

Coastal Dune Restoration in a Time of Sea Level Rise



Ross Clark

Climate Action Coordinator, City of Santa
Cruz

Director, Central Coast Wetlands Group @
Moss Landing Marine Labs

SLR threatens coastal land use in many ways i.e. Forcing Mechanisms

Cliff Erosion



Dune Erosion



Rising Tides

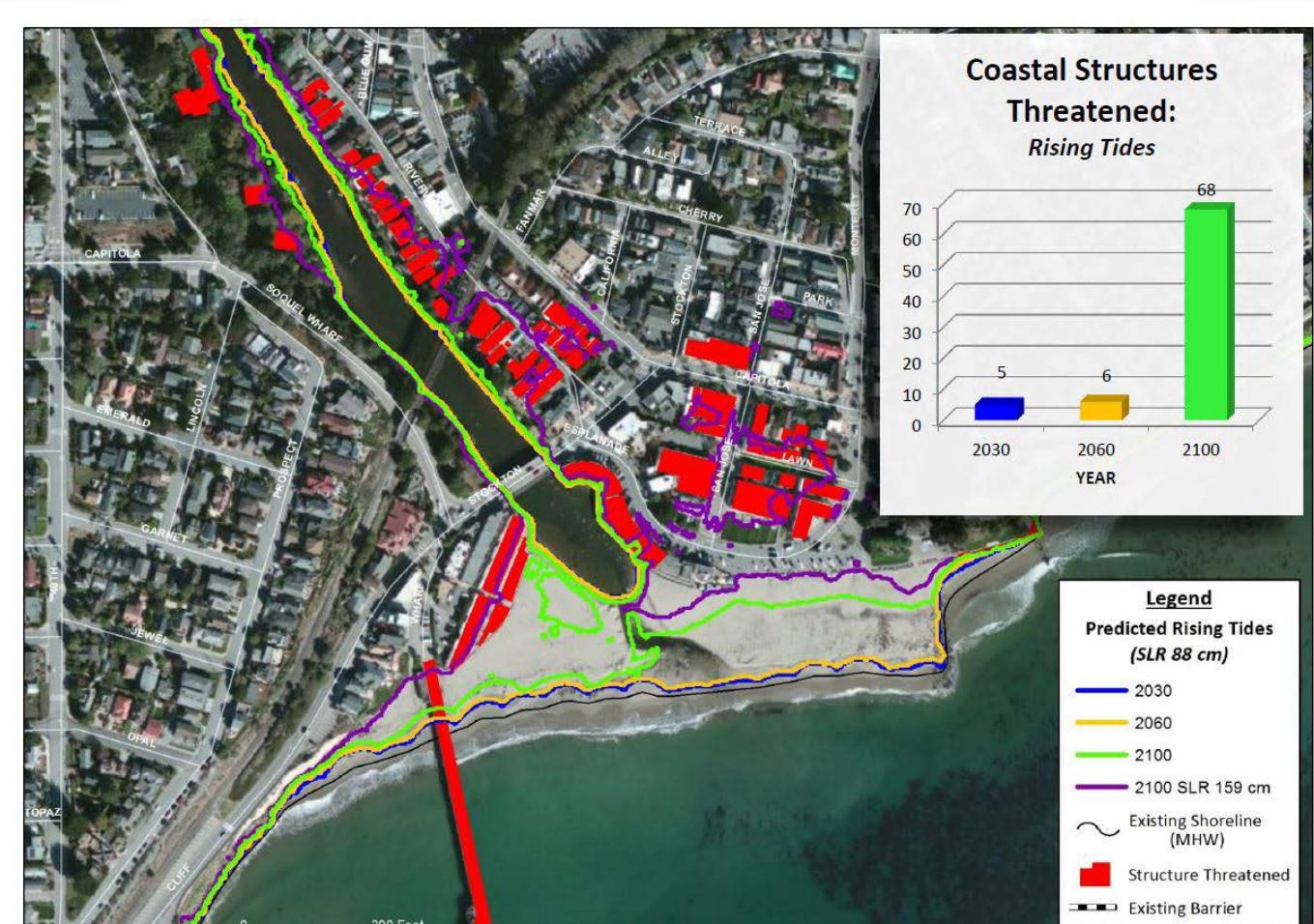


Storm Flood Impacts



Different Forcing Mechanisms Lead to Different Threats

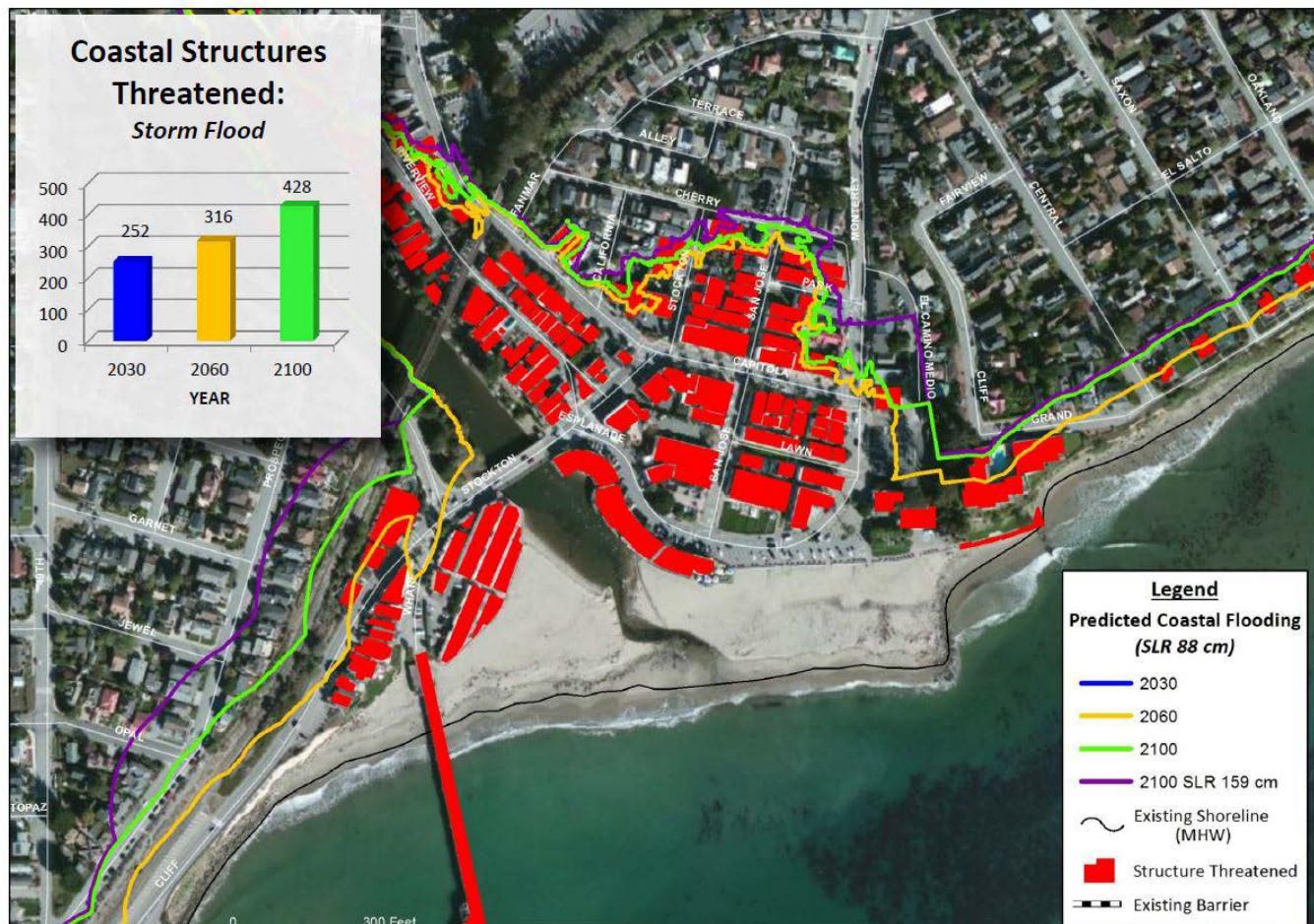
Threats to Capitola from Rising Sea Levels



