PORT of SAN DIEGO
Environment

Sea Level Rise Ad Hoc Committee
Report to Environmental Advisory Committee

March 13, 2019

Assembly Bill 691

- Trustees of granted public trust lands
  - ✓ Assess of the impacts of Sea Level Rise
  - ✓ Conduct financial impact analysis
  - ✓ Submit a description of how trustee proposes to address sea level rise

2018 SLR Ad Hoc Committee Meeting Summary

September 18, 2018	**Review results of the Port's sea level rise vulnerability assessment**
November 13, 2018	**Receive feedback on a sea level rise adaptation framework**
December 6, 2018	**Help to inform options for a monitoring strategy**

2018 Sea Level Rise Ad-Hoc Committee

EAC Members

- Department of Navy
- Center for Sustainable Energy
- Port Tenants Association
- Shelter Island Marina
- US Fish and Wildlife

- - - - - - - - - - - - - - - -

- Southwest Wetlands Interpretive Association

Regional Agencies

- City of San Diego
- City of National City
- City of Chula Vista
- City of Imperial Beach
- City of Coronado
- SANDAG
- Airport Authority
- Coastal Commission

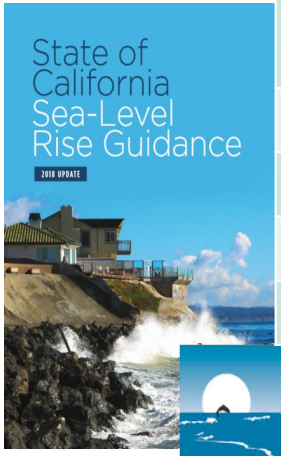
Advisors & Presenters

- Scripps Institution of Oceanography—Center for Climate Change Impacts and Adaptation
- Army Corps of Engineers
- United States Geologic Survey
- Tijuana River National Estuarine Research Reserve

Meeting 1:
Review results of the vulnerability assessment

PG1
PG [2]1

Sea Level Rise Projections for San Diego Bay



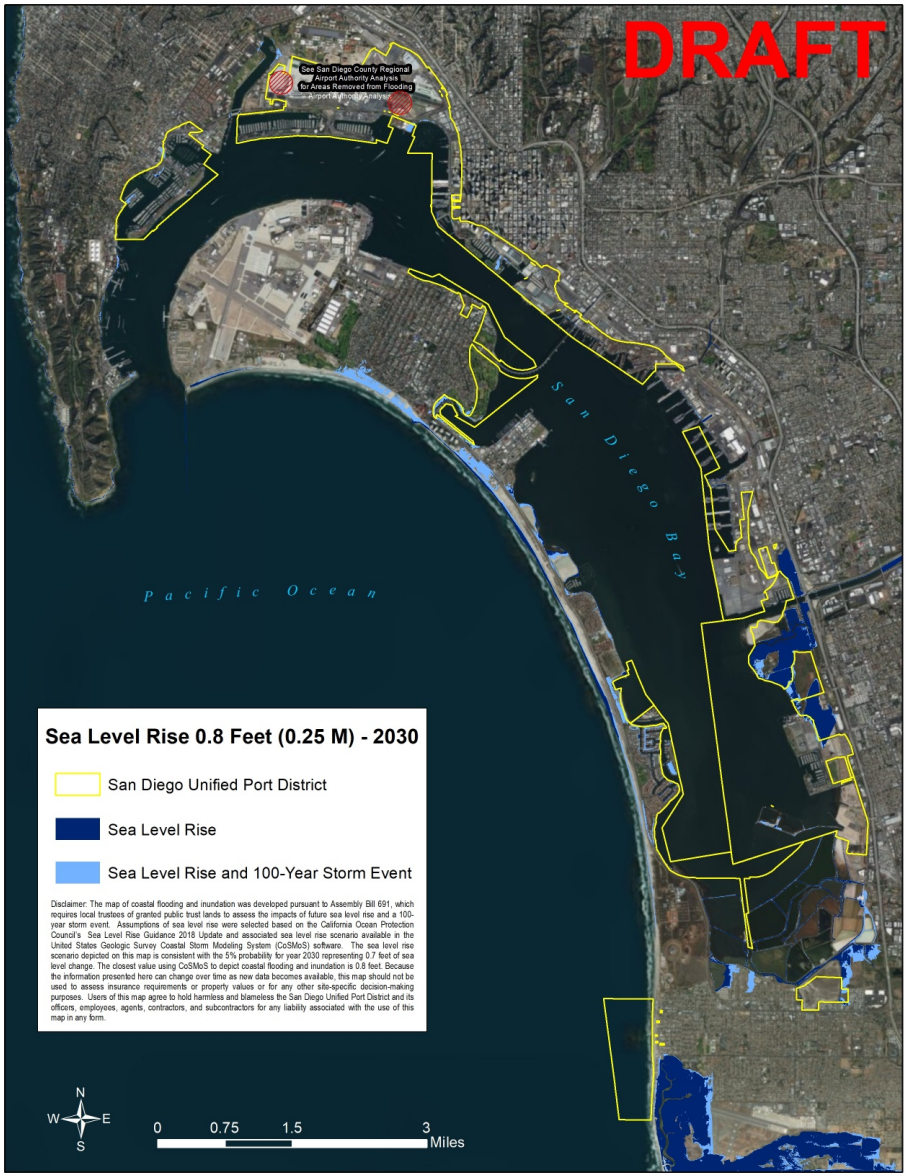
OCEAN PROTECTION COUNCIL

Feet (Meters) above 1991-2009 MSL	Median		Likely Range		1-in-20 Chance		1-in-200 Chance		Port Scenarios Using CoSMoS Model	
Year/Percentile	50% probability SLR meet or exceeds		67% probability SLR is between		5% probability SLR meets or exceeds		0.5% probability SLR meets or exceeds		Feet	Meters
	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	0.8	0.25
2030	0.5	0.15	0.4—0.6	0.12—0.18	0.7	0.21	0.9	0.28	1.6	0.5
2050	0.9	0.27	0.7—1.2	0.21—0.37	1.4	0.43	2.0	0.61	2.5	0.75
2100 (RCP 8.5)	2.6	0.79	1.8—3.6	0.55—1.10	4.5	1.4	7.1	2.16	4.9	1.5

Slide 6

PG1 Include cross walk to COSMOS intervals
Philip Gibbons, 2/28/2019

PG [2]1 Provide background on why we chose these?Not only time we will utilize projections
Philip Gibbons, 3/1/2019


