

Sea Level Rise: What's happening on Puget Sound?

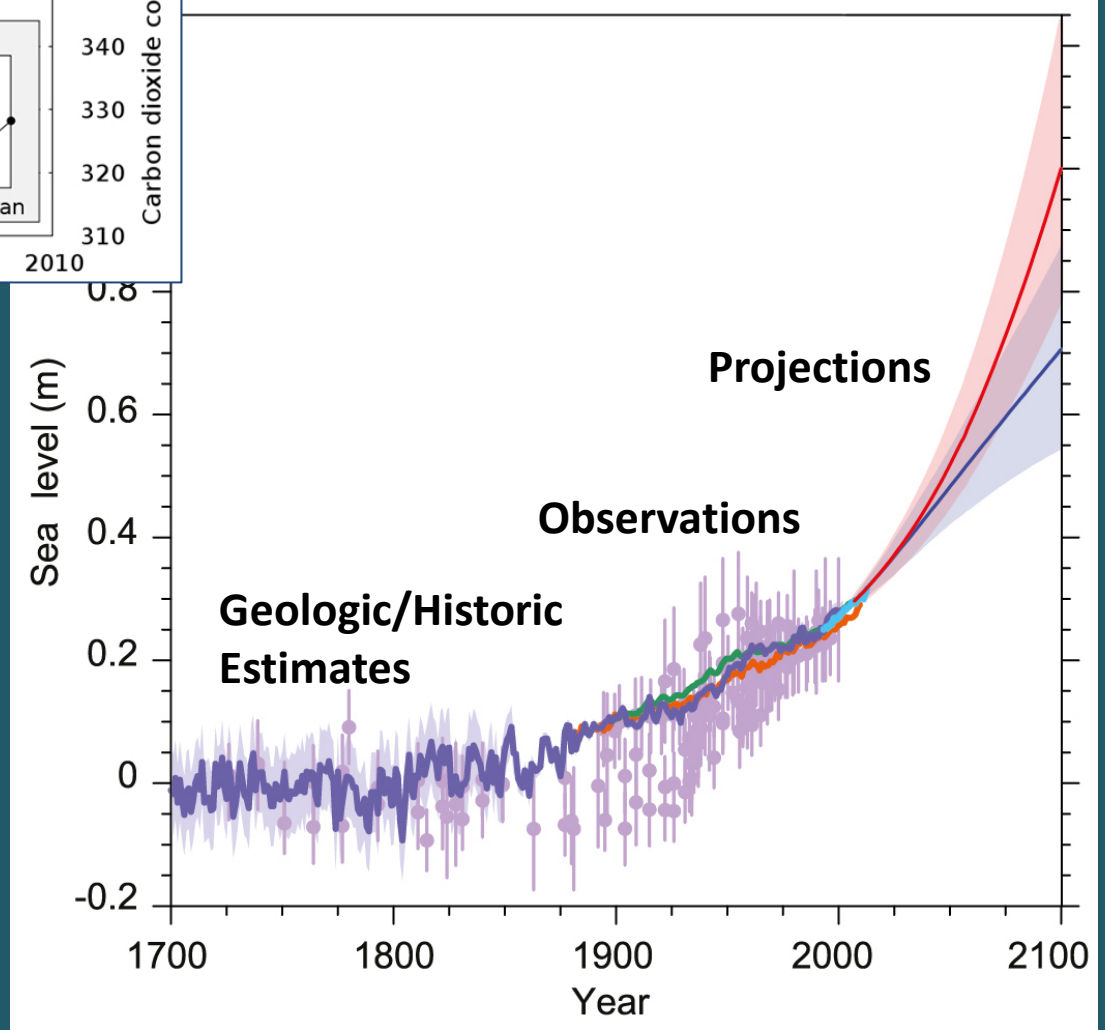
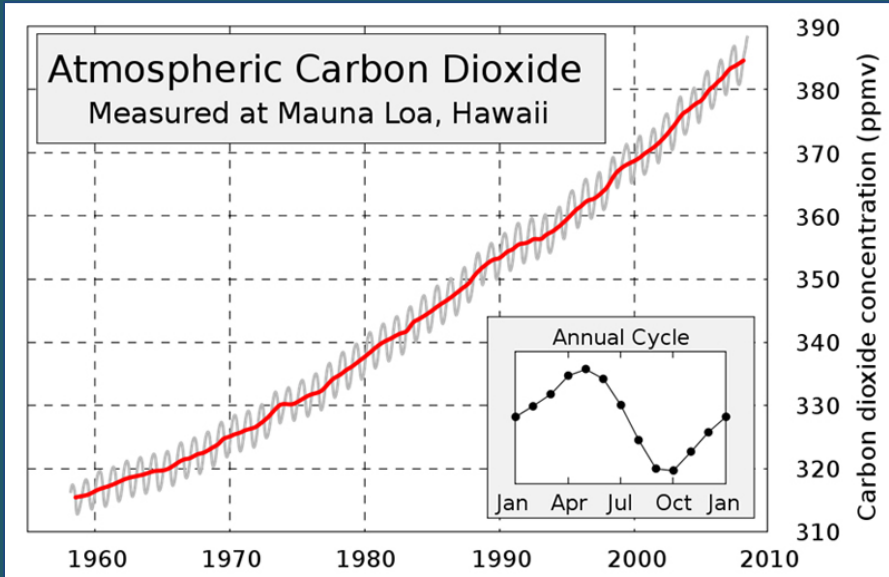


