Sea Level Rise:

Rising Tides at Giacomini Wetlands

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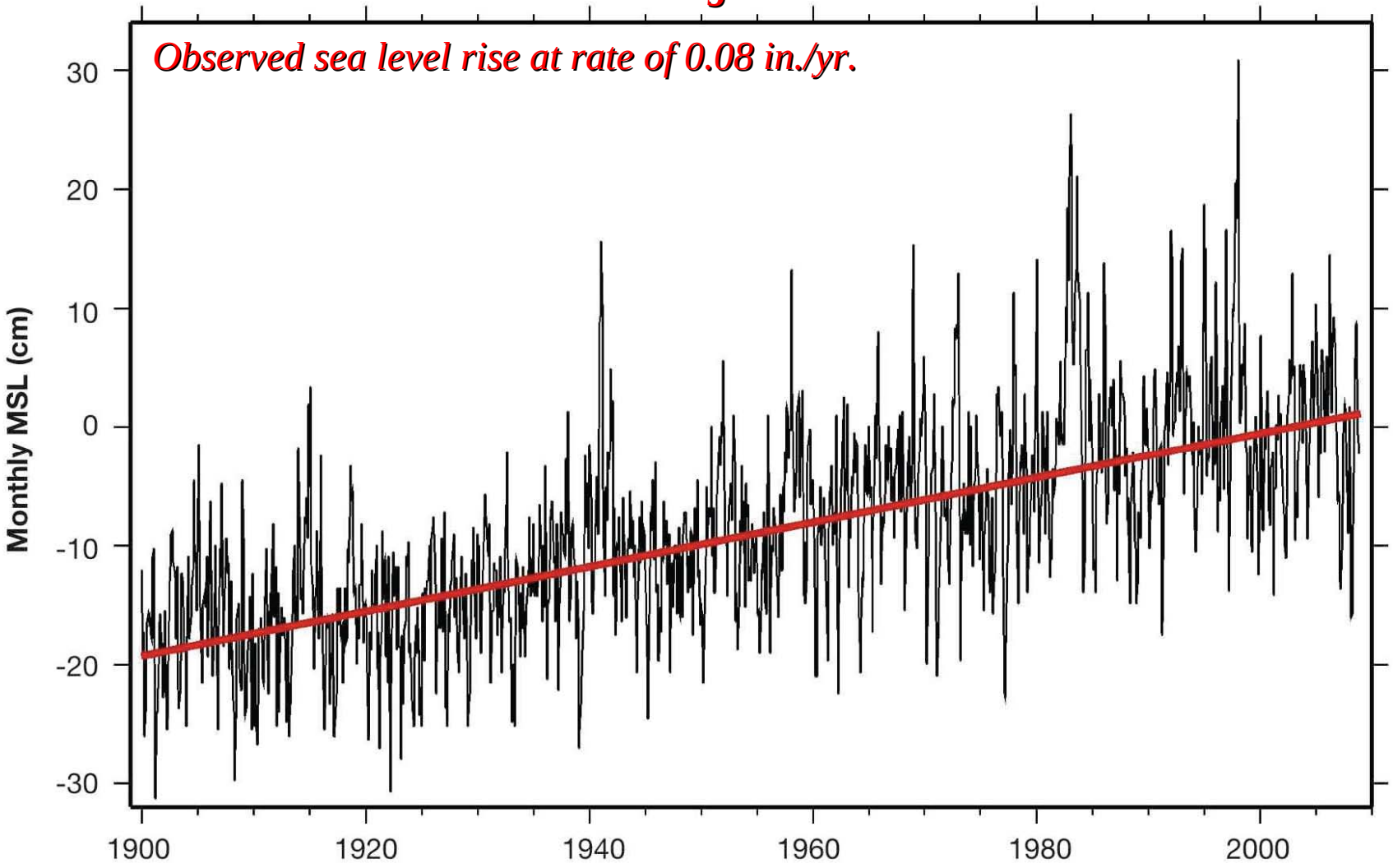
•Photo by: R. Campbell

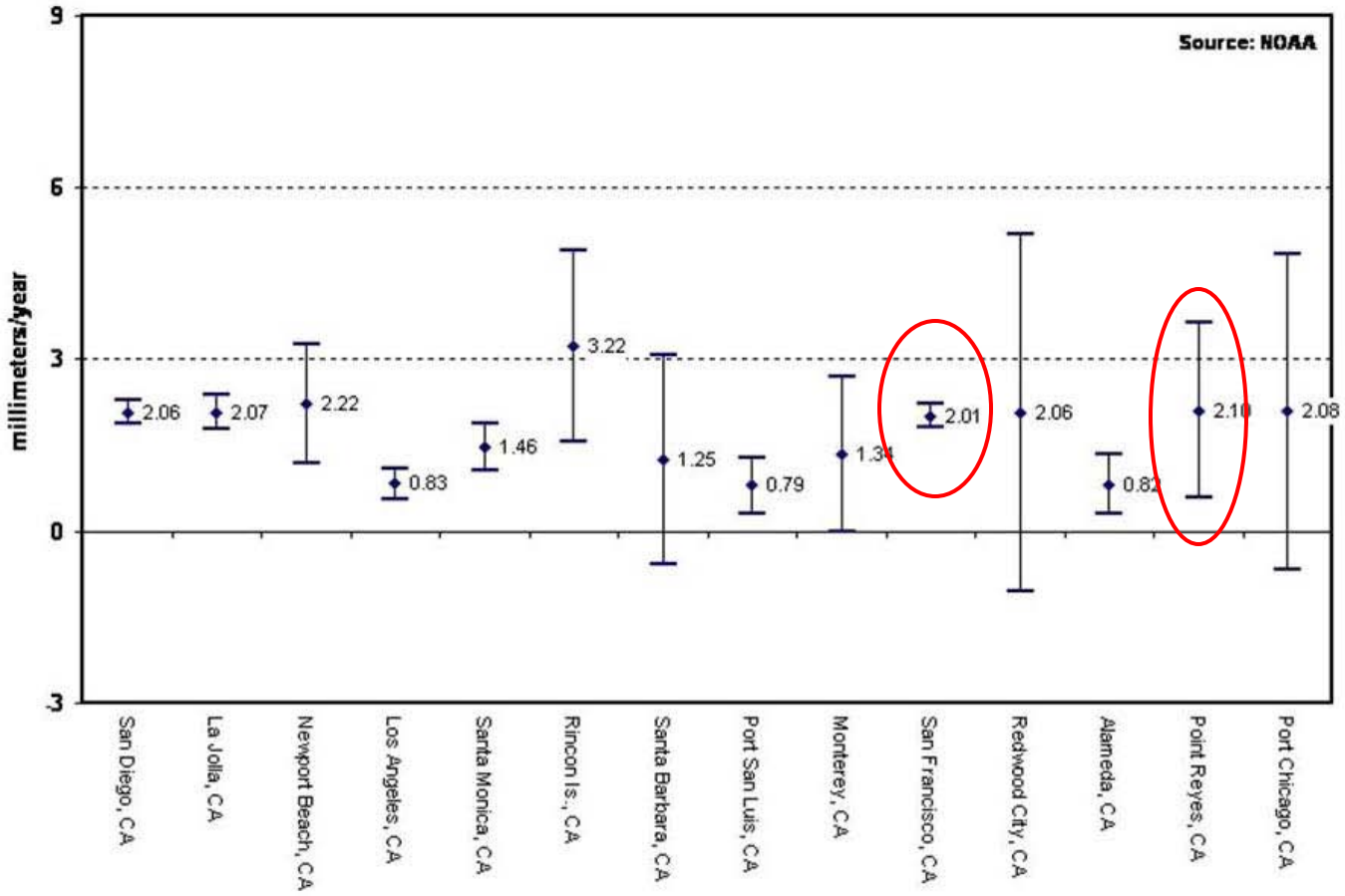
Sea Level Rise is a reality - Demonstrated in historical long term records

