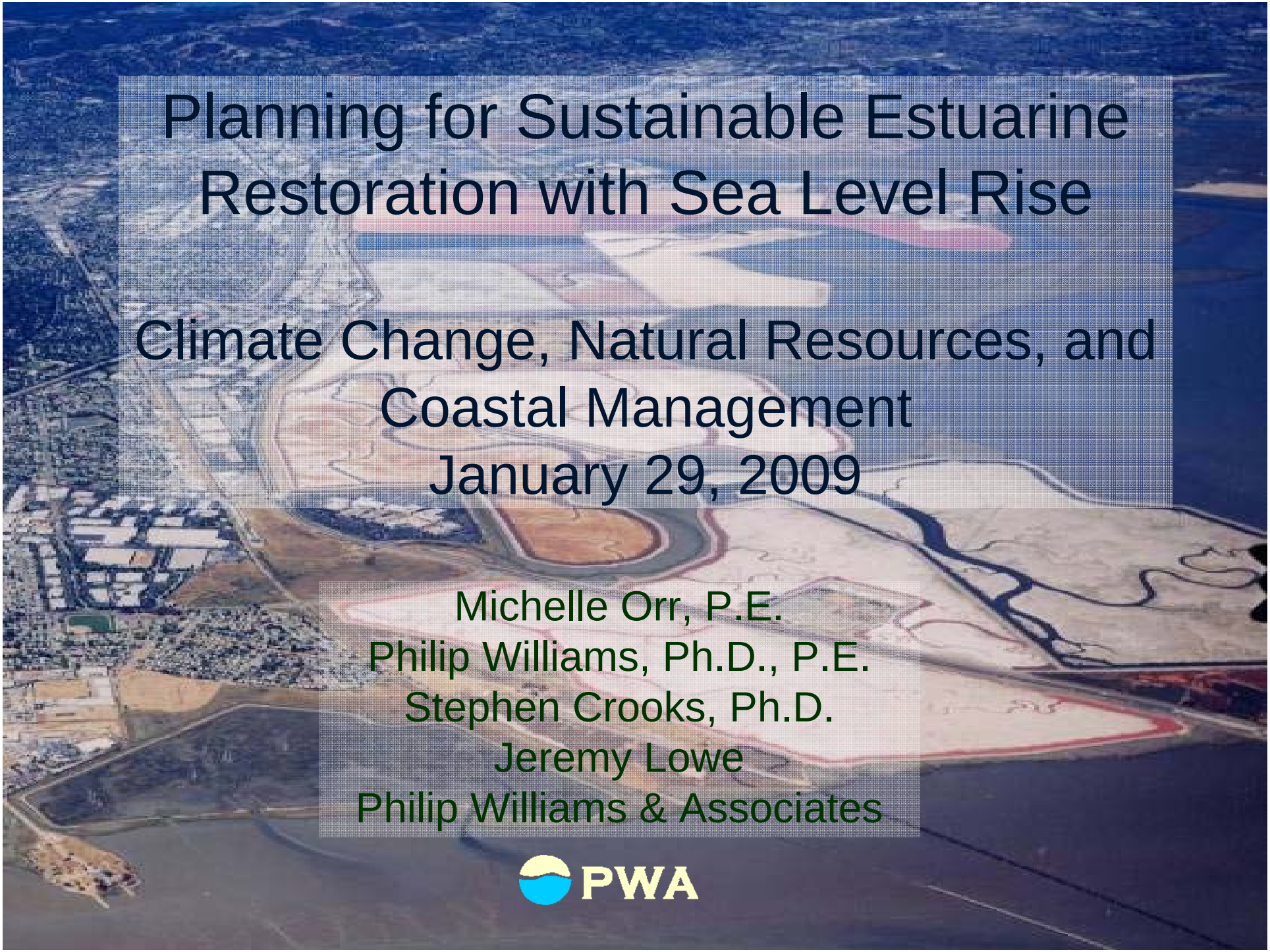

Planning for Sustainable Estuarine Restoration with Sea Level Rise

Climate Change, Natural Resources, and Coastal Management
January 29, 2009

Michelle Orr, P.E.
Philip Williams, Ph.D., P.E.