Shoreline and Coastal Planners Group

22 January 2015

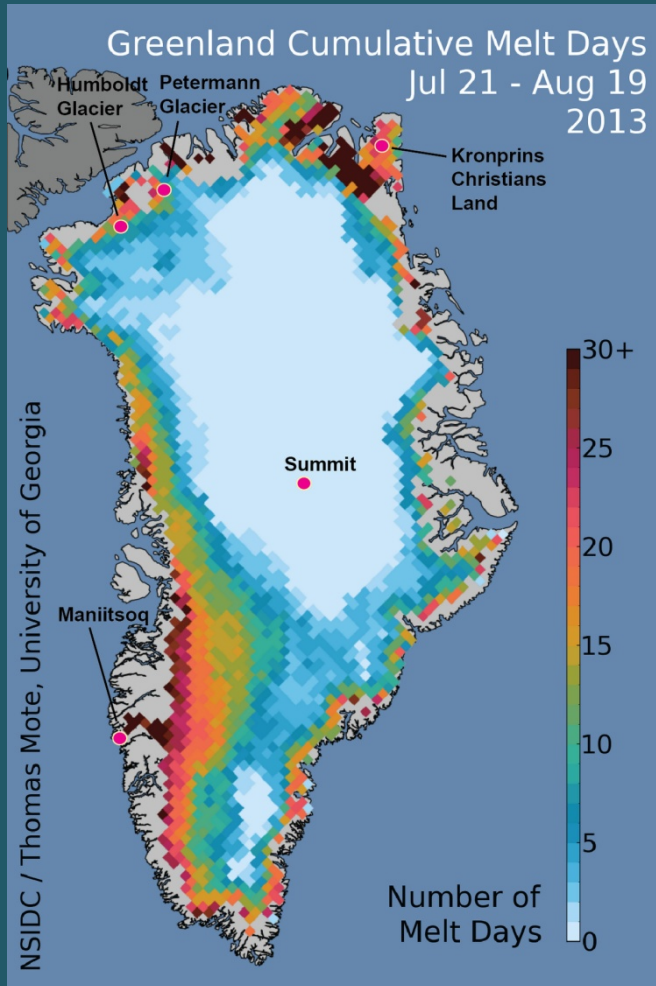
**Hugh Shipman
WA Ecology**

Sea Level Rise 101

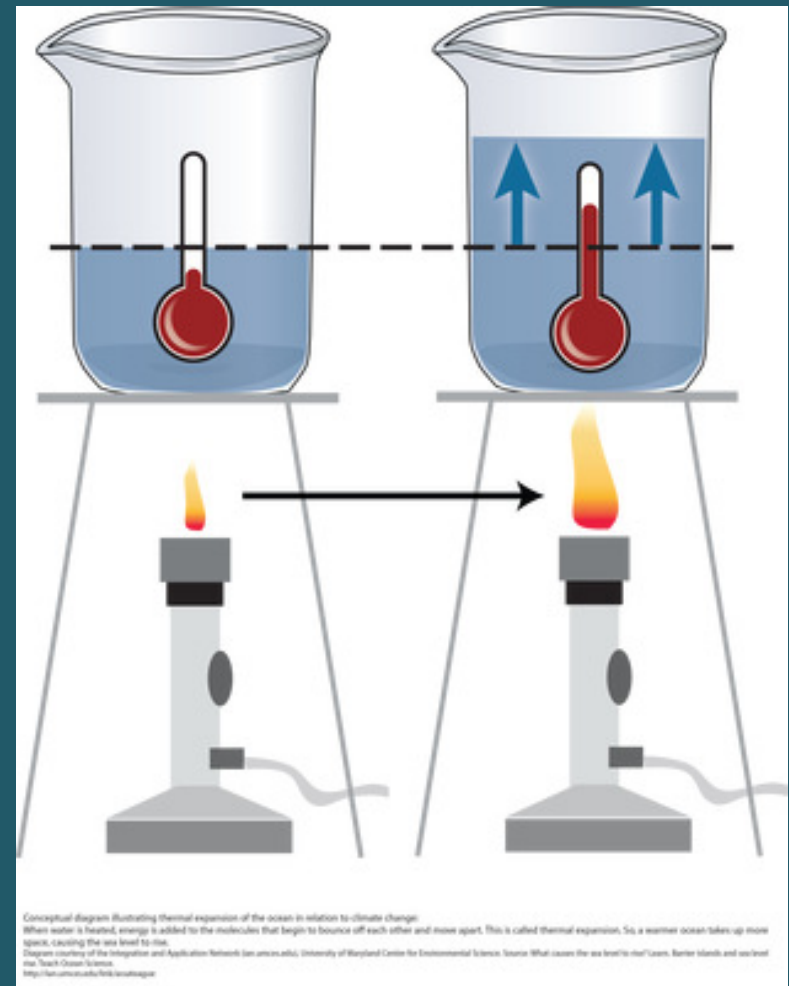


Warmer climate leads to higher sea level ...