The Presidio's Fort Point Tide Gage :



As San Francisco goes, so goes Tomalas Bay

NOS Estimates the historic rates of sea level rise: Point Reyes tides historically rose at 2.1 mm/year



Magnitude and confidence limits of trends for southern Pacific coast NOS tide stations. (NOS 2009, http://tidesandcurrents.noaa.gov/sltrends/index.shtml).

2007 Estimates:

- *Scientists agree that rate of Sea Level Rise is accelerating*
- *The global rate of acceleration continues to be debated*

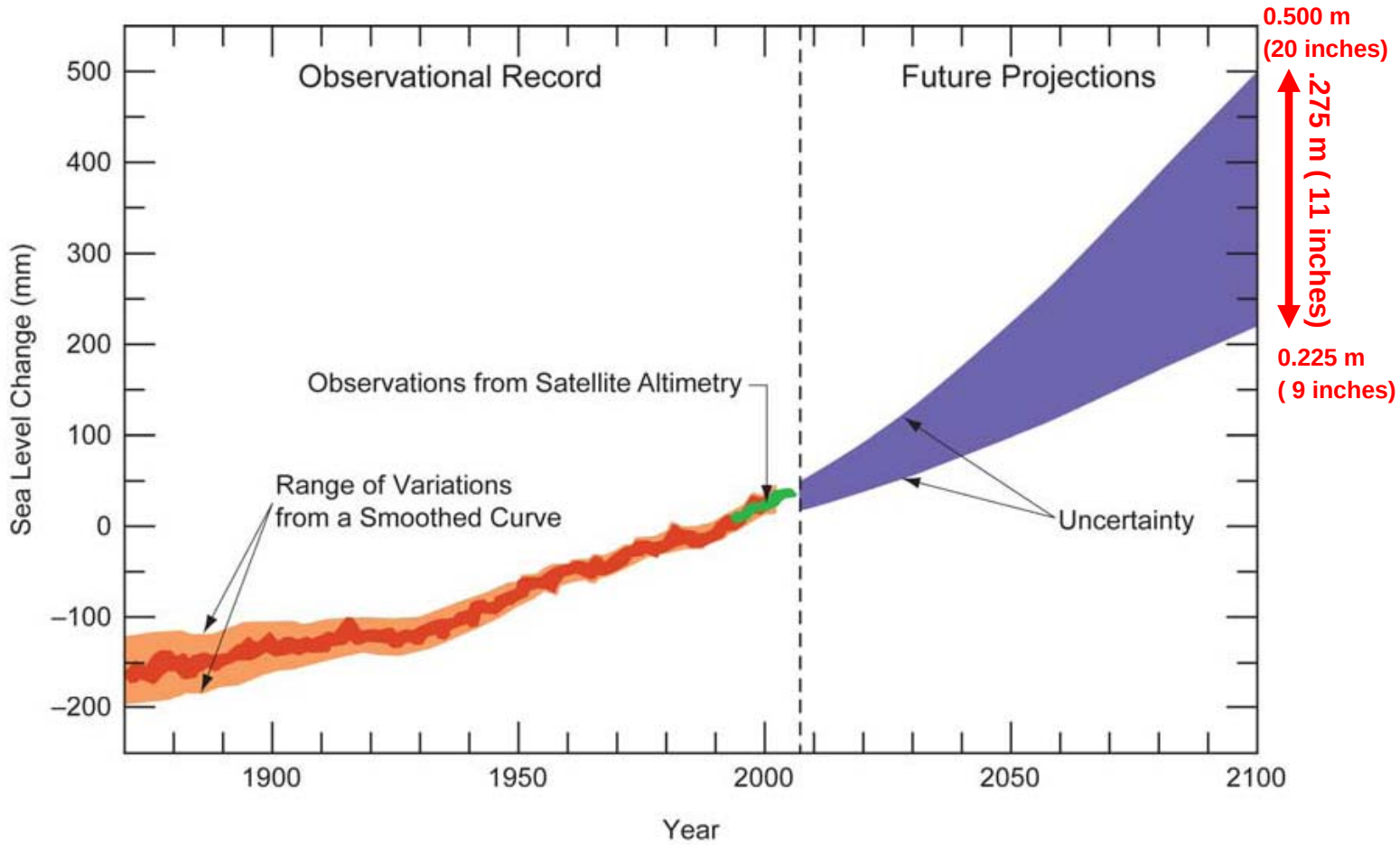


Figure B-10. Illustration of global mean sea level (deviation from the 1980-1999 mean) as observed since 1870 and projected for the future. The future projections have been calculated independently from the observations (after IPCC 2007a, FAQ 5.1, Figure 1).

Source: USACE, 2009 Technical Report: EC1165-2-221.

2100 sea level rise projections are growing in range and value.

