

Challenges and Risks to the Bay Area Maritime and Industrial Economy

Flood Management Challenges

Ed Curtis, P.E., Risk Analysis Branch, FEMA Region IX
Gregor Blackburn, CFM, Floodplain Management &
Insurance Branch, FEMA Region IX

California Coastal Analysis and Mapping Project – SF Bay Area Coastal Study

Study flood risk along the open coast and inland bays of all California coastal counties



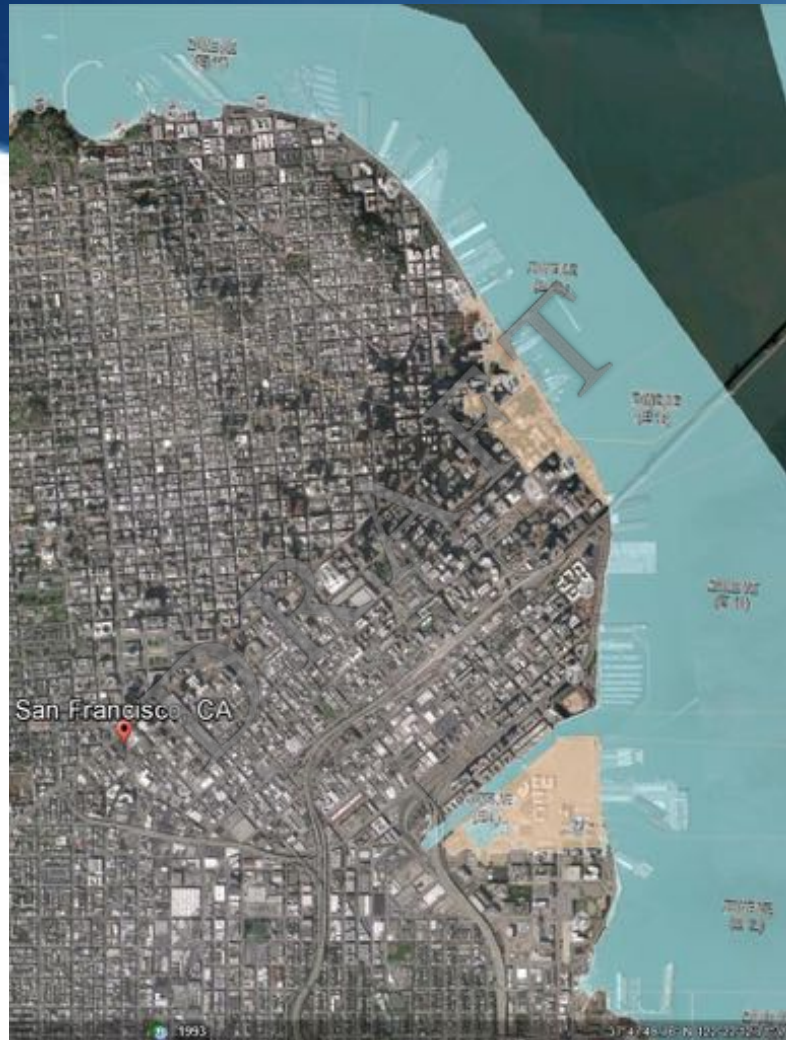
Map the elevation and inland extent of **wave-induced** coastal flooding

www.r9coastal.org

SF Bay Coastal Flood Risk Mapping Timeline



Draft 100-Year Flood Risk Mapping



PORT OF SAN FRANCISCO



SAN FRANCISCO INTL. AIRPORT

Draft 100-Year Flood Risk Mapping



Port of Oakland

Draft 100-Year Flood Risk Mapping



OAKLAND INTERNATIONAL AIRPORT

More information:



CCAMP Website:

www.r9coastal.org

CGS Tsunami Website:

www.tsunami.gov

Lessons Learned from Recent Tsunamis

- **Evacuation**

- Inconsistent local responses
- Appropriate response to minor or moderate “Warning” alert at high/low tide?