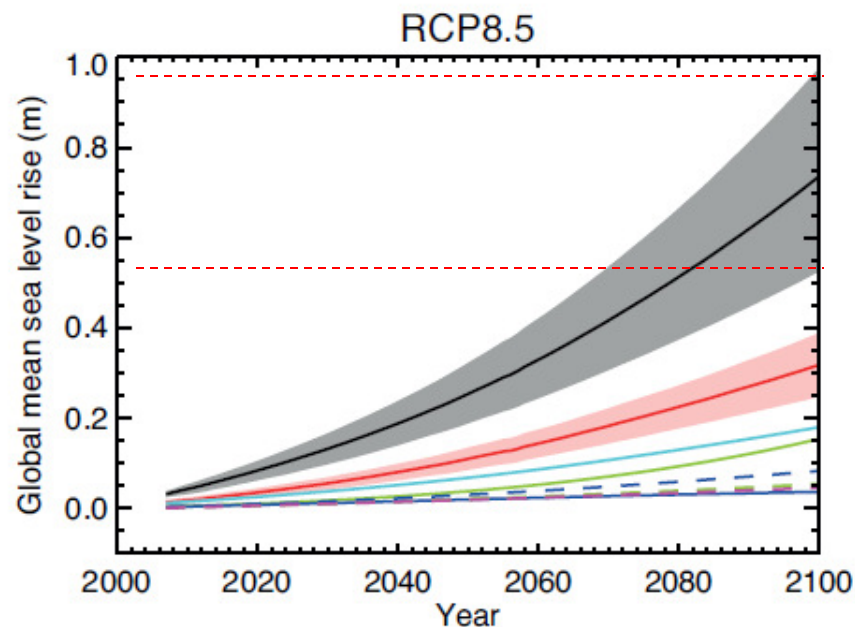
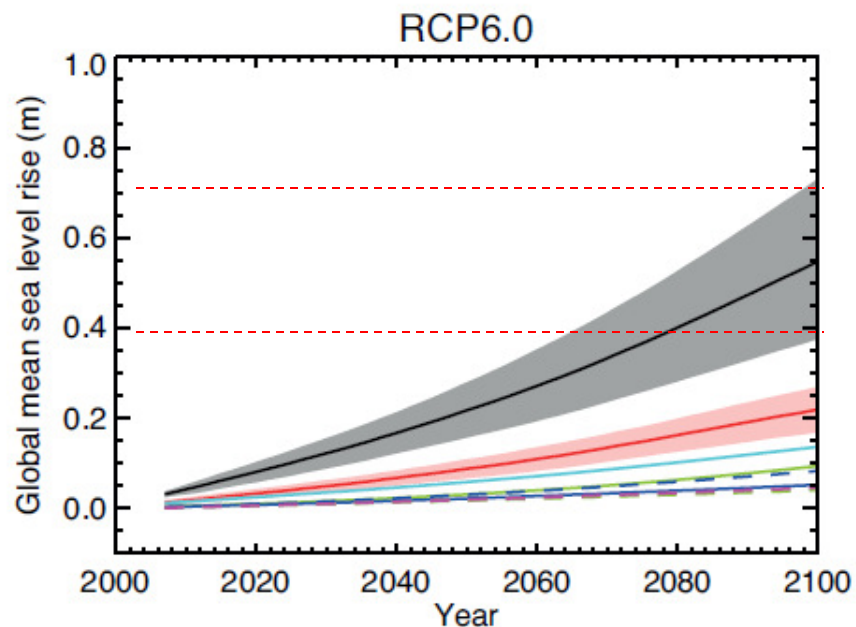
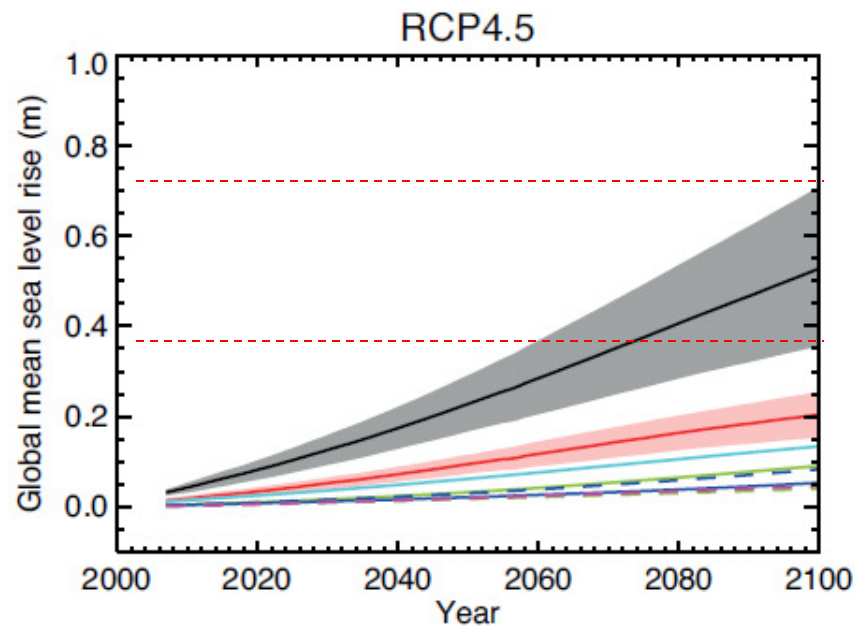
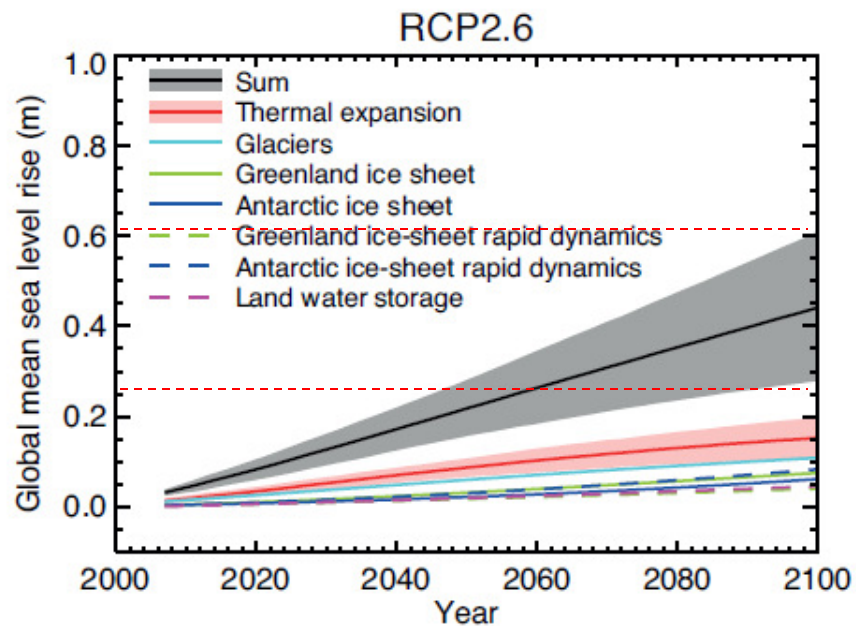
Glaciers melt