DRAFT
See San Diego County Regional Airport Authority Analysis for Areas Removed from Flooding
San Diego Bay
Pacific Ocean
Sea Level Rise 0.8 Feet (0.25 M) - 2030
San Diego Unified Port District
Sea Level Rise
Sea Level Rise and 100-Year Storm Event
Disclaimer: The map of coastal flooding and inundation was developed pursuant to Assembly Bill 691, which requires local trustees of granted public trust lands to assess the impacts of future sea level rise and a 100-year storm event. Assumptions of sea level rise were selected based on the California Ocean Protection Council's Sea Level Rise Guidance 2018 Update and associated sea level rise scenario available in the United States Geologic Survey Coastal Storm Modeling System (CoSMoS) software. The sea level rise scenario depicted on this map is consistent with the 5% probability for year 2030 representing 0.7 feet of sea level change. The closest value using CoSMoS to depict coastal flooding and inundation is 0.8 feet. Because the information presented here can change over time as new data becomes available, this map should not be used to assess insurance requirements or property values or for any other site-specific decision-making purposes. Users of this map agree to hold harmless and blameless the San Diego Unified Port District and its officers, employees, agents, contractors, and subcontractors for any liability associated with the use of this map in any form.
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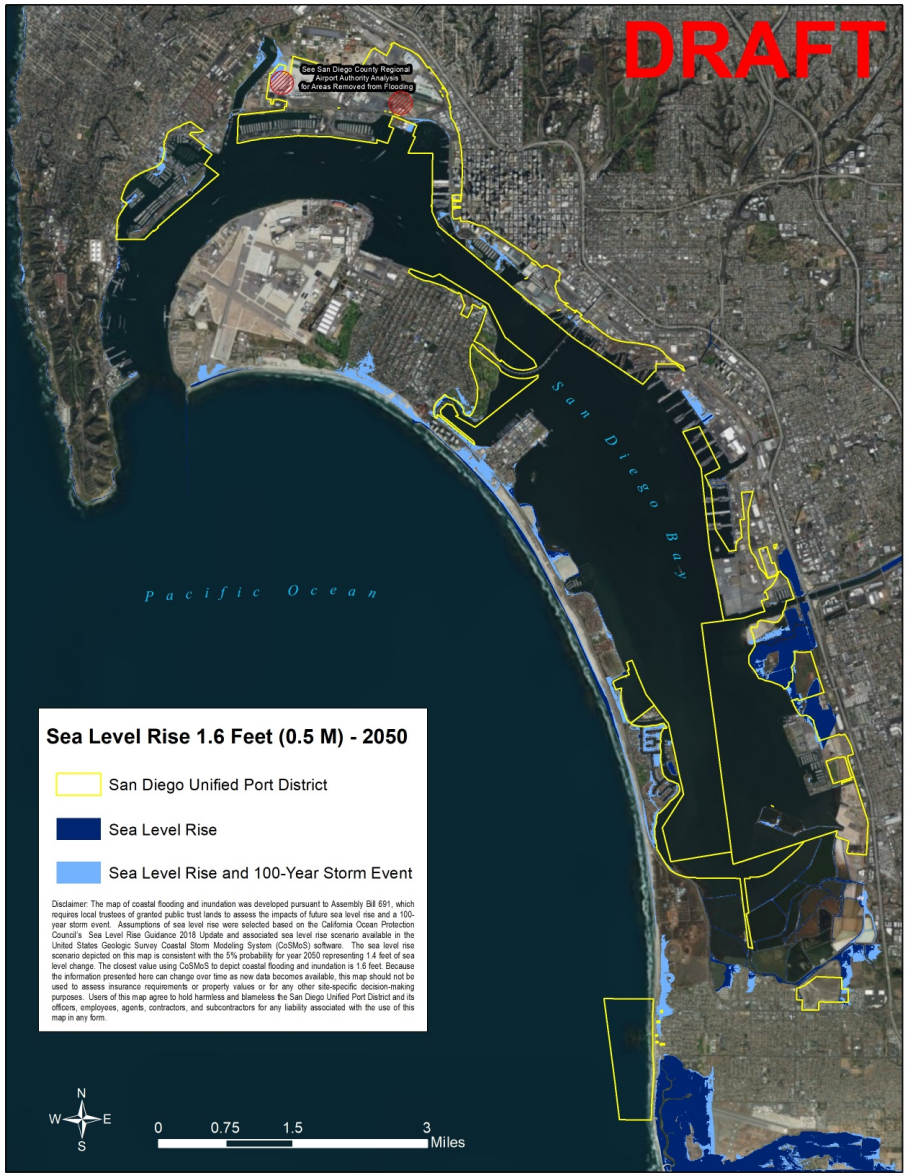
DRAFT
See San Diego County Regional Airport Authority Analysis for Areas Removed from Flooding
San Diego Bay
Pacific Ocean
Sea Level Rise 1.6 Feet (0.5 M) - 2050
San Diego Unified Port District
Sea Level Rise
Sea Level Rise and 100-Year Storm Event
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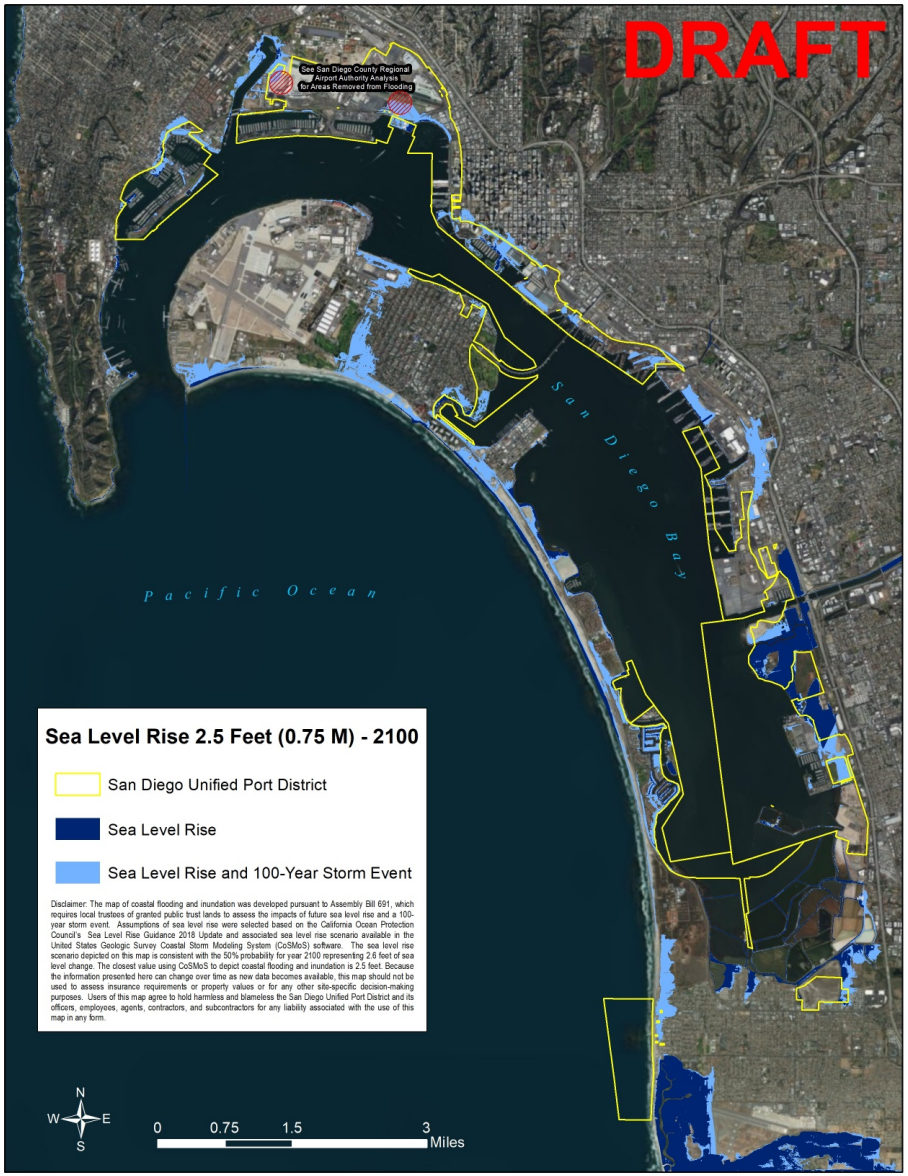
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See San Diego County Regional Airport Authority Analysis for Areas Removed from Flooding
San Diego Bay
Pacific Ocean
Sea Level Rise 2.5 Feet (0.75 M) - 2100
San Diego Unified Port District
Sea Level Rise
Sea Level Rise and 100-Year Storm Event
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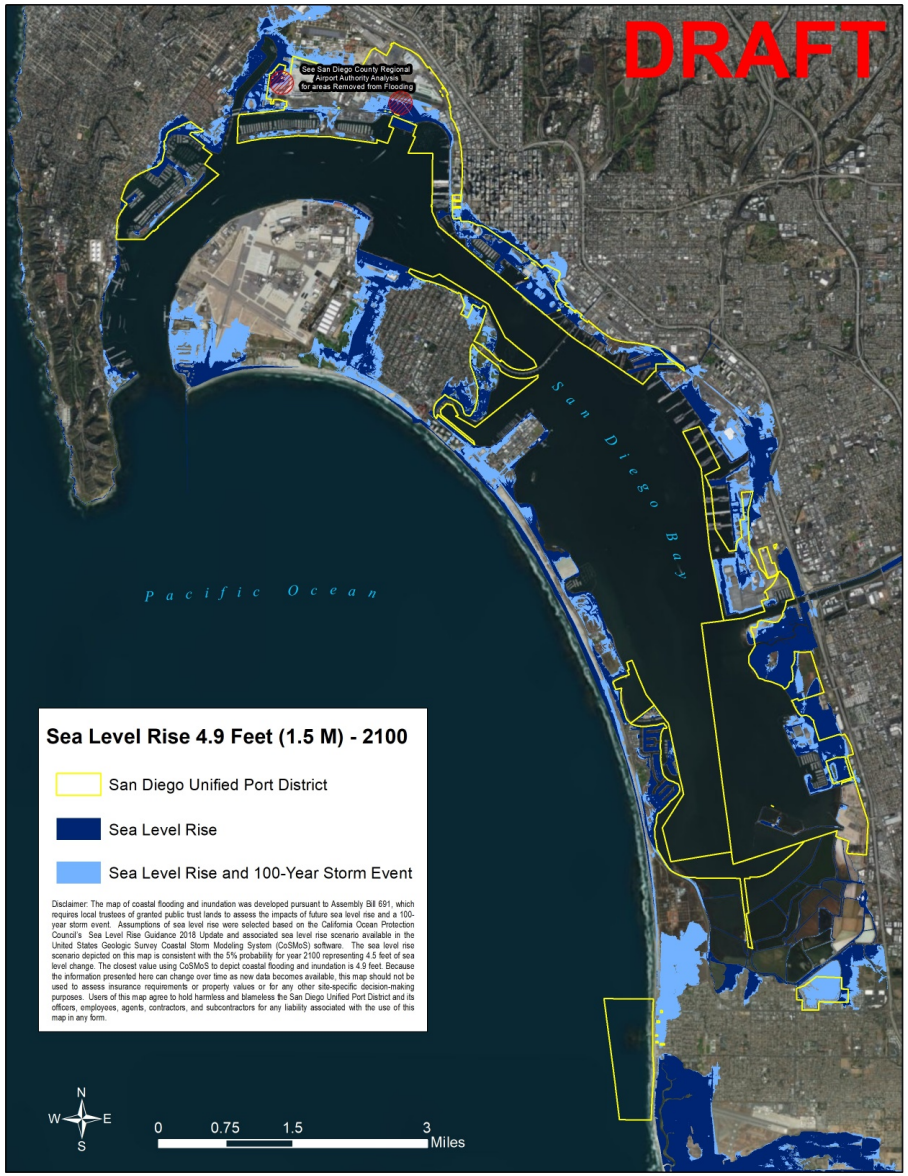
DRAFT
See San Diego County Regional Airport Authority Analysis for areas Removed from Flooding
San Diego Bay
Pacific Ocean
Sea Level Rise 4.9 Feet (1.5 M) - 2100
San Diego Unified Port District
Sea Level Rise
Sea Level Rise and 100-Year Storm Event
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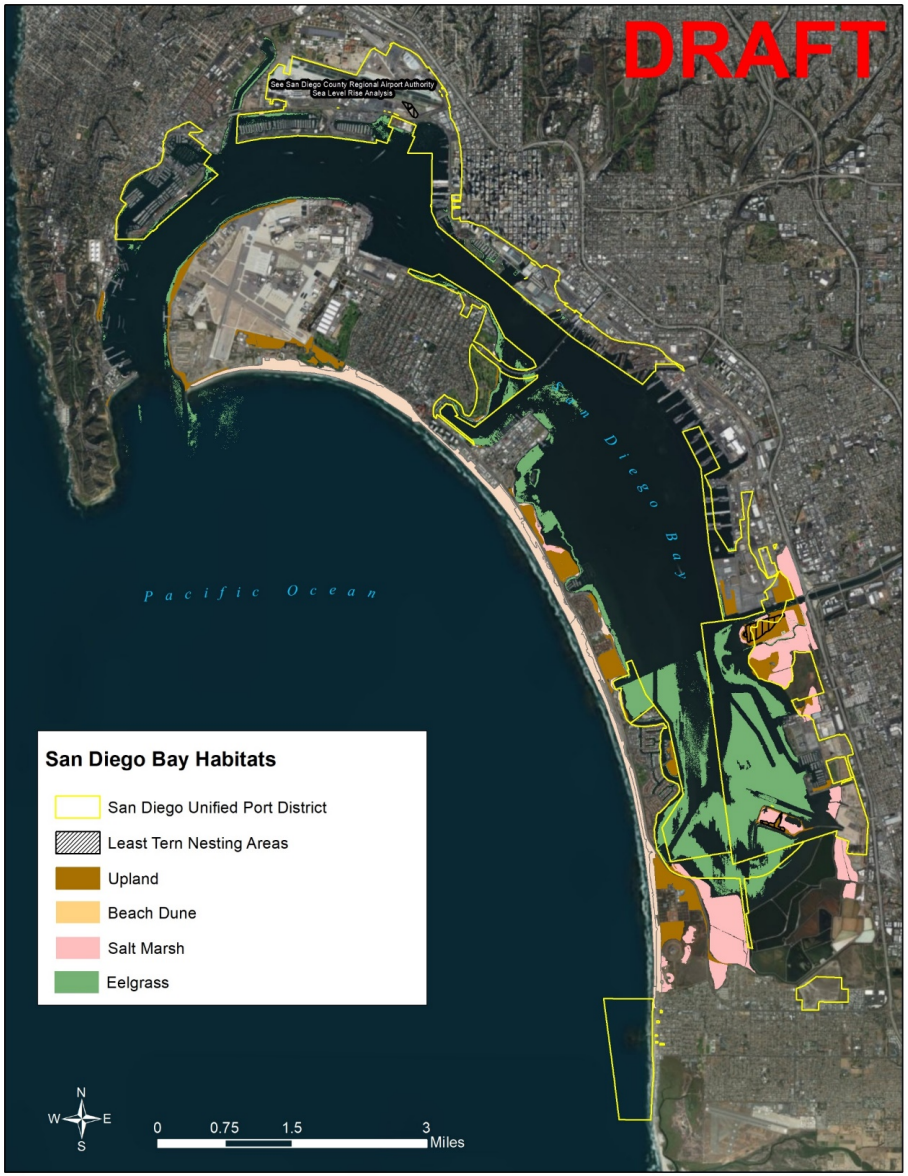
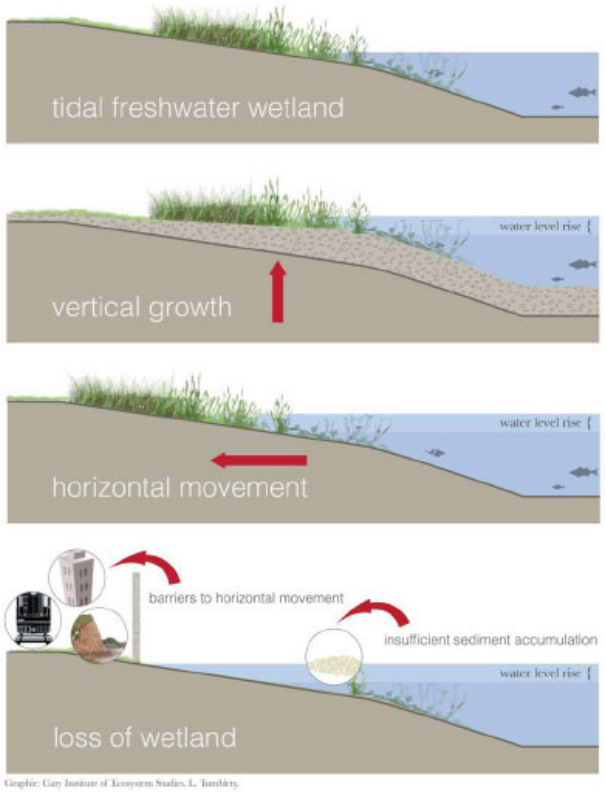
Vulnerability Results

