A photograph of a coastal wetland. In the foreground and middle ground, there are patches of tall, green and brown grasses growing out of shallow, greyish water. The water reflects the overcast sky. In the background, more grassy areas and a distant shoreline are visible under a heavy, grey sky.

Surviving Sea-Level Rise: What can be done to maintain viable coastal wetlands?

Denise J. Reed
University of New Orleans
AAAS February 2012

Bottom Line

- ***Is sea-level rise a threat to coastal marshes?***

Yes – but.... here may be other more important threats

- ***What will happen on the west coast?***

The news is better than in many other areas

- ***What can be done?***

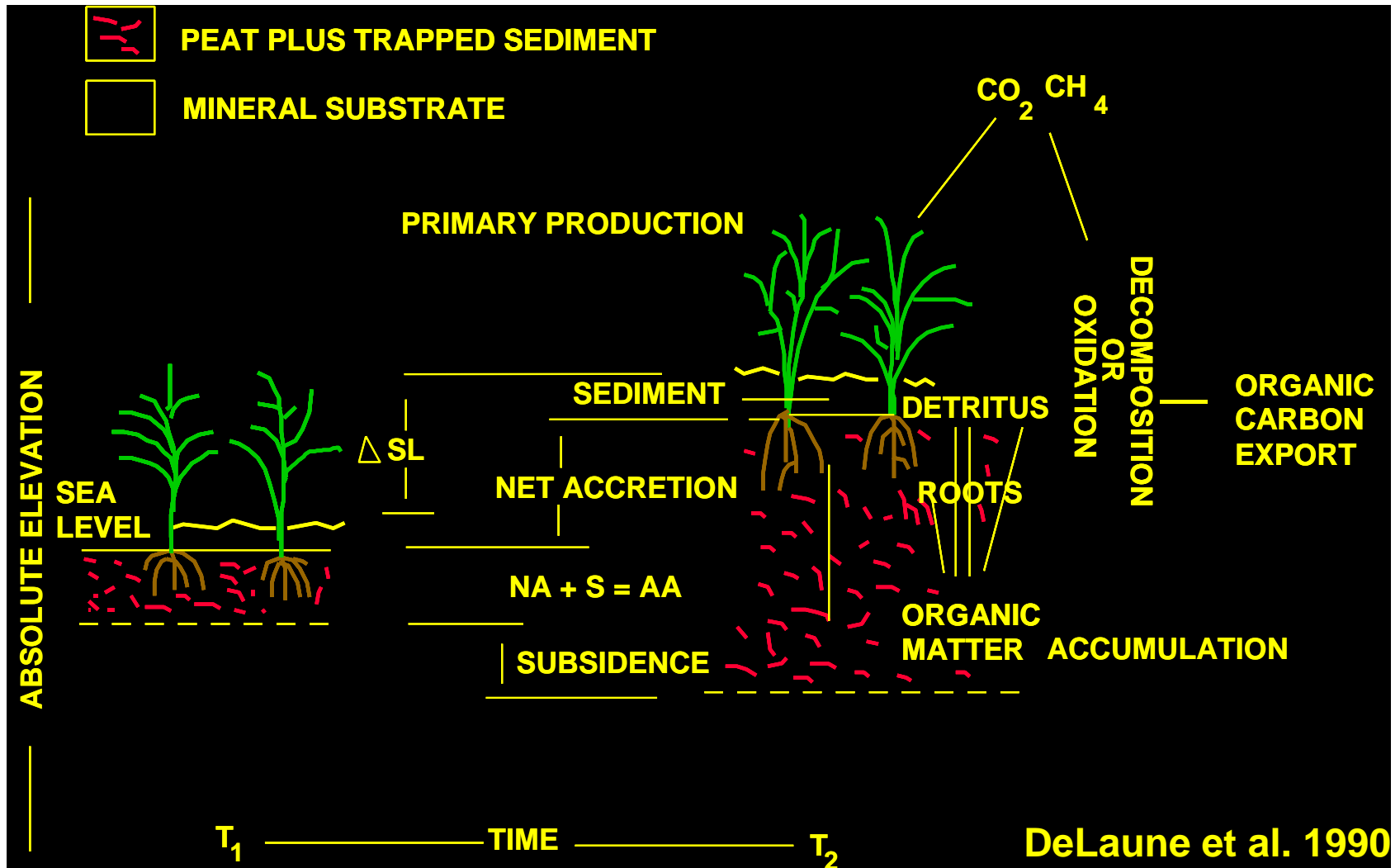
The best intervention may be no intervention.