Water expands



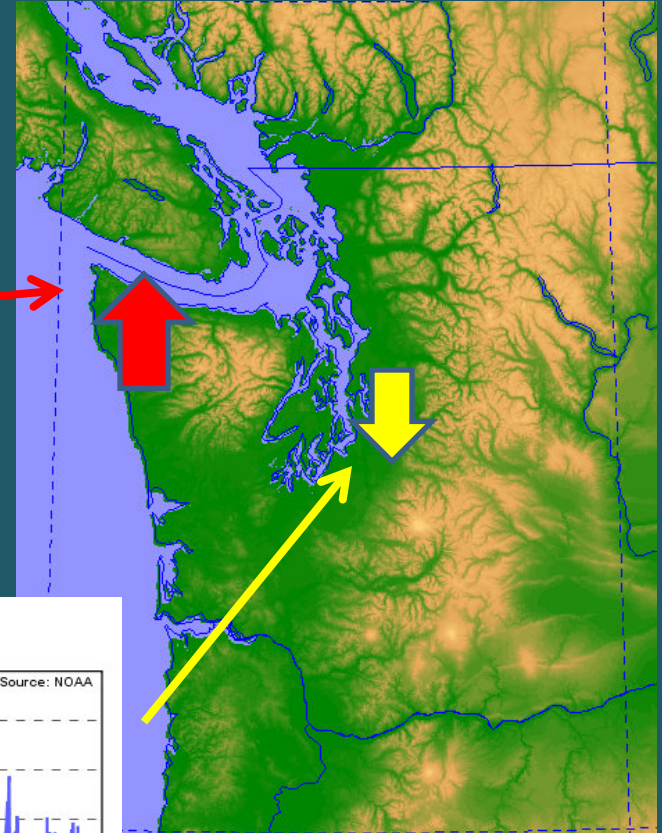
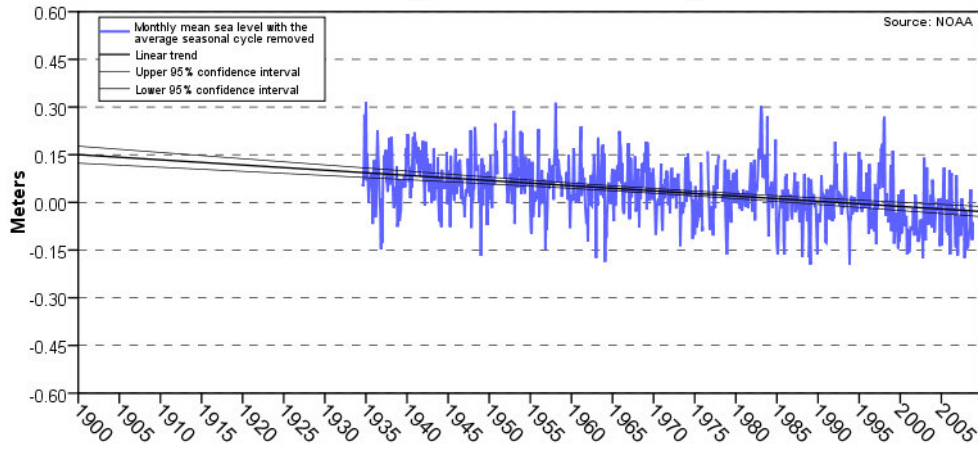
IPCC 2014 Sea Level Projections