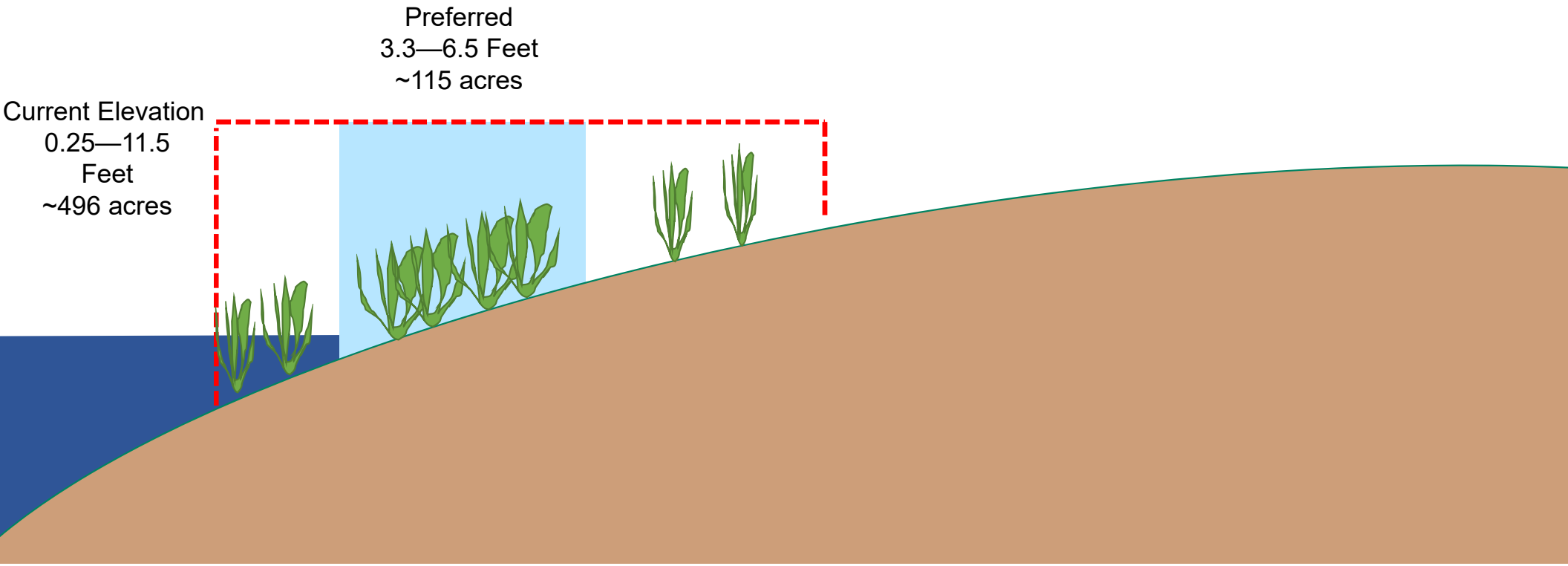
Asset	Total Quantity	Exposed to Daily Inundation				Exposed to 100-Year Storm			
		0.25 m	0.50 m	0.75 m	1.50 m	0.25 m	0.50 m	0.75 m	1.50 m
Transport Facilities (linear feet)	**350,390**	**0%**	**1%**	**3%**	**36%**	**2%**	**5%**	**17%**	**58%**
Roads (linear feet)	*233,891*	*1%*	*1%*	*2%*	*26%*	*2%*	*5%*	*16%*	*46%*
Rail (linear feet)	*85,203*	*0%*	*0%*	*0%*	*57%*	*0%*	*0%*	*12%*	*83%*
Bikeways (linear feet)	*31,297*	*1%*	*2%*	*10%*	*55%*	*10%*	*17%*	*34%*	*82%*
Marine Terminals (acres)	**233**	**1%**	**1%**	**1%**	**37%**	**1%**	**1%**	**9%**	**69%**
Building Stock (count)	**590**	**11%**	**11%**	**13%**	**46%**	**13%**	**18%**	**30%**	**67%**
Stormwater Management (count)	**458**	**4%**	**4%**	**7%**	**45%**	**5%**	**14%**	**30%**	**66%**
Wastewater Management (count)	**24**	**67%**	**67%**	**71%**	**88%**	**71%**	**71%**	**79%**	**96%**
Sewer Lifts (count)	***10***	*20%*	*20%*	*30%*	*70%*	*30%*	*30%*	*50%*	*90%*
Sanitary Pump Outs (count)	***14***	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*
Contaminated Sites (count)	**15**	**20%**	**20%**	**27%**	**47%**	**20%**	**27%**	**40%**	**60%**
Park & Beach Areas (acres)	**155**	**7%**	**8%**	**11%**	**49%**	**11%**	**16%**	**30%**	**73%**
Beach Accessible Areas (acres)	***11***	*71%*	*75%*	*80%*	*93%*	*79%*	*83%*	*90%*	*95%*
Parks (acres)	***144***	*3%*	*3%*	*6%*	*45%*	*6%*	*11%*	*25%*	*72%*
Boating facilities (count)	**6**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Fuel Docks (count)	***3***	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*
Boat Launch Ramps (count)	***3***	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*
Ecosystems & Critical Species	**54**	**6%**	**11%**	**13%**	**35%**	**13%**	**16%**	**32%**	**47%**
Least Tern Habitat (acres)	***54***	*6%*	*11%*	*13%*	*35%*	*13%*	*16%*	*32%*	*47%*