EC 1165-2-211
1 Jul 09

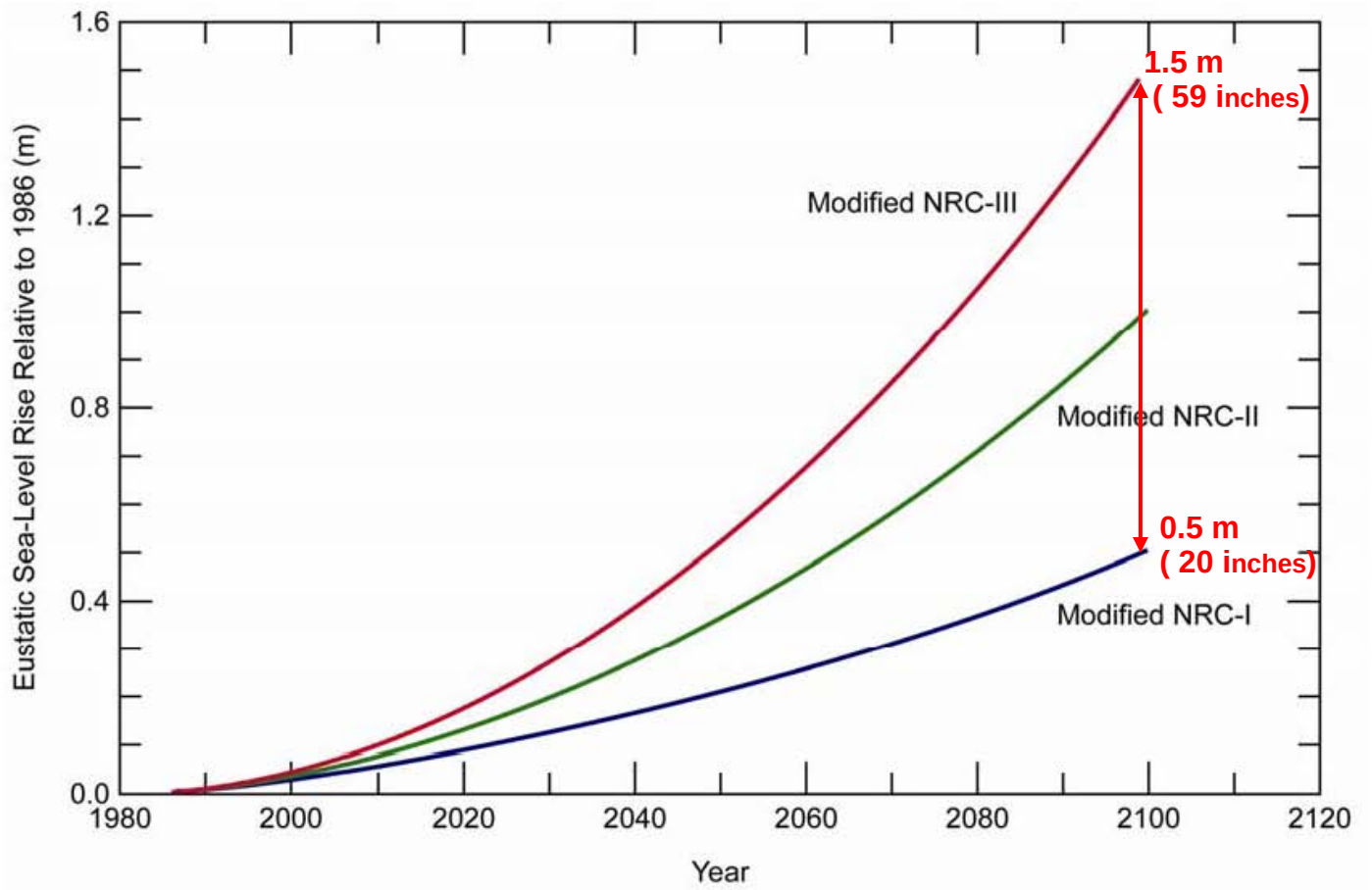
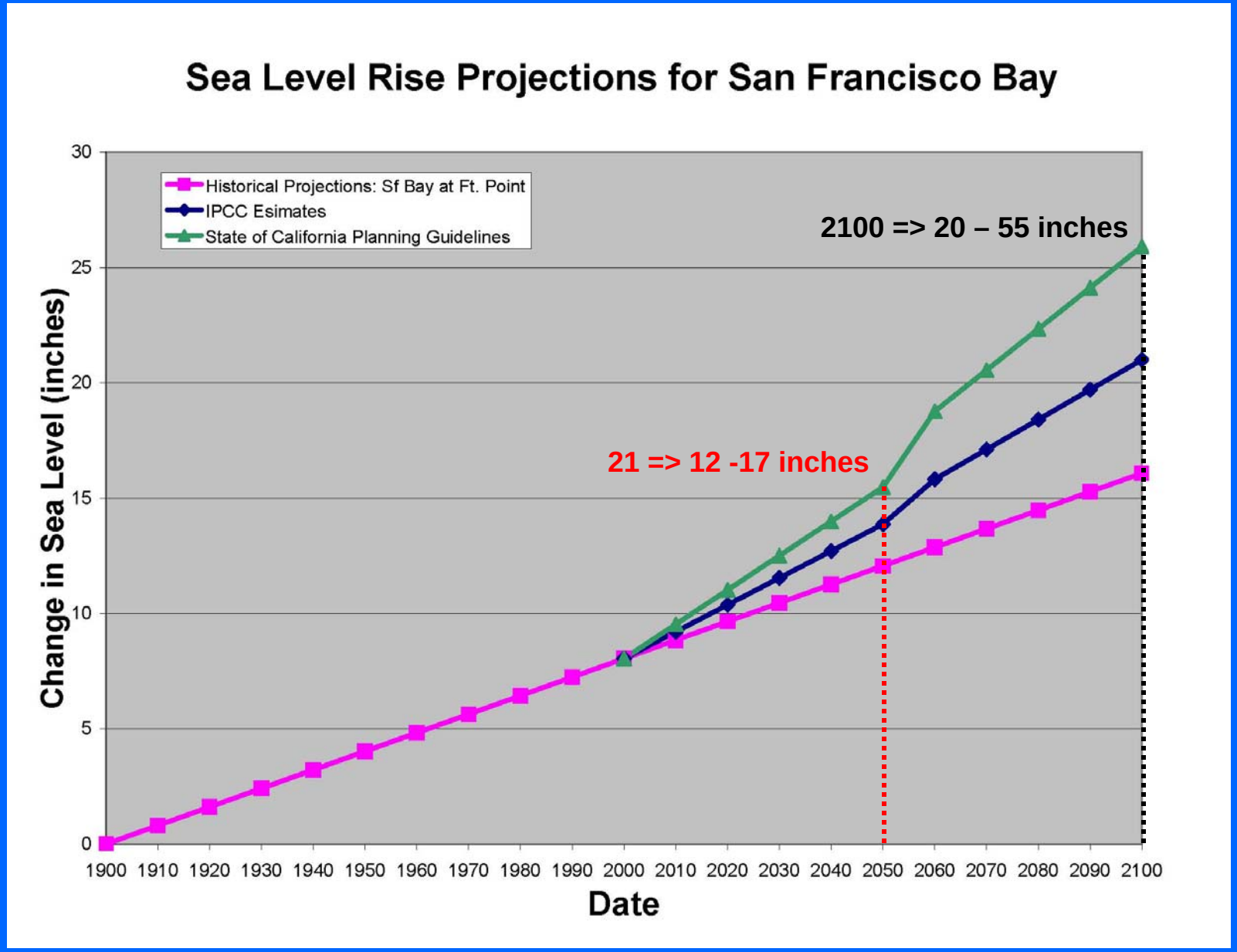


Figure B-9. Scenarios for Eustatic Sea-level Rise (based on updates to NRC 1987 equation).

USACE requires project assessment over this <u>range</u> of MSLs

State of California's 2009 MSL planning horizons also increased over 2007 IPCC estimates.