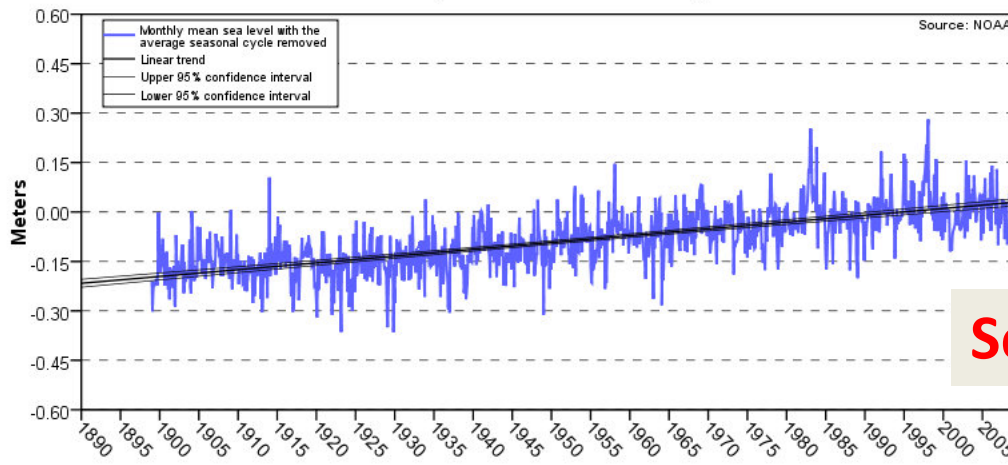
Tide Gage Records

Neah Bay

Neah Bay, WA - 1.63 +/- 0.36 mm/yr

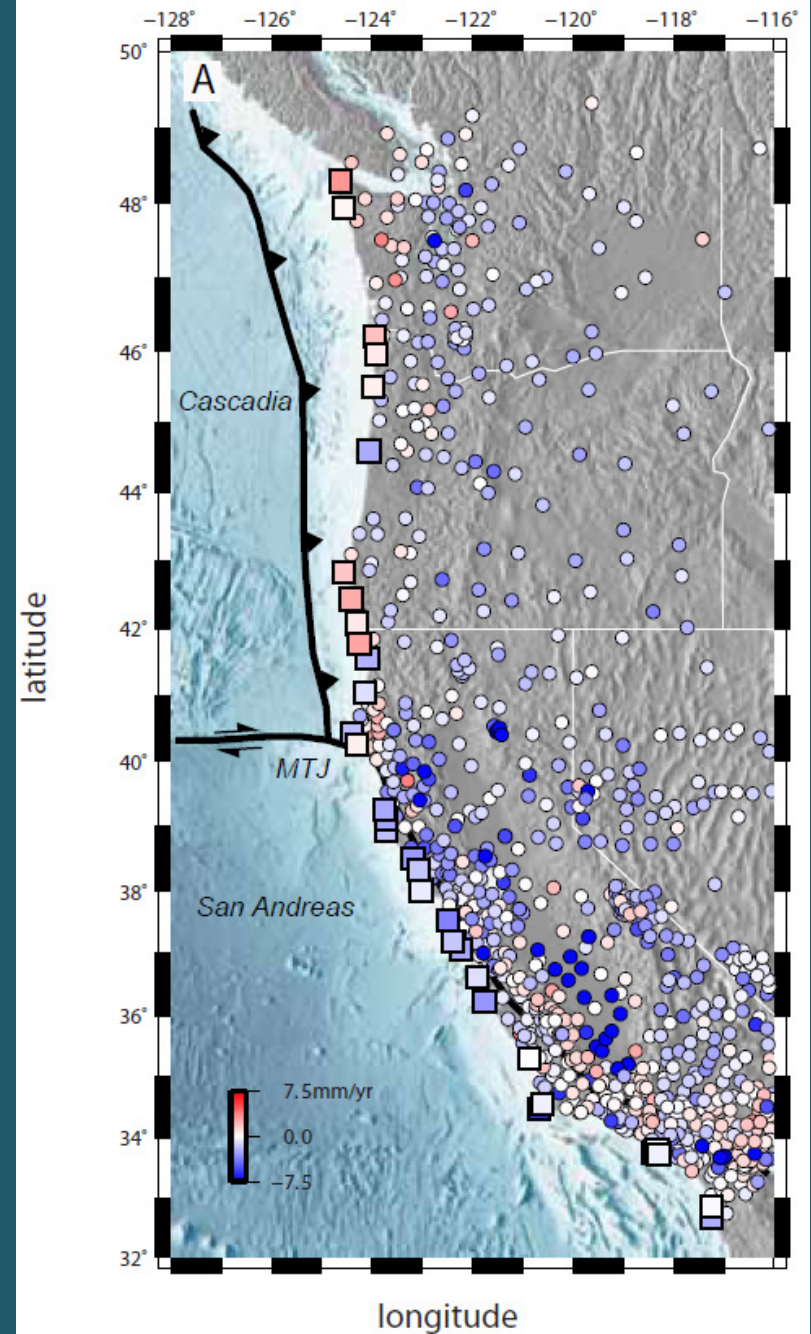
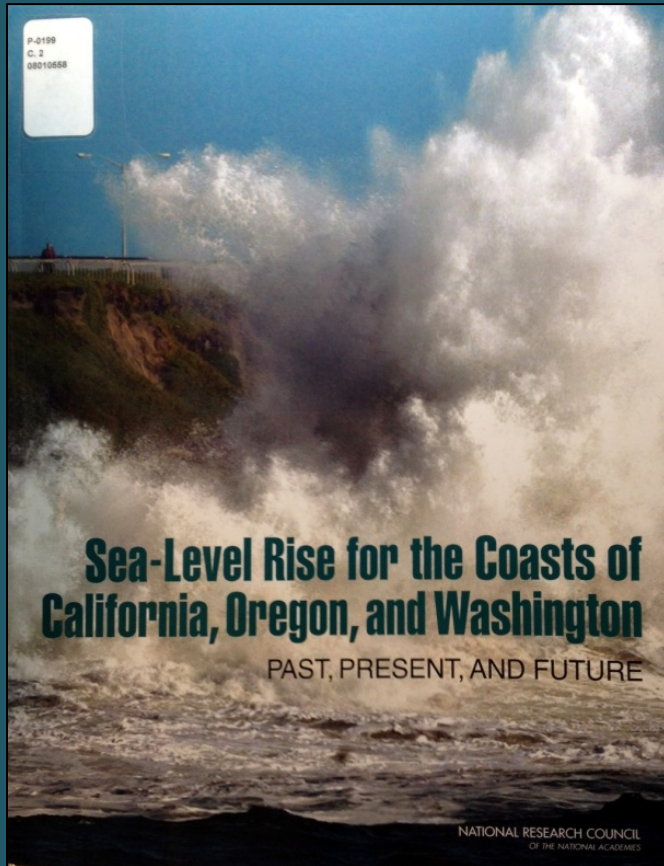