Stephen Crooks, Ph.D.
Jeremy Lowe
Philip Williams & Associates

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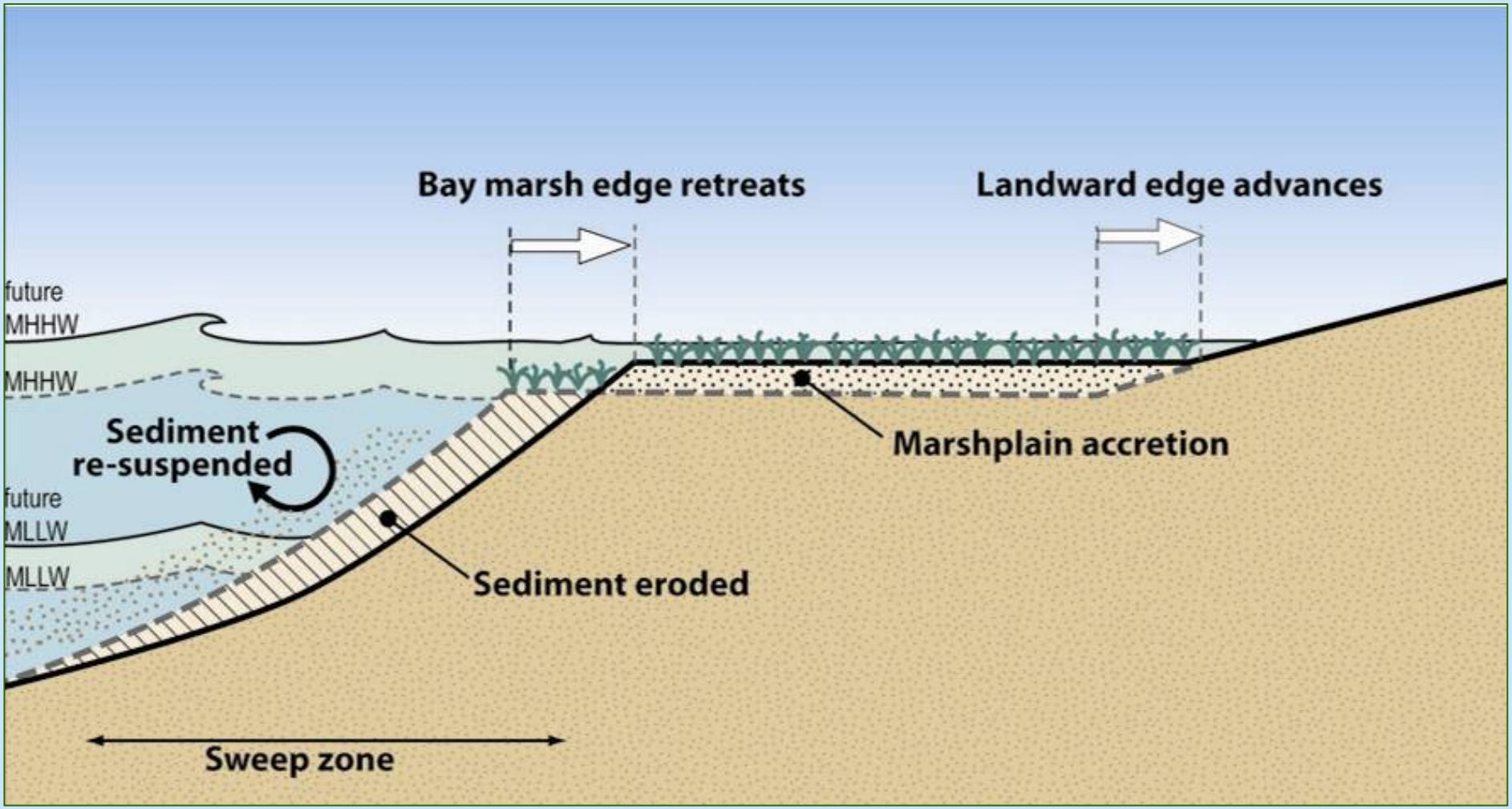
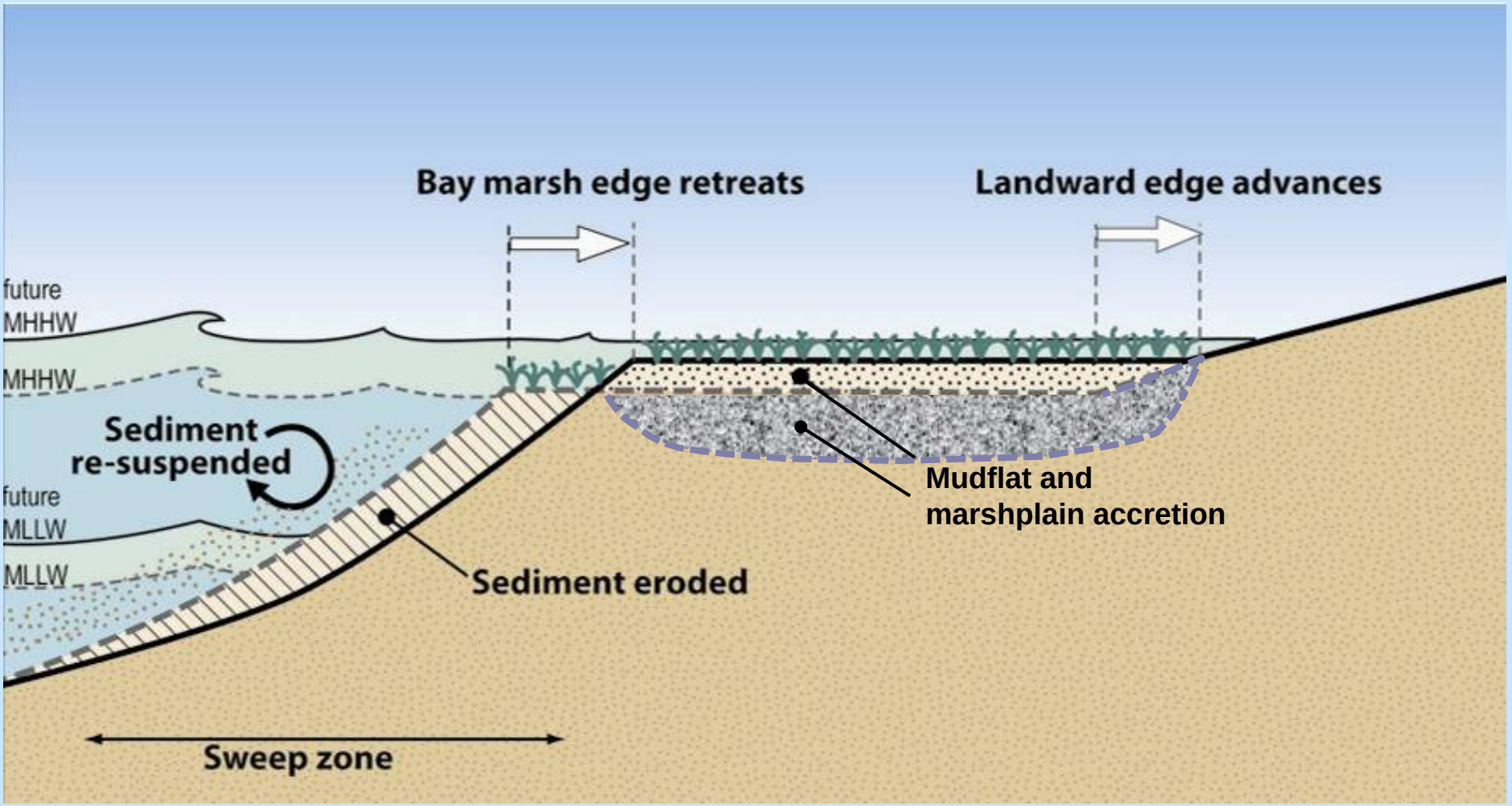
Overview