NE Pacific Coastal Wetlands



Sea Level Rise

- Rates are more important than amounts

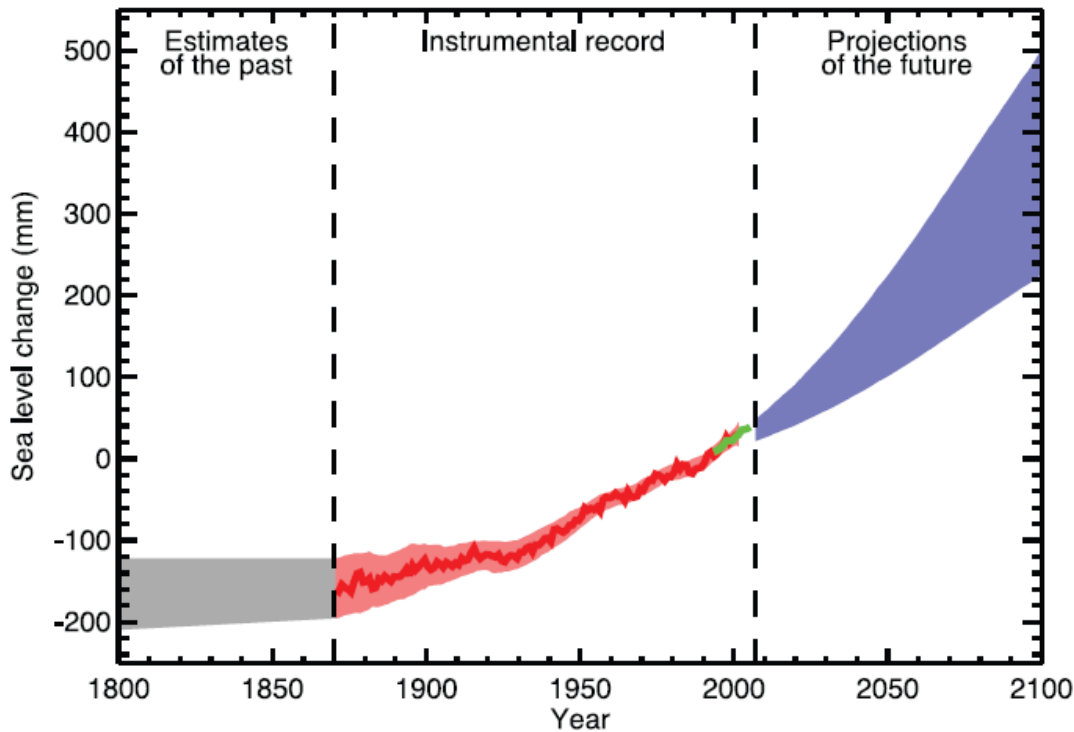


One of the number of threats



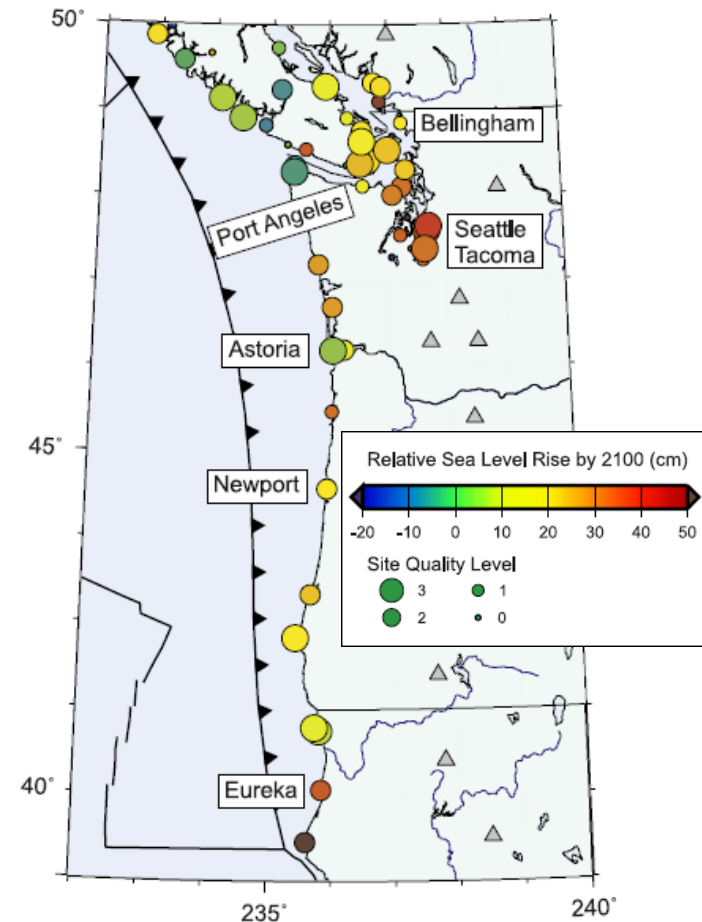
SLR and NE Pacific Marshes

- Not just the ocean....



IPCC, 2007

+



Mazzotti et al. (2008)

NATIONAL WILDLIFE FEDERATION