Data Source: ESA 2014 Vulnerability Analysis

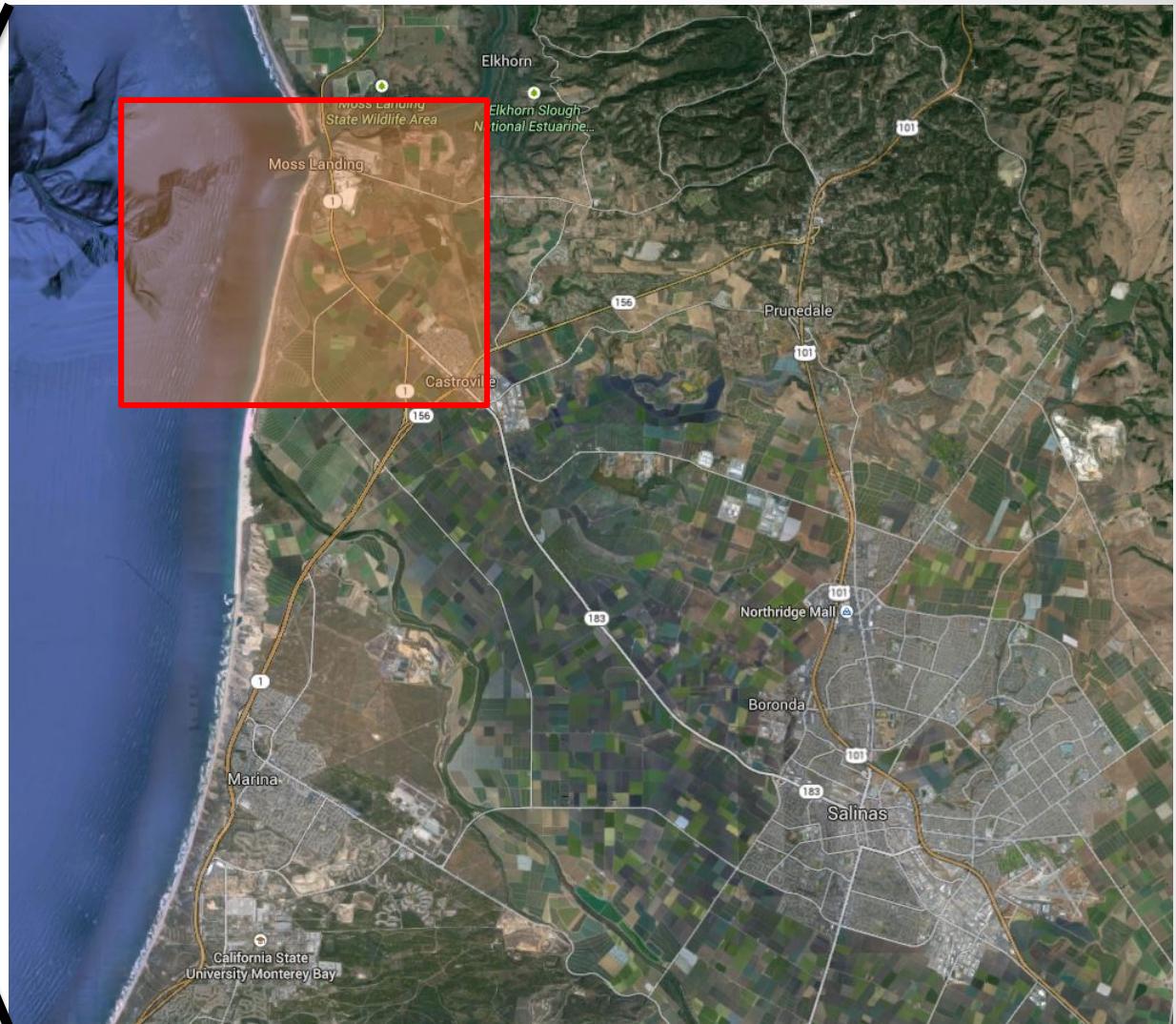
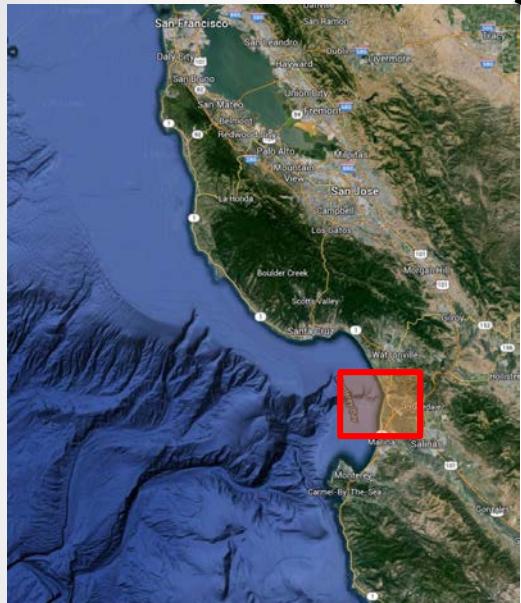
Different Forcing Mechanisms Lead to Different Threats