- "Will restored wetlands be sustainable?"
- Examples of wetland restoration adaptation approaches to SLR

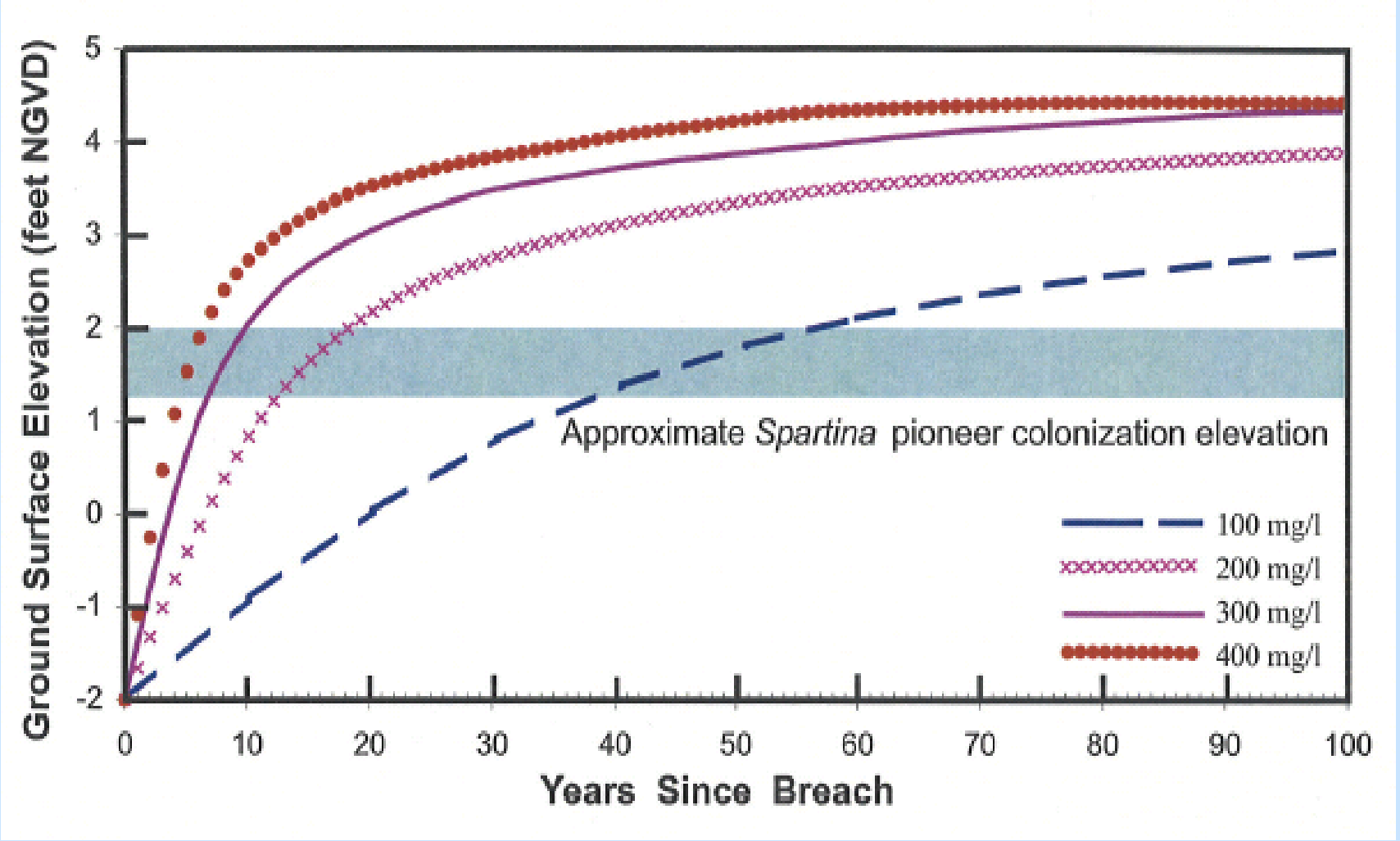
Shoreline Transgression



Shoreline Transgression

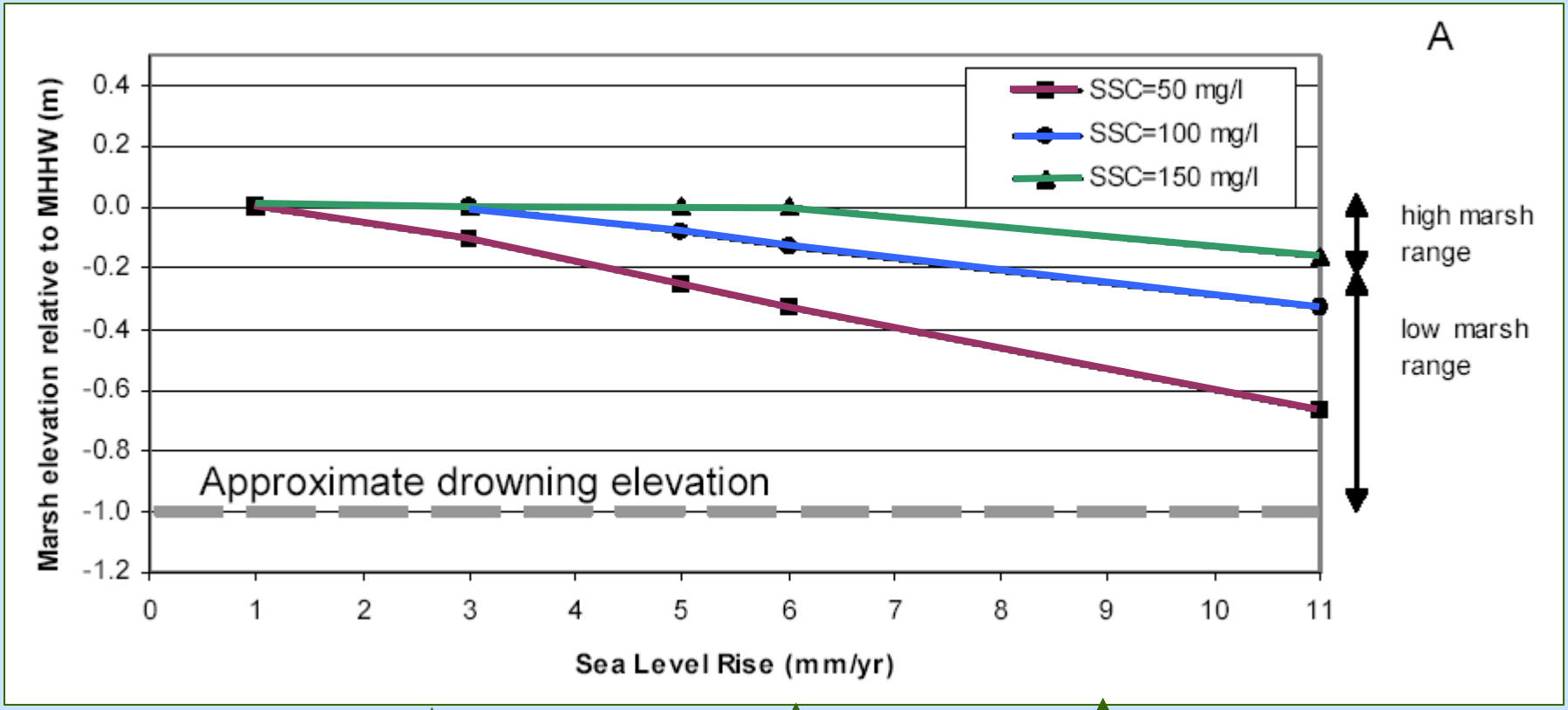


Vertical evolution of estuarine habitats



Relation between SLR, sediment supply, and marsh sustainability

Initial marsh elevation: MHHW



Recent SLR

Future SLR by 2100 (IPCC 2007)

Future SLR By 2050 (Delta Vision 2008)

 Source: Orr, Crooks, and Williams 2003

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N
1618 ft
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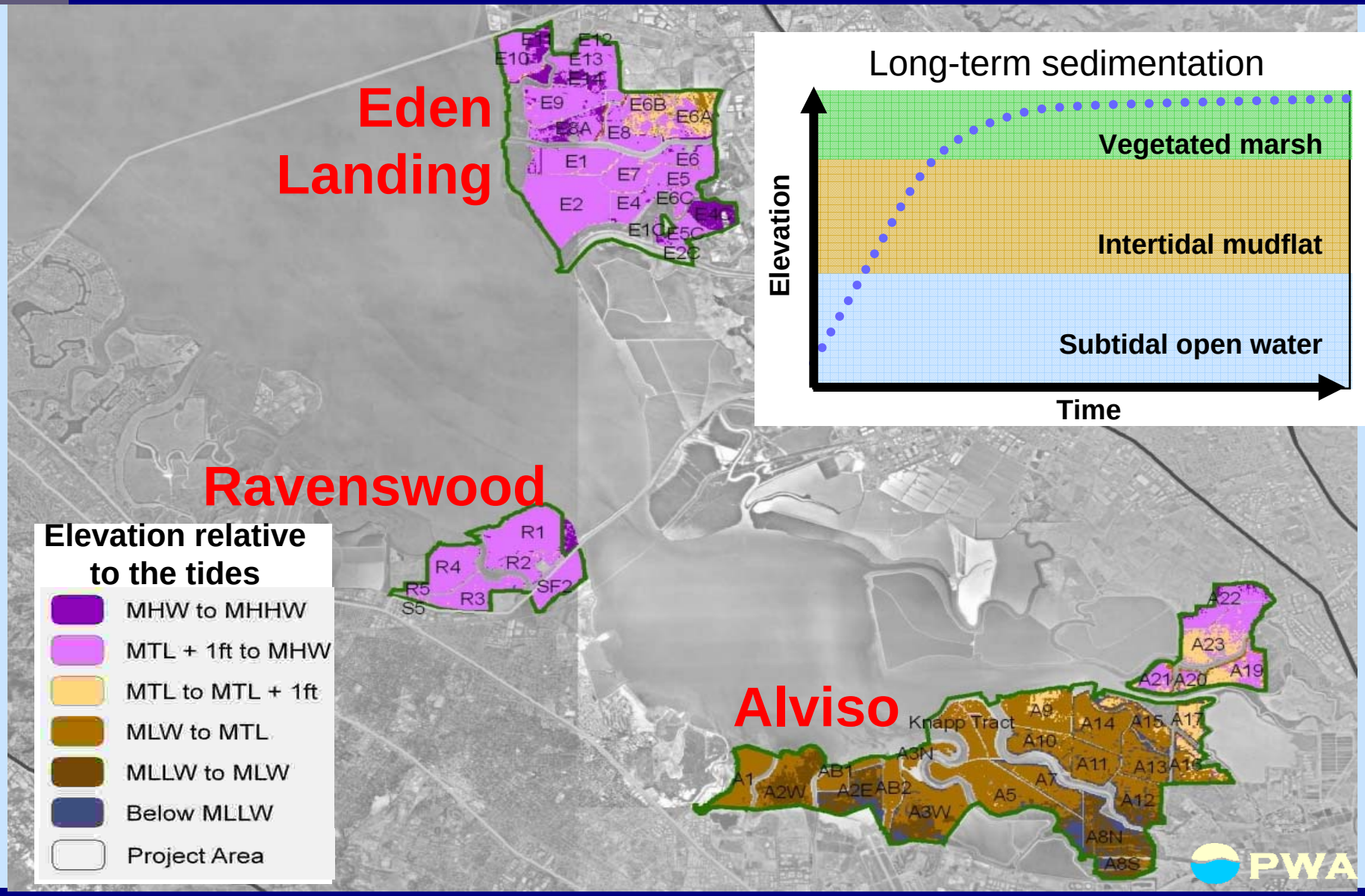
Planning for SLR: South Bay Salt Ponds