- **Maritime Community**

- Move or evacuate vessels? Where?
- Long-term recovery issues
- Infrastructure improvements to increase resilience

- **Land-Use and Recovery Planning**

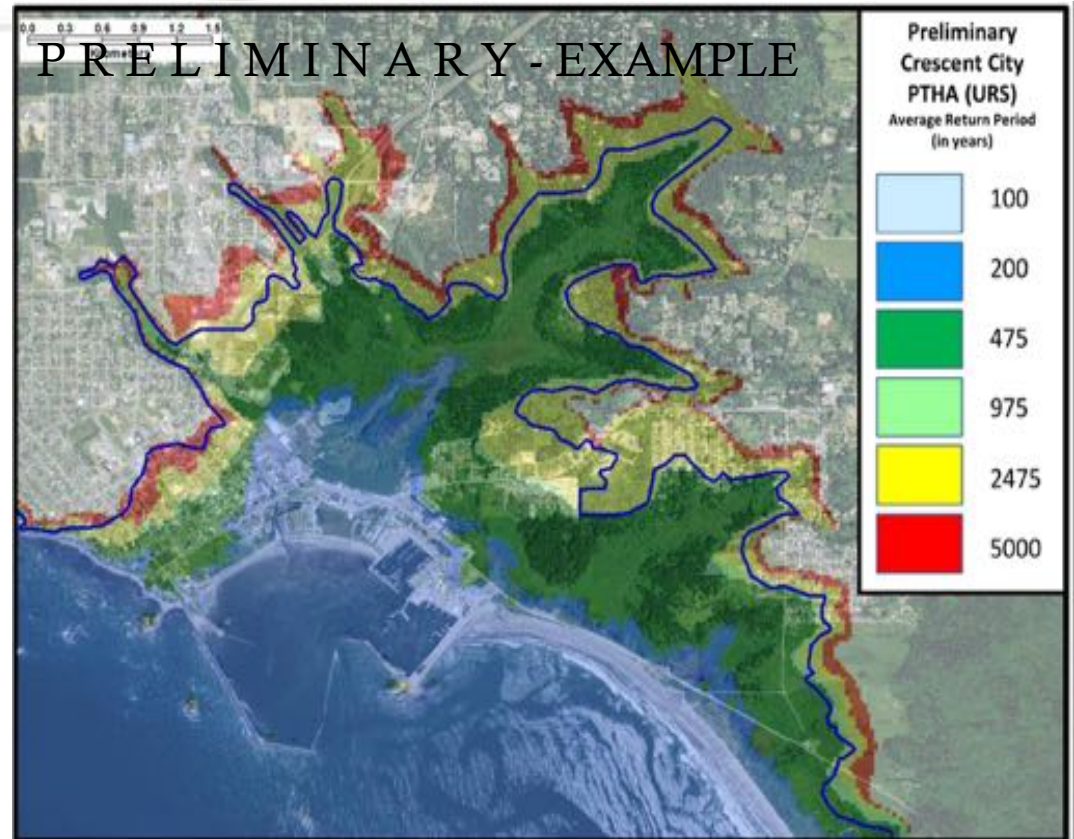
- Pre- and post-tsunami development
- Recovery issues in California in 2011



Boats sunk; recovery efforts in Crescent City Harbor after 2011 Japan tsunami

Probabilistic Tsunami Hazard Analysis

- › **Project Assessment and Real-Estate Disclosure** (CGS-Seismic Hazard Mapping Act)
- › **Land-Use Planning** (communities, harbor districts, CA Coastal Commission)
- › **Evacuation Planning** (Cal-OES)
- › **Building Design and Construction , Critical Facilities** (ASCE, Uniform/ International Building Code, Nuclear Regulatory Commission)
- › **Flood Protection and Insurance** (FEMA, Risk MAP, CA-Dept. of Water Resources)
- › **Risk Analysis and Damage Estimates** (HAZUS)



URS Consultants (AECOM), 2013 for
Caltrans/ PEER/ CGS

Probabilistic Tsunami Hazard Analysis in
Crescent City; blue line is 2009 state
inundation map line

Tsunami Recovery Issues

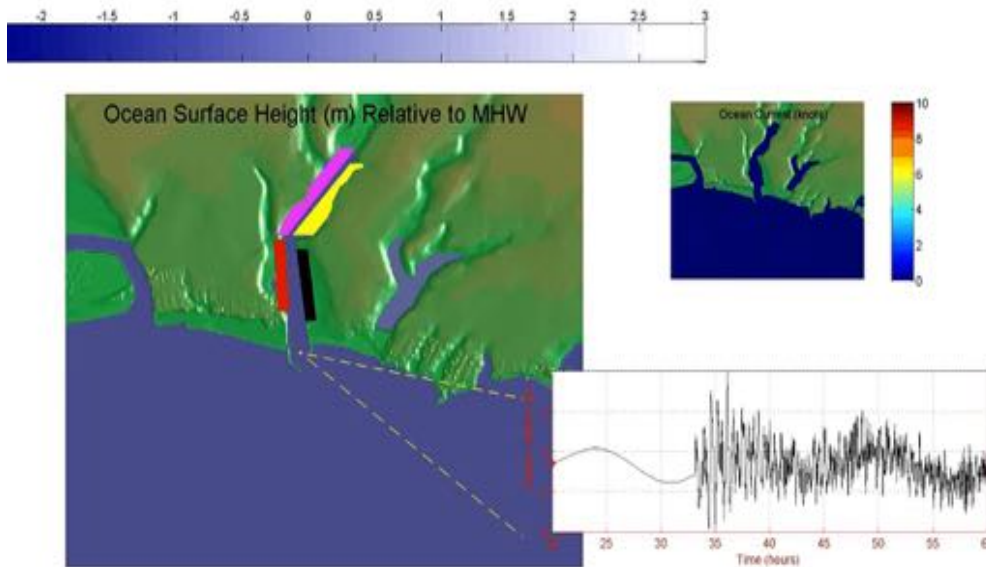


Direct Impacts (Damage):

- Structure, vessel harbor infrastructure damage
- Debris
- Sedimentation and scour
- Contaminated water and sediment

Indirect Impacts (Time):

- Reconstruction and/or relocation
- Commercial fishing and shipping disruption
- Regulatory delays
- Limited funding for recovery
- Limited resources for recovery
- Loss of businesses and workforce



*Potential debris movement in Santa Cruz Harbor
during large Alaska tsunami*

National Flood Insurance Program

NFIP

A 3-leg Stool

1st Leg—Produce Flood Maps

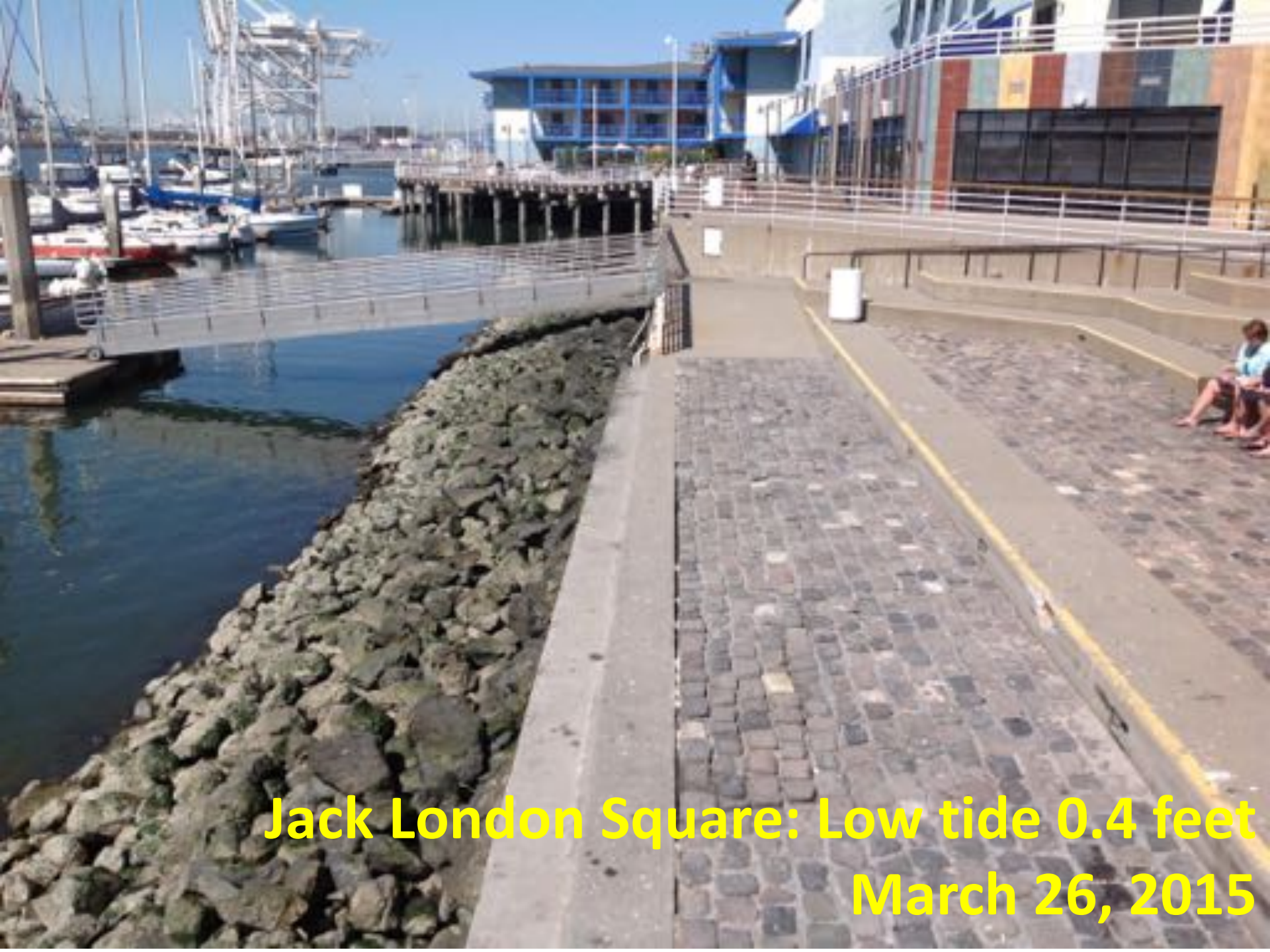
2nd Leg—Community Adopts Map

3rd Leg—FEMA Makes Insurance Available

NFIP

Current Challenges

Map Accuracy
Community Compliance
Solvent Insurance Fund



**Jack London Square: Low tide 0.4 feet
March 26, 2015**



**Jack London Square High tide, 5.7 feet
April 2, 2015**



**Jack London Square, King Tide 7.4 feet
January 21, 2015**



JLS-Marina & Restaurant
Low tide 0.4 feet
March 26, 2015



JLS-Marina & Restaurant
High tide 5.7 feet
April 2, 2015



JLS-Marina & Restaurant
King tide 7.4 feet
January 21, 2015



**Colma Creek, Low tide 0.6 feet
March 28, 2015**



**Colma Creek, High tide 6.1 feet
March 28, 2015**



**Colma Creek, King tide 8.1 feet
December 12, 2012**



Colma Creek, SSF Waste Water Treatment Plant
Low tide 0.6 feet
March 28, 2015



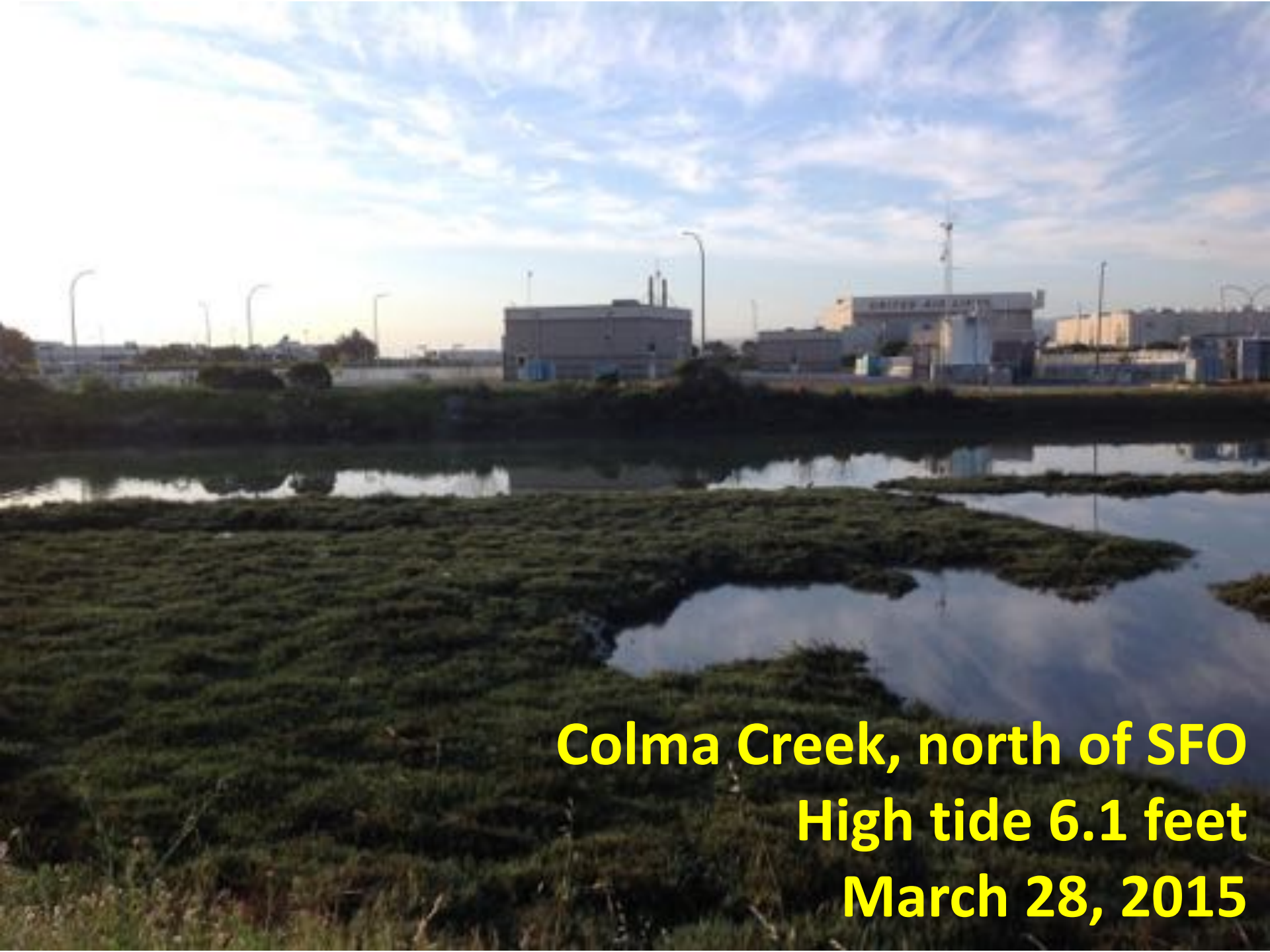
Colma Creek, SSF Waste Water Treatment Plant
High tide 6.1 feet
March 28, 2015



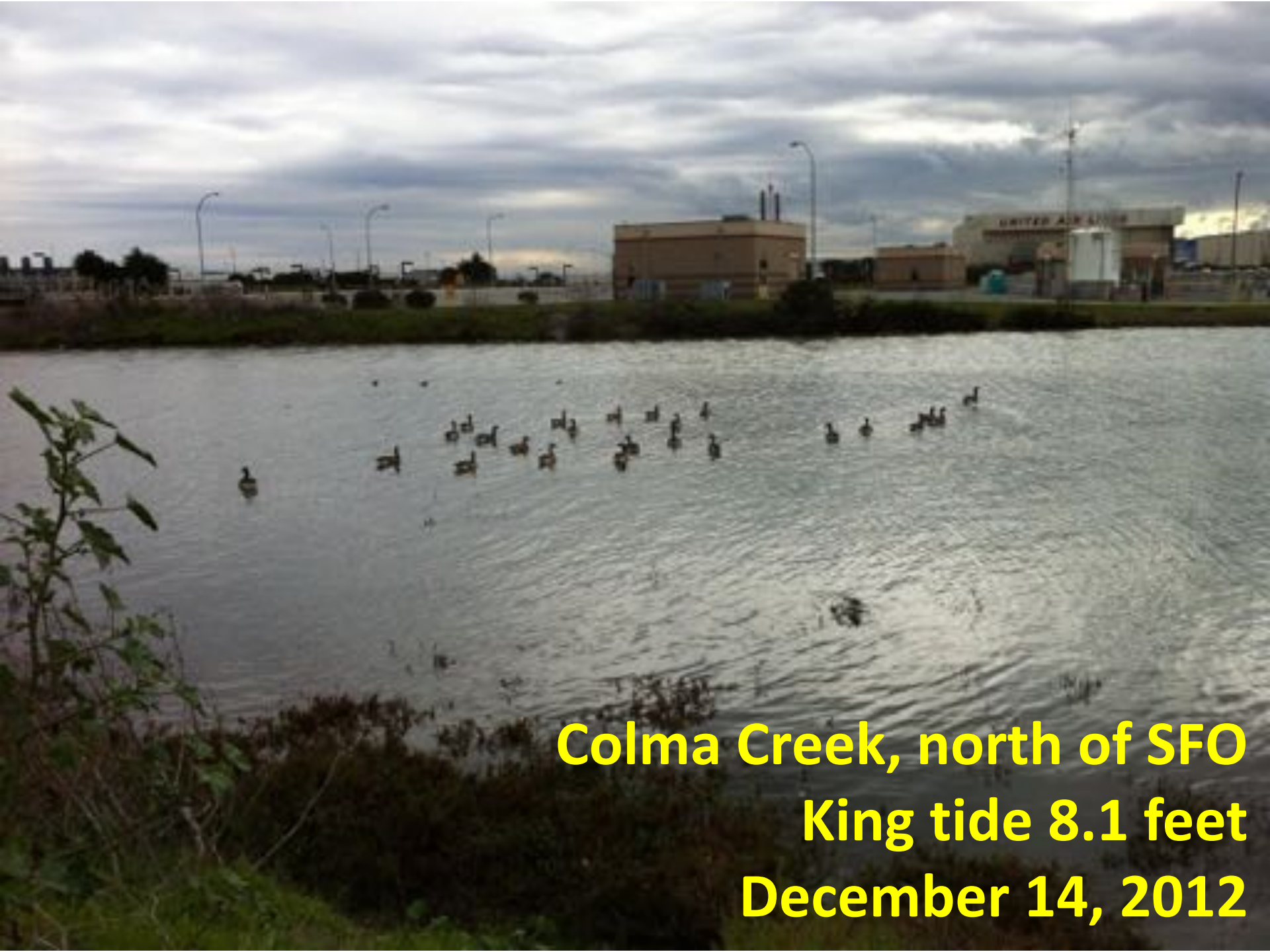
Colma Creek, SSF Waste Water Treatment Plant
King tide 8.1 feet
December 14, 2012



Colma Creek, north of SFO
Low tide 0.6 feet
March 28, 2015



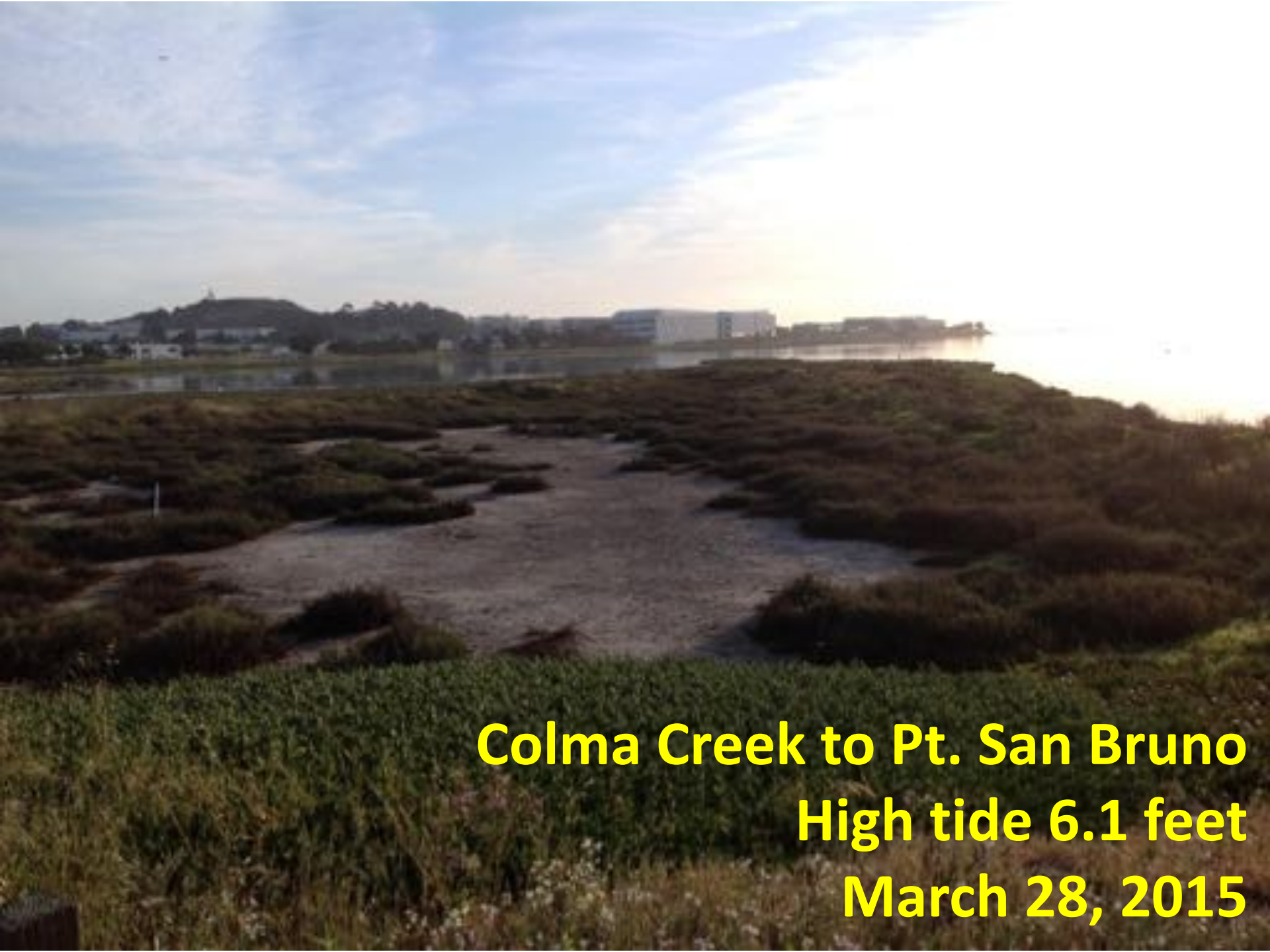
Colma Creek, north of SFO
High tide 6.1 feet
March 28, 2015



Colma Creek, north of SFO
King tide 8.1 feet
December 14, 2012



Colma Creek to Pt. San Bruno
Low tide 0.6 feet
March 28, 2015



Colma Creek to Pt. San Bruno
High tide 6.1 feet
March 28, 2015



Colma Creek to Pt. San Bruno
King tide 8.1 feet
December 14, 2012

Federal Flood Risk Management Standard

Executive Order 13690
Signed Jan. 30, 2015



FFRMS EO 13690

- ◆ Amends EO 11988, Floodplain Management
- ◆ Executive Order 13690 also requires agencies to develop Implementation Plans describing how each agency will update its existing policies, procedures and/or regulations to comply with the new requirements.
- ◆ Federal agencies will continue to implement Executive Order 11988, but replacing the 100-year base in the Executive Order with the process identified in the Federal Flood Risk Management Standard.
- ◆ The FFRMS and Executive Order 13690 ensure that agencies expand management from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended

Approaches in the Federal Flood Risk Management Standard

- ◆ Federal agencies will be given the flexibility to select the best approach for establishing the elevation and flood hazard area used when implementing Executive Order 11988 as amended by Executive Order 13690:
 - Utilizing best-available, science-based and actionable data and methods that integrate current and future changes in flooding;
 - Two or three feet of elevation, (depending on criticality), above the 100-year, or 1%-annual-chance, flood elevation; or
 - 500-year, or 0.2%-annual-chance, flood elevation.

Requirements of Executive Order 13690

- ◆ In addition to establishing the elevation and flood hazard area used when implementing Executive Order 11988, as amended by Executive Order 13690, there are also two other notable requirements:
 - The new Executive Order requires definition of critical actions.
 - The new Executive Order also states that agencies shall use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration.

Soliciting Input on Implementing FFRMS: Comment Period closes May 6, 2015

- ◆ Written comments on the implementation process via:



Federal eRulemaking Portal

<http://www.regulations.gov>

Search for the notice in docket

ID FEMA-2015-0006



Mail/Hand Delivery/Courier

Regulatory Affairs Division
Office of Chief Counsel, FEMA,
8NE, 500 C Street, SW,
Washington, DC 20472-3100