



# CALIFORNIA COASTAL COMMISSION DRAFT SEA-LEVEL RISE POLICY GUIDANCE

12/12/2013

California Coastal Commission Hearing



CALIFORNIA  
COASTAL  
COMMISSION

# Sea-Level Rise Science and Projections

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South Jetty, Humboldt Bay | Jan 2013

CA King Tides Initiative | Neva Swensen



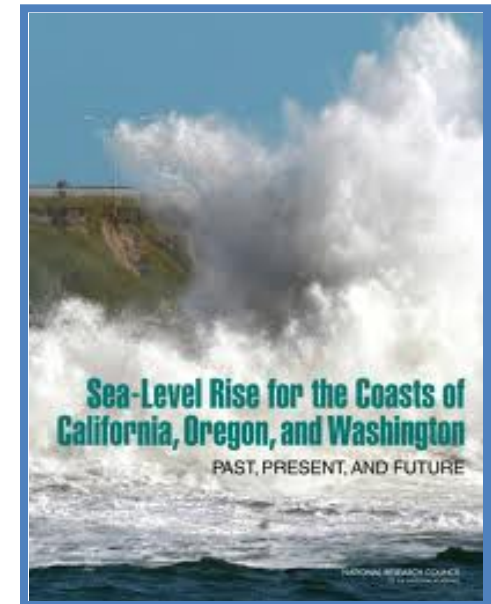


# Best Available Science on SLR

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## □ National Research Council Report SLR Projections for California

Time Period	South of Cape Mendocino	North of Cape Mendocino
2000-2030	4 – 30 cm (1.5 – 12 inches)	-4 – +23 cm (-1.5 – 9 inches)
2000-2050	12 – 61 cm (5 – 24 inches)	-3 – + 48 cm (-1.2 – 19 inches)
2000-2100	42 – 167 cm (17 – 66 inches)	10 – 143 cm (3.6 – 56 inches)



- Most locations can use these projections without modification
- Humboldt Bay & Eel River Sea Level Rise
  - SLR is at faster rate than region North of Cape Mendocino
  - Modify projections to account for local vertical land motion

# Impacts to California

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Oceanside, CA | May 2009







Sunset Beach, CA | Dec 2012



CA King Tides Initiative | Mario Fernandez



Bolinas, Marin County | Dec 2011





Ocean Beach, San Francisco | Jan 2011





Pacifica, CA



Photo by L Ewing

Coastal Commission 12/12/2013



CALIFORNIA  
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# Highway 1 at Surfer's Beach, Half Moon Bay | Feb 2011







Rincon Beach, Ventura, CA | Dec 2012

David Powdrell



# Port of San Diego



<http://commons.wikimedia.org>





# How is California addressing sea-level rise?

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- Statewide efforts
  - 2009 California Adaptation Strategy
  - Draft Safeguarding California Plan (update to 2009)
  - 2013 update to General Plan Guidelines
  - 2013 update to OES State Hazard Mitigation Plan
  - OPC: 2013 State SLR Guidance, grant program
  - 2012 Adaptation Planning Guide
- California Coastal Commission efforts
  - Local Coastal Programs & Coastal Development Permits
  - Strategic Plan

# Goals of the Document

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- Address sea-level rise in California
- Coastal Act: Minimize hazards and impacts to coastal resources due to sea-level rise
- Fulfill Strategic Plan item 3.1.1



Surf scene, San Diego | Nathan Rupert



# About the Draft Document

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## IT IS

Draft

Draft Guidance for addressing Sea-Level Rise in conformance with the Coastal Act

Complement to other Commission materials

Multi-purpose guidance in which users may focus on particular chapters

A list of sea-level rise adaptation options to choose from

A living document

## IT IS NOT

Final

New regulations

Replacement for other Commission materials

Meant to be read cover to cover

A checklist of adaptation measures where all items have to be accomplished

Static



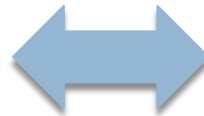
# Contents of the Draft Document

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## Executive Summary

### Main Report

Chapter 1: Introduction  
Chapter 2: Guiding Principles  
Chapter 3: Science  
Chapter 4: Guidance for LCPs  
Chapter 5: Guidance for CDPs  
Chapter 6: Additional Research  
Chapter 7: Next Steps  
Chapter 8: Glossary



### Appendices

Appendix A: Science  
Appendix B: Coastal Engineering  
Appendix C: Adaptation Options  
Appendix D: LCP Resources  
Appendix E: Other Agencies' Programs  
Appendix F: Coastal Act Policies





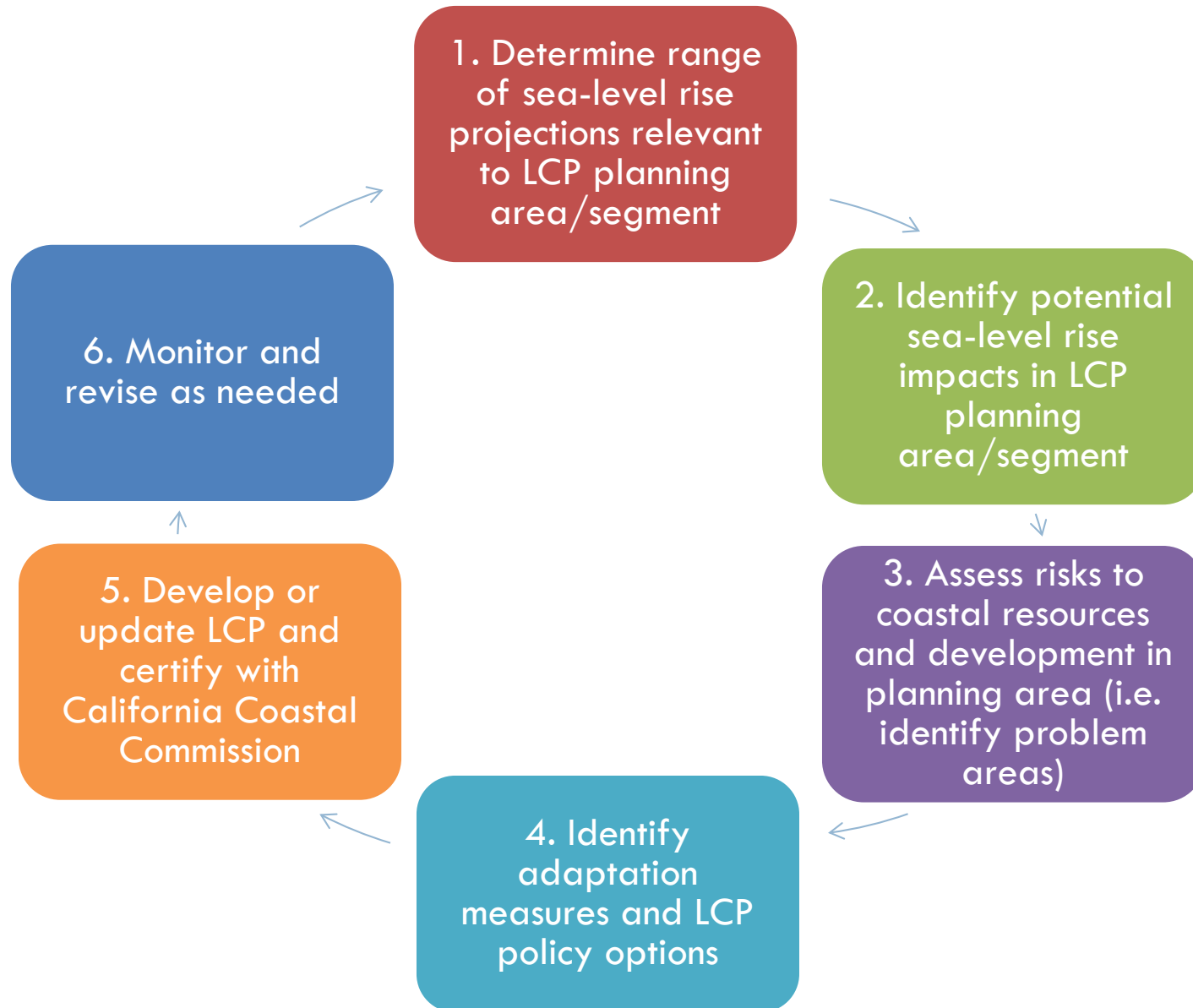
# Guiding Principles

17

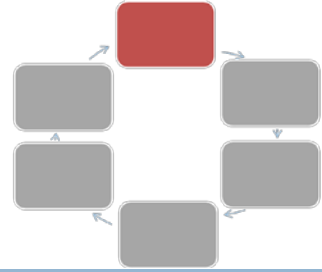
- ▣ 17 principles intended to guide sea-level rise adaptation efforts at the Coastal Commission
- ▣ Principles derive directly from the Coastal Act
- ▣ Organized into 4 sections:
  - Use science to guide decisions
  - Minimize coastal hazards
  - Protect access, recreation, sensitive coastal resources
  - Maximize agency coordination and public participation



# Steps for Addressing SLR in LCPs



# LCP Step 1: Determine SLR Projections

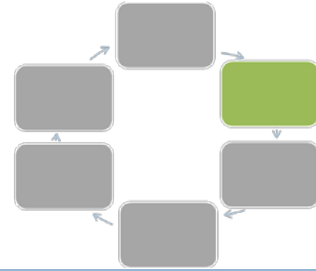


Time Period	South of Cape Mendocino	North of Cape Mendocino
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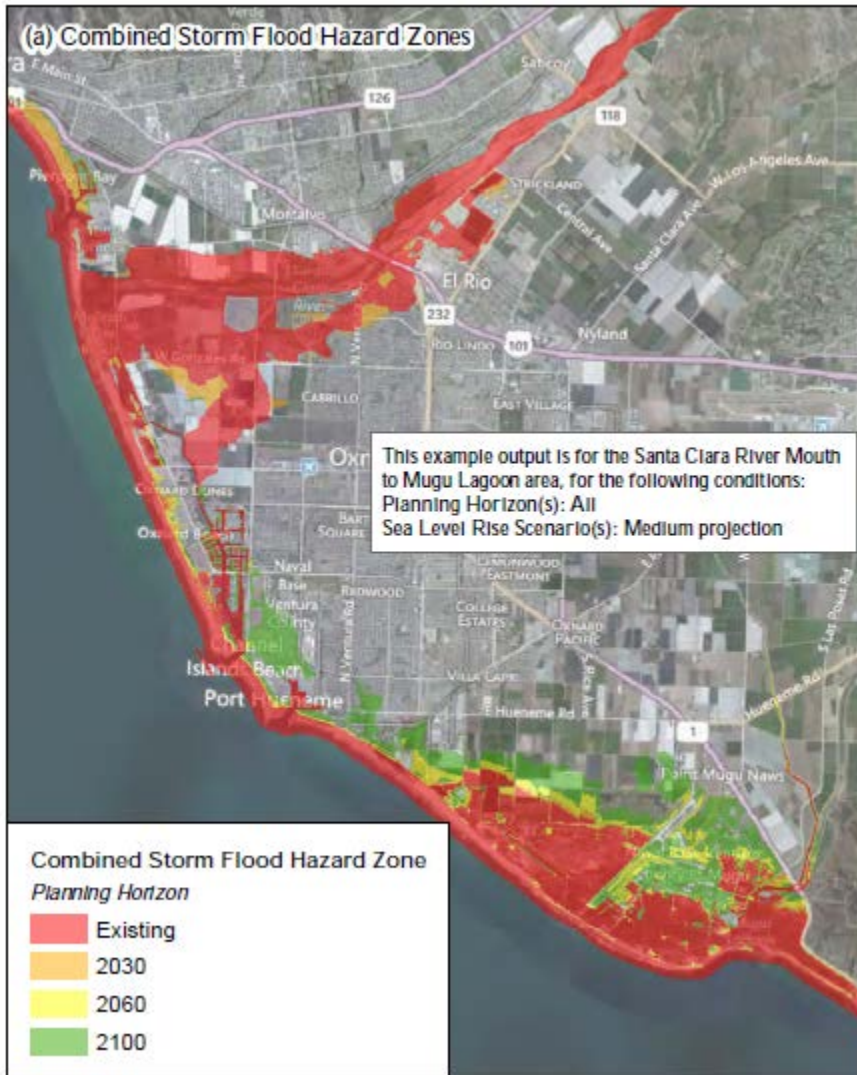
**Expected outcomes:**  
Range of locally relevant sea-level rise projections for the time periods of concern



# LCP Step 2: Identify SLR Impacts



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Expected outcomes:

Current and future SLR hazards and impacts mapped and/or described

figure 6

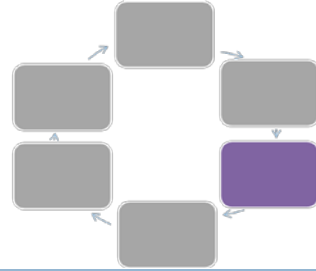
Ventura County Climate Change Vulnerability Study

Example of Combined Storm Flood Hazard Zones

ESA PWA Ref# D211452.00



# LCP Step 3: Assess risks to Coastal Resources



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## Coastal Resources to Consider:

- Public access, beaches, recreation areas
- California Coastal Trail
- Wetlands, ESHA, other habitats
- Agricultural areas
- Cultural sites
- Coastal-dependent uses
- Critical infrastructure
- Coastal Highway 1
- Existing and new development



## Expected outcomes:

Risks and expected consequences of SLR impacts to coastal resources and broader community; maps of resources and/or land uses at risk.



Layers

Flood & Sea Level Rise

2

Switch Map

Split View

Print & Share

Report Page

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Layers

Search

### Flood & Sea Level Rise

**1. Select the hazard to view:**

- Tidal Inundation (monthly in feet)
- Wave Impact (large storm)
- Flood Inundation (large storm)
- River Flood Inundation (large storm)
- Erosion Risk

**2. Select the time and amount of sea level rise:**

Year

Current 2030 2060 2100

Sea Level Rise Scenario

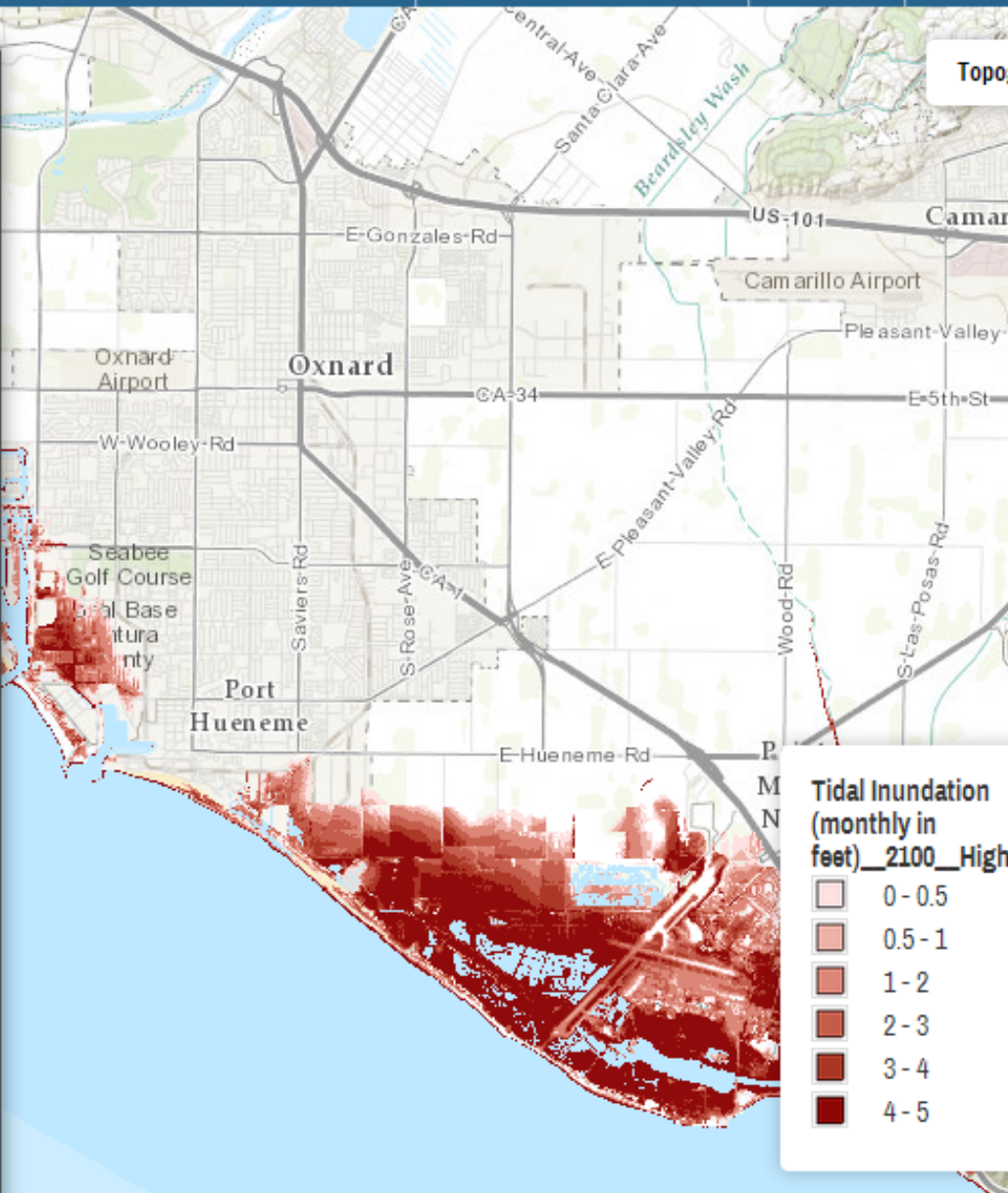
Low Medium High

Large Storm Wave Event (for Erosion Risk)

Existing Wave Climate Doubling of El Niño Frequency Addition of ARkStorm

Layer Properties:  Opaque  Transparent

Methods



#### Tidal Inundation (monthly in feet) 2100\_High

- 0 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5



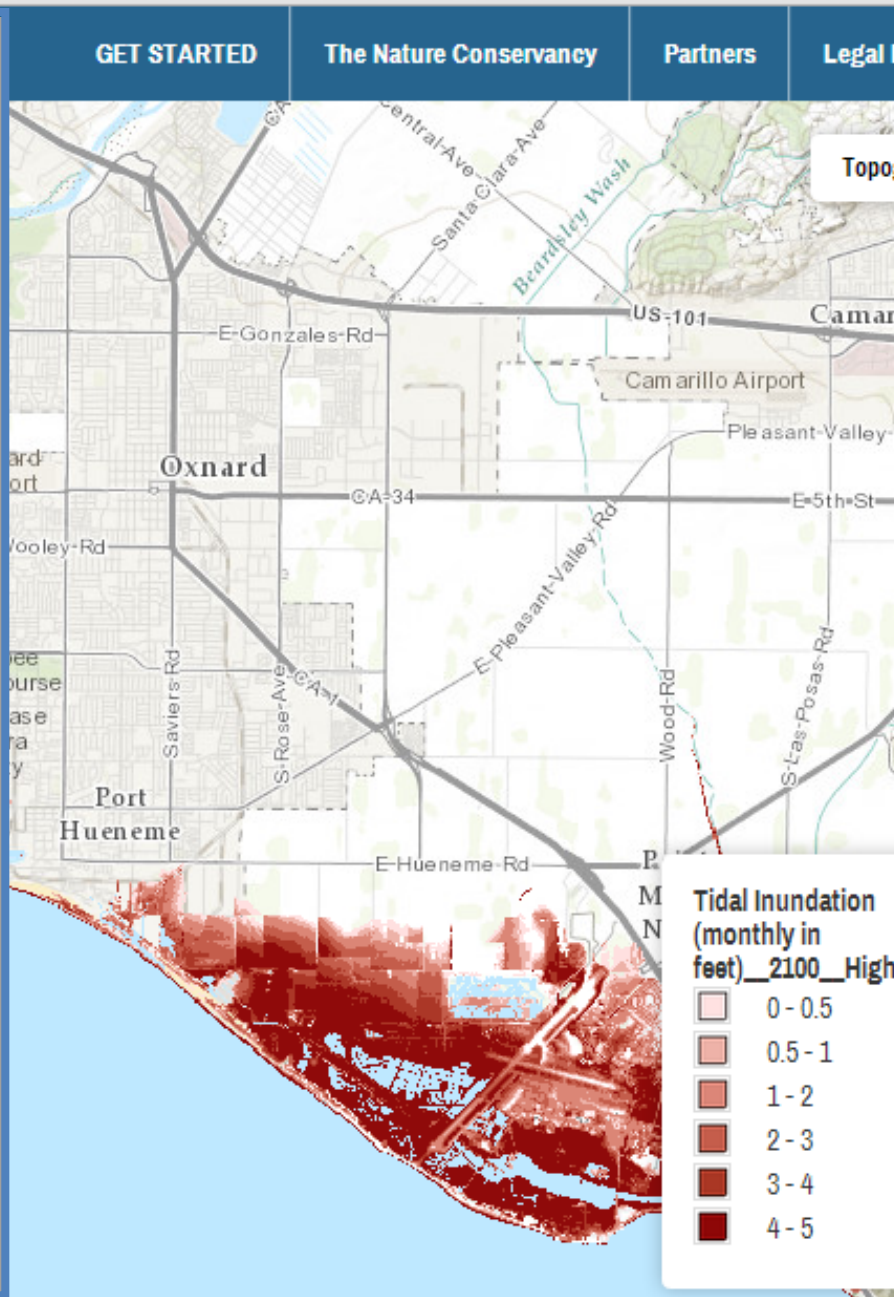


Tuluwat 8.94', 2010

# HUMBOLDT BAY

## Shoreline Inventory, Mapping and Sea Level Rise Vulnerability Assessment

Aldaron Laird  
Trinity Associates





# HUMBOLDT BAY

## Shoreline Inventory, Mapping and Sea Level Rise Vulnerability Assessment

Aldaron Laird  
Trinity Associates

# CITY OF SANTA BARBARA SEA-LEVEL RISE VULNERABILITY STUDY

A White Paper from the California Energy Commission's California Climate Change Center

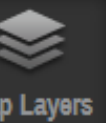
Prepared for: California Energy Commission

Prepared by: University of California, Santa Cruz

JULY 2012

CEC-500-2012-039





Flood & Sea Level Rise

+  
 -

### Flood & Sea Level Rise

**1. Select the hazard to view:**

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Sea Level Rise Scenario

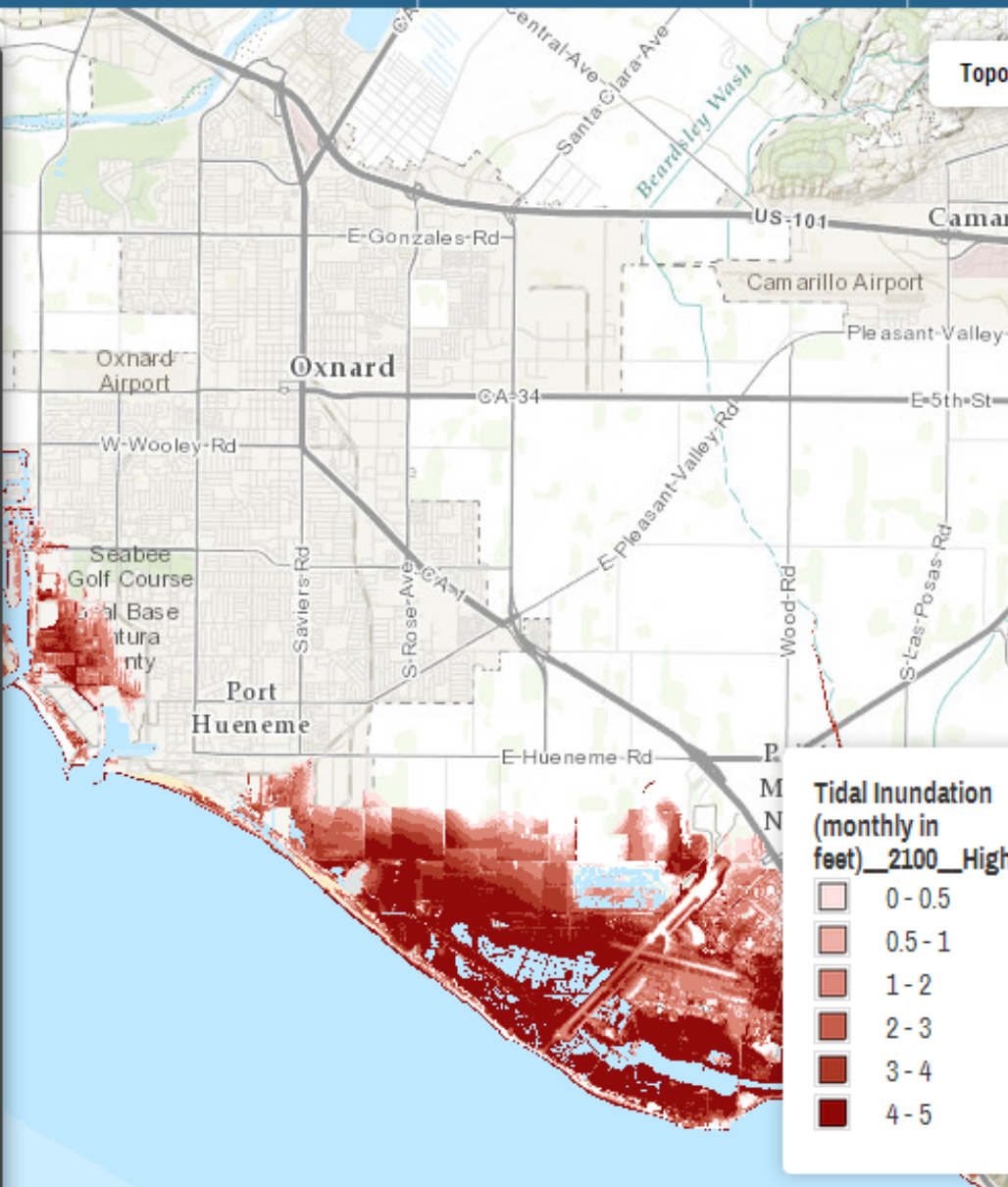
Low    Medium    High

Large Storm Wave Event (for Erosion Risk)

Existing Wave Climate    Doubling of El Niño Frequency    Addition of ARkStorm

Layer Properties: [Methods](#)

Opaque    Transparent







McGrath State Beach | [www.caopensapce.org](http://www.caopensapce.org)



Oxnard Beach | Flickr user Surfingsanders



Oxnard Shores Mobile Home Park | California Coastal Records Project



Visitor serving facilities, Oxnard | [mymotels.com](http://mymotels.com)



Oxnard Farm Fields

Reliant Ormand Beach Generating Station | California Coastal Records Project



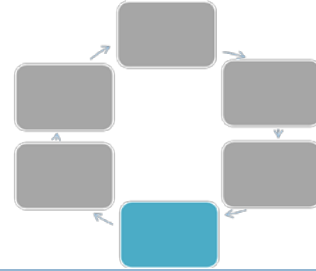
Port of Hueneme | [portofhueneme.org](http://portofhueneme.org)



Ormand Beach Wetlands | Sierra Club



# LCP Step 4: Identify LCP Adaptation Measures



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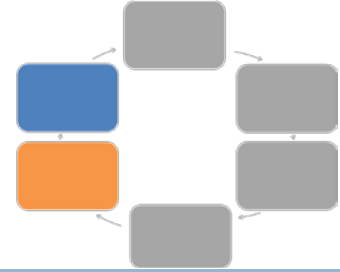


## Expected outcomes:

Identification of necessary updates,  
list of applicable adaptation  
measures applicable, new  
implementation policies/ordinances

Tomales Bay Wetland Restoration | CA King Tides Initiative | Jan 2012 | Sarah Allen

# LCP Steps 5 & 6: Finalize LCP



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Image by California Coastal Commission

## Step 5 expected outcomes:

Certified/updated LCP with policies and land use designations that address sea-level rise and the related hazards

## Step 6 expected outcomes:

Plan to monitor the LCP planning area for SLR and other impacts; revisions when conditions change or science is updated



# Steps for Addressing SLR in CDPs

1. Establish the projected sea-level rise range for the proposed project

2. Determine how sea-level rise impacts may constrain the project site

3. Determine how the project may impact coastal resources over time, considering SLR

4. Identify project design alternatives to both avoid resource impacts and minimize risks to the project

5. Finalize project design and submit permit application





# CDP Analysis of Sea-Level Rise

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## General Situations for considering sea-level rise:

- On or near a floodplain, beach, wetland, lagoon or estuary
- Exposed to wave impacts or wave runup
- Protected by levees, dikes, bulkheads, seawalls, etc.
- On an eroding coastal bluff
- Reliant on shallow water well for water supply



Coastal dunes, Humboldt Bay |  
Lesley Ewing



# CDP Step 1: Determine SLR Projections

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## Expected Outcomes:

- Proposed project life
- Scenarios of SLR for use in project analysis

Time Period	South of Cape Mendocino	North of Cape Mendocino
2000- 2030	4 – 30 cm (1.5 – 12 inches)	-4 – +23 cm (-1.5 – 9 inches)
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Levees along Wintersberg Channel, Huntington Beach | Lesley Ewing

# CDP Step 1: Determine SLR Projections



## Expected Outcomes:

- Proposed project life
- Scenarios of analysis

Project life: 75 years, to ~2090

Expected sea level rise: 14" – 56"

Scenarios: 14", 30", and 56"

Time Period	South of Mendocino	
2000- 2030	4 – 30 cm (1.5 – 12 inches)	
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Levees along Wintersberg Channel, Huntington Beach | Lesley Ewing





# CDP Step 2: Identify SLR Impacts & Constraints

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## Hazard Analysis Types:

- Geologic Stability
- Erosion
- Waves and wave runup
- Flooding and inundation

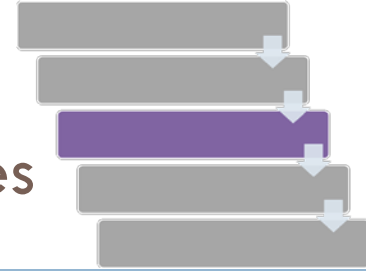
## Expected Outcomes:

- Maps of site-specific hazards
- Areas that can safely support development



Highway 1 near Pescadero, San Mateo County |  
Lesley Ewing

# CDP Step 3: Assess Impacts to Coastal Resources



## Coastal Resources to Consider:

- Public access, beaches, recreation areas
- California Coastal Trail
- Wetlands, ESHA, other habitats
- Agricultural areas
- Cultural sites
- Coastal-dependent uses
- Critical infrastructure
- Coastal Highway 1
- Existing and new development



Ocean Beach, San Francisco | Lesley Ewing

## Expected Outcomes:

SLR risks to coastal resources; map overlaying development and resource constraints



# CDP Step 4: Identify Project Alternatives



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Surfers Point Managed Retreat Project, Ventura, CA |  
Lesley Ewing

## Expected Outcomes:

- Project modifications and reexamination of impacts
- 1+ project alternatives
- Possible adaptation options





# CDP Step 5: Finalize Application



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## Expected Outcomes:

- Analysis of sea-level rise concerns for inclusion in a CDP application
- Combine with other application items for a complete submittal



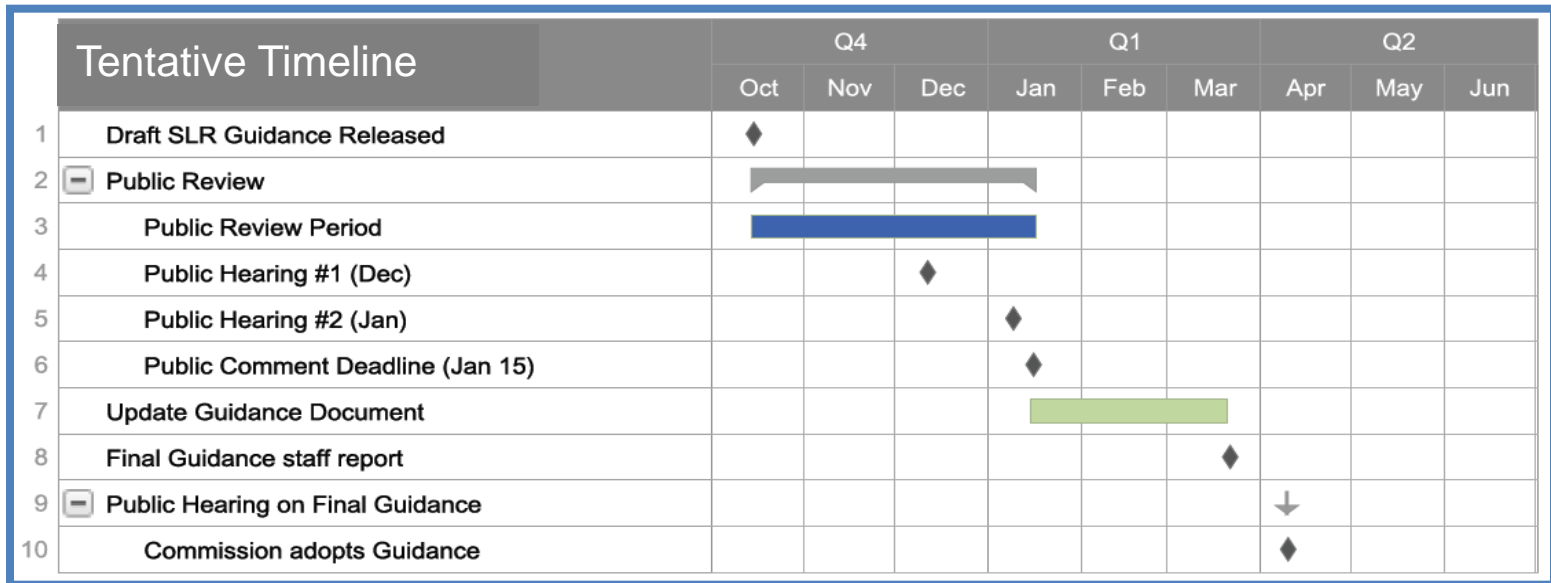
Pacifica State Beach, Linda Mar Area, Pacifica, CA |  
Lesley Ewing



# Public Review

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- Draft is a work in progress
- 3 webinars, 10+ in person meetings, accounting for close to 200 stakeholders
- Meetings with staff



# Thank You

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## Contact Information:

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Lesley Ewing, [lewing@coastal.ca.gov](mailto:lewing@coastal.ca.gov)  
(415) 904-5291

## Submit comments to:

[SLRGuidancedocument@coastal.ca.gov](mailto:SLRGuidancedocument@coastal.ca.gov)

SLR Working Group

45 Fremont St

San Francisco, CA 94105



California Coastal Trail, San Francisco | CA  
Coastal Commission

**To access the document go to:**

[www.coastal.ca.gov/climate/SLRguidance](http://www.coastal.ca.gov/climate/SLRguidance)