Threats to Capitola from Storm Induced Flooding



Data Source: ESA 2014 Vulnerability Analysis

Salinas Valley



Prime agriculture lands of the Salinas Valley generate 2.7 billion dollars in crops annually (Ag Commissioners Office, 2011)

Salinas Valley Agriculture



SLR Threats to Agriculture 2030



SLR Threats to Agriculture 2060



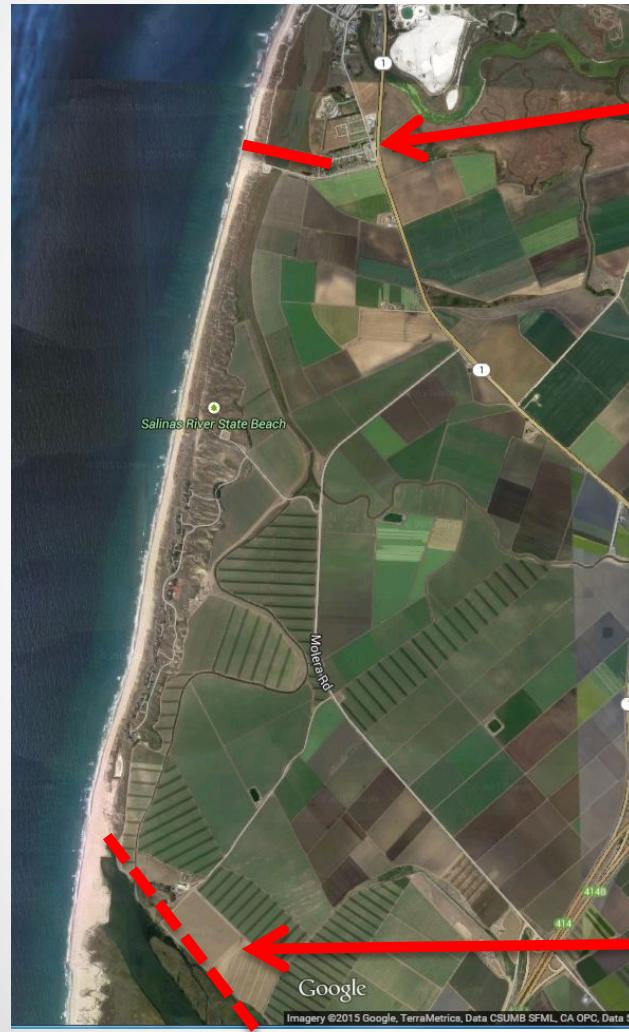
SLR Threats to Agriculture 2100



SLR Threats to Agriculture 2100+



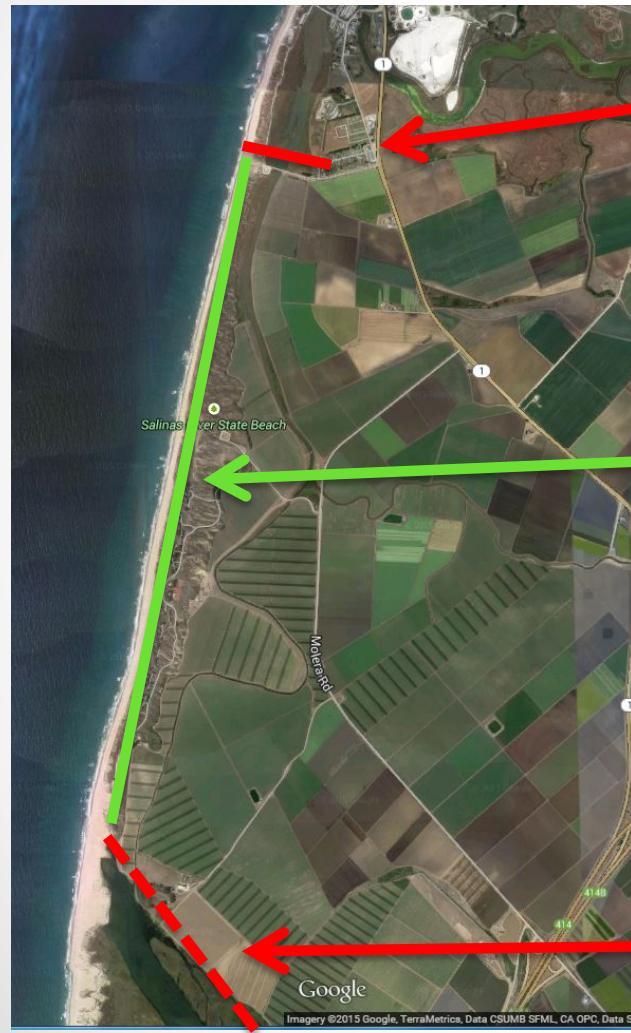
Salinas Valley Coastal Protections



Potrero Tide Gates

Salinas River Levee

Salinas Valley Coastal Protections

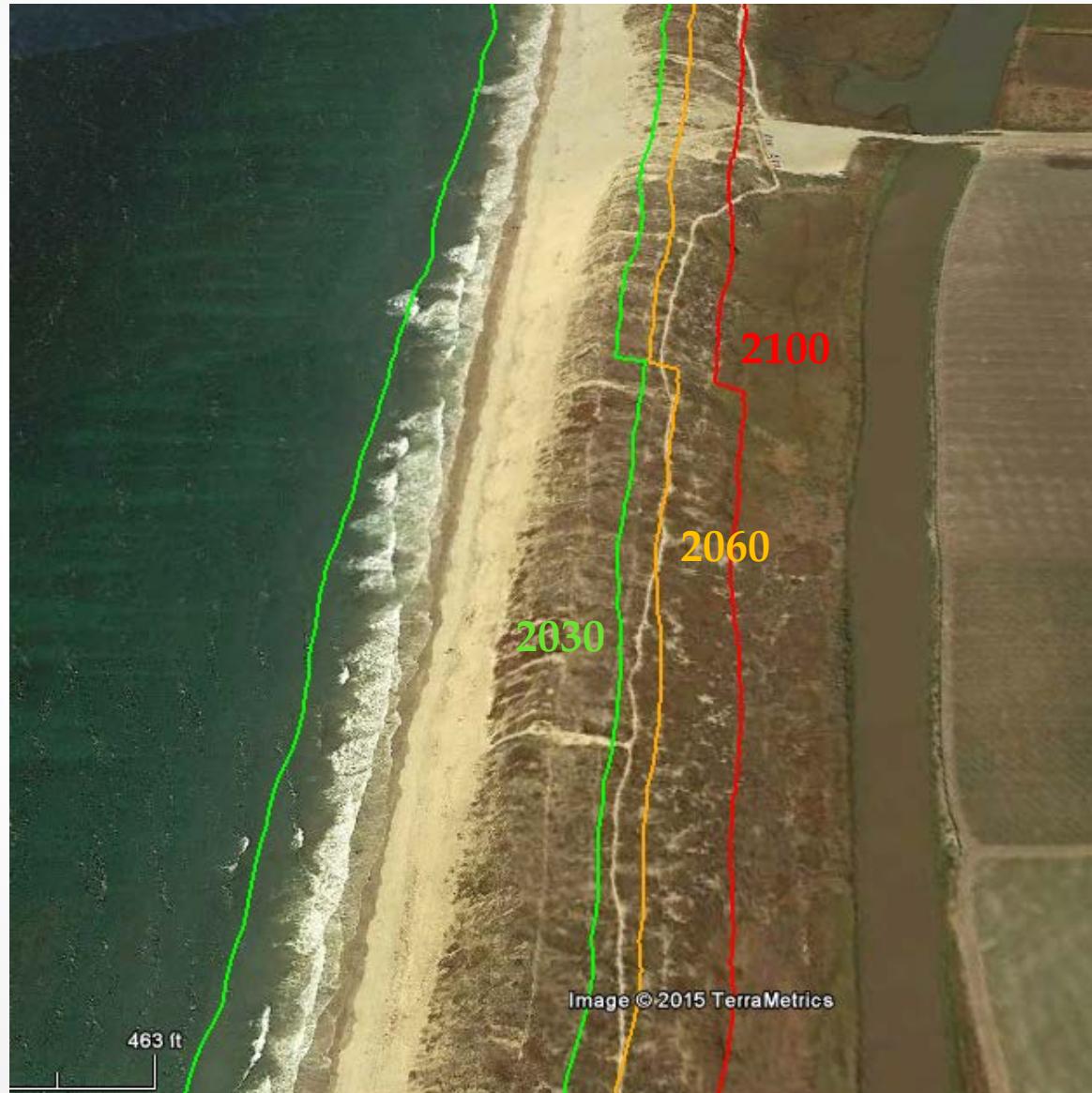