Seattle, WA 2.06 +/- 0.17 mm/yr

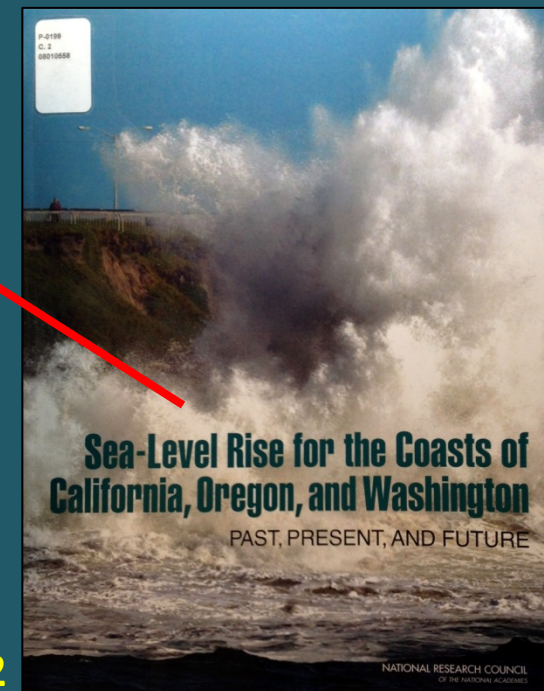
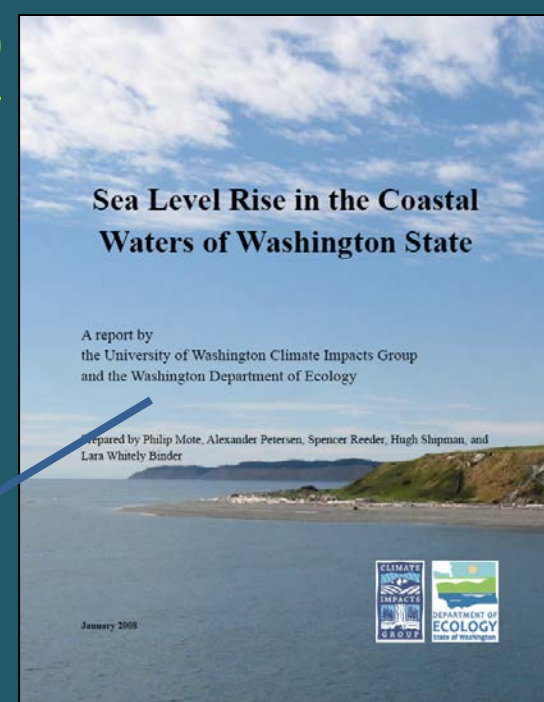
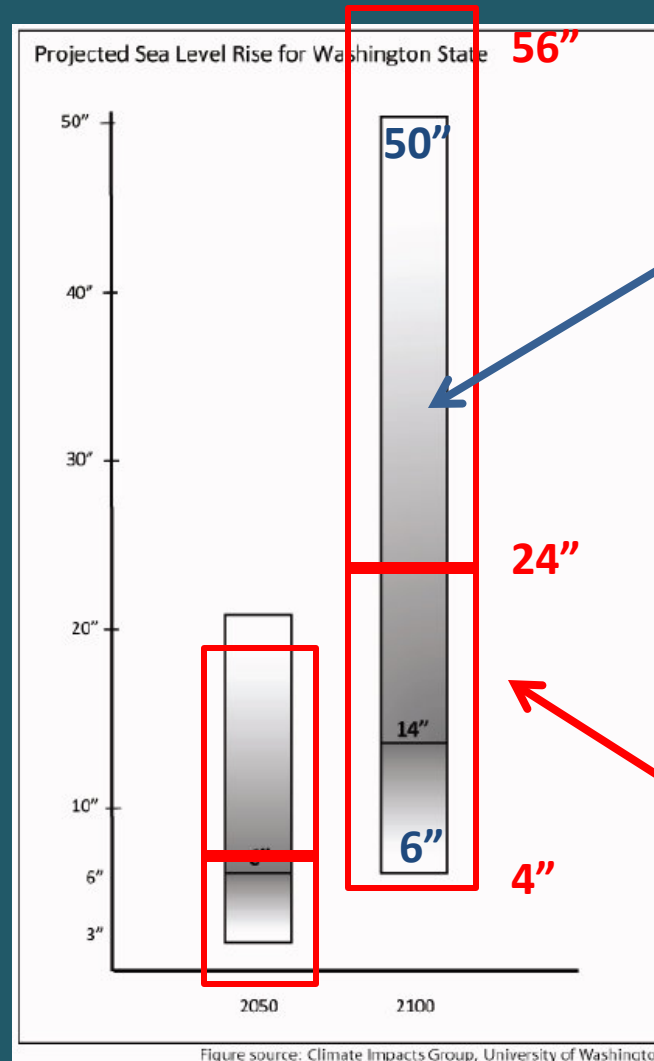