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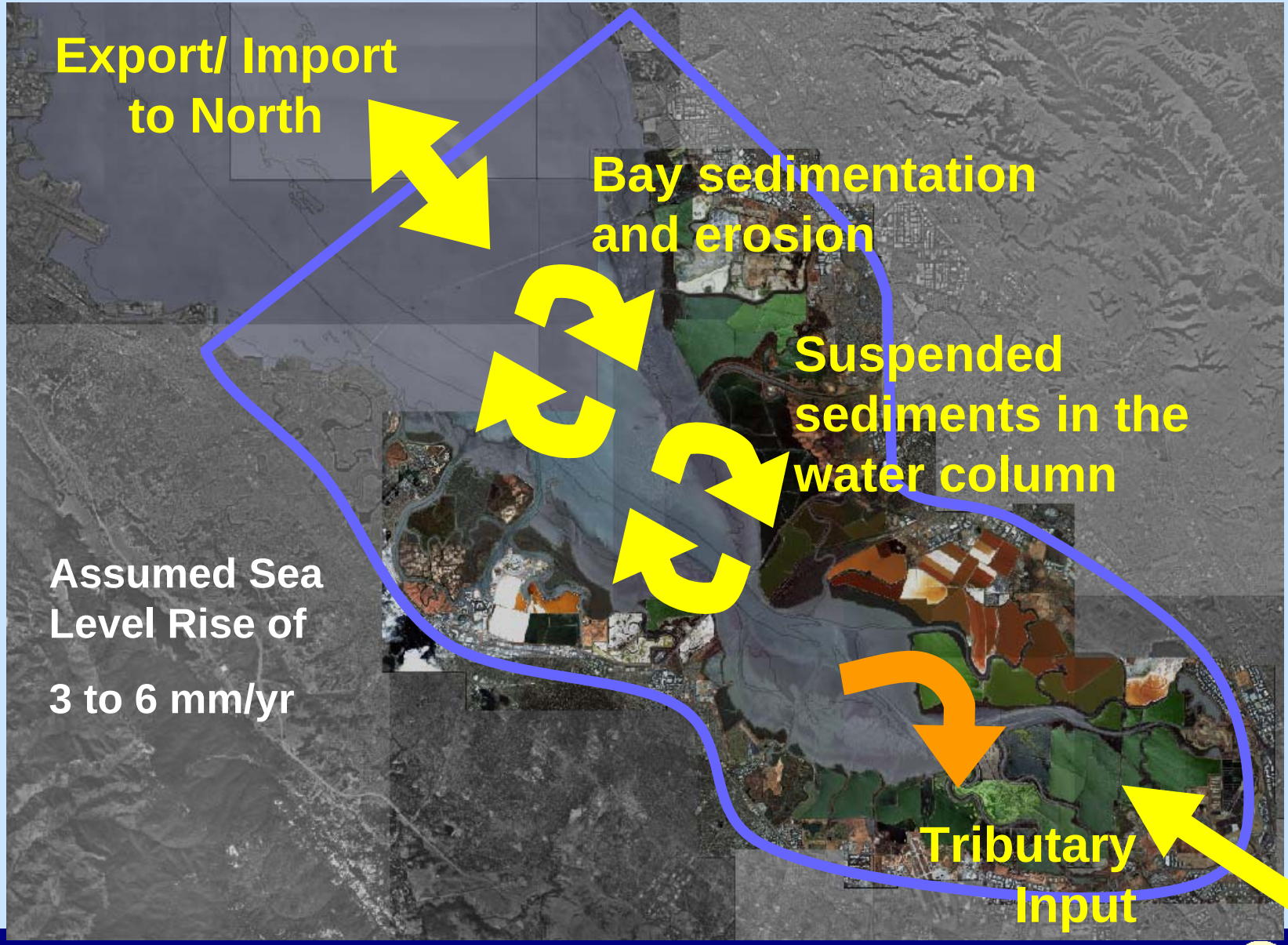
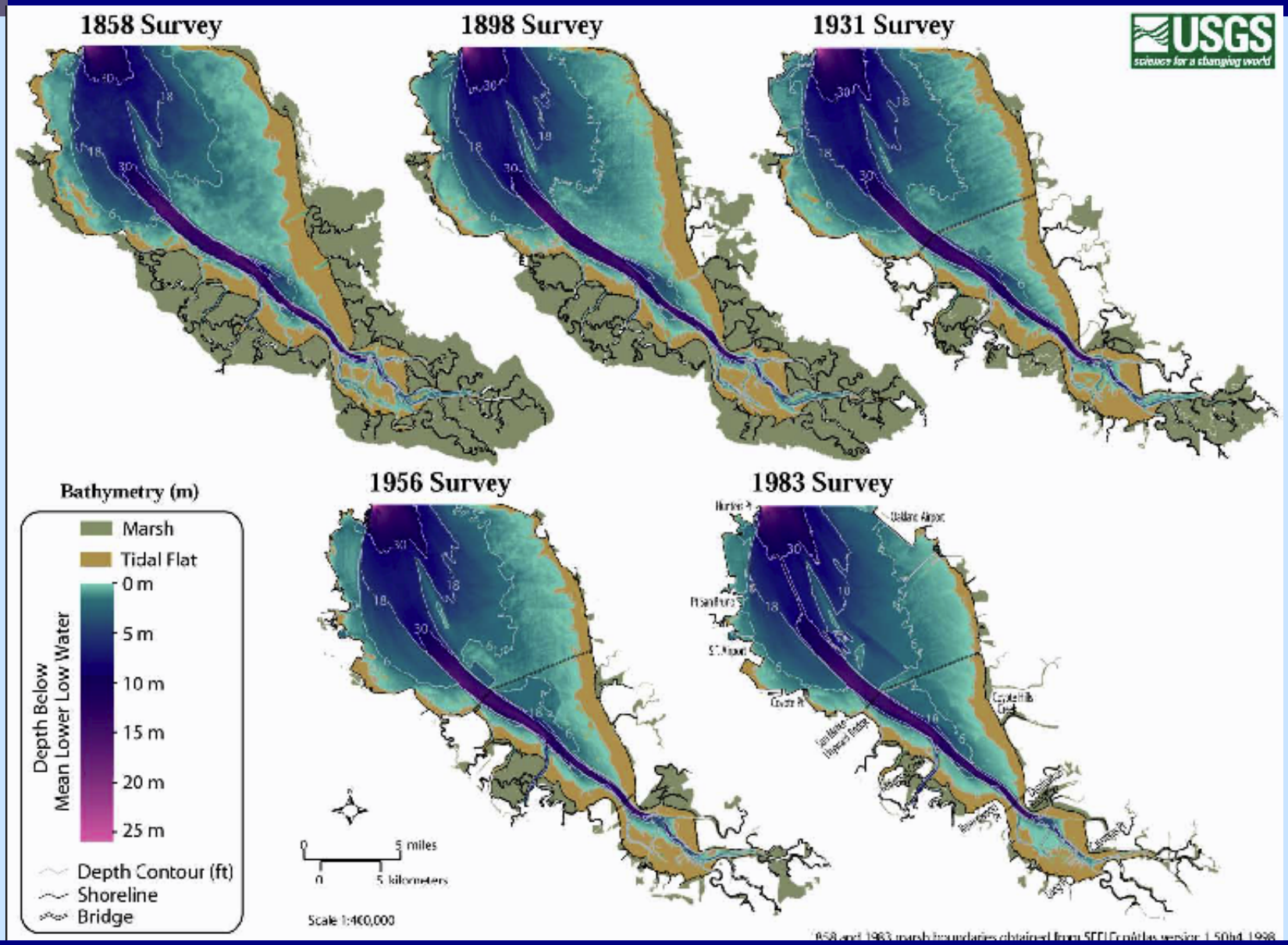
Sediment Budget