Habitat Zones: Giacomini Wetland Restoration Project

2009 Conditions

note: delieation based on relation between existing topography and tidal datums at NOAA gage at Inverness; does not account for local variations in tidal exchange.

2009 Wetland Habitats:

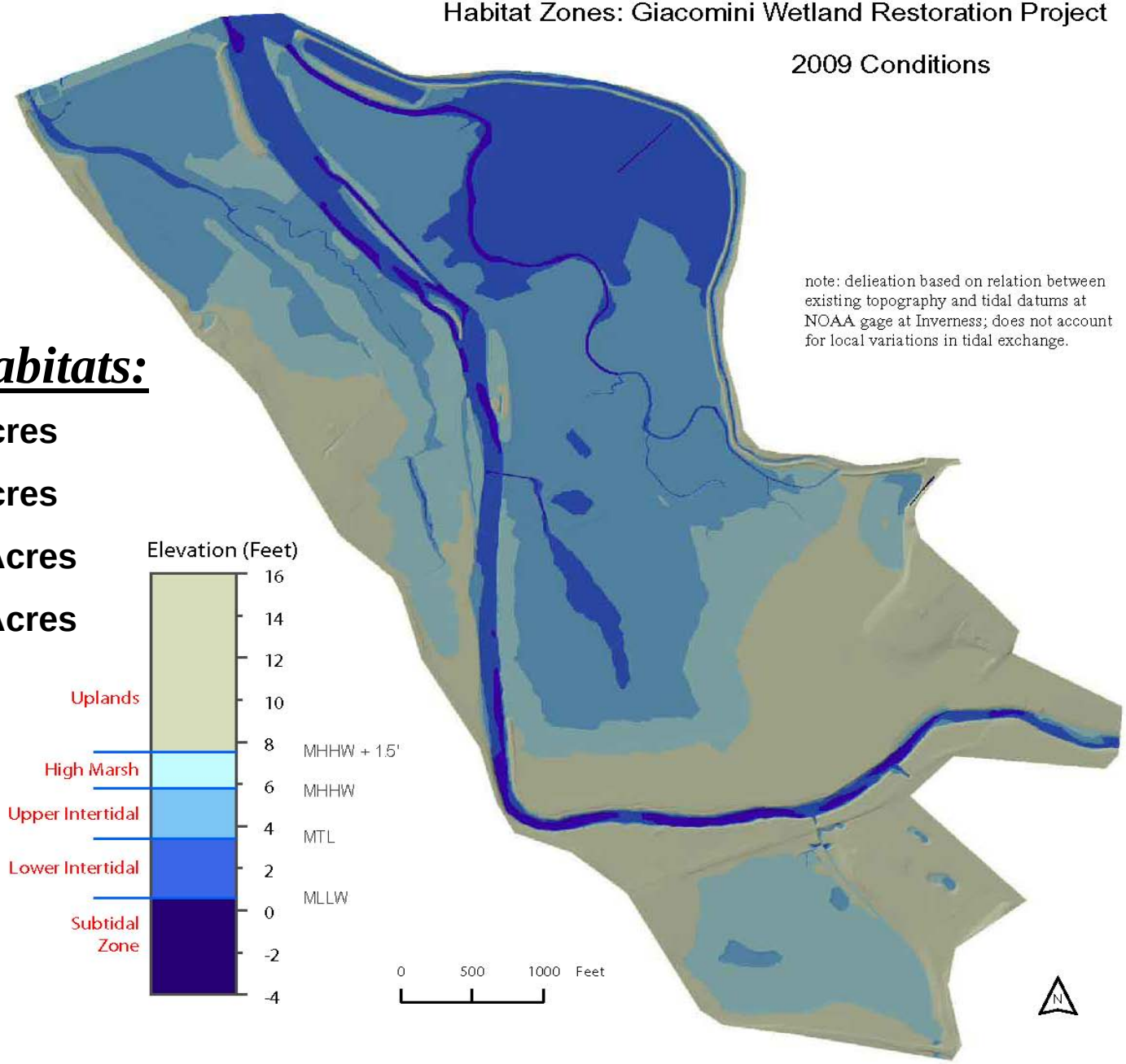
Subtidal: 12 Acres

Low Intertidal: 99 Acres

Upper Intertidal: 227 Acres

High marsh: 140 Acres

Total: 477



Habitat Zones: Giacomini Wetland Restoration Project

Projected 1-foot Sea Level Rise