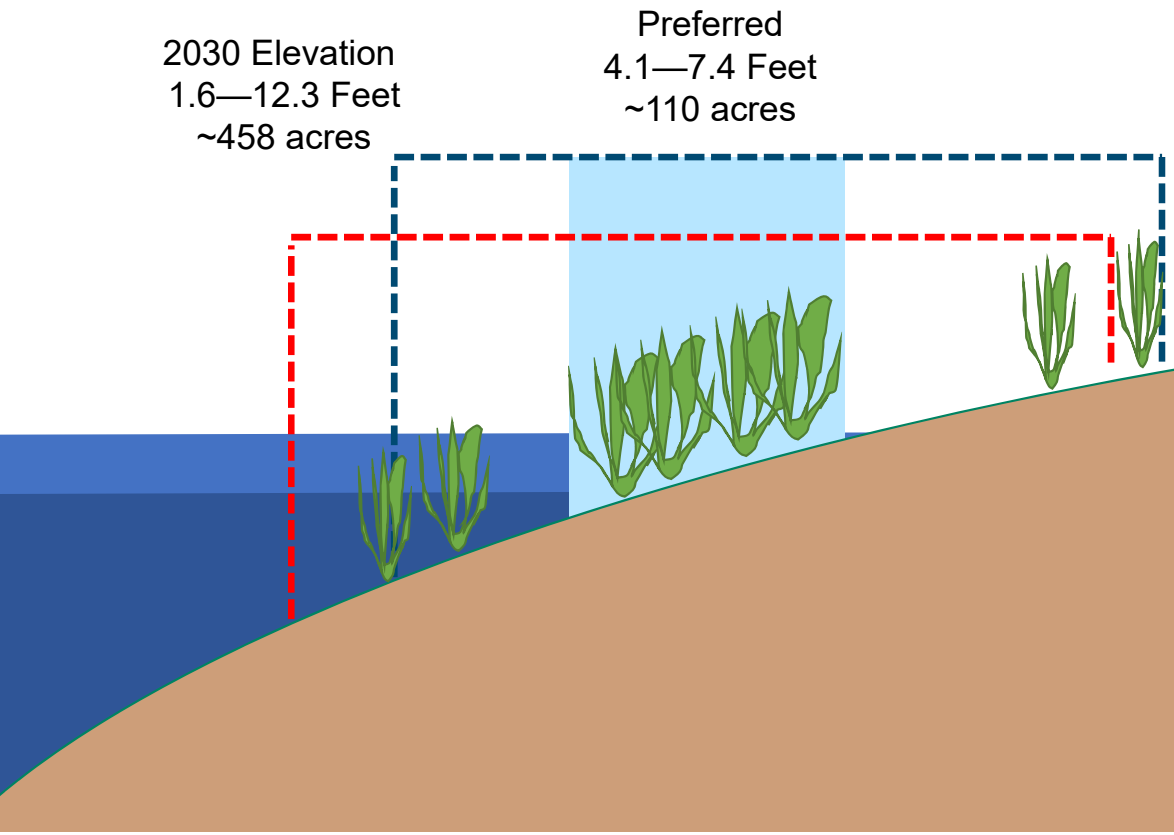


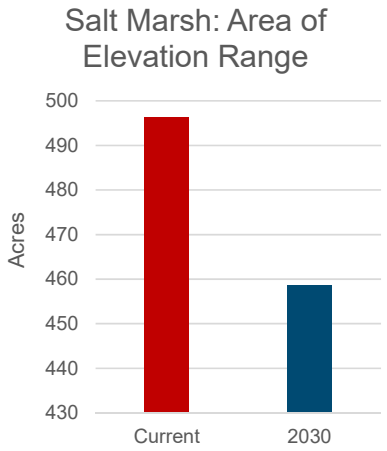
Graphic: Cary Institute of Ecosystem Studies, L. Tumbiolo