Sea-level Rise and Coastal Habitats in the Pacific Northwest

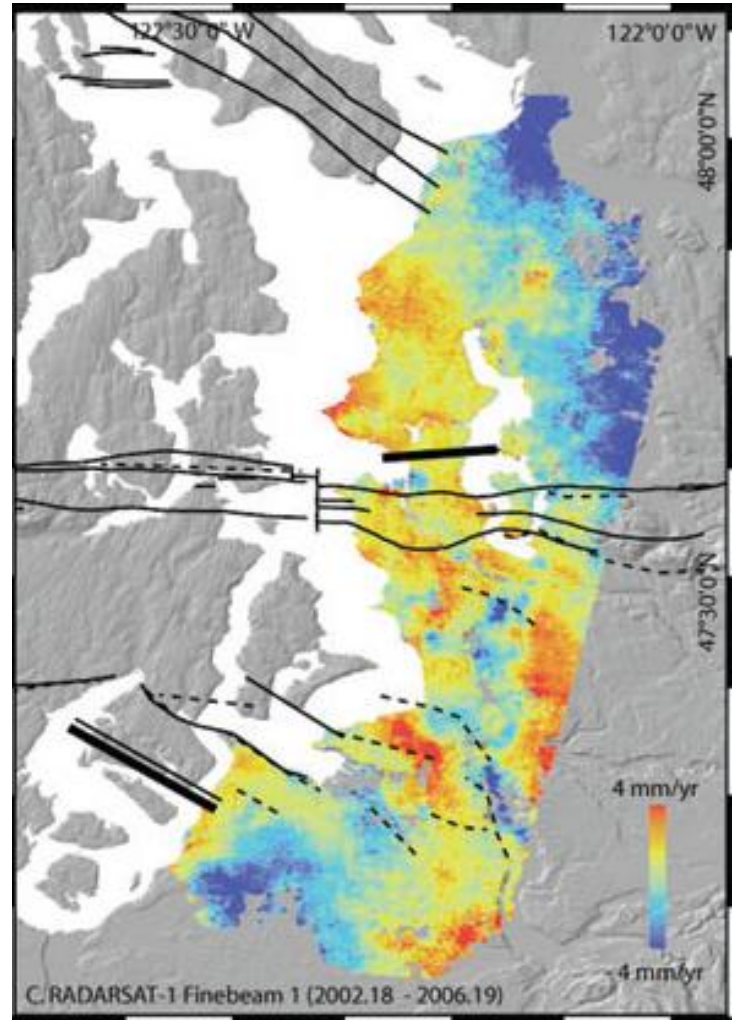
An Analysis for Puget Sound, Southwestern
Washington, and Northwestern Oregon



- Assumed marsh accretion rates of 3.6-3.75 mm yr⁻¹
- Predicted that salt marsh would expand, partly at the expense of more inland fresh marsh areas