South Bay Historical Data



 Source: Foxgrover et al. 2004

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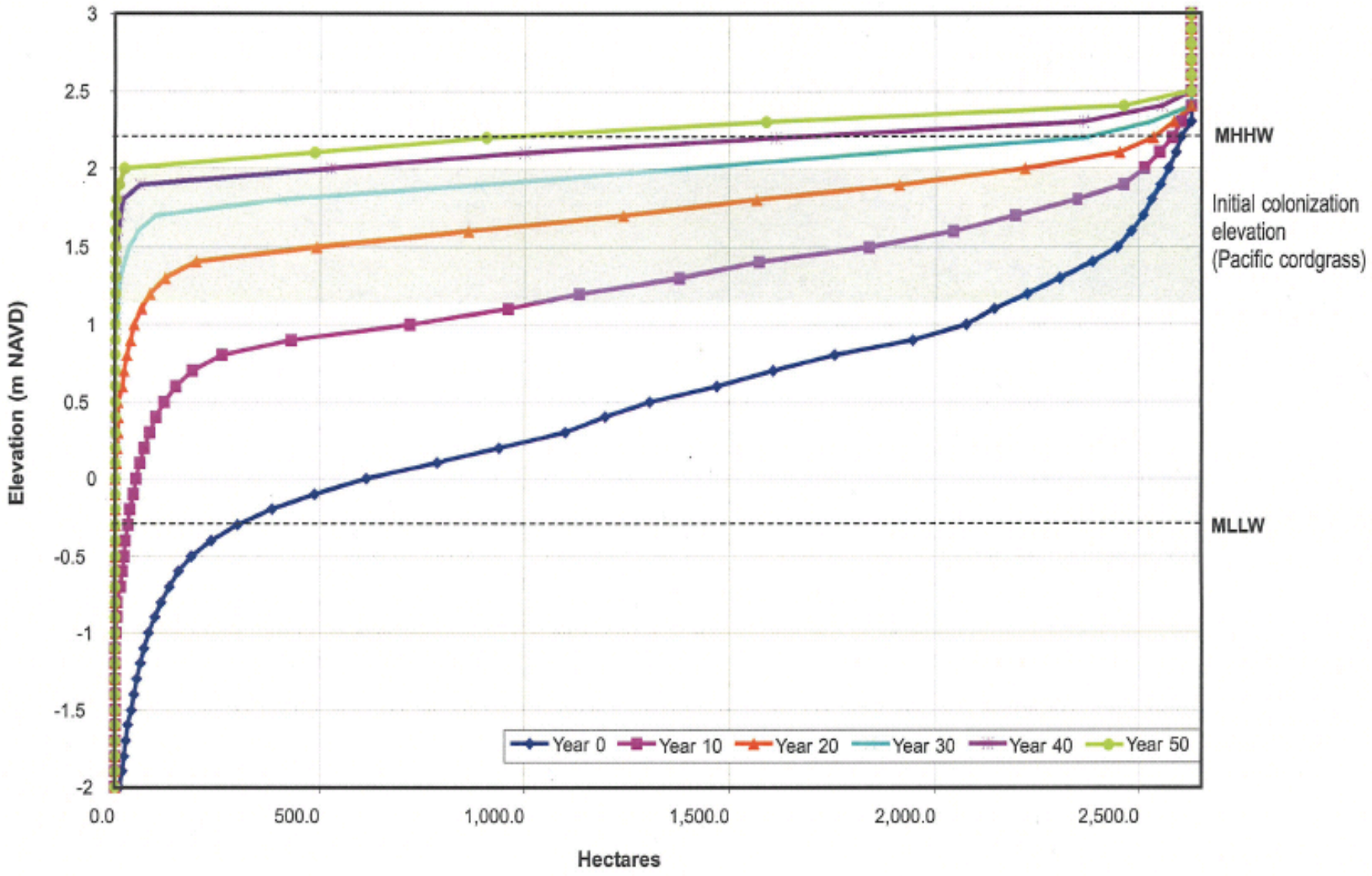
Pond Sediment Demand