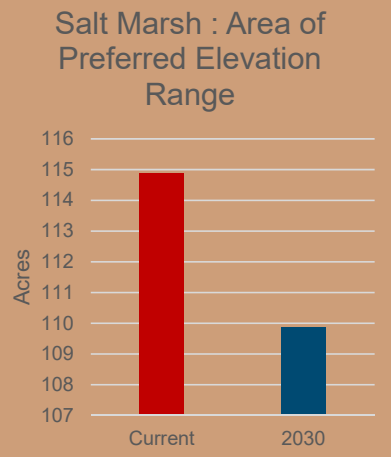
Salt Marsh—Current



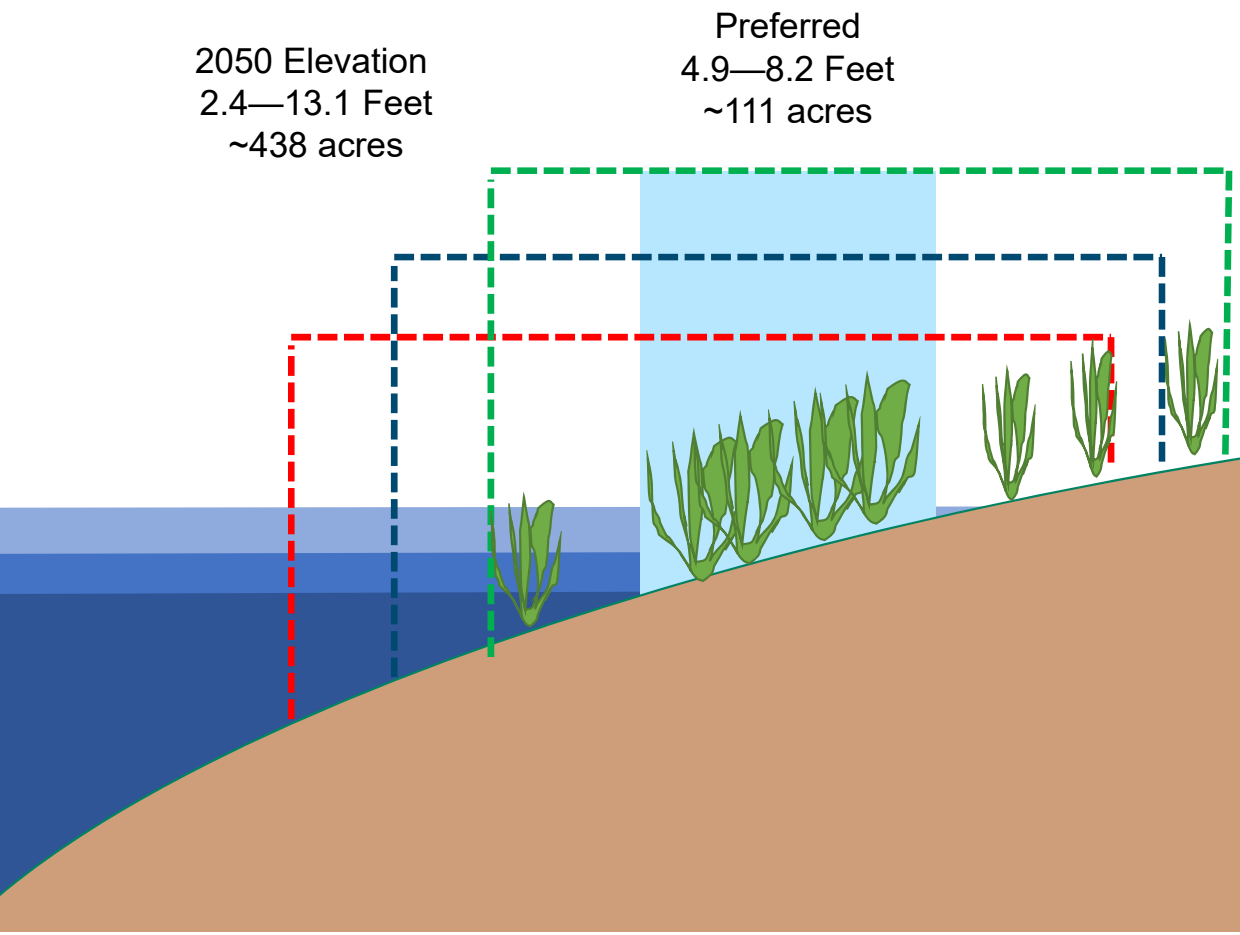
Salt Marsh—2030 High (0.8 Feet)

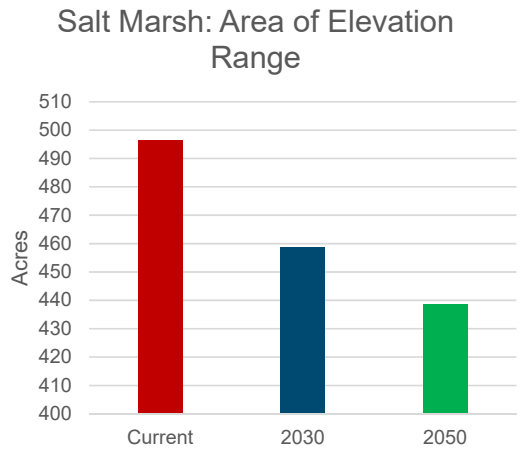


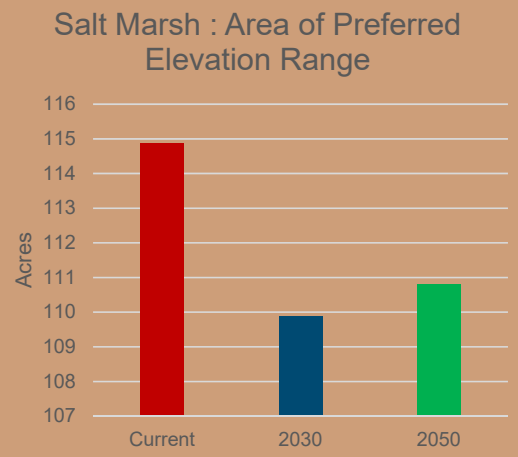




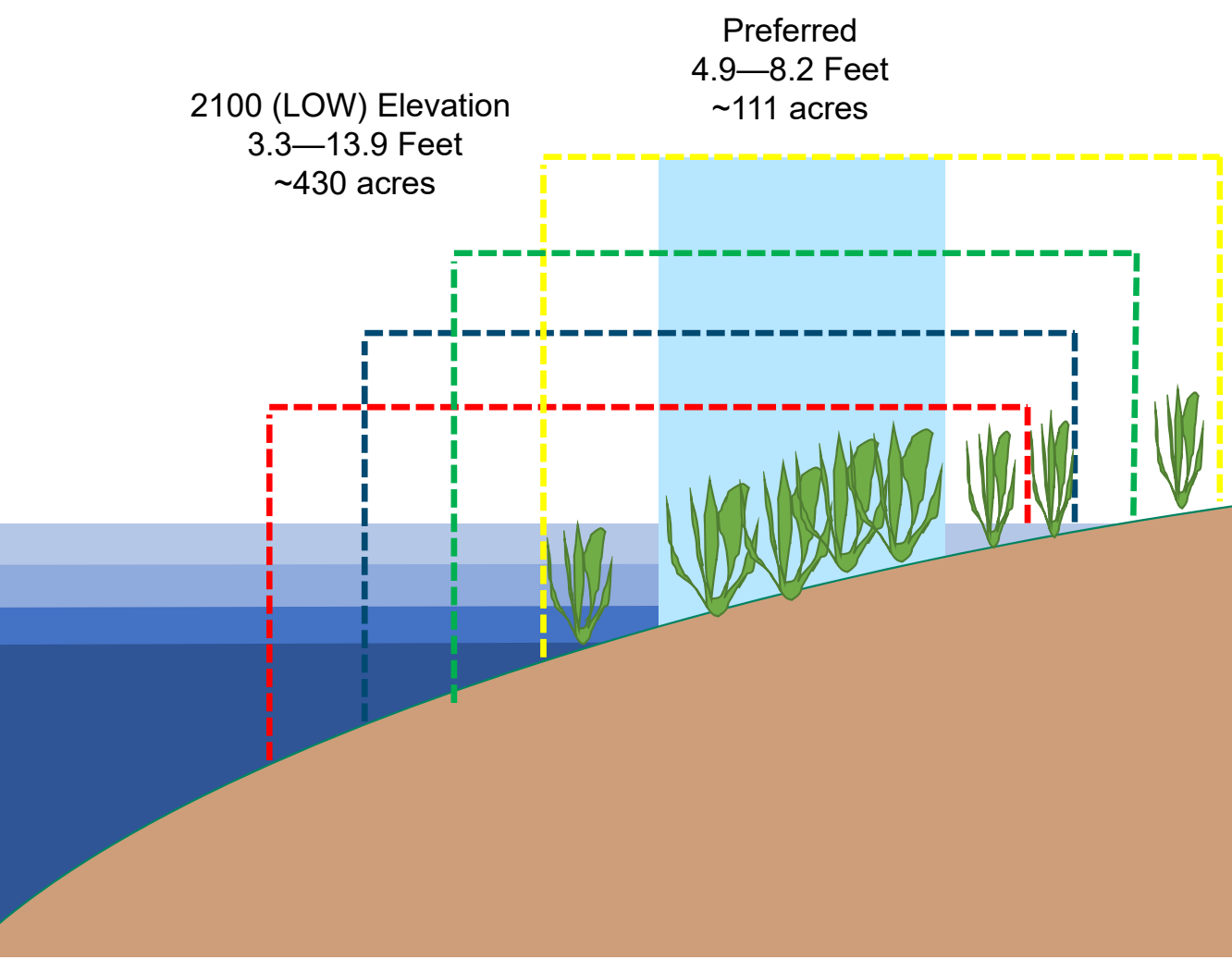
Salt Marsh—2050 (1.6 feet)