Seattle

National Research Council 2012



Regional Sea Level Projections



How wet?
How often?



Inundation Maps

Port Angeles | Sea Level Rise (High Scenario)

NORTH OLYMPIC PENINSULA
RESOURCE CONSERVATION AND DEVELOPMENT
NOP RC&D

Port Angeles
Harbor

Map Legend

Transportation

- Major Roads
- Local Roads

Fish Passage Barriers

- No Blockage
- Partial Blockage
- Complete Blockage

Critical Infrastructure

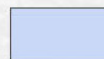
- Health Care Facilities
- EMS Stations
- Fire Stations
- Public Safety
- Schools
- Water Treatment Plant

Water

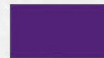
- Current Shoreline = Mean Higher High Water (MHHW)
- Sea Level Rise (SLR) = 3.3 ft (100 cm)
- Coastal Flood Risk Zone = SLR + 2.95 ft (90 cm) (10 Year Return Frequency)

adaptation international Sea Grant Washington

Water



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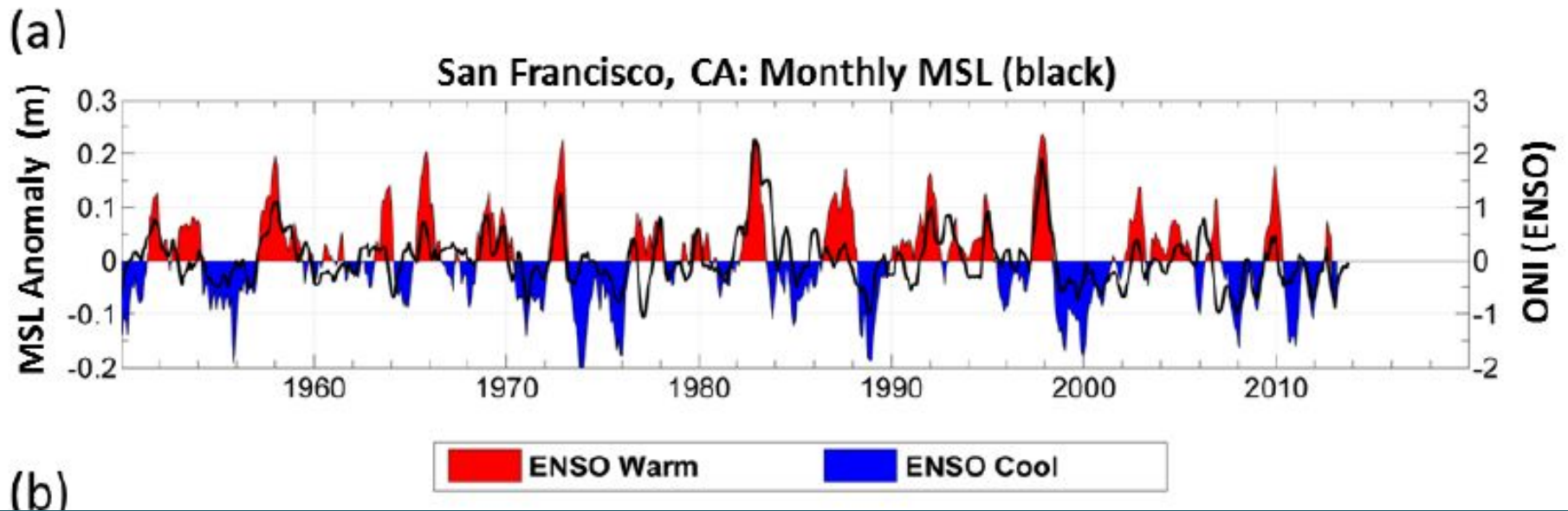
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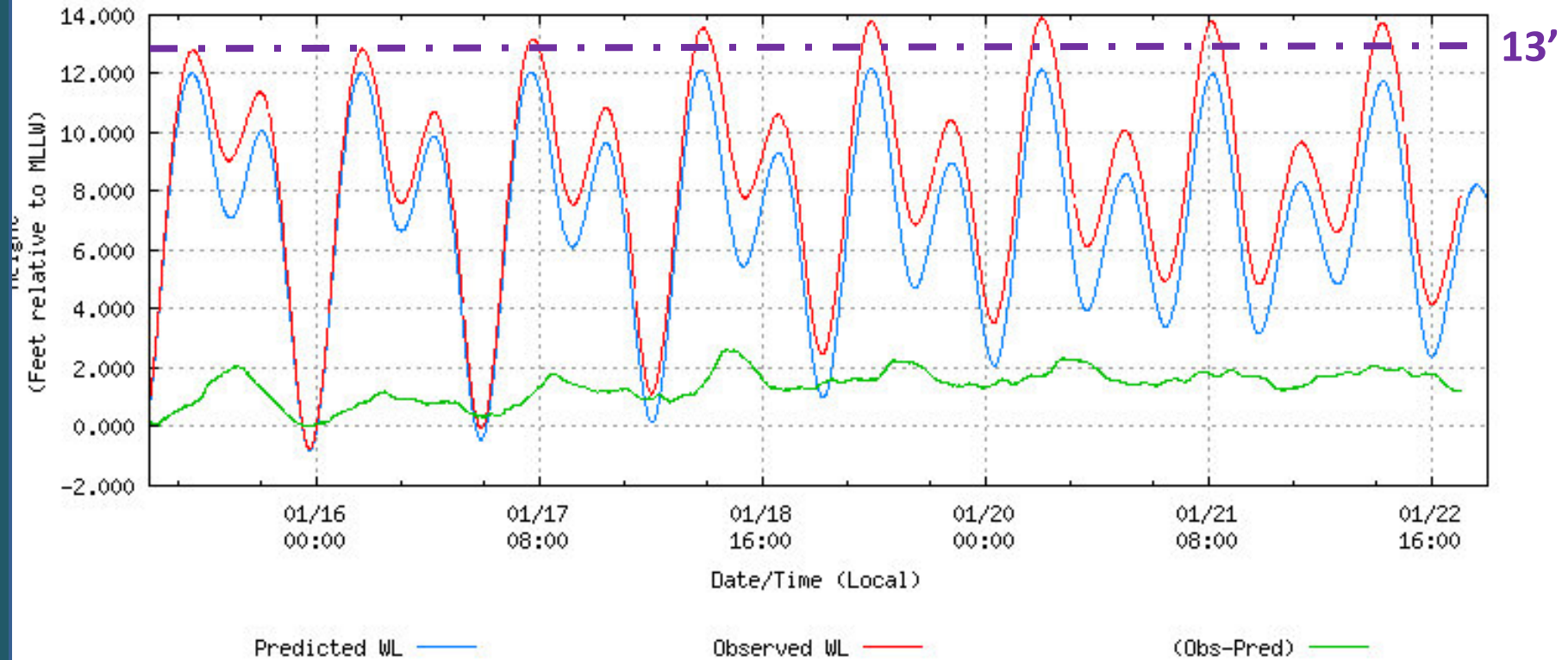
Courtesy Ian Miller
WA Sea Grant

Higher sea level during El Ninos



Seattle Tides – January 15-22, 2010

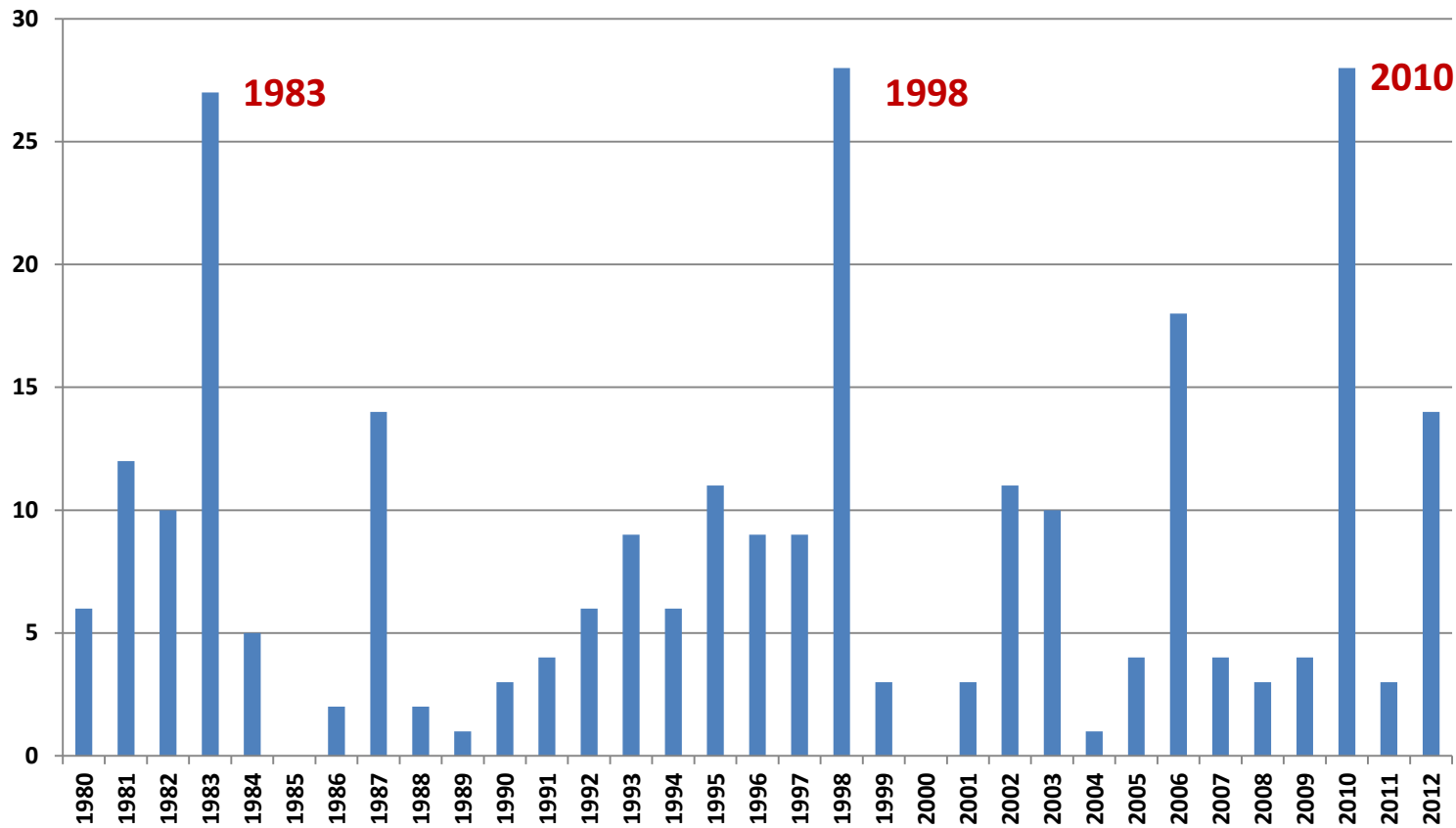
NOAA/NOS/CO-OPS
Preliminary Water Level (A1) vs. Predicted Plot
9447130 Seattle, Puget Sound, WA, WA
from 2010/01/15 - 2010/01/22