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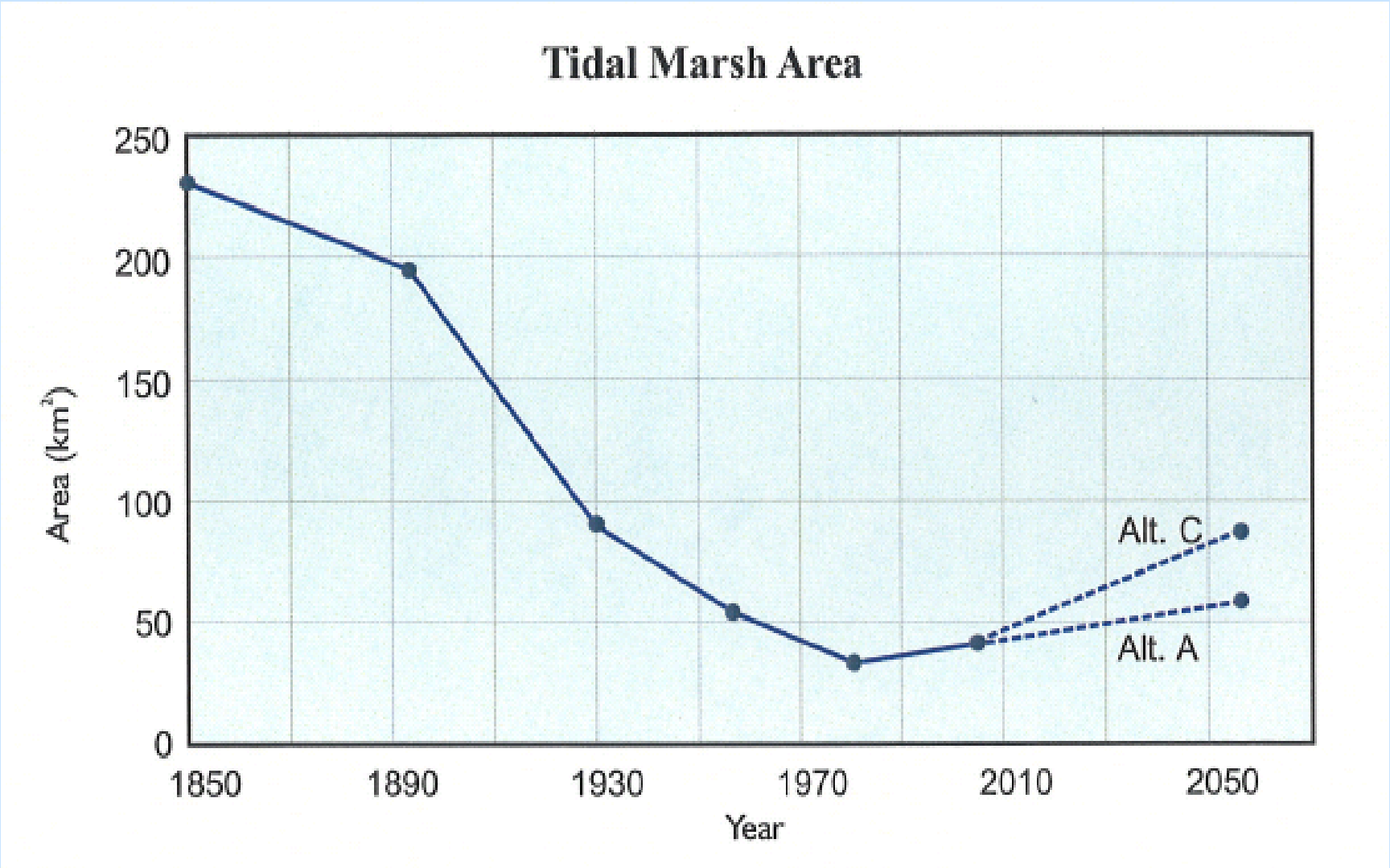
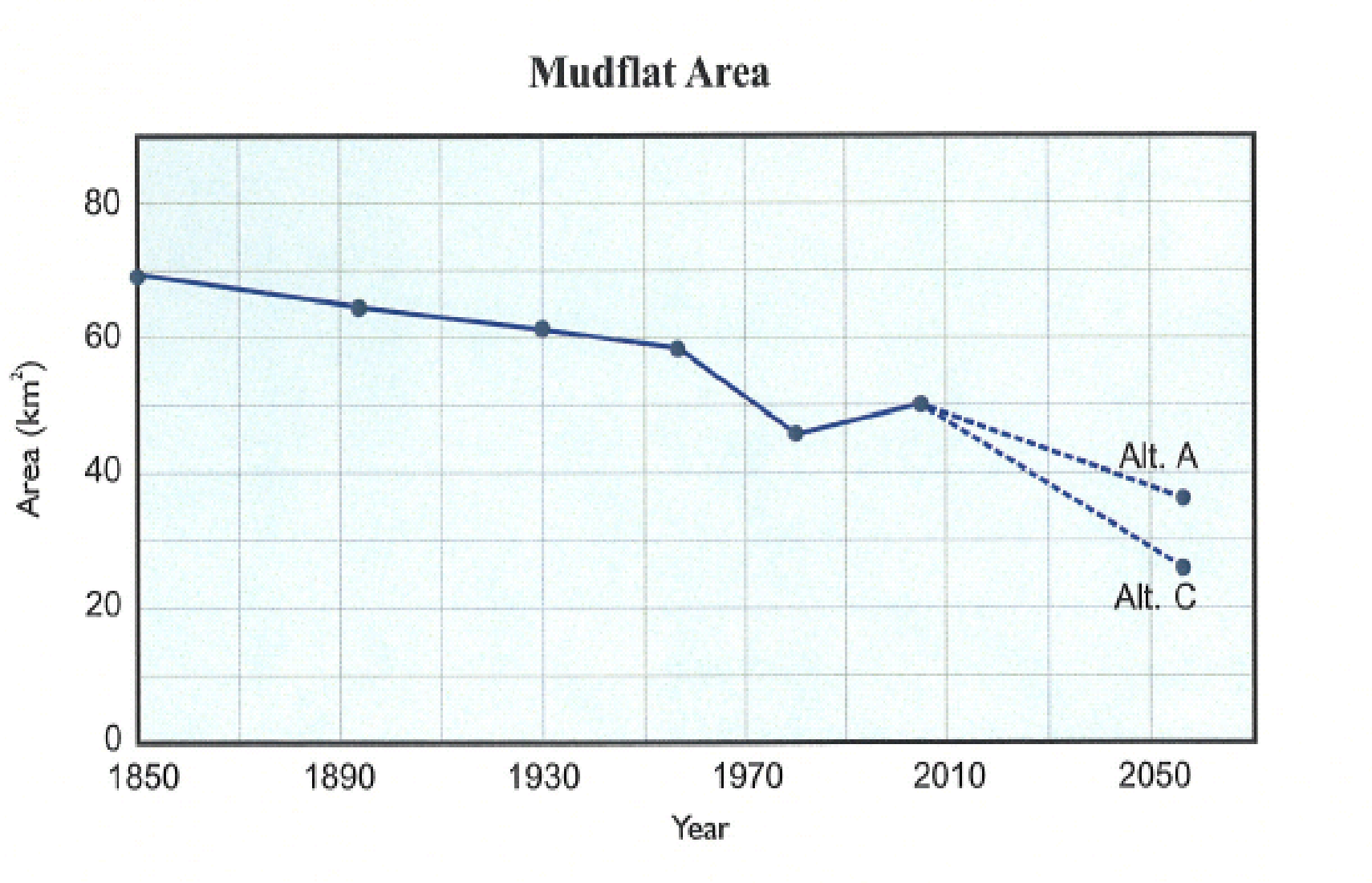
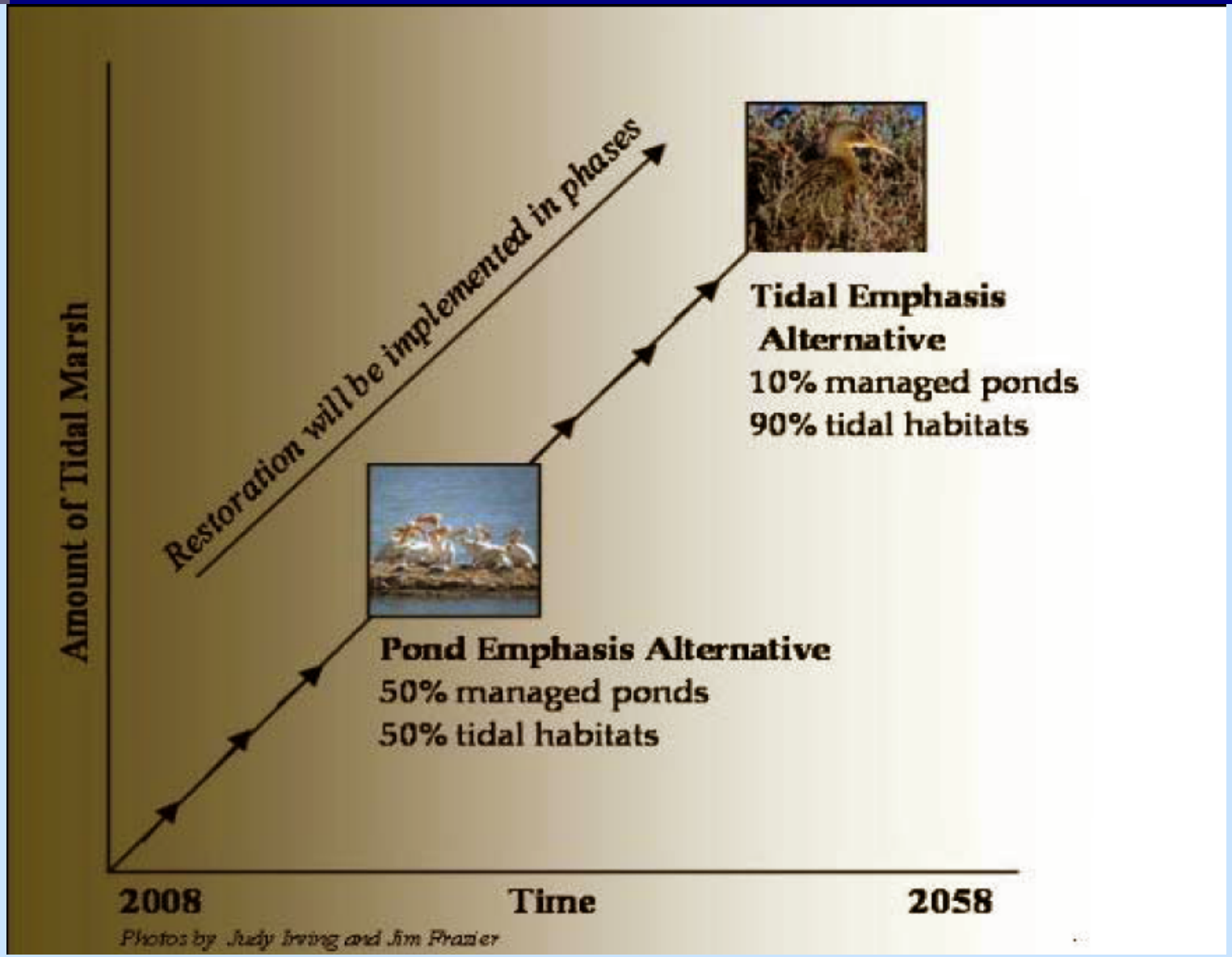
SBSP Marsh Area Increase