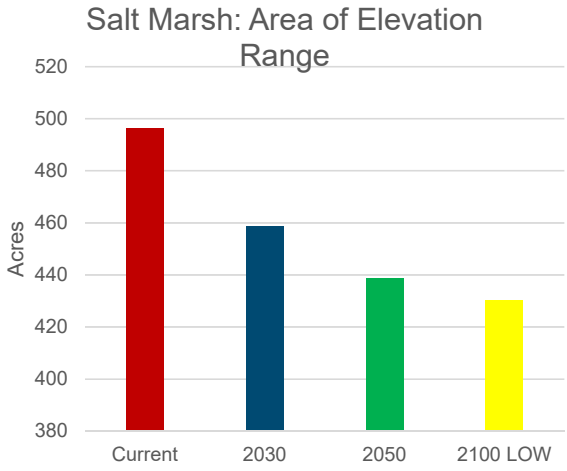


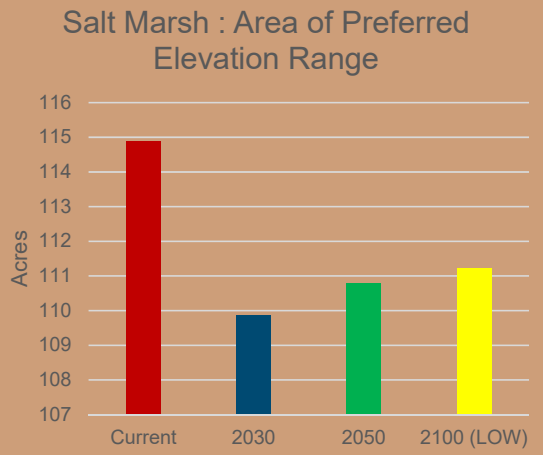




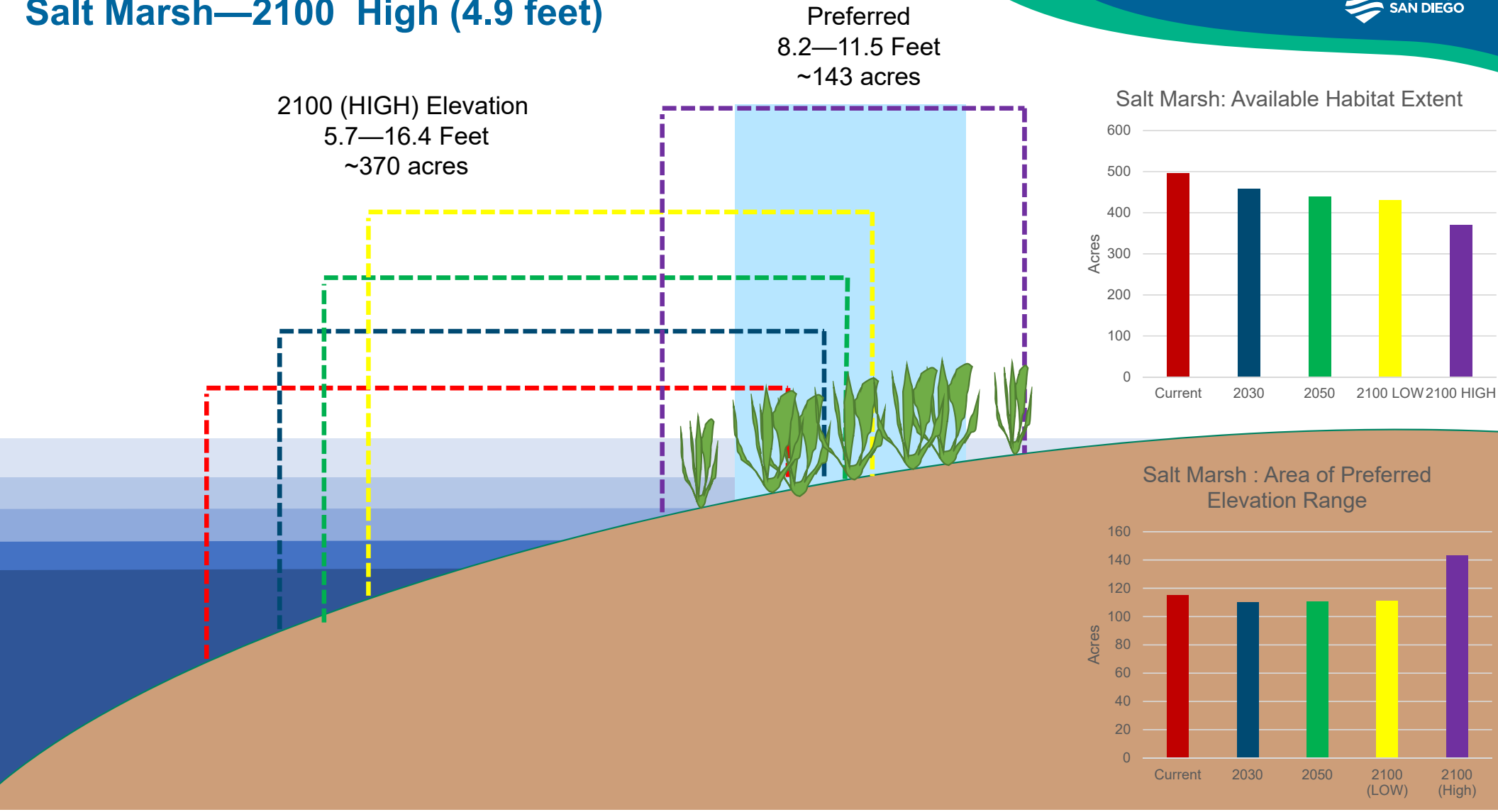
Salt Marsh—2100 Low (2.5 feet)