Annual frequency of Seattle tides >13.0' MLLW

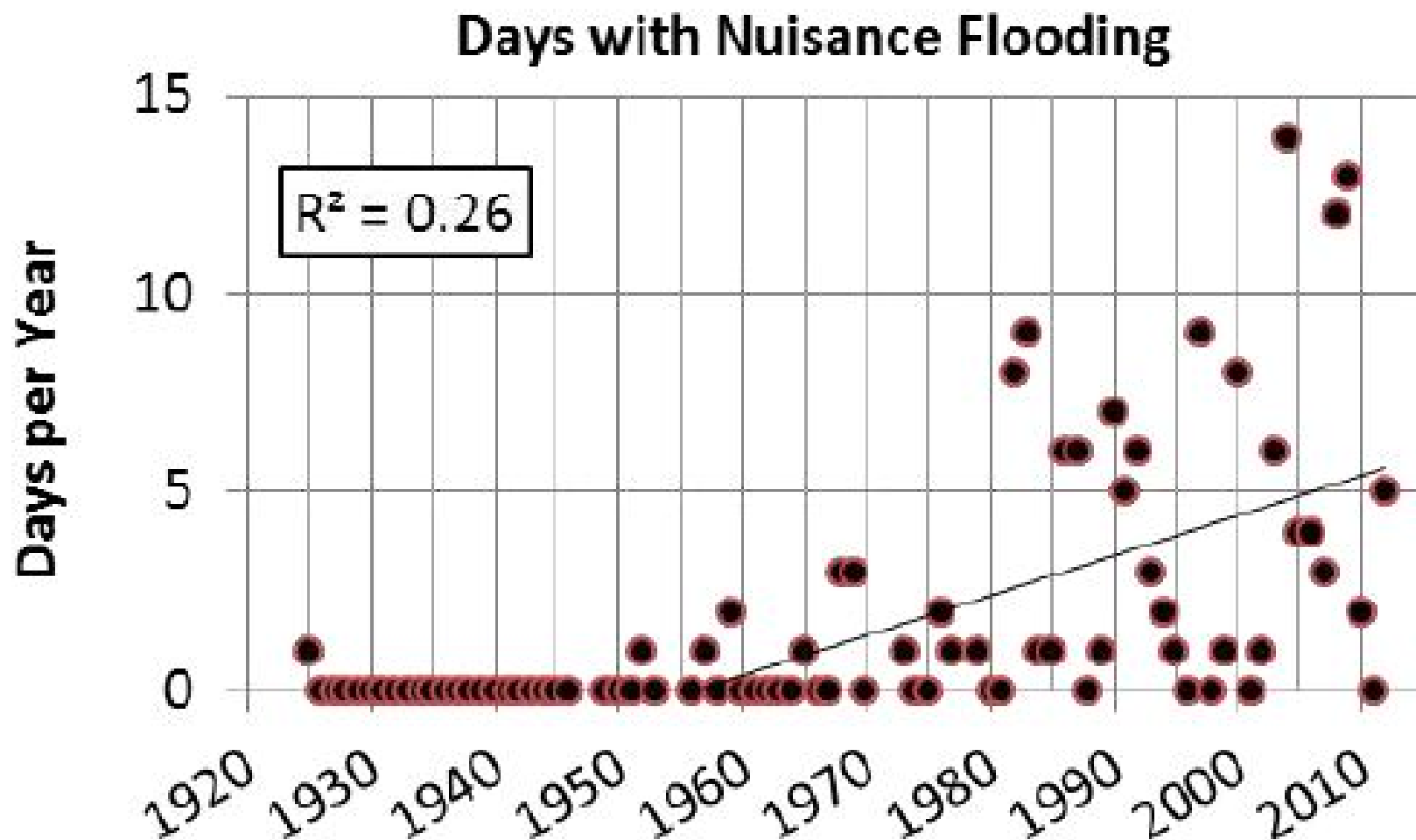
During strong El Ninos, sea level on the west coast can rise more than 15-20 cm (6-8"), resulting in more frequent extreme high tides.

MHHW = 11.35'



“Nuisance” Flooding

La Jolla CA



Storms and Floods

Extreme high water levels *will increase*

Flood events of any given magnitude *will become more frequent*

Severity and frequency of storms *may or may not increase*

Damaging storms will occur *more frequently*, because storms will occur at higher water levels

Our response to sea level will be *dictated by events*, not the chronic increase in water levels

**West Beach, Whidbey Island
December 17, 2012**



Summary

- Estimates remain highly uncertain
- Many confounding factors, but few alter long-term patterns
- More frequent flood events

Alki Beach, January 2010