One important adaptation strategy is to ensure that the Coastal Dunes remain functional as barriers to wave surge that could flood the valley.

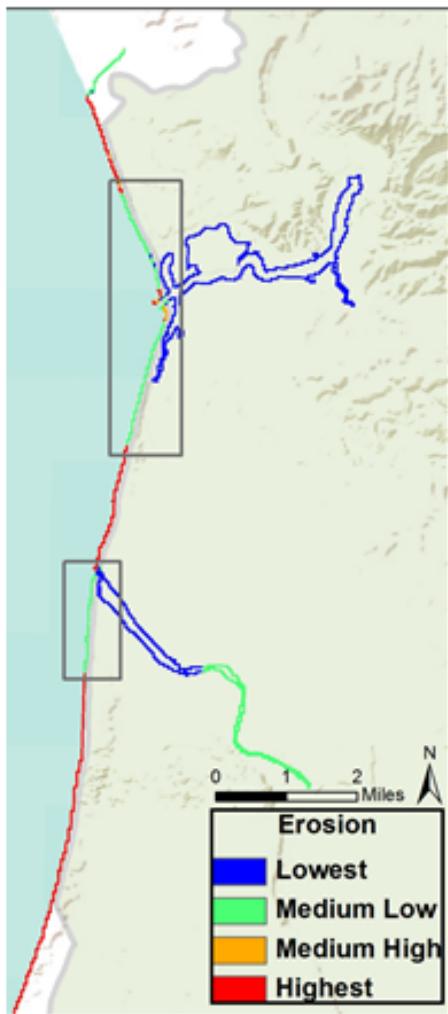
Monterey Bay Natural Capital Project

2013

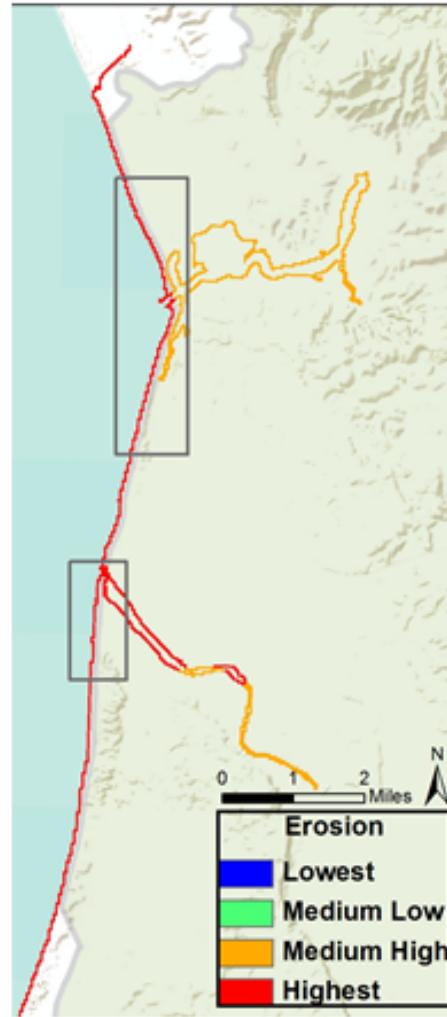
Projected Dune Erosion, Salinas State Beach