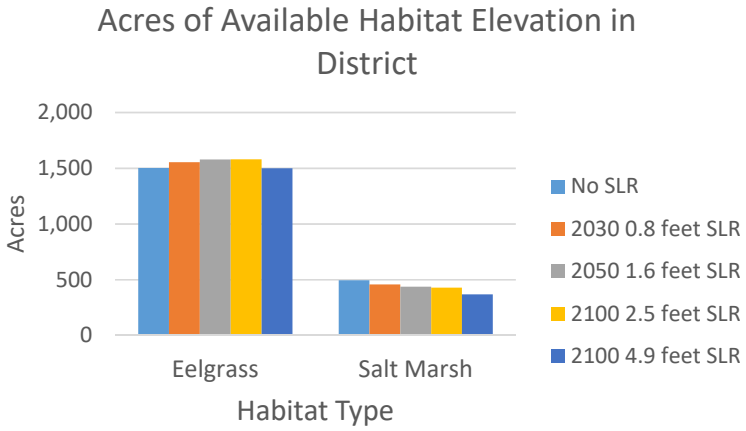


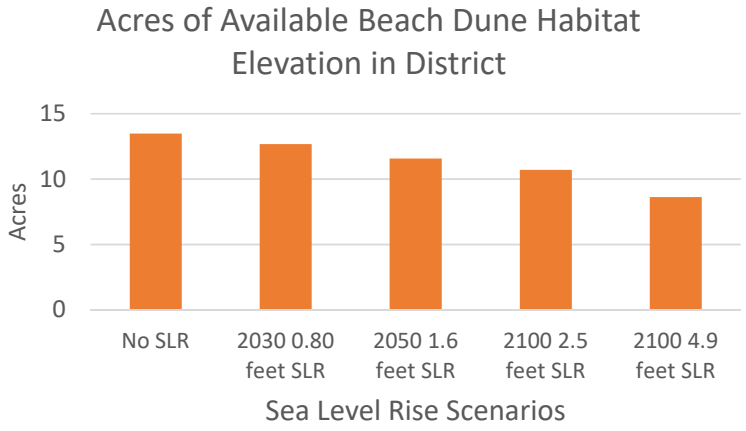


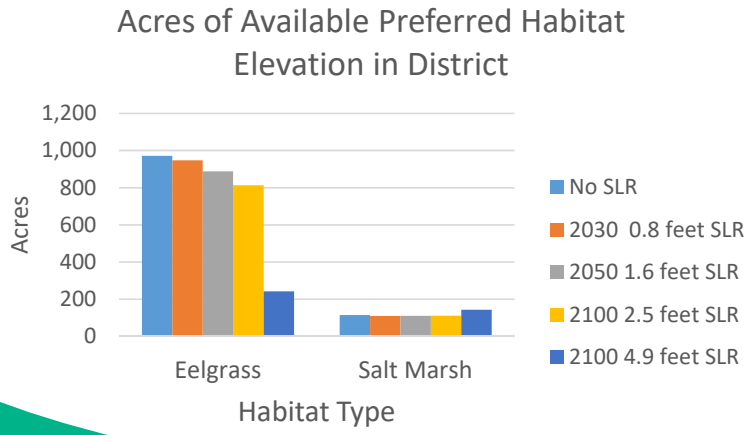
Salt Marsh—2100 High (4.9 feet)