Projected 1 ft. Sea Level Rise

<u>2050 Wetland Habitats:</u>

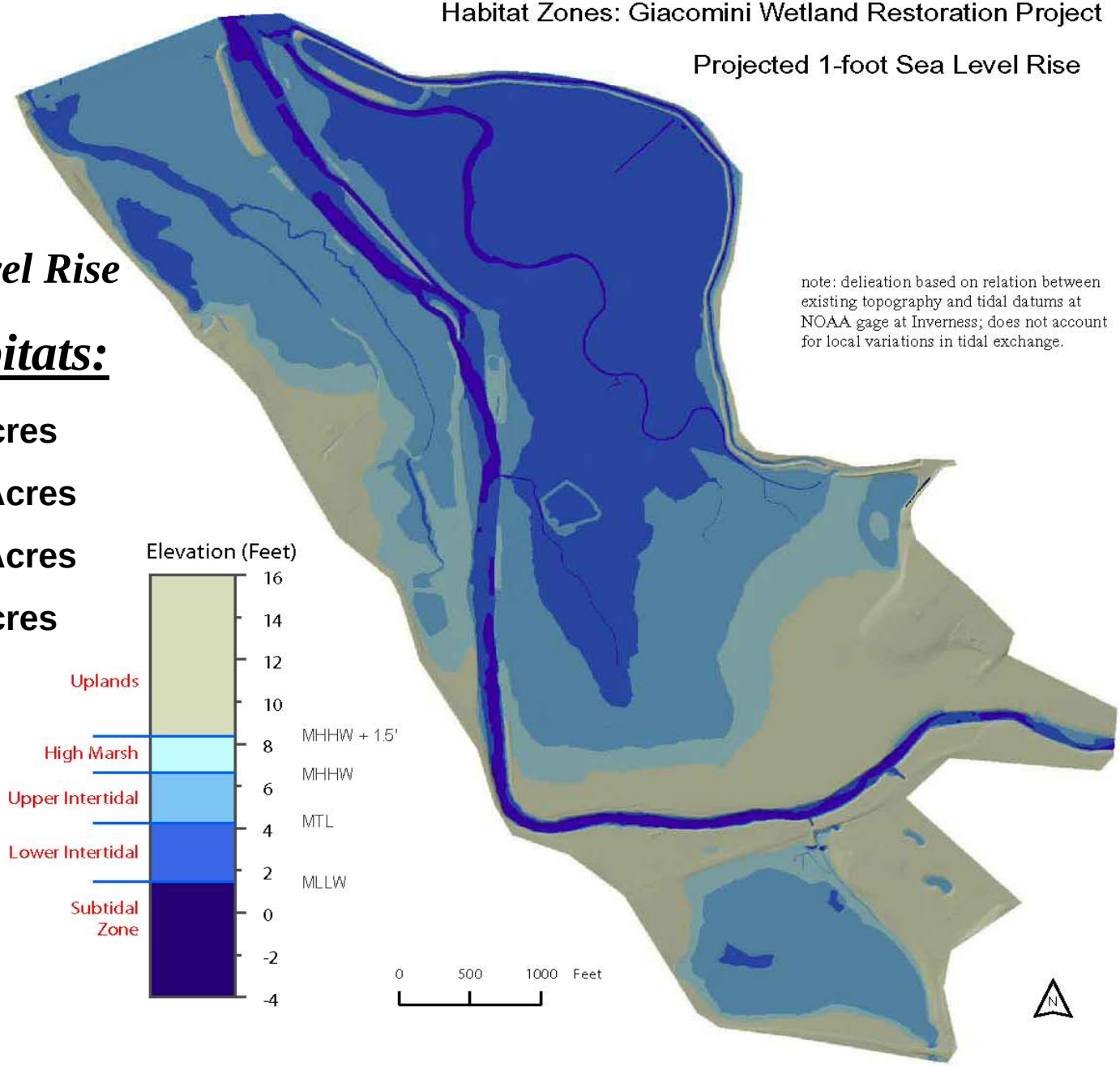
Subtidal: 26 Acres

Low Intertidal: 195 Acres

Upper Intertidal: 222 Acres

High marsh: 73 Acres

Total: 516



Projected 3 ft. Sea Level Rise

2100 Wetland Habitats:

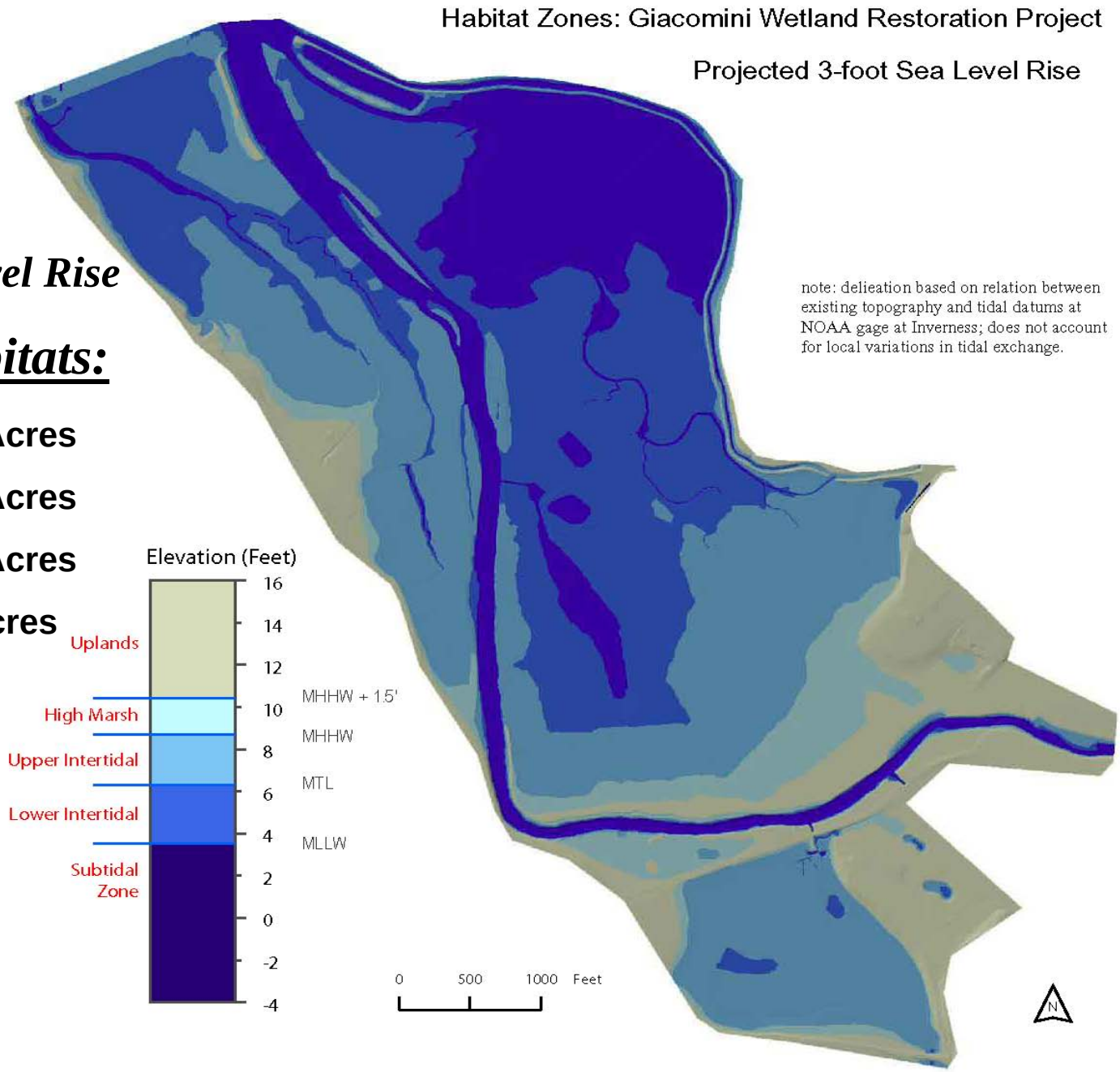
Subtidal: 121 Acres

Low Intertidal: 286 Acres

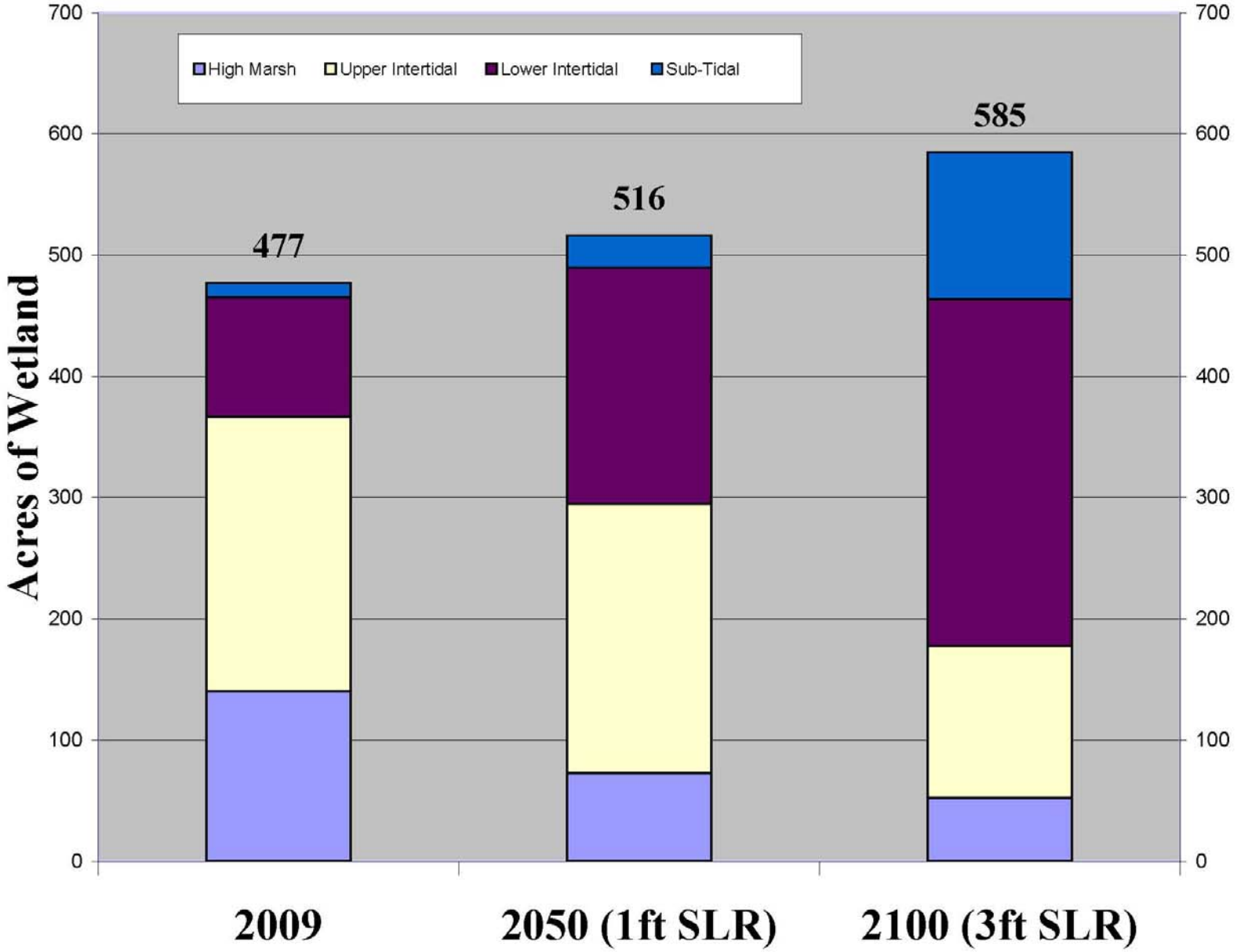
Upper Intertidal: 125 Acres

High marsh: 52 Acres