Effects of Habitat on Erosion Index



A. Erosion with Habitat Protection
at Year 2000 Sea Level

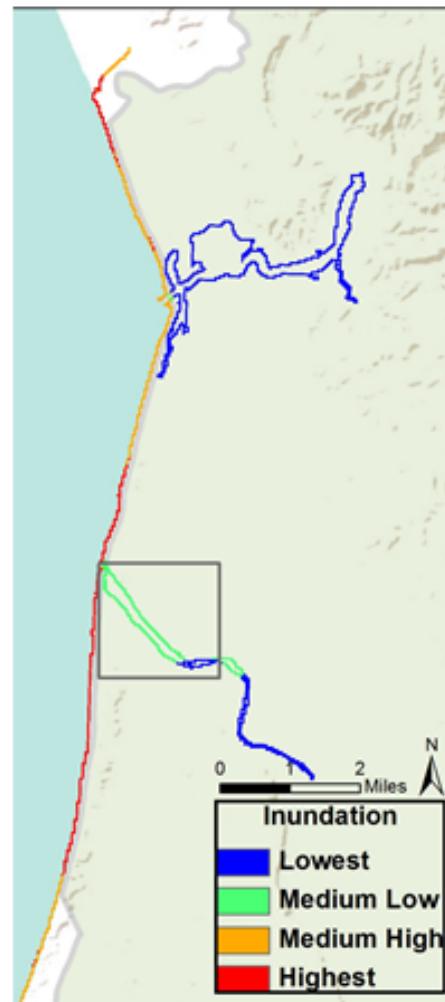


B. Erosion with Habitat Loss at
Year 2000 Sea Level

Effect of Habitat on Inundation Index



A. Erosion with Habitat Protection
at Year 2000 Sea Level



B. Erosion with Habitat Loss at
Year 2000 Sea Level

The Role of Natural Habitat in Mitigating Vulnerability

- The InVEST Coastal Vulnerability model results indicate that habitats play the greatest protective role for communities and prime agriculture in the areas with the highest vulnerability—Moss Landing, Marina and Seaside
- Analyses suggest prioritizing areas within this region for habitat conservation and restoration.

Proposed Dune Restoration Project



Proposed Dune Restoration Project

Central Salinas State Beach Management Area

Ice Plant Density for this area ranges from 35-100% cover. Average = 65%

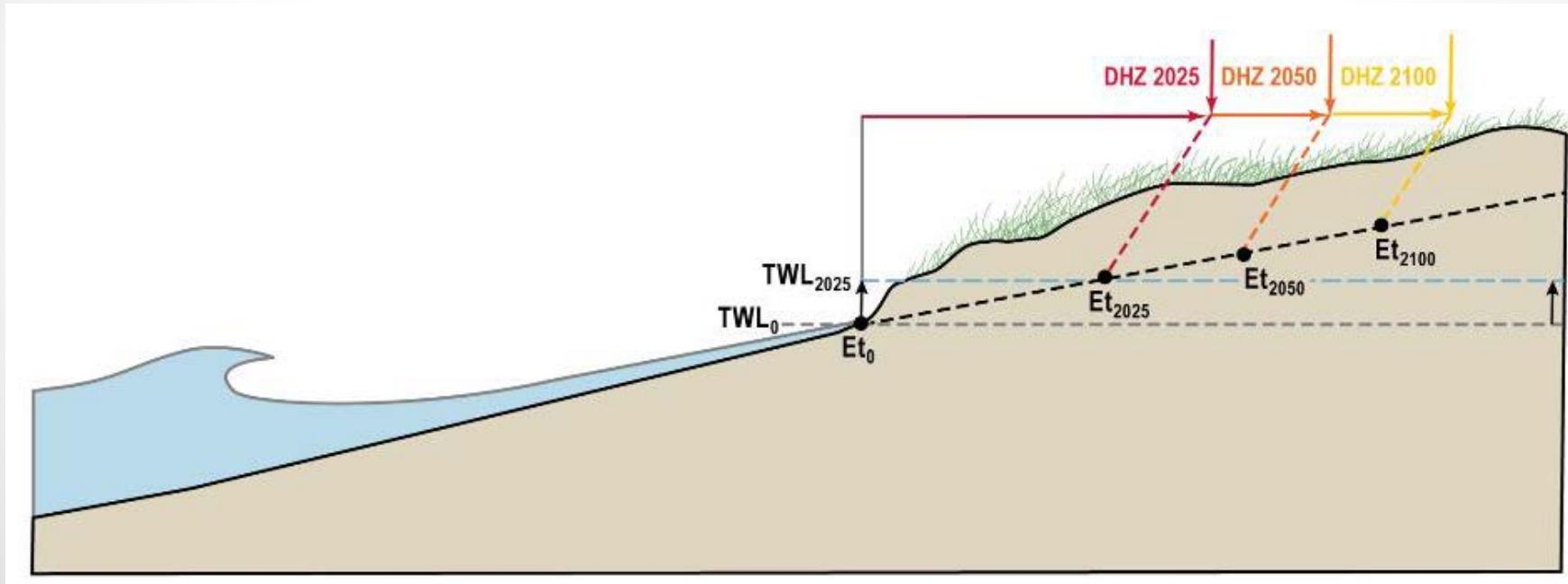


Proposed Dune Restoration Project



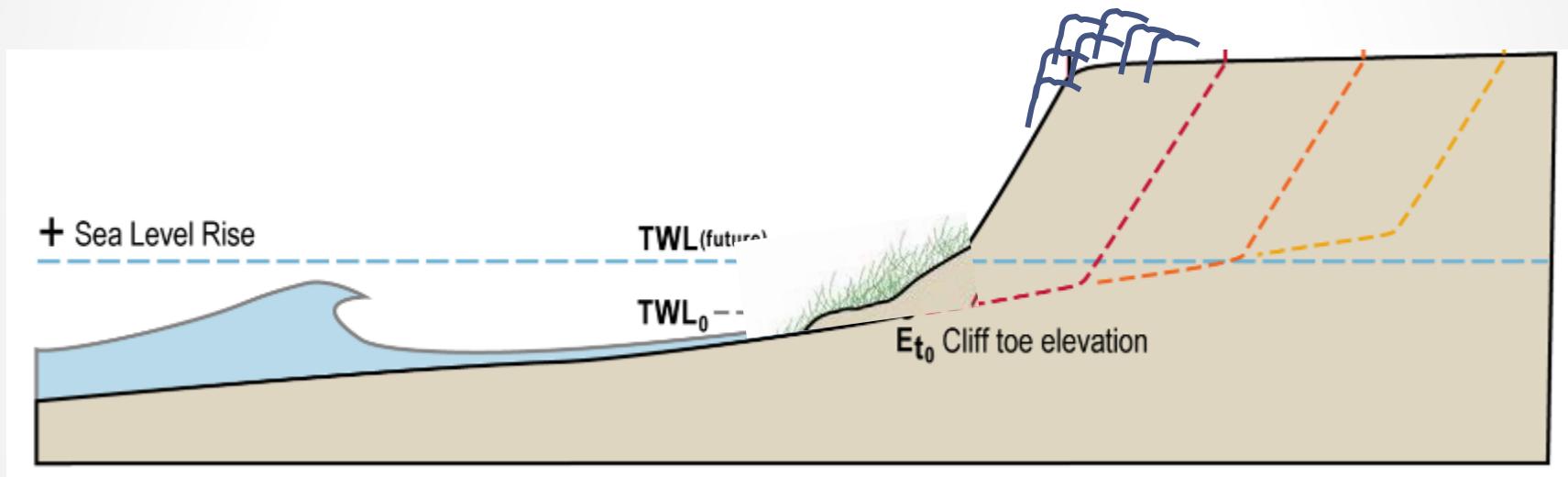
Natural Dune Loss and Regeneration

- Storm Induced Dune Loss- Leads to Regeneration



Iceplant Dominated Dune Failure

- Cliff Edge Formation and Storm Induced Failure



Combined Threats of Iceplant and Unmanaged Pathways



Iceplant Removal & Native Plantings

Native Plantings



Sand Nourishment

Sand Stabilization
and Deposition

Foredune Planting

Foredune Wrack
Placement

Public Access/Trail Management

- Provide well managed access ways
- Reduce direct lateral pathway of trails



Next - Restore fore-dune habitat as management strategy to reduce inland flooding threats