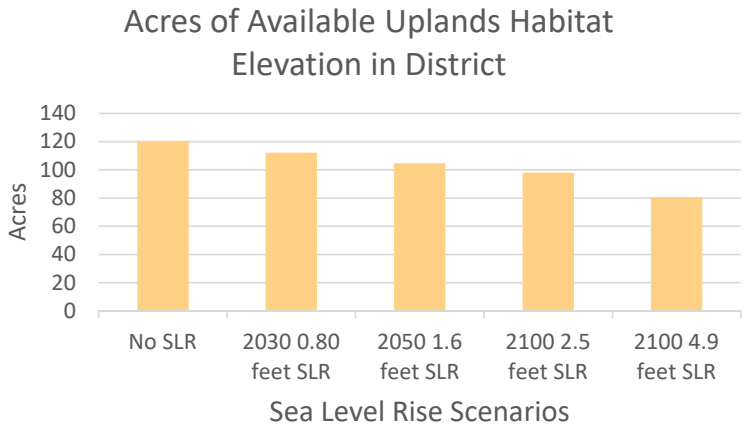


Habitat Analysis



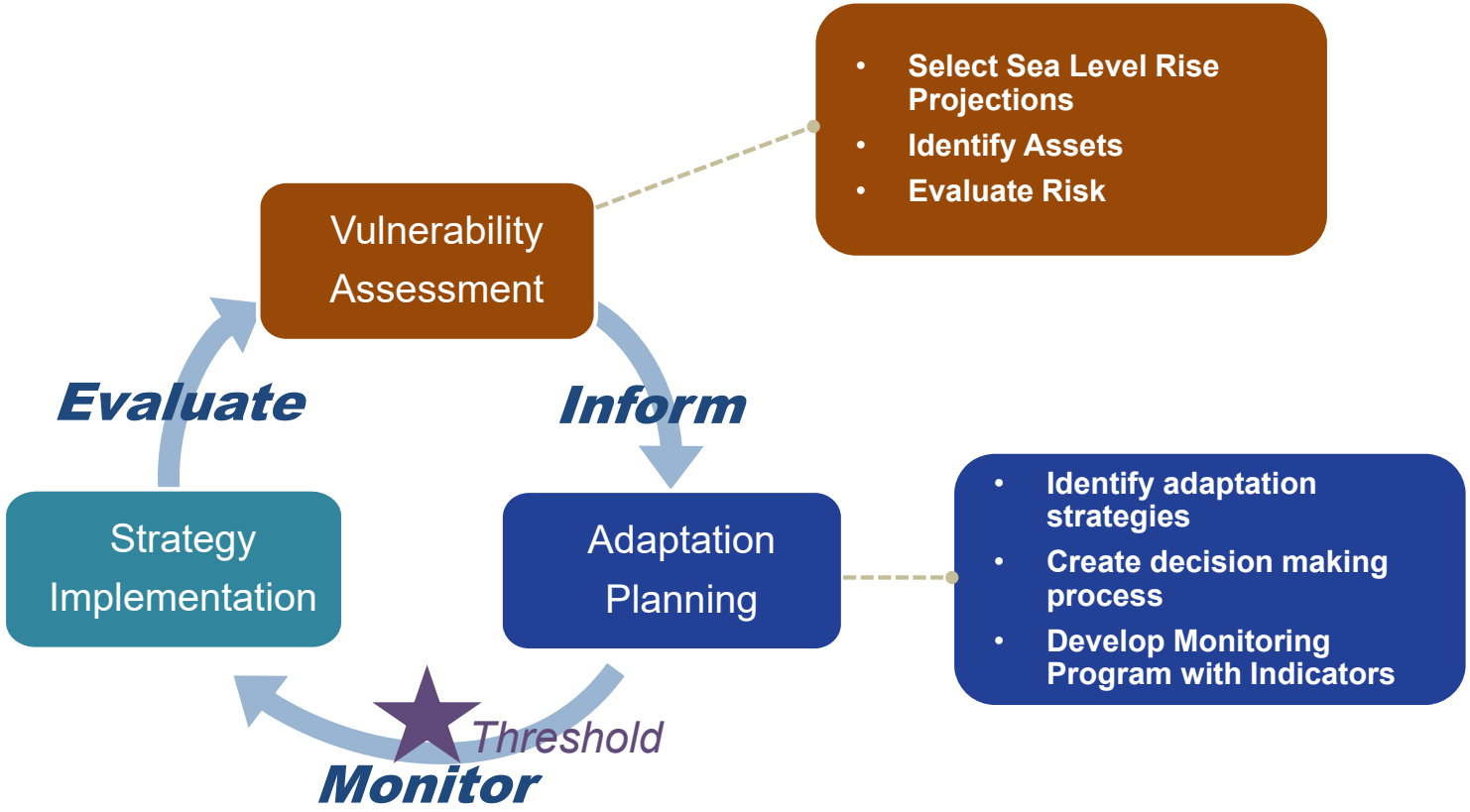






Meeting 2:
Receive Feedback on Sea Level Rise Framework

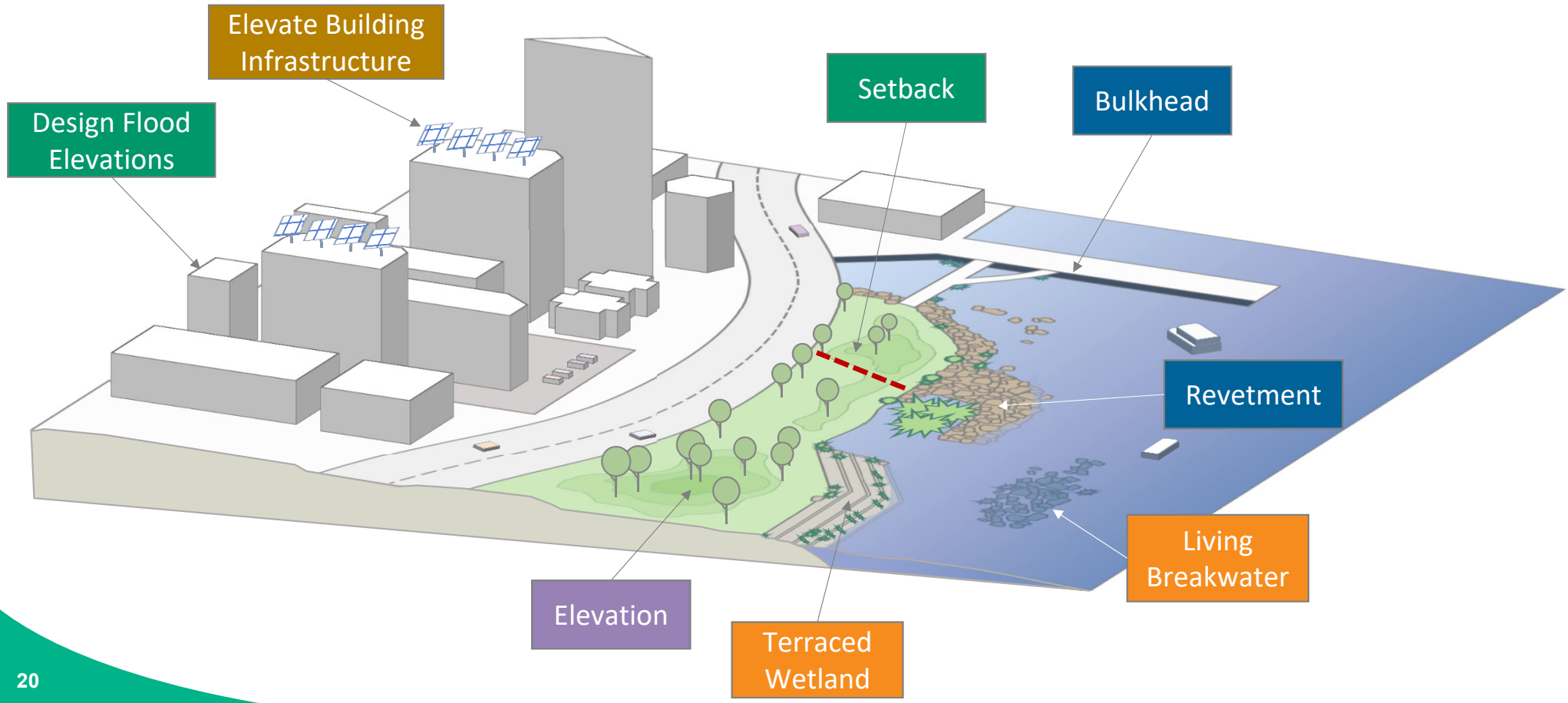
Sea Level Rise Planning Framework



Adaptation Strategies

	Policy	Nature-Based	Shoreline Infrastructure	Facilities
Protect	• Cluster New Development • Encourage Natural Solutions	• Build dikes with habitat value • Living shorelines	• Bulkheads • Embankments/Levees • Floodwalls • Revetments • Groins	• Floodwalls • Flood proofing
Accommodate	• Allow Temporary and Occasional Flooding in Open Space • Design Flood Elevations	• Beach and sediment nourishment • Habitat Restoration • Living Breakwater	• Internal Drainage Systems • Floodable Open Spaces • Cobble Nourishment • Beach Dewatering	• Permeable Pavers • Elevate Structures and infrastructure • Floodable Parking Structures
Adjust	• Setbacks • Modify Redevelopment in At-Risk Locations	• Allow habitat migration • Create buffers	• Beach Nourishment	• Relocate Critical Facilities

Visualizing Sea Level Rise Adaptation Strategies



Decision-Making Process

Step 1.

Identify Suitable Adaptation Strategies

Which strategies address the impacts of concern?

Step 2.

Identify Benefits and Limitations

Qualitative/Quantitative Description

Step 3.

Evaluate Feasibility

Can the strategies technically, financially, and legally be implemented?

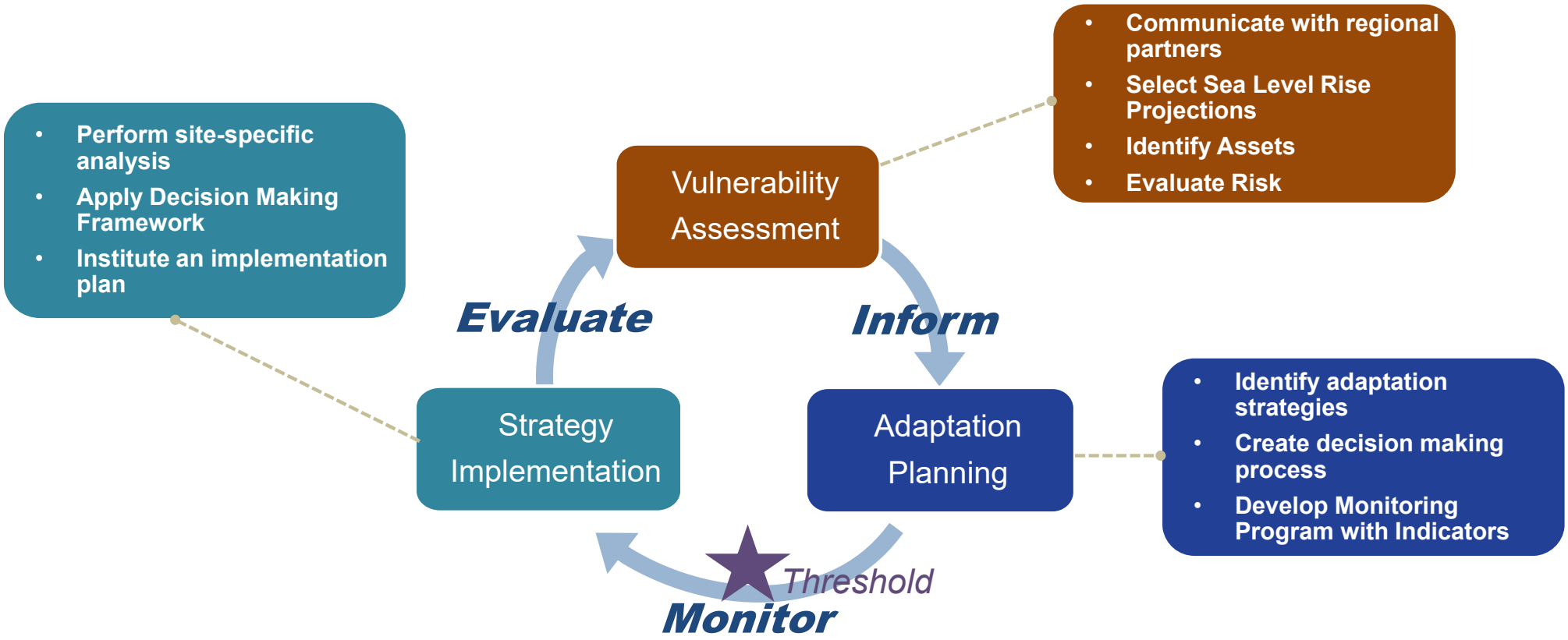
Step 4.

Evaluate Appropriateness

Are the strategies consistent with policy and plans? Politically appropriate? Proportional to impacts?

Suitable Adaptation Strategies

Sea Level Rise Planning Framework



Sea Level Rise Approach

Meeting 3:
Receive Feedback on the Sea Level Rise Framework

Monitoring Indicators

WATER

- Mean Sea Level
- Waves
- Tide Levels
- Frequency of Storms

NATURAL

- Habitat
  - Types
  - Health
  - Extent
  - Migration
- Topography
- Water depth

BUILT

- Flooding Frequency
- Cost of Response
- Performance of Flood Defense Infrastructure

Next Steps

Next Steps

- Financial impacts analysis
- Work with Scripps Institution of Oceanography to deploy wave sensors in San Diego Bay
- Identify near-term and long-term actions
- Finalize draft report
- Presentation to the Board of Port Commissioners

Discussion