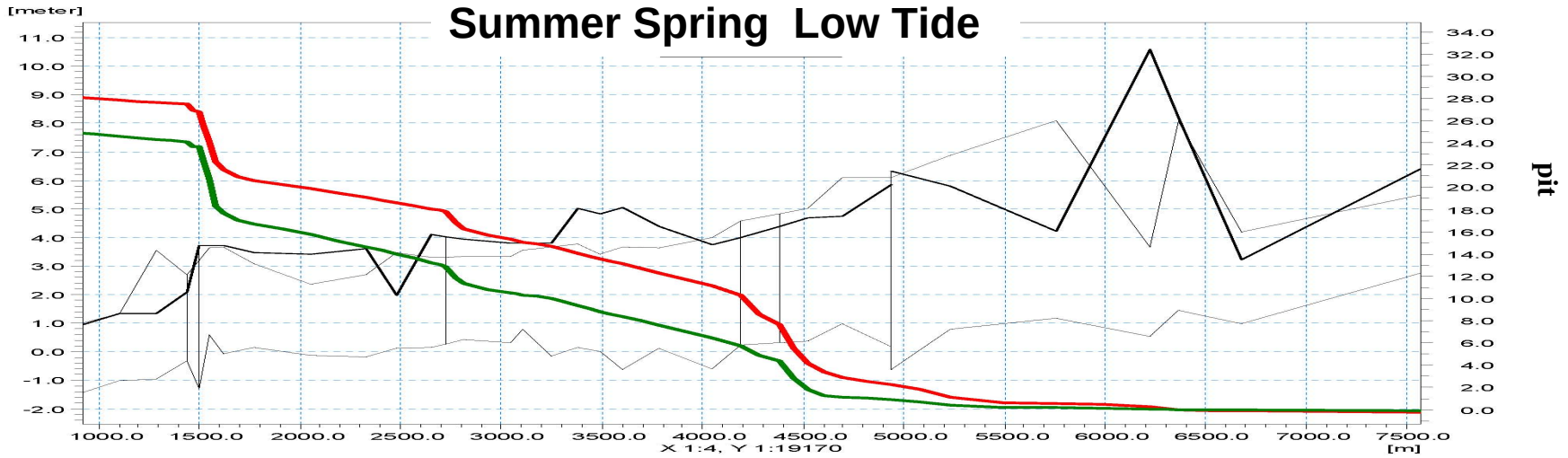
Total: 585

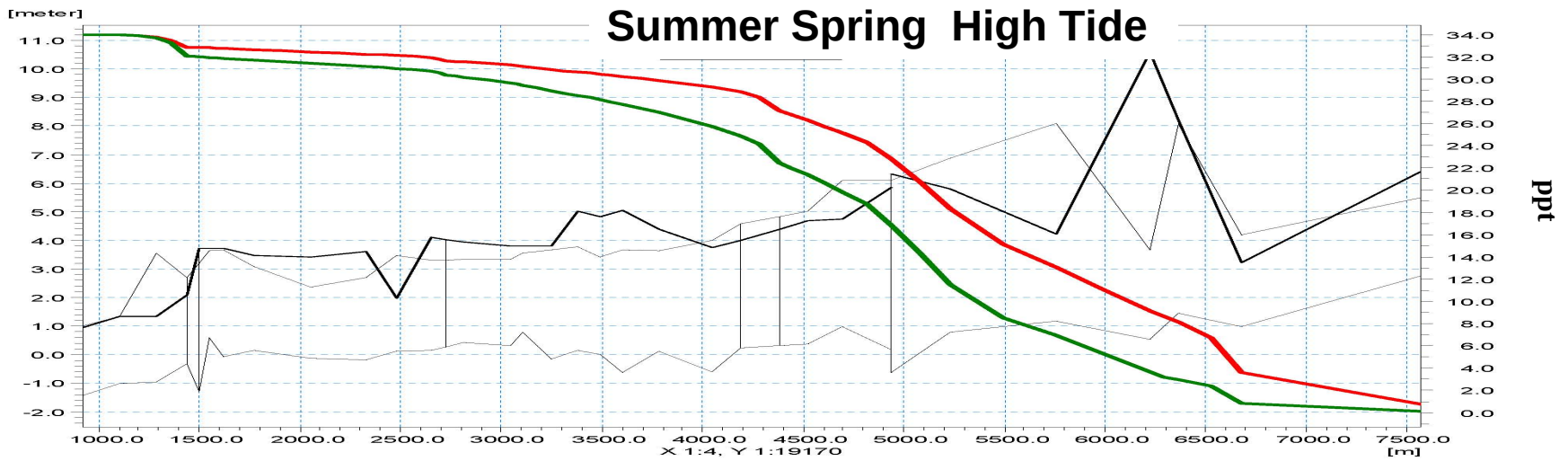


Changes in wetland habitat distribution with Sea Level Rise

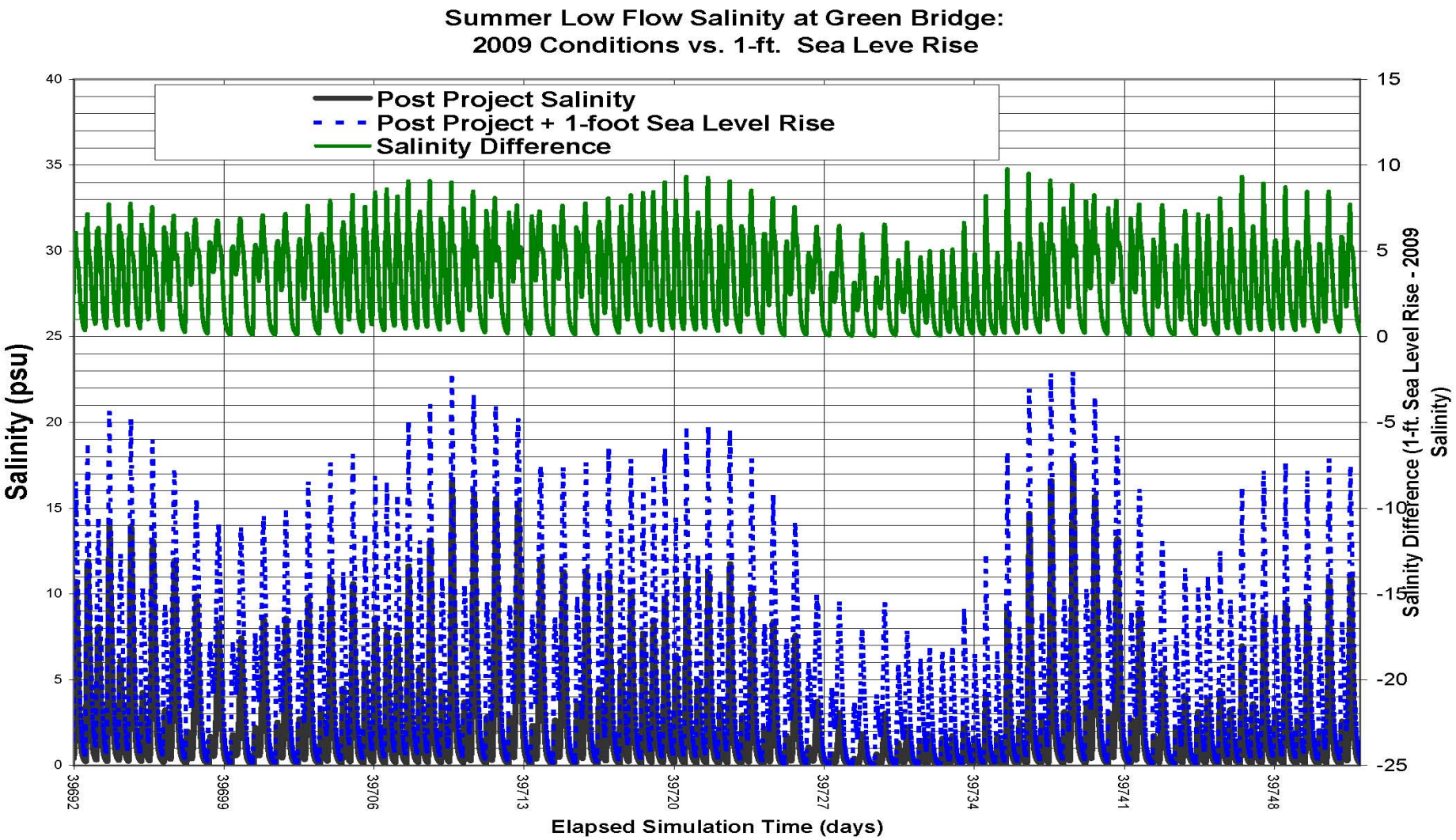


Changes in salinity structure with 1 ft Sea Level Rise





Changes in Summer Salinity at Green Bridge: 2009 Conditions vs. 1-ft Sea Level Rise



Good News…

Restoration Goals and Site Characteristics make Giacomini Wetlands resilient

ECOLOGICAL RESTORATION Goals:

Promote ecological diversity

Maximize:

- **Contiguous salt/brackish/fresh marshland transitions**
- **Channel and floodplain interaction**
- **Surface and groundwater interaction**
- **Ecological value of freshwater sources**

GEOMORPHIC RESTORATION Goals:

RESTORE NATURAL GEOMORPHIC PROCESSES AND FUNCTIONS

- Design for and anticipate channel and floodplain evolution
- Use subtle design features to promote natural formation of desired habitats
- Create a mosaic of riparian, wetland, transitional and upland habitats