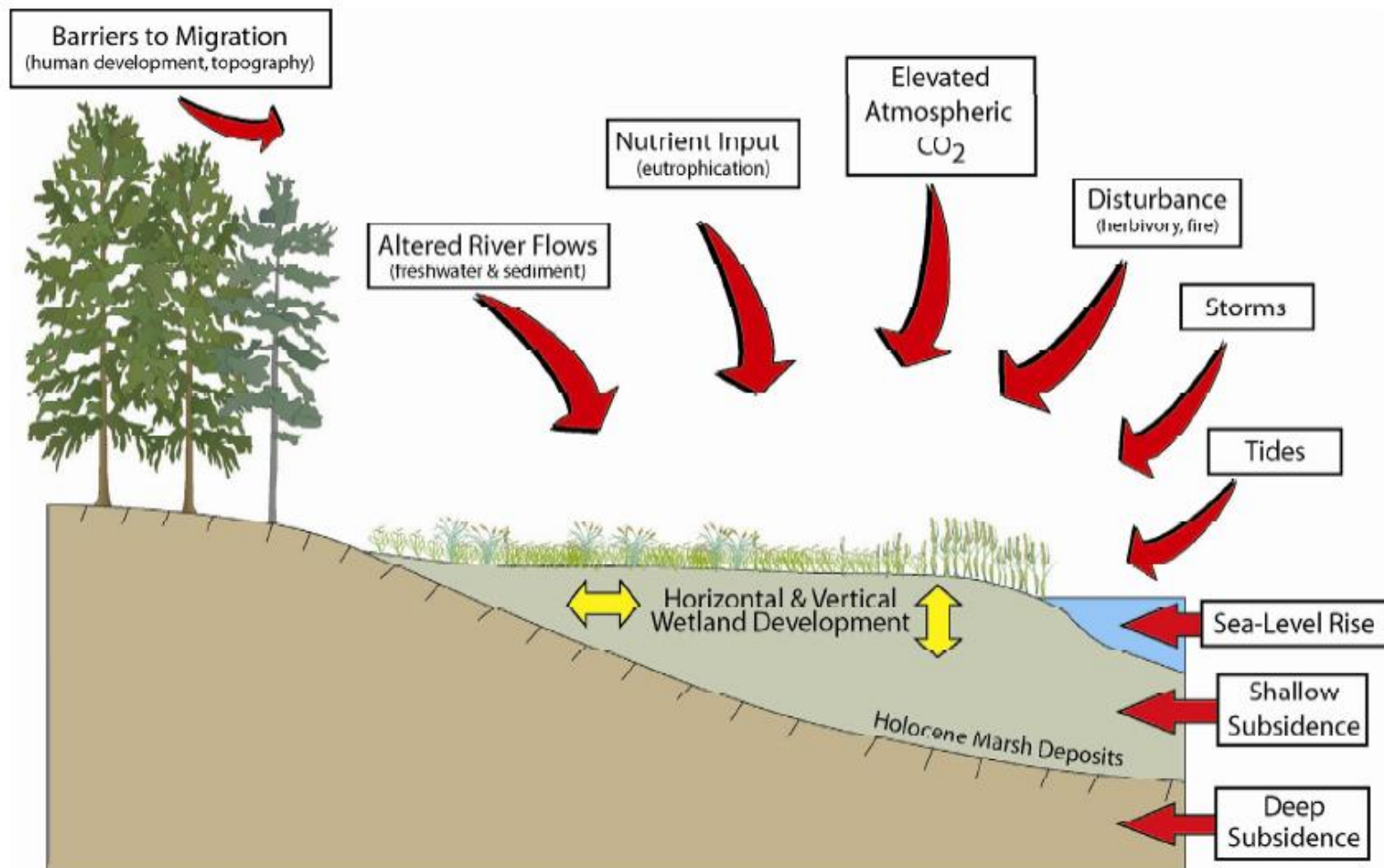
'Net Rates'

- IPCC SLR 4-7mm
- Vertical land motion?
- Finnegan InSAR study
- 2002-2006 rates →
- Current accretion rates maybe adequate?
- **Where** the marsh is makes a difference



Finnegan et al. 2008

What can be done?

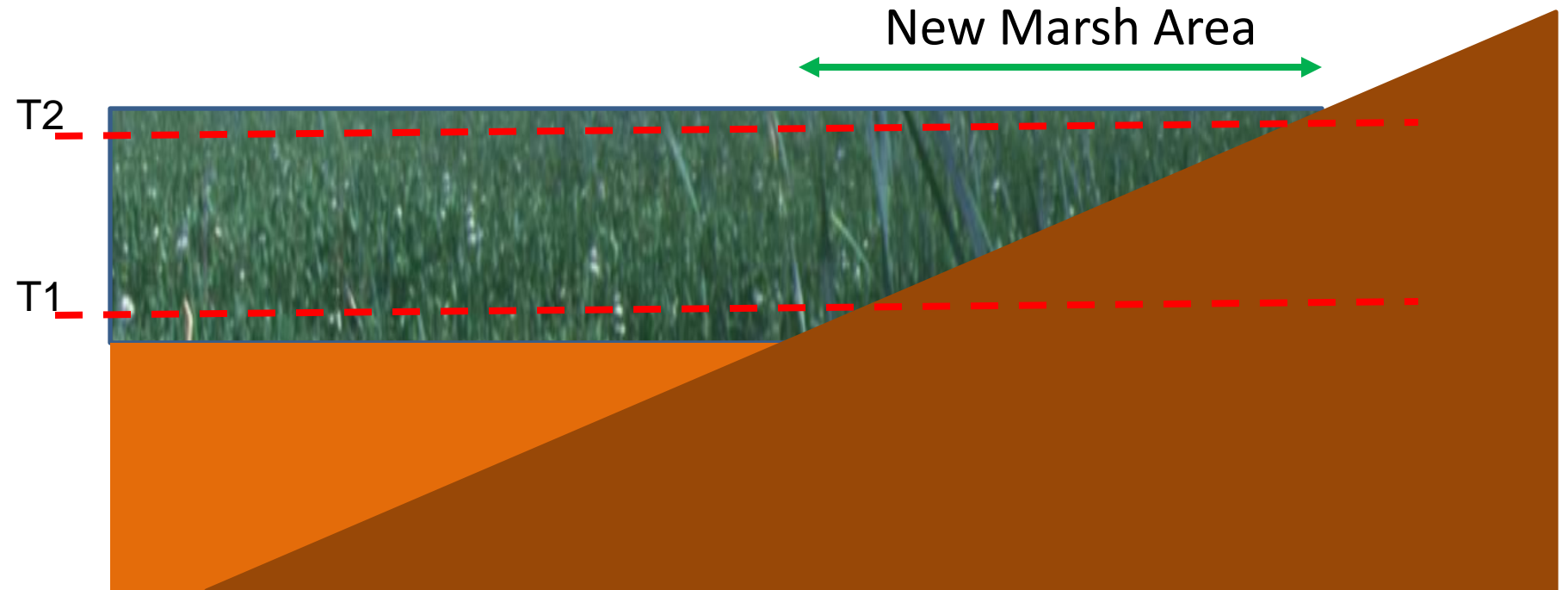


Vertical vs Horizontal

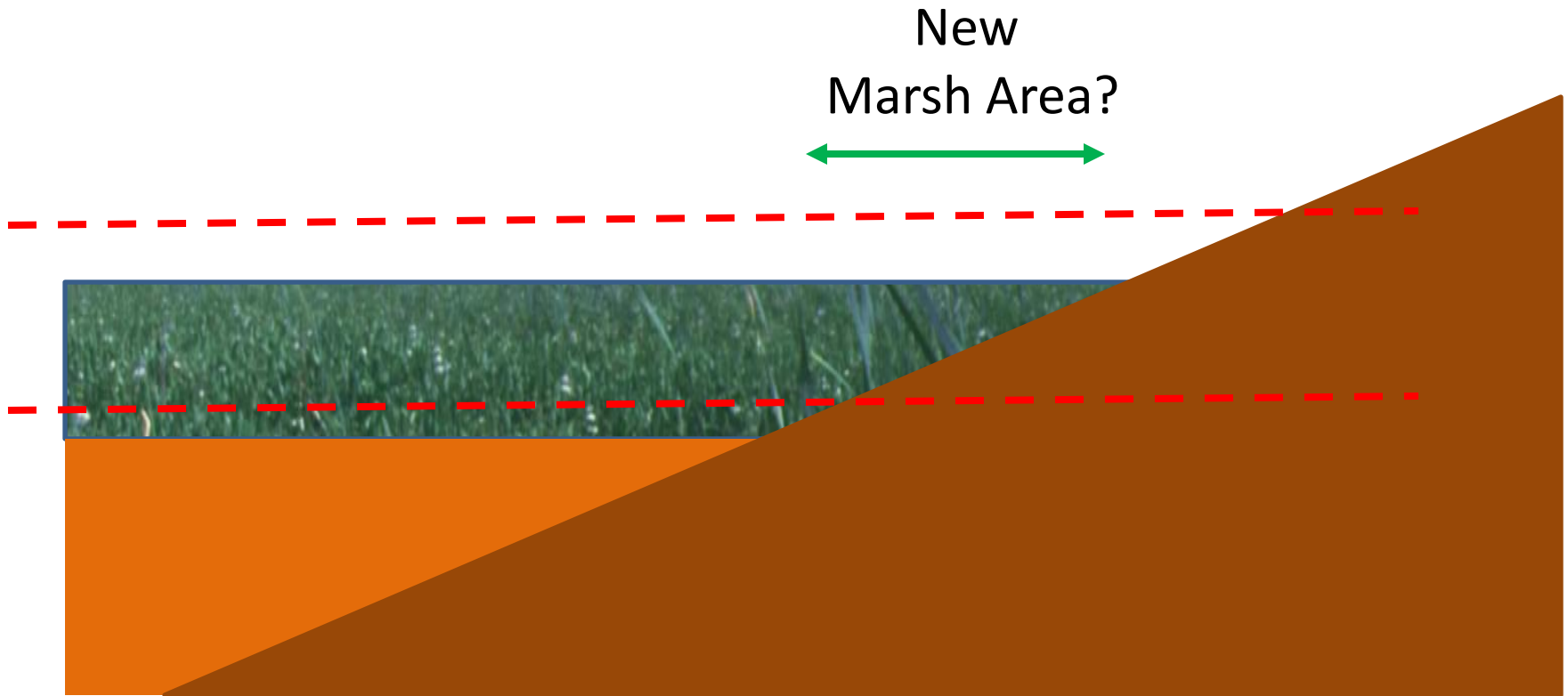
- Marshes must accrete vertically to keep pace with with the local 'net' rate of sea-level rise
- Higher sea-level means more land is flooded and migration onshore

Rate of.....

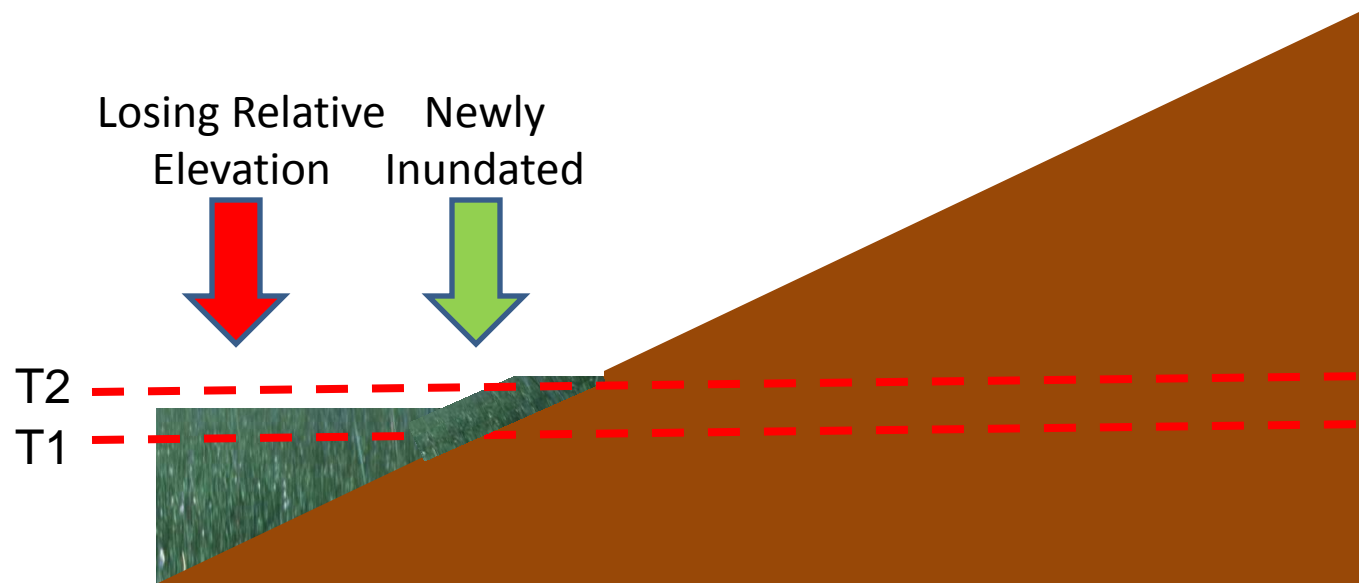
SLR~= Surface Elevation Change



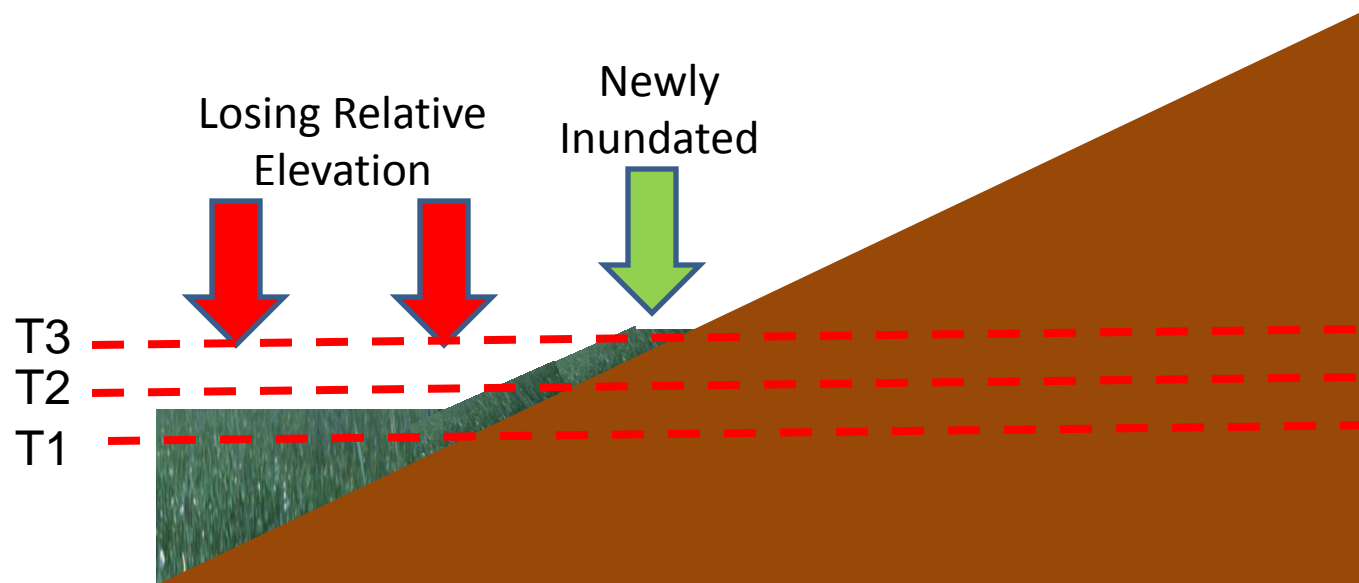
Rate of..... SLR > Surface Elevation Change



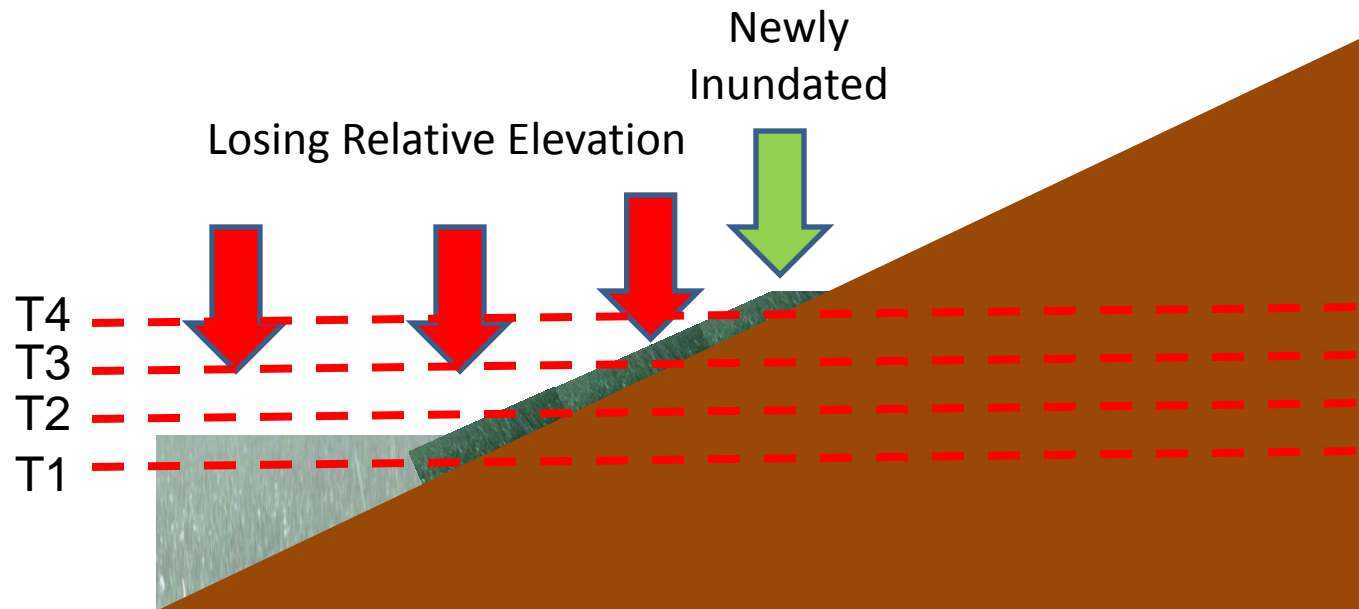
Rate of..... SLR > Surface Elevation Change



Rate of..... SLR > Surface Elevation Change

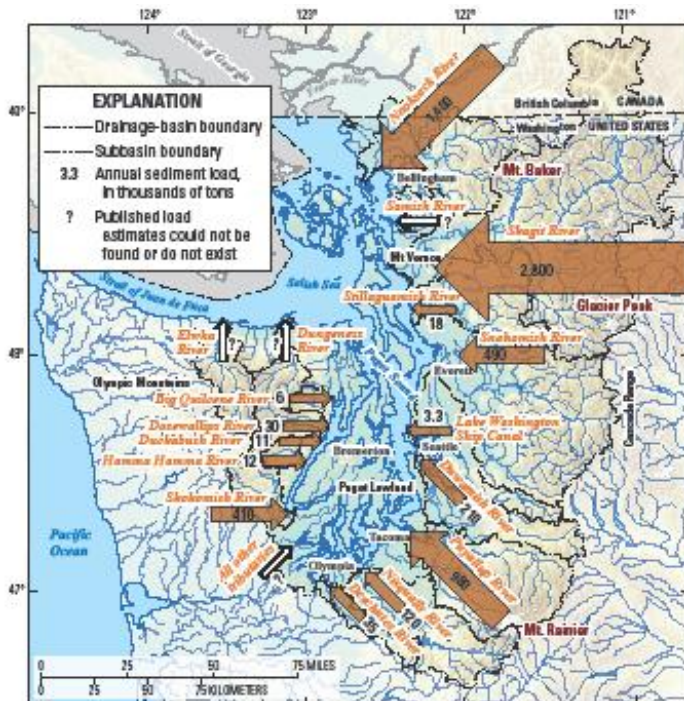


Rate of..... SLR > Surface Elevation Change



What Can Be Done?

- Promote vertical accretion!
 - Allow for sediment delivery
 - Allow for sediment distribution
 - ***Where*** makes a difference



Bottom Line

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