

# **HUMBOLDT BAY SEA LEVEL RISE ADAPTATION PLANNING PROJECT**

**Adaption Planning Working Group**

**Meeting**

**July 16<sup>th</sup> 2013**

# **AGENDA**

- 1. Introductions and agency updates/announcements**
- 2. Adaptation planning process update**
- 3. Humboldt Bay shoreline vulnerability rating presentation**
- 4. Assets at risk assessment update**
- 5. Inundation and groundwater modeling update**
- 6. Project web site update**
- 7. Goals and objectives discussion**
- 8. Discuss public and stakeholder meeting to introduce the Project and share inundation maps**
- 9. Discuss presentation to the CCC in September in Eureka**

# **SEA LEVEL RISE ADAPTATION PLANNING**

**ASSESS**

**PLAN**

**IMPLEMENT**

# SCOPE

Assemble Planning Group

Select Adaptation Planning Process

# ASSESS

Identify Existing Coastal Hazards

Describe Existing Conditions

Identify Impacts

Identify Vulnerabilities

Identify Assets at Risk

Analyze Risks/Impacts

Evaluate Adaptive Capacity

# PLAN

Prioritize Adaptation Needs

Identify Adaptation Strategies

Prioritize Adaptation Strategies

Integrate Strategies & LCP/HMP

# ADATATION STRATEGIES

Land Use  
Policies and Regulations

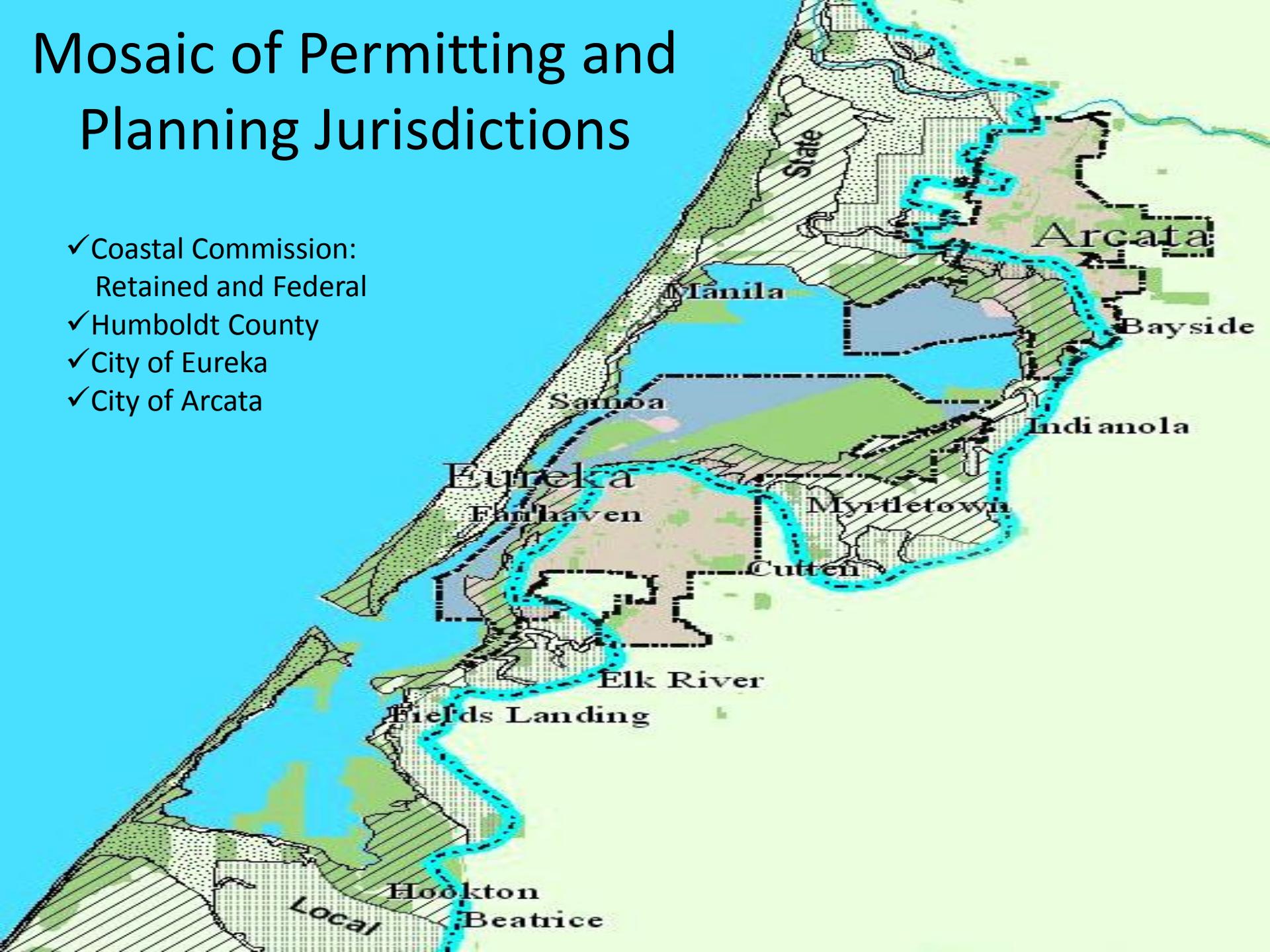
Structure and  
Infrastructure Projects

Natural Systems  
Protections

Public Education and  
Awareness

# Mosaic of Permitting and Planning Jurisdictions

- ✓ Coastal Commission:  
Retained and Federal
- ✓ Humboldt County
- ✓ City of Eureka
- ✓ City of Arcata





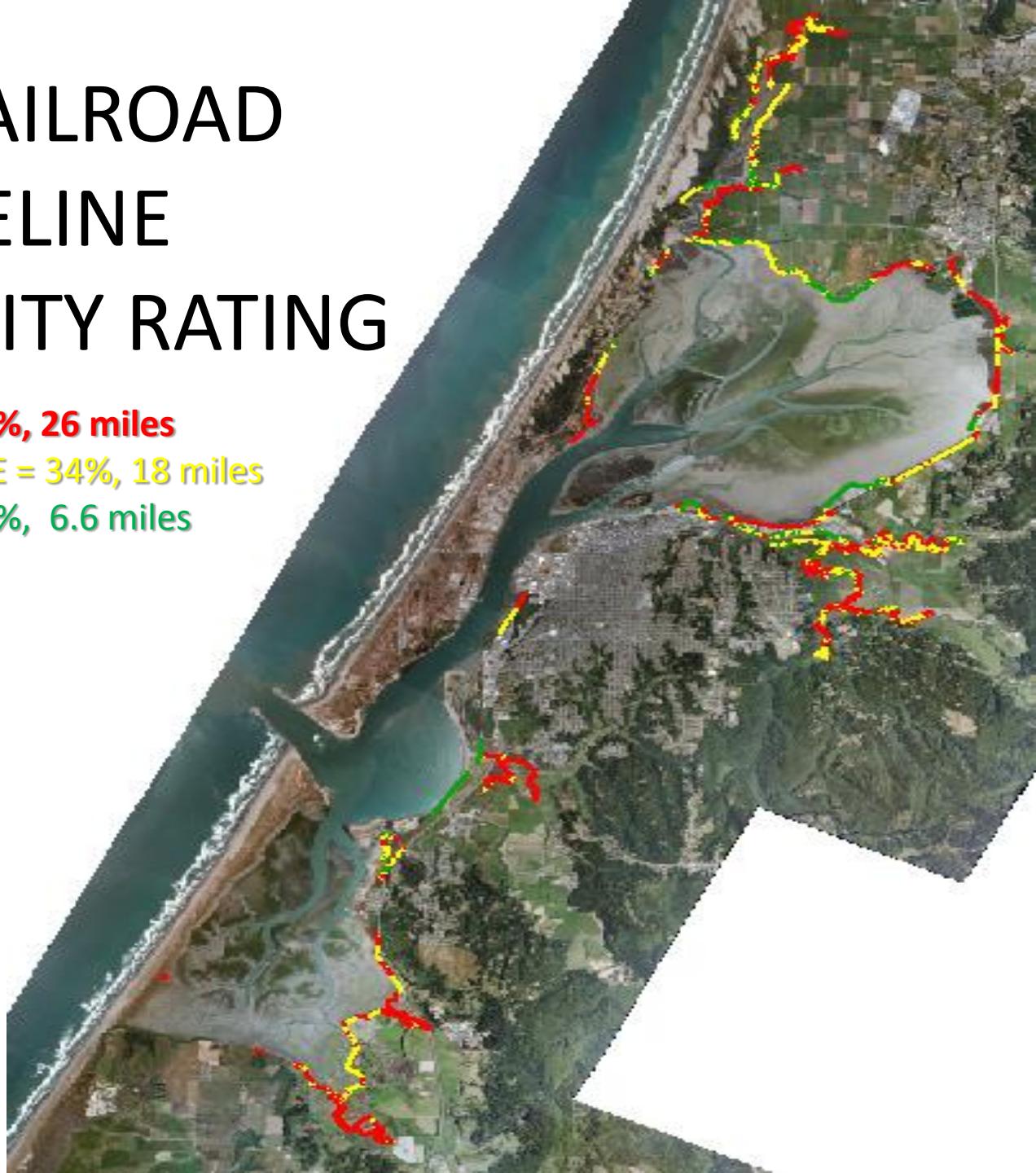
# Humboldt Bay Shoreline Inventory, Mapping and Sea Level Rise Vulnerability Assessment

Addendum:

Shoreline Vulnerability Ratings

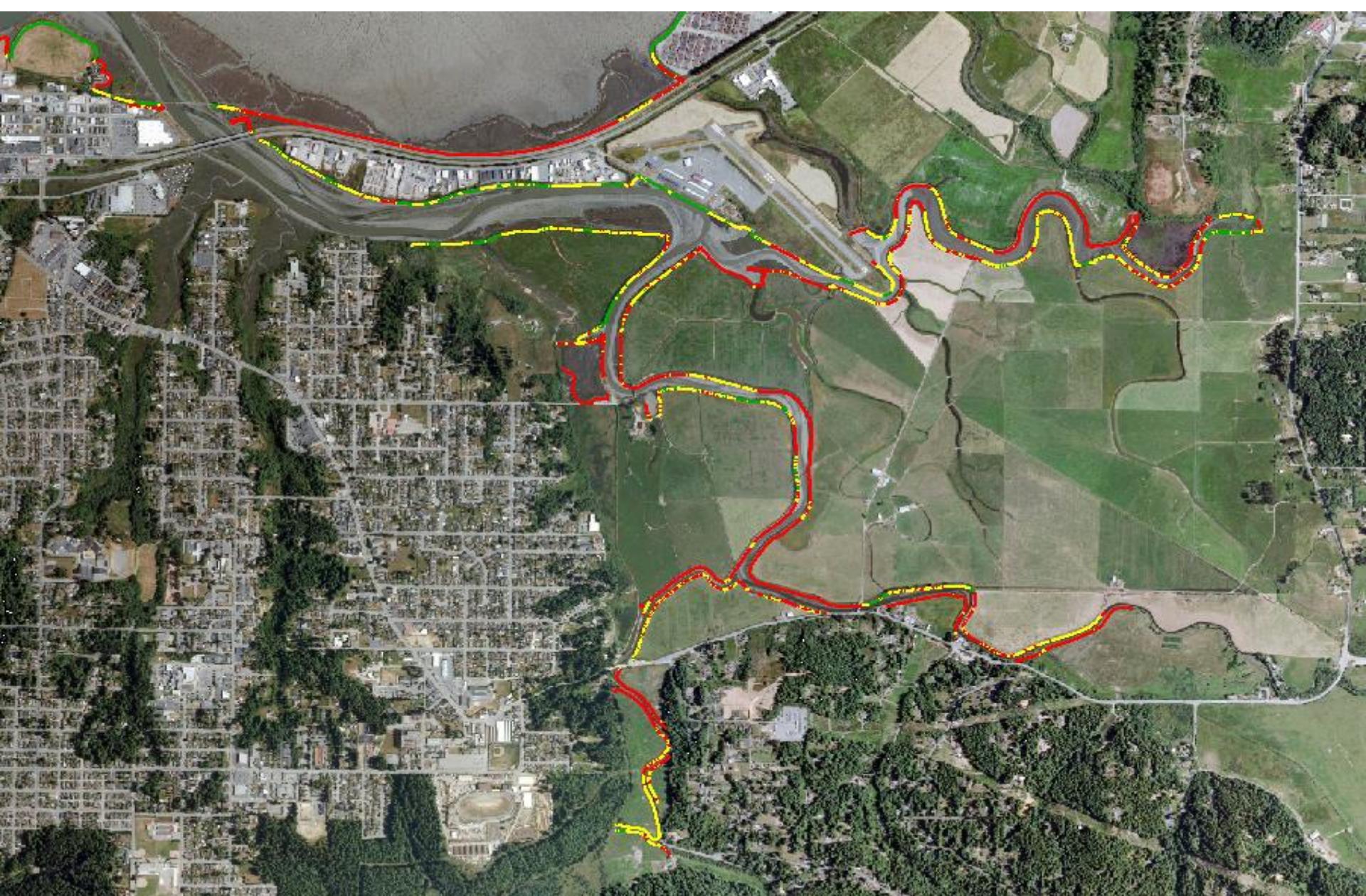
# DIKE & RAILROAD SHORELINE VULNERABILITY RATING

- **HIGHLY VULNERABLE = 51%, 26 miles**
- **MODERATELY VULNERABLE = 34%, 18 miles**
- **LOW VULNERABILITY = 13%, 6.6 miles**



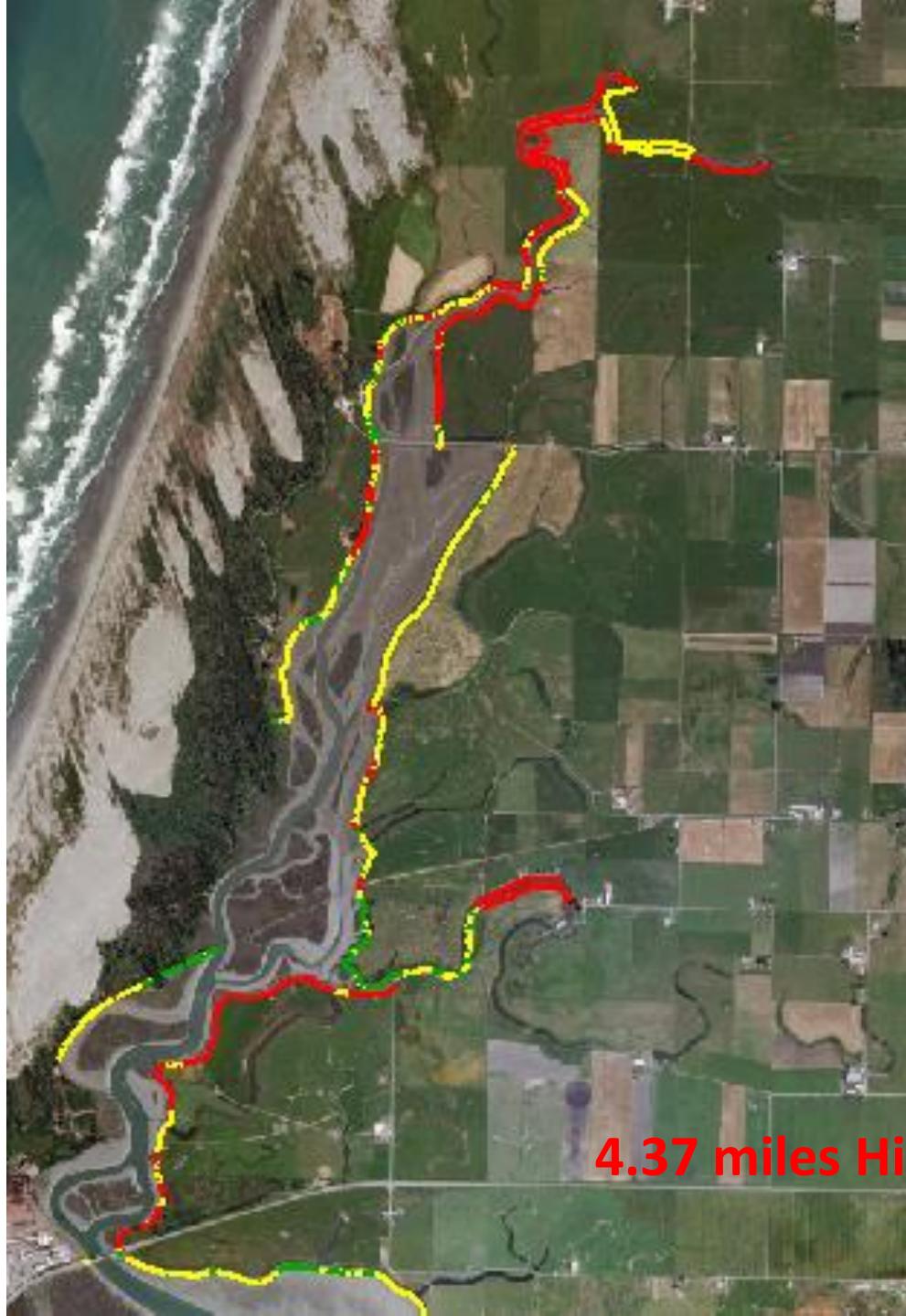
Sum of Length (miles)		Vulnerability Rating									
	Low	2	3	4	5	6	7	8	9	10	High
		2	3	4	5	6	7	8	9	10	Total
<b>Arcata Bay</b>											
Dike		0.68	0.86	0.9	1.15	0.67	0.59	0.73	0.2	0	5.78
Railroad		0	0.02	0.08	0.26	2.15	2.78	1.16	0.06	0	6.52
<b>Eureka Bay</b>											
Dike		0	0.32	0.01	0	0.01	0.05	0.1	0.09	0	0.58
Railroad		0.67	0.09	0.02	0.13	0.39	0.29	0.09	0	0	1.68
<b>South Bay</b>											
Dike		0.01	0.06	0.11	0.69	1.65	3.28	1.28	0.43	0.12	7.63
Railroad		0	0.01	0.04	0.13	0.61	0.53	0.06	0	0	1.38
<b>Mad River Slough</b>											
Dike		0.04	0.27	0.52	1.51	2.29	1.88	1.74	0.62	0.12	8.99
Railroad		0	0.07	0.16	0.17	0.13	0.01	0	0	0	0.55
<b>Eureka Slough</b>											
Dike		0	0.46	0.98	1.84	3.92	4.6	1.95	0.55	0.03	2.91
Railroad		0	0	0	0	0.02	0.03	0.03	0.02	0	0.32
<b>Elk River Slough</b>											
Dike		0	0.01	0.01	0.05	0.16	0.46	0.73	1.49	0	14.33
Railroad		0.08	0.13	0.04	0.01	0.04	0.02	0	0	0	0.11
Total		1.48	2.28	2.88	5.94	12.03	14.54	7.87	3.47	0.28	50.78

**7.2 miles Highly Vulnerable**



**5.7 miles Highly Vulnerable**