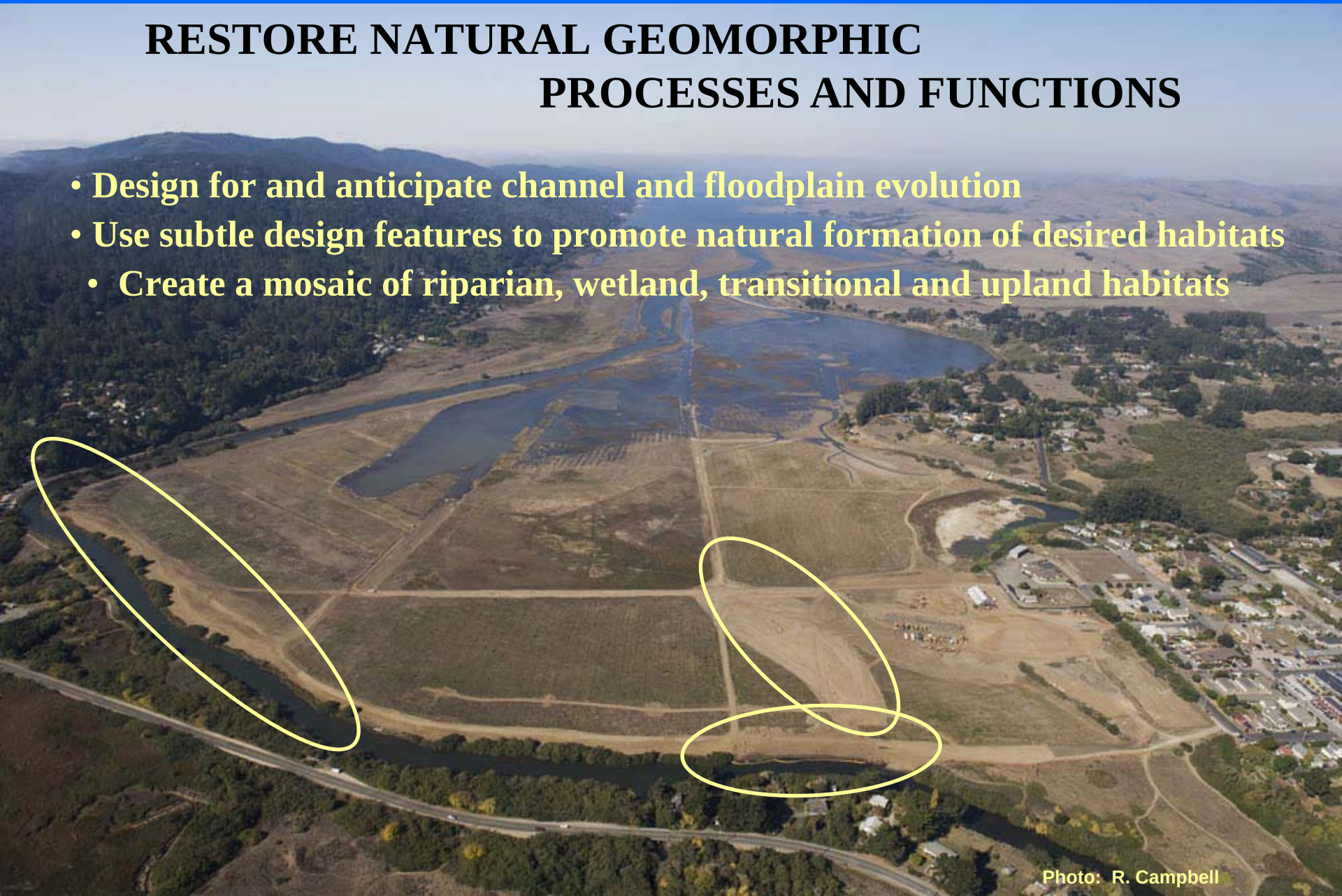


Photo: R. Campbell

Resilient Site Characteristics:

The restored marsh can evolve naturally, improving it's chances of keeping pace with sea level rise

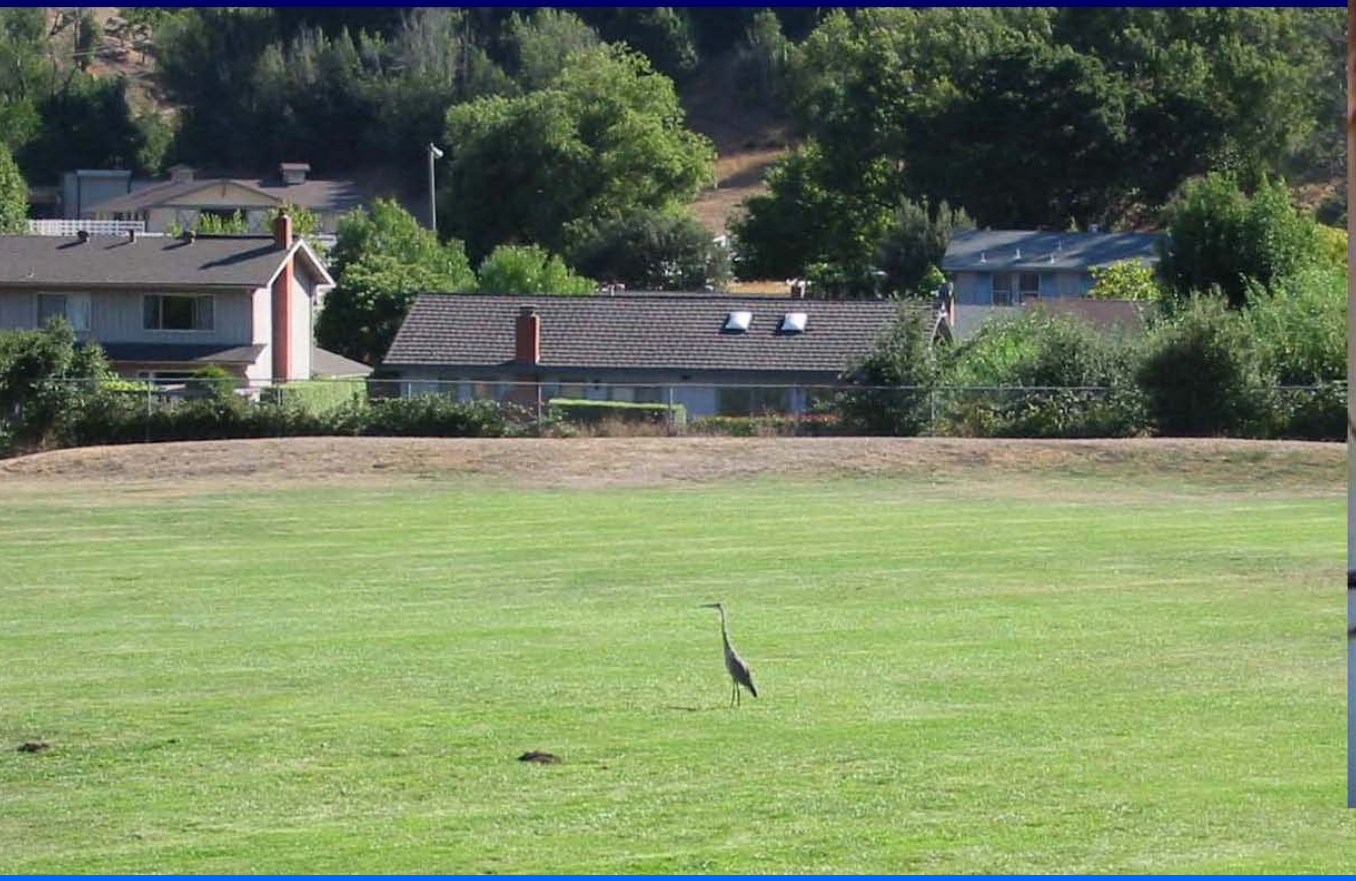
- Expansive inter-tidal marsh and upland transition zone accommodates landward migration of habitats
- The removal of Lagunitas Creek levees allows creek sediments to accumulated on the marsh plain.

Giacomini Wetland : 1942 Aerial

In Conclusion:

Sea Level Rise will be a powerful force reshaping our landscapes.

Giacomini Wetlands' will likely have some of the most robustly sustained and diverse brackish marsh habitat in the region.

The ecological value and use of the Giacomini Wetlands will likely rise with the tides.

Harbinger of Change