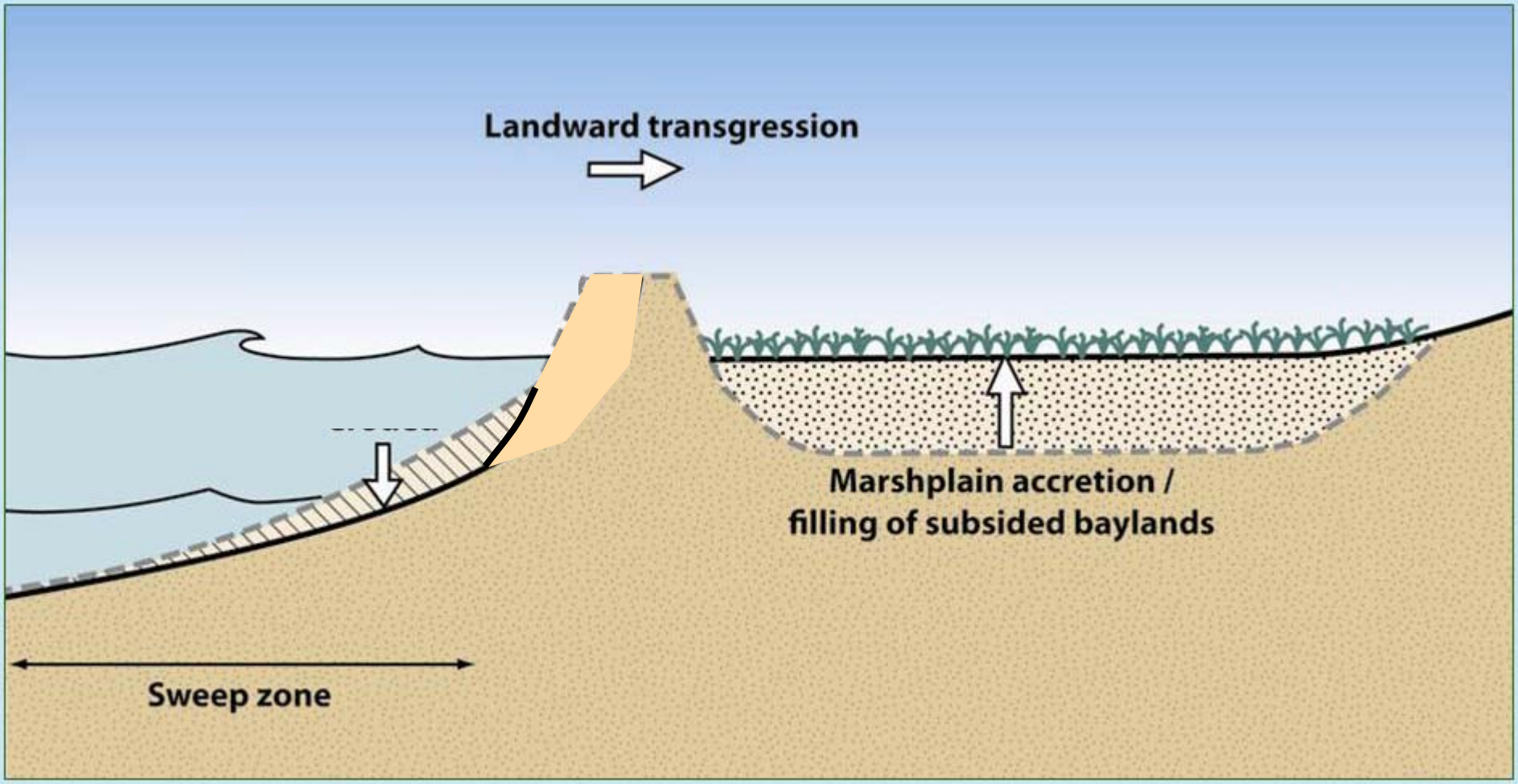
SBSP Mudflat Loss



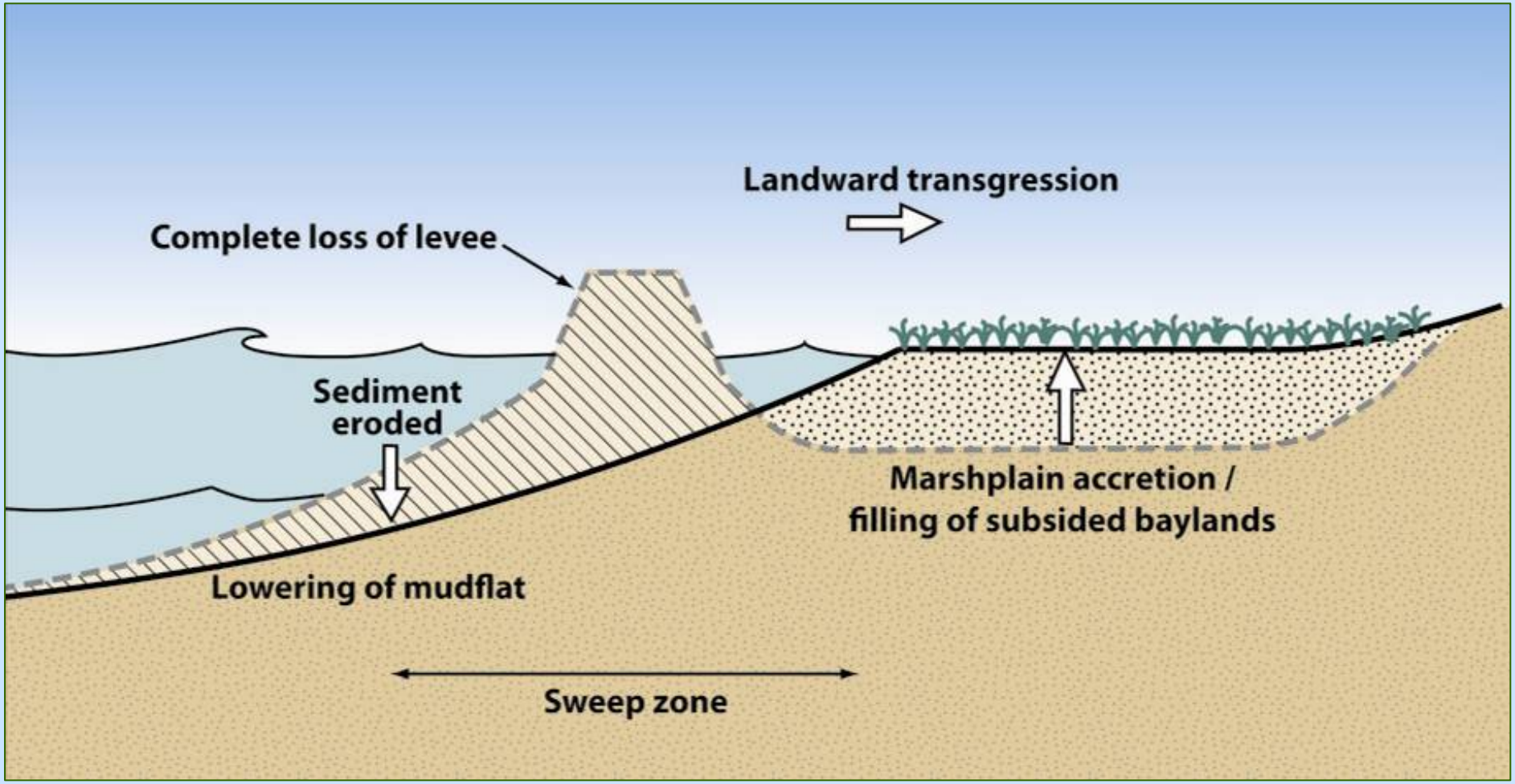
SLR Adaptation: Phased implementation



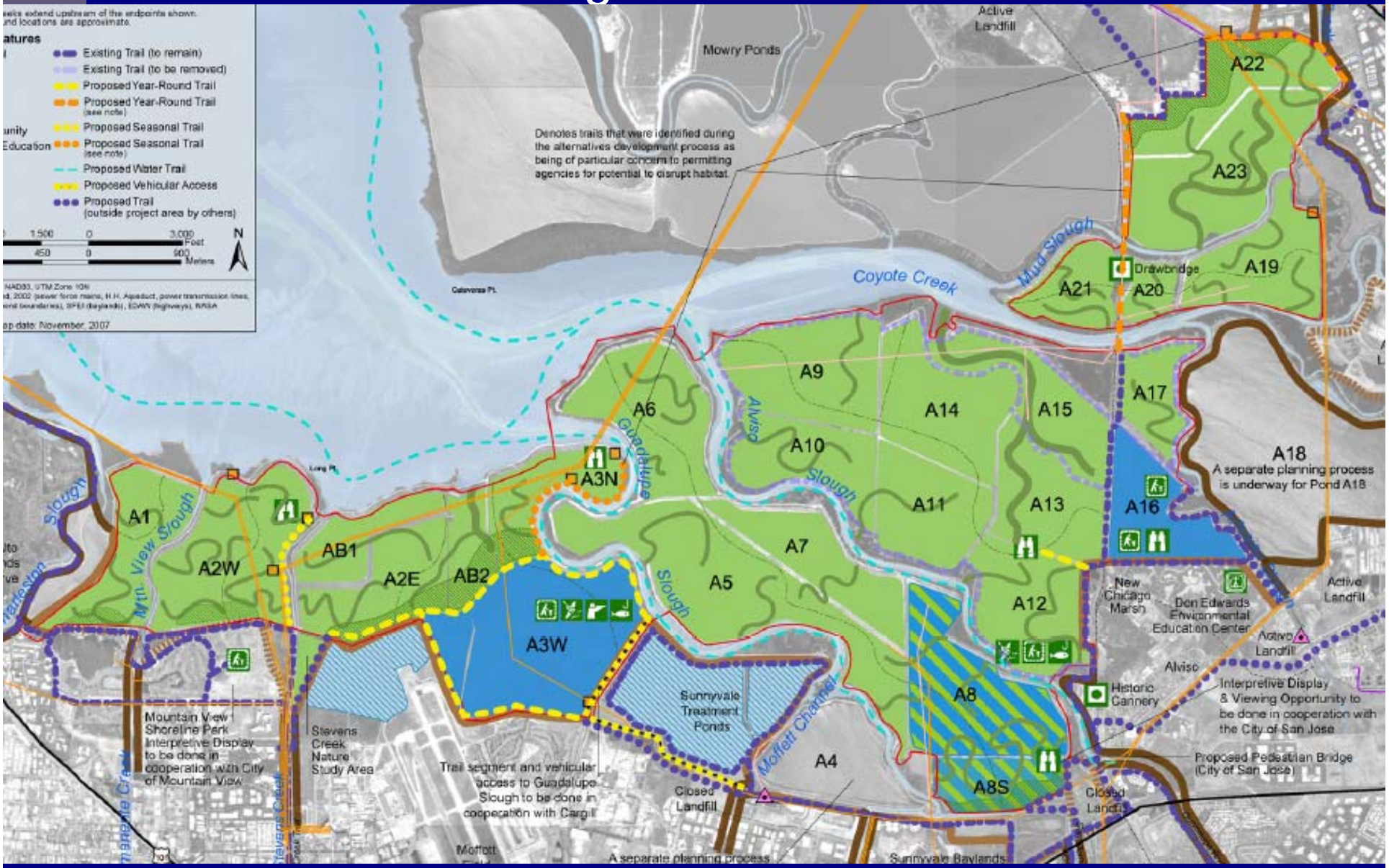
Maintain levees to shelter marsh



Reconnecting Mudflat to Saltmarsh



Increase sustainability
make room for transgression



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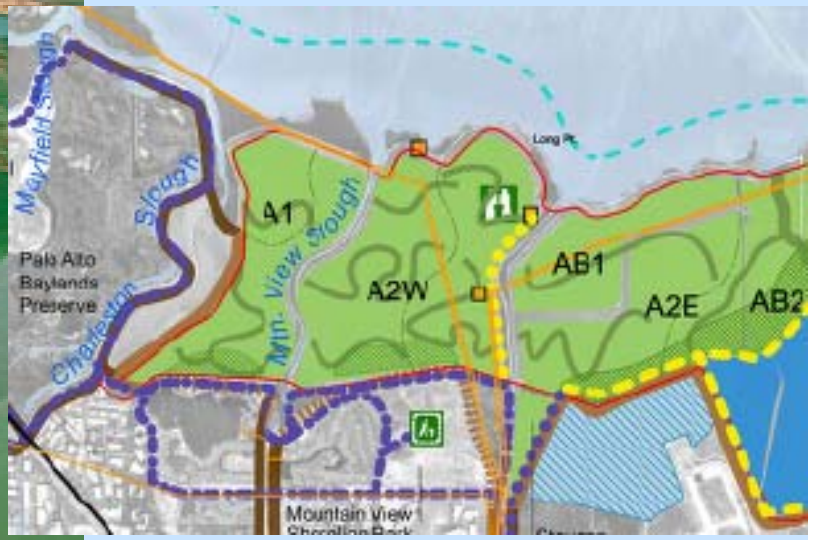
Beneficial re-use of dredged material



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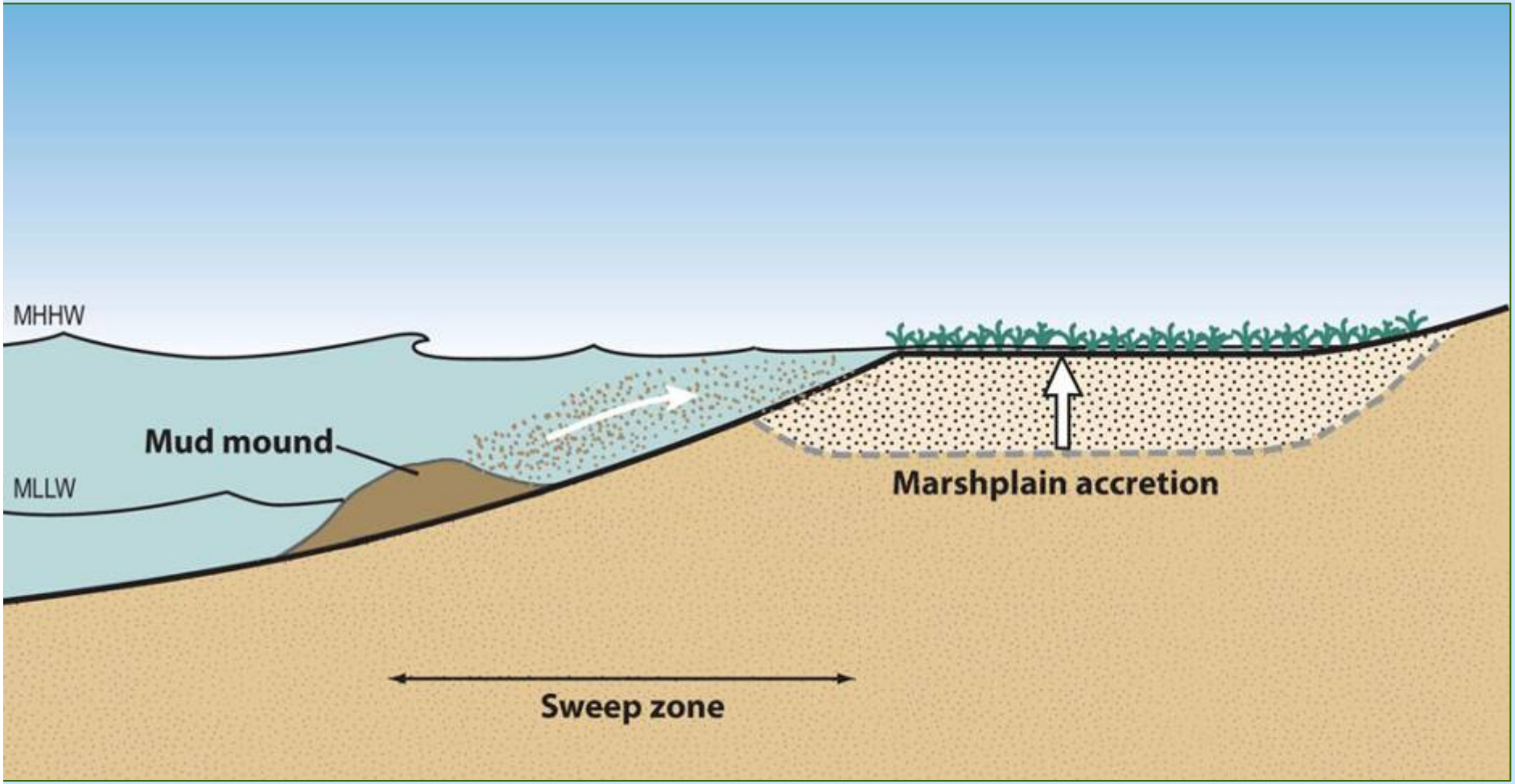
Rainbow dredging

Sacrificial Mud Mounds



Conclusions

- Restored wetlands are likely to be sustainable at moderate rates of SLR and may experience "drowning" at higher rates, depending on sediment supply.
  - restore sooner rather than later
- Sediment dynamics are key to understanding sustainability of restored and other estuarine habitats
- Adaptation may require trade-offs between marshes, mudflats, and managed habitat
- Sustainable wetlands need room for transgression
- Manage sediments as a resource

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