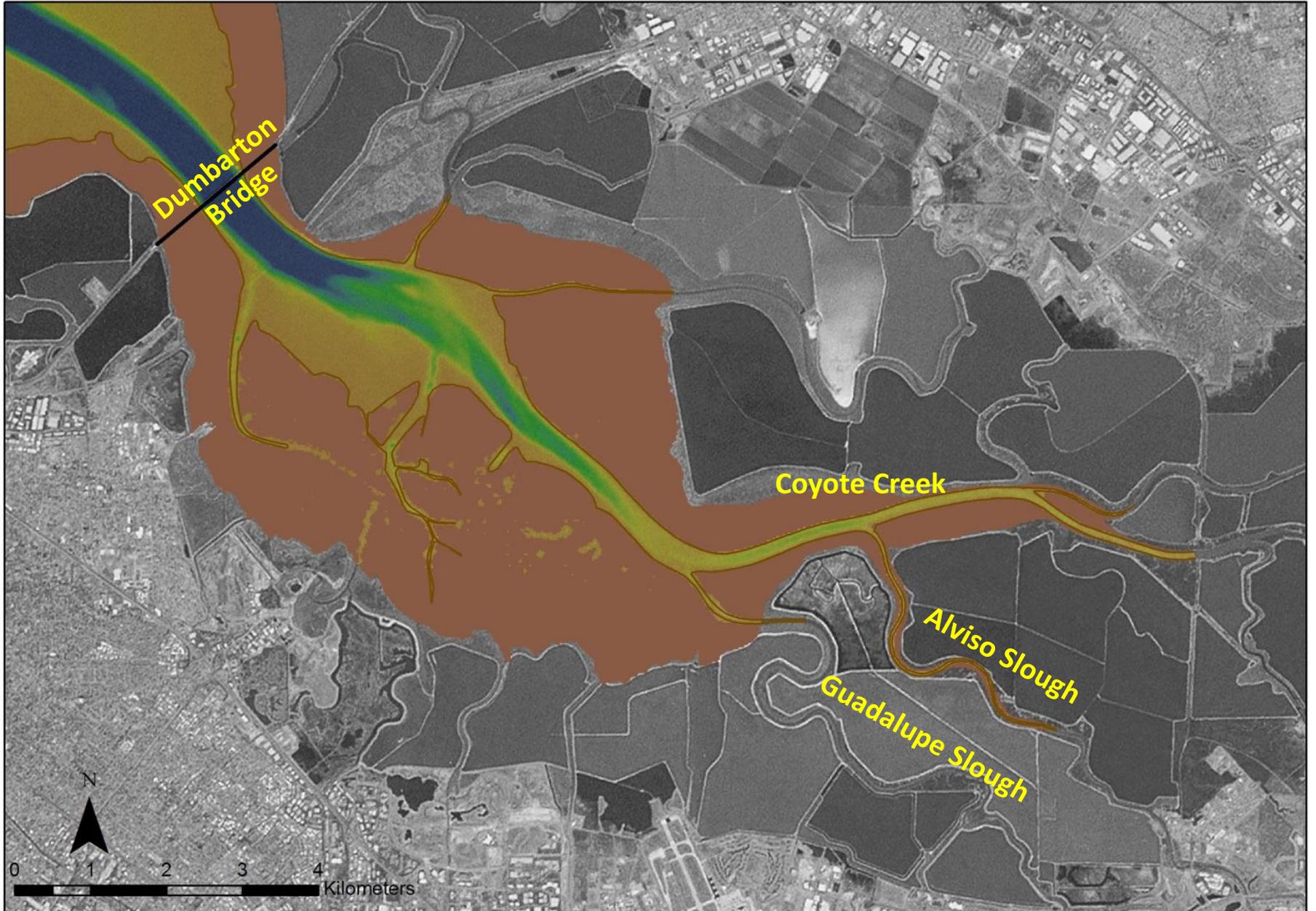
Dumbarton
Bridge

Coyote Creek

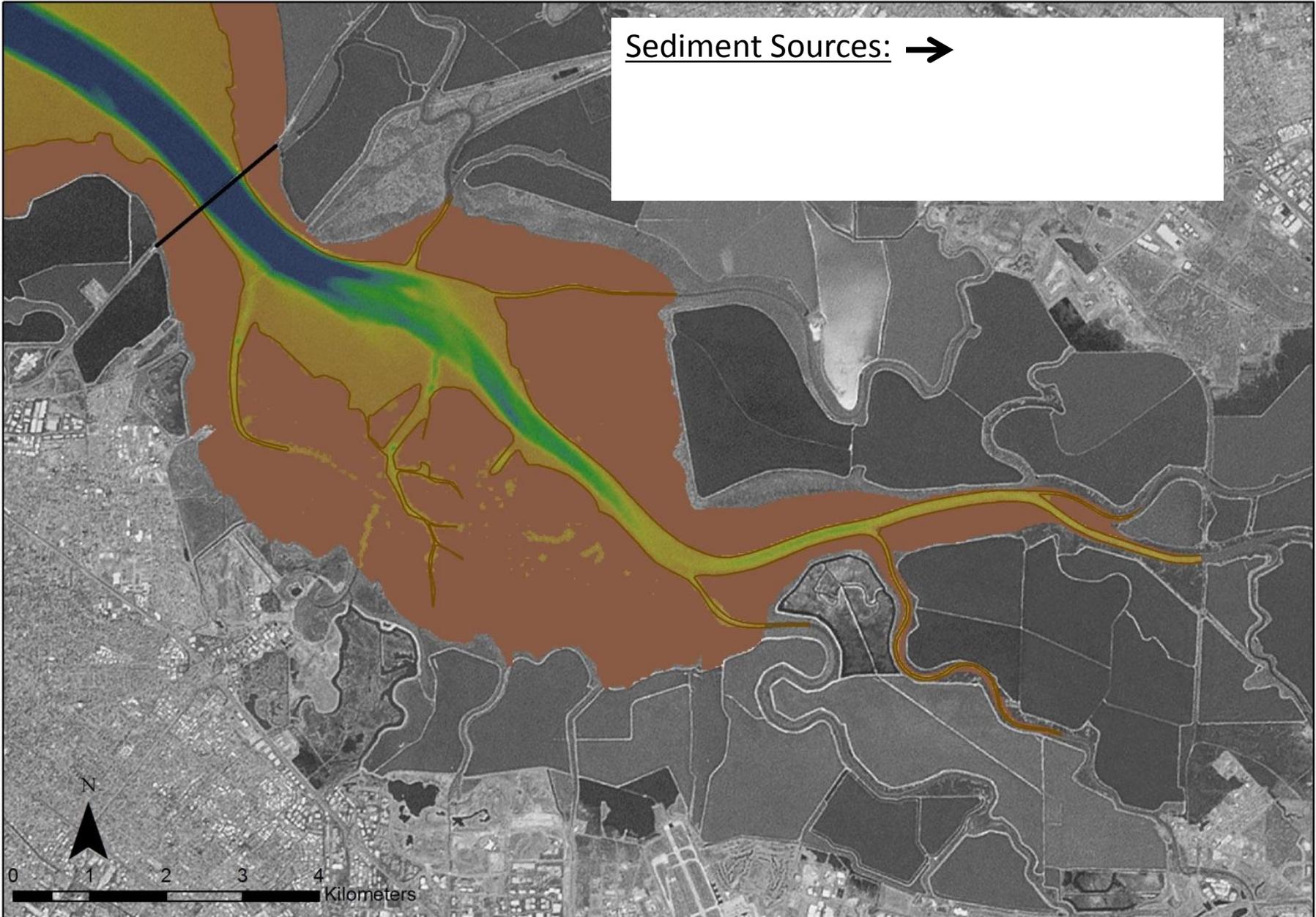
Alviso Slough

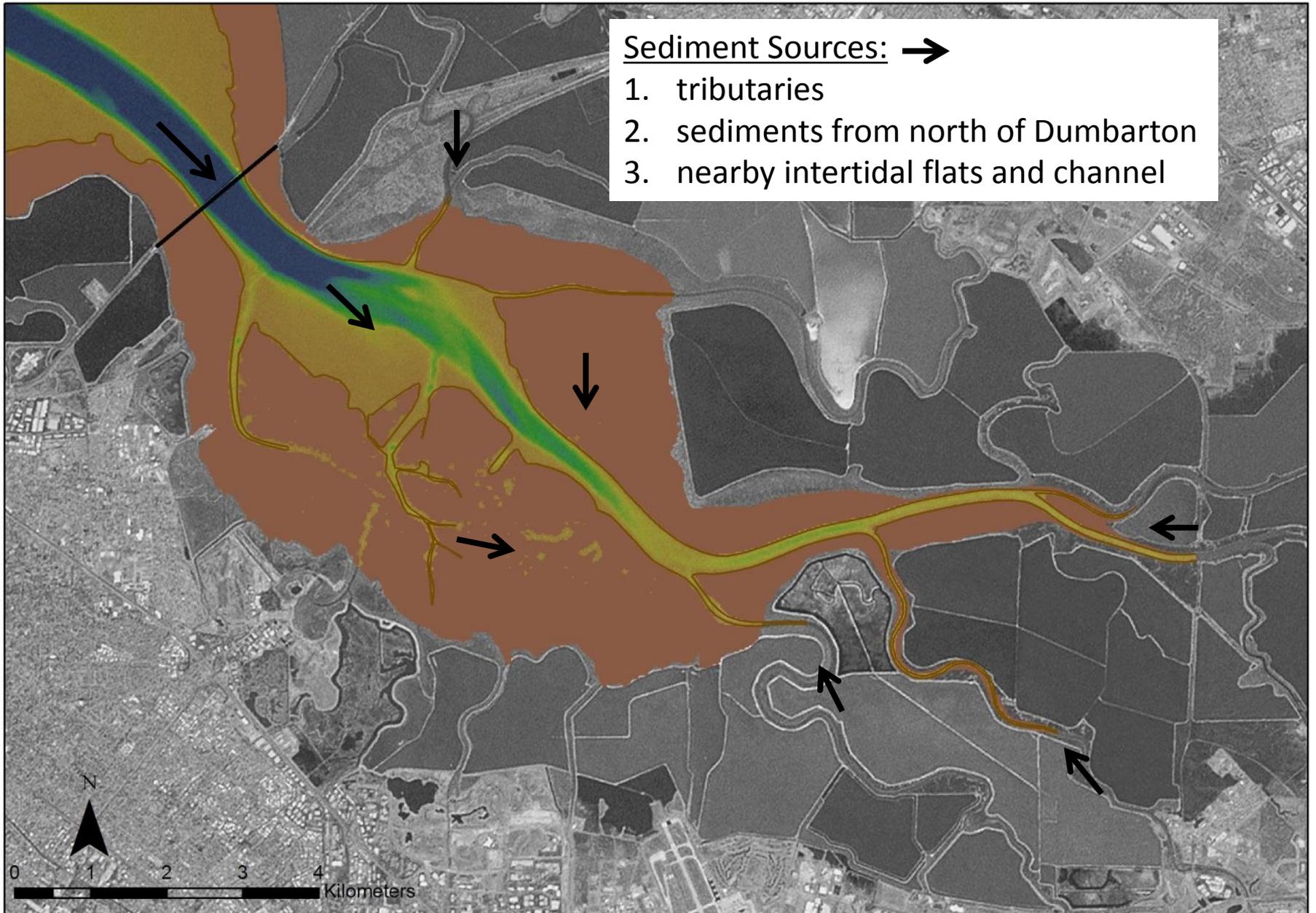
Guadalupe Slough

0 1 2 3 4 Kilometers

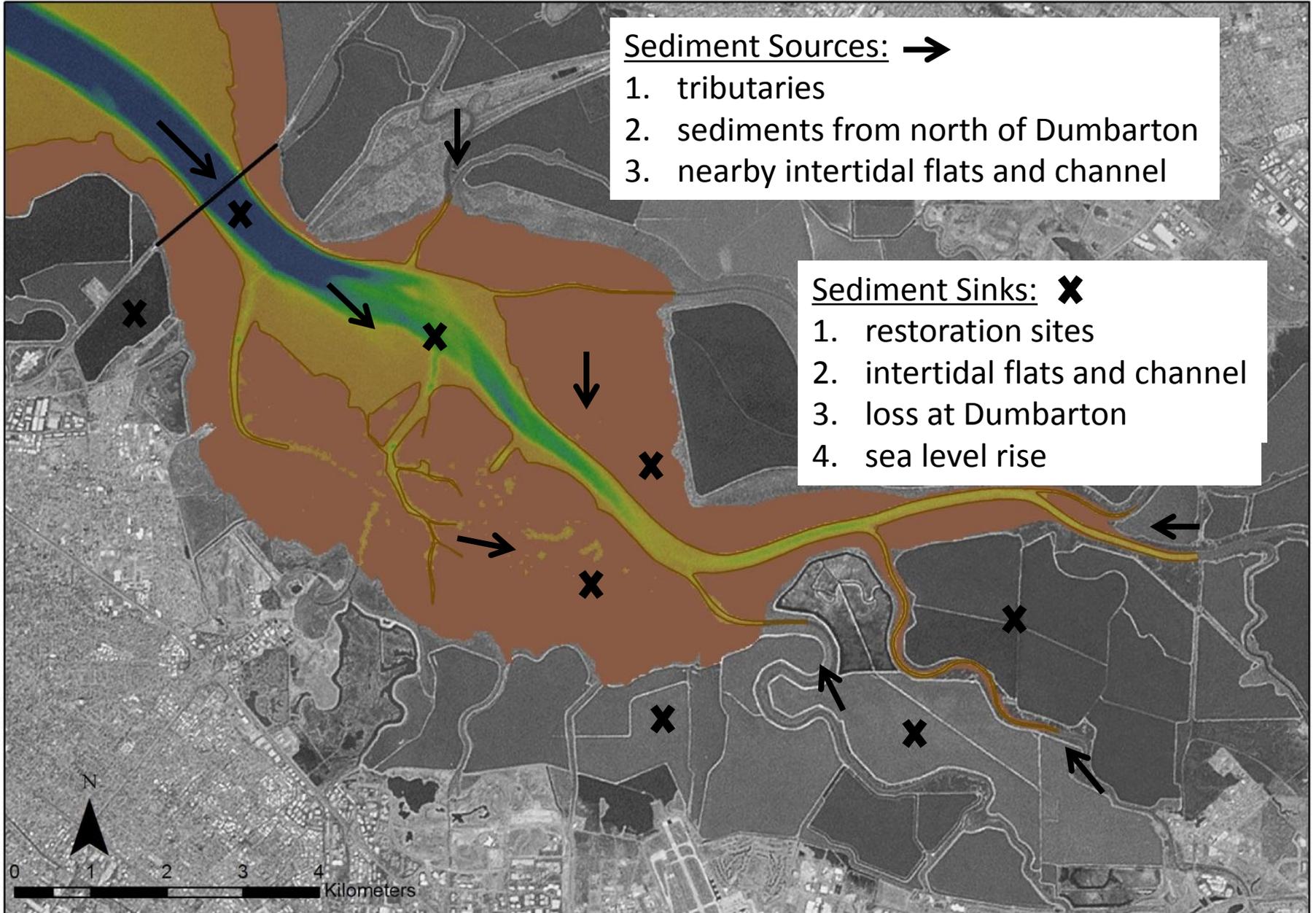


Sediment Sources: →

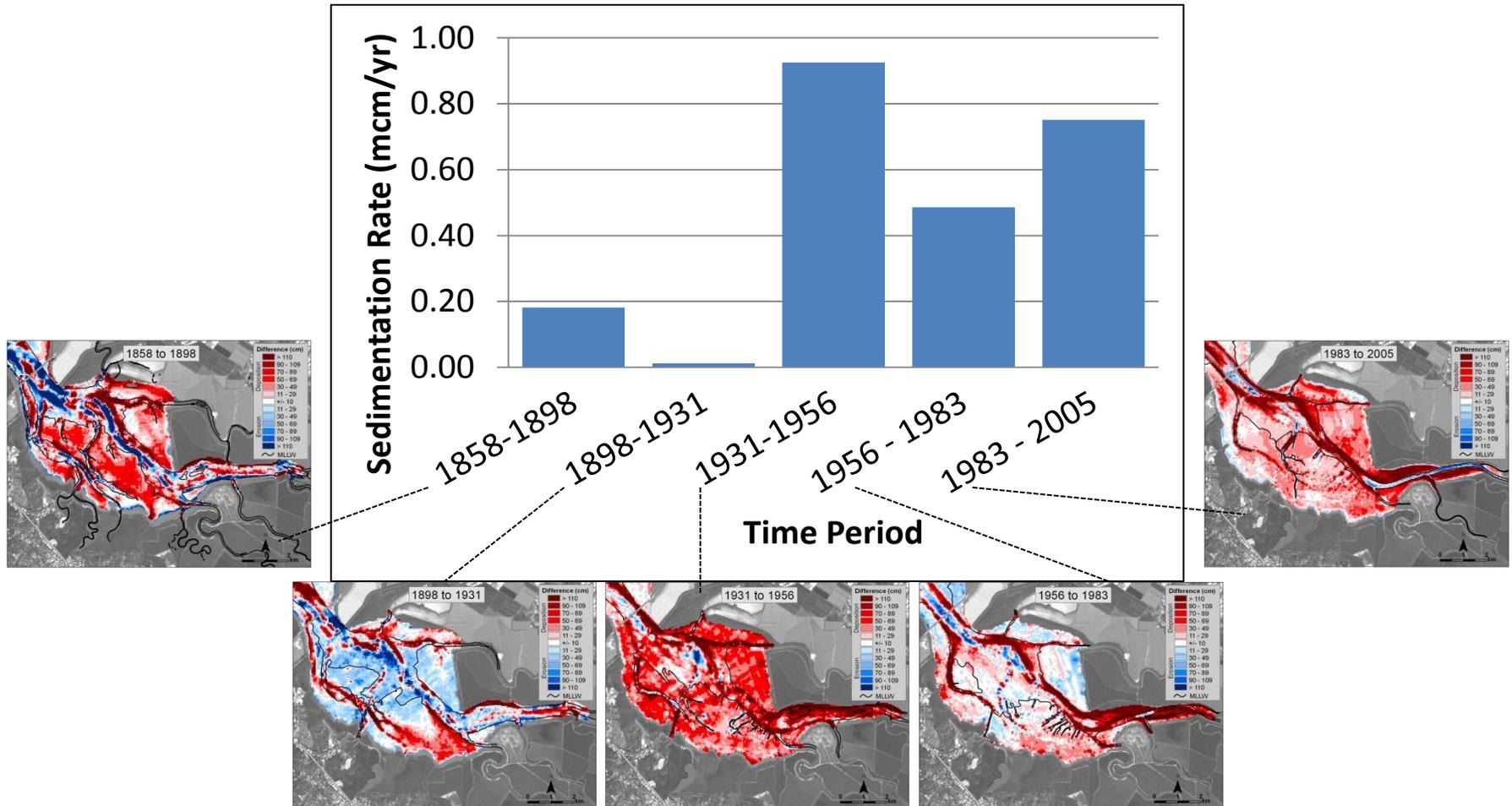




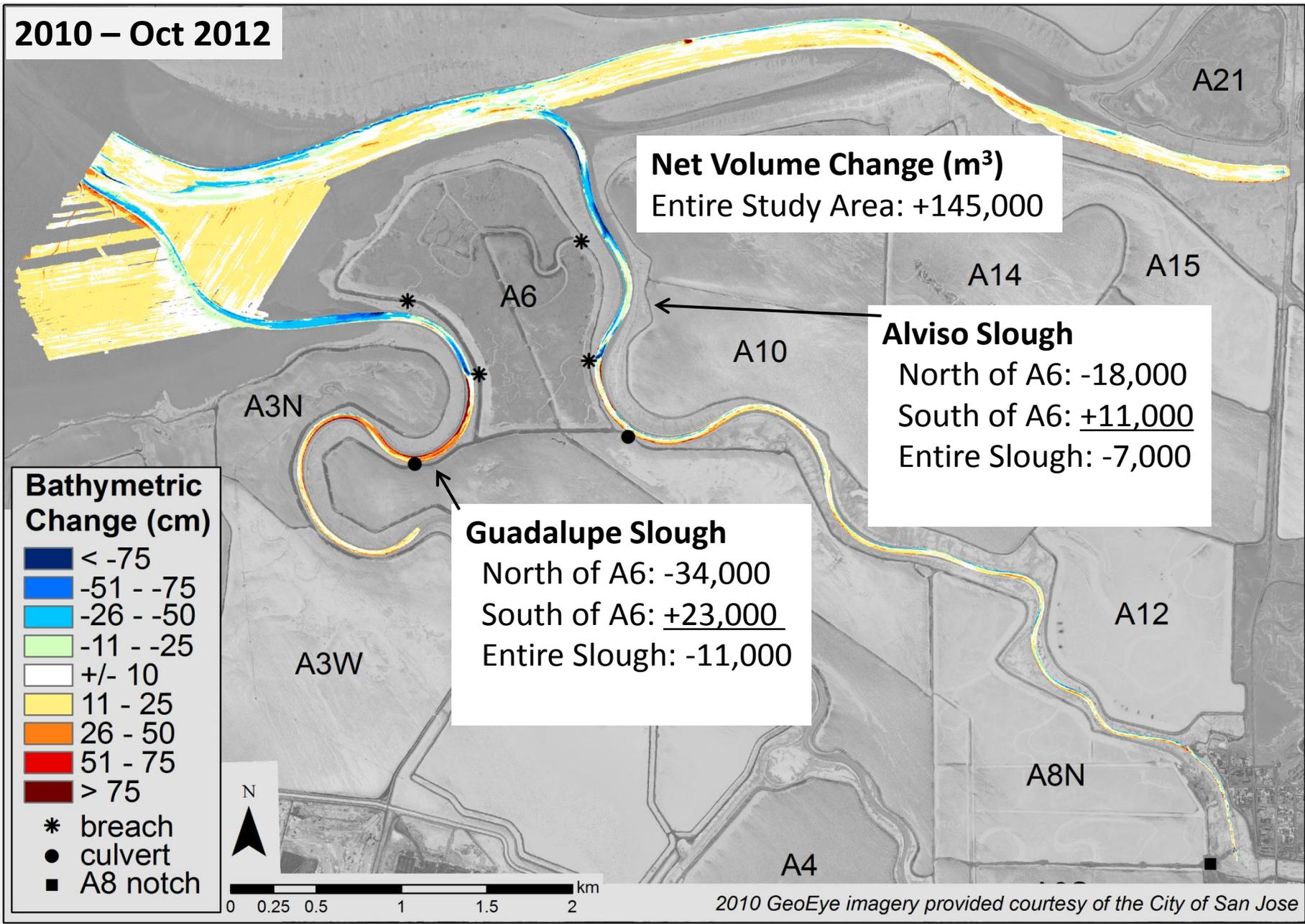
see Shellenbarger et al., in press



Historical Sedimentation



2010 – Oct 2012



Net Volume Change (m³)
Entire Study Area: +145,000

Alviso Slough
North of A6: -18,000
South of A6: +11,000
Entire Slough: -7,000

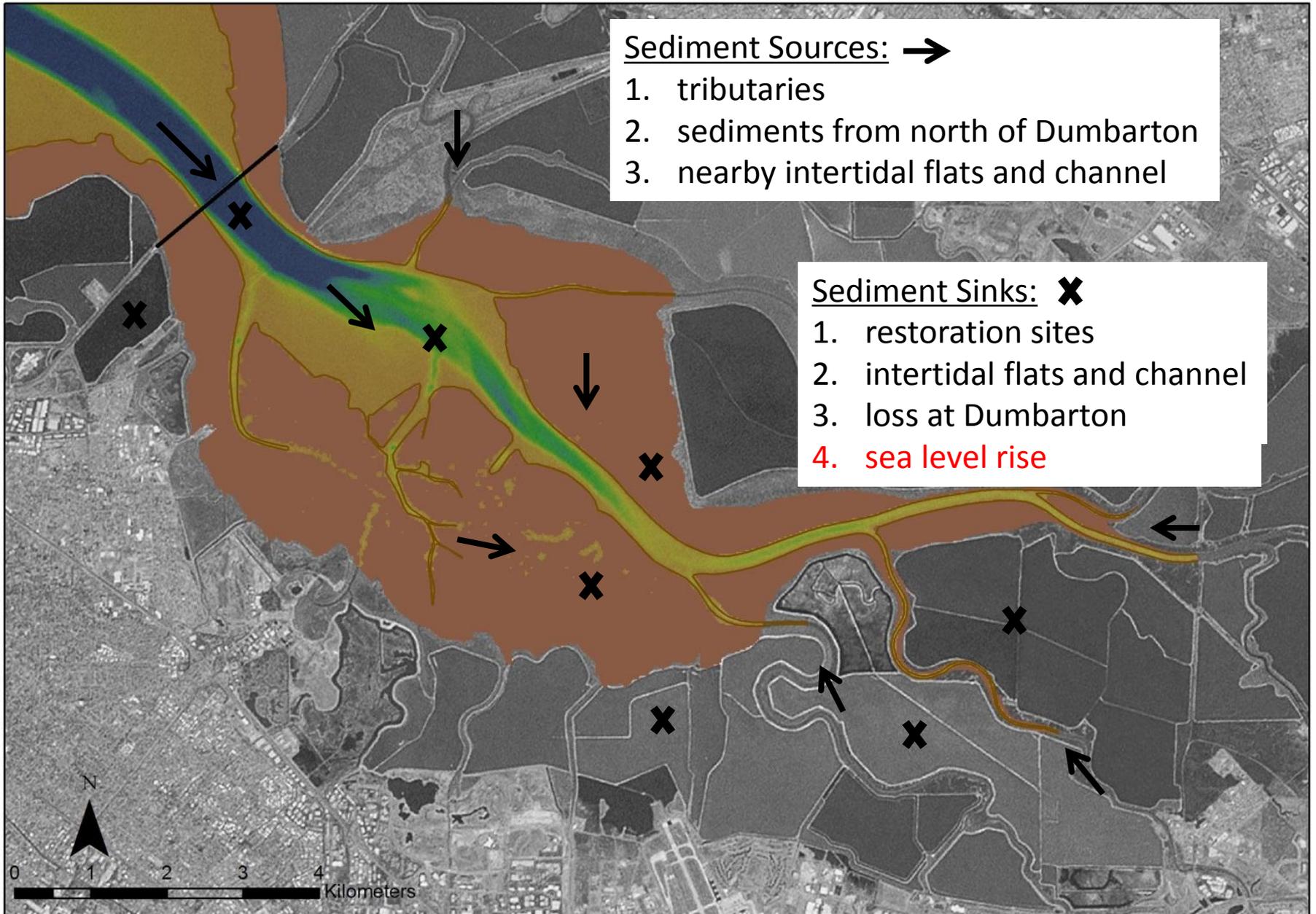
Guadalupe Slough
North of A6: -34,000
South of A6: +23,000
Entire Slough: -11,000

Bathymetric Change (cm)

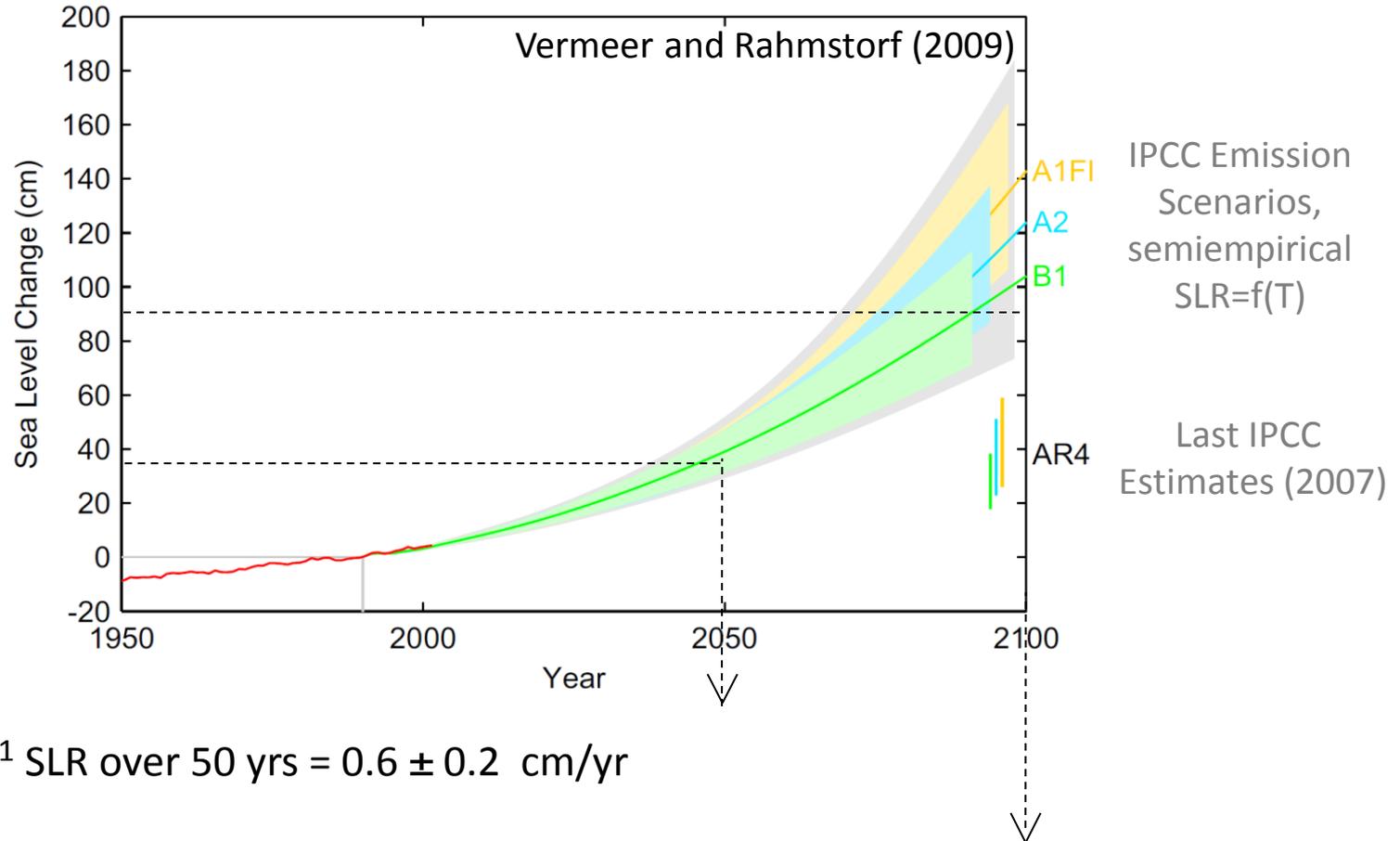
- < -75
- 51 - -75
- 26 - -50
- 11 - -25
- +/- 10
- 11 - 25
- 26 - 50
- 51 - 75
- > 75

- * breach
- culvert
- A8 notch



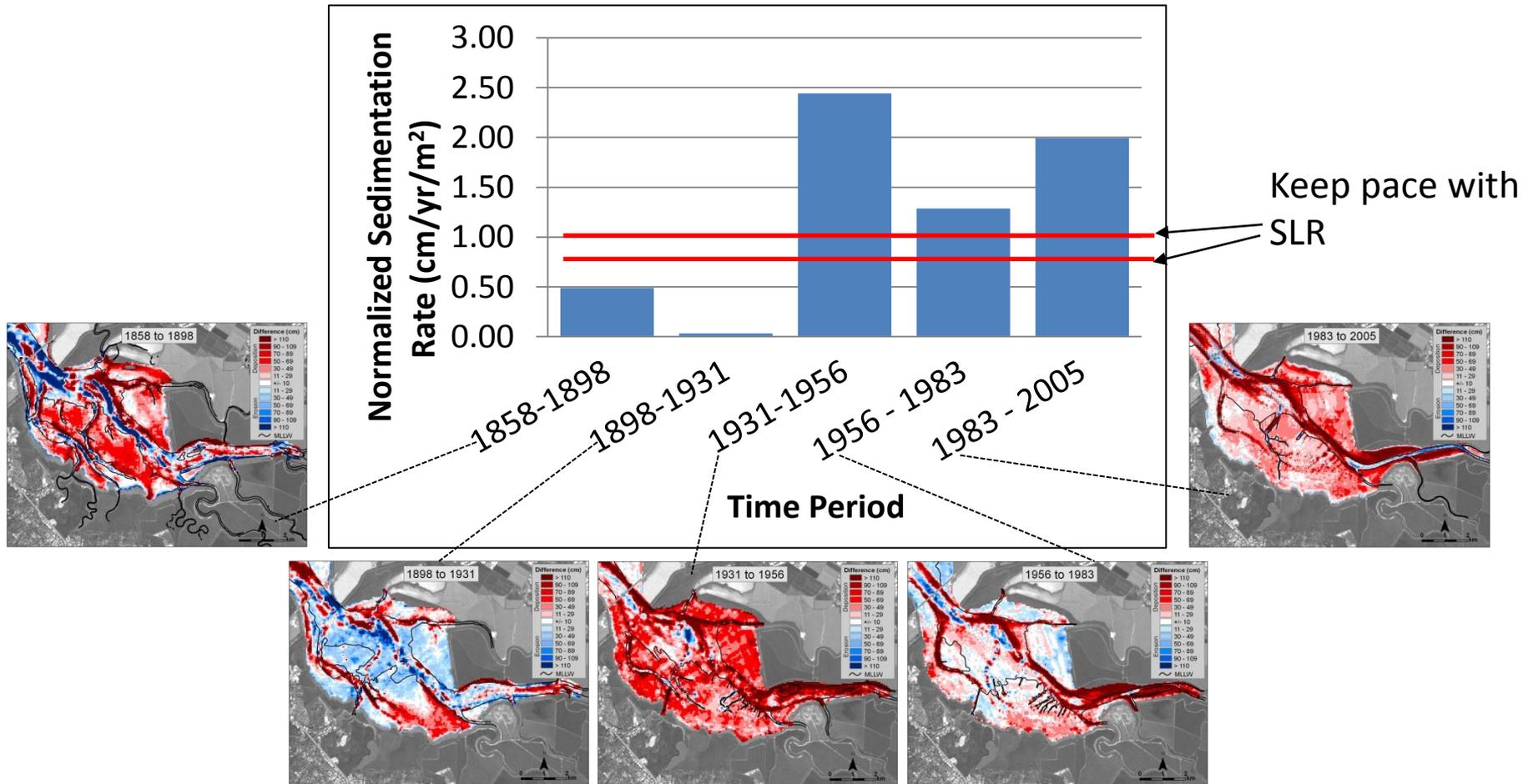


Sea Level Rise (SLR) Scenarios

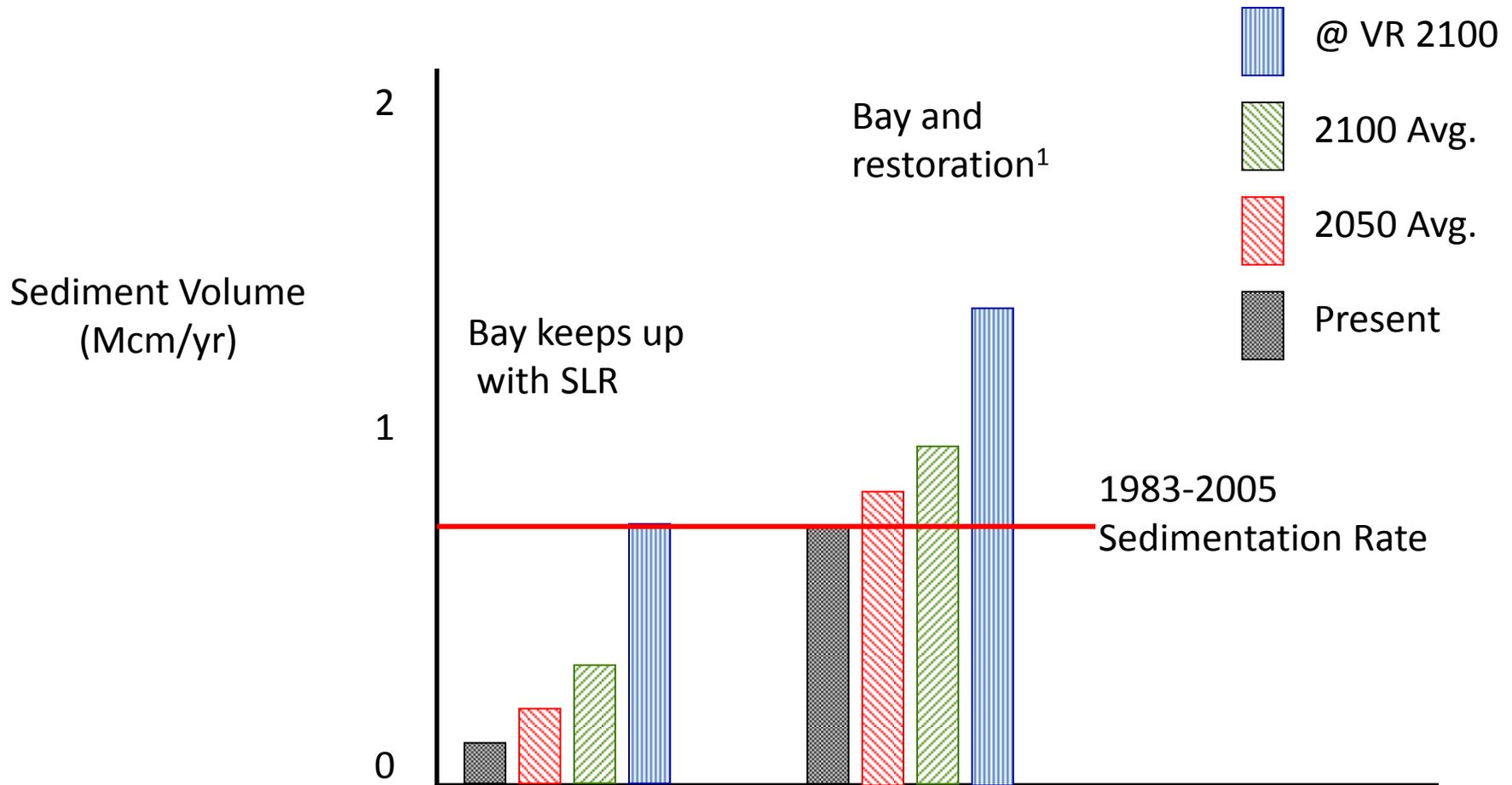


¹ estimates from NRC, "Sea-Level Rise for the Coasts of California, Oregon, and Washington" (2012)

Historical sedimentation and SLR



Bay and restoration sediment “demand” from SLR (food for thought)



¹ 35 Mcm over 50 years = 0.7 Mcm/yr
from Schoellhamer et al. (2006)

Summary and Conclusions

- Sediment from the Bay north of Dumbarton Bridge was a significant source historically
- Restoration of A6 in the Alviso Pond Complex has resulted in localized scour in the sloughs; intertidal mudflats gained sediment
- Recent sedimentation in far South Bay > SLR for rates < ~2 cm/yr; will this continue? (A key unknown is exchange of sediment at Dumbarton Bridge.)
- Restoration sediment demand, in combination with very high SLR rates, will stress the system and may have adverse effects. Optimal restoration requires **monitoring, modeling** and **adaptive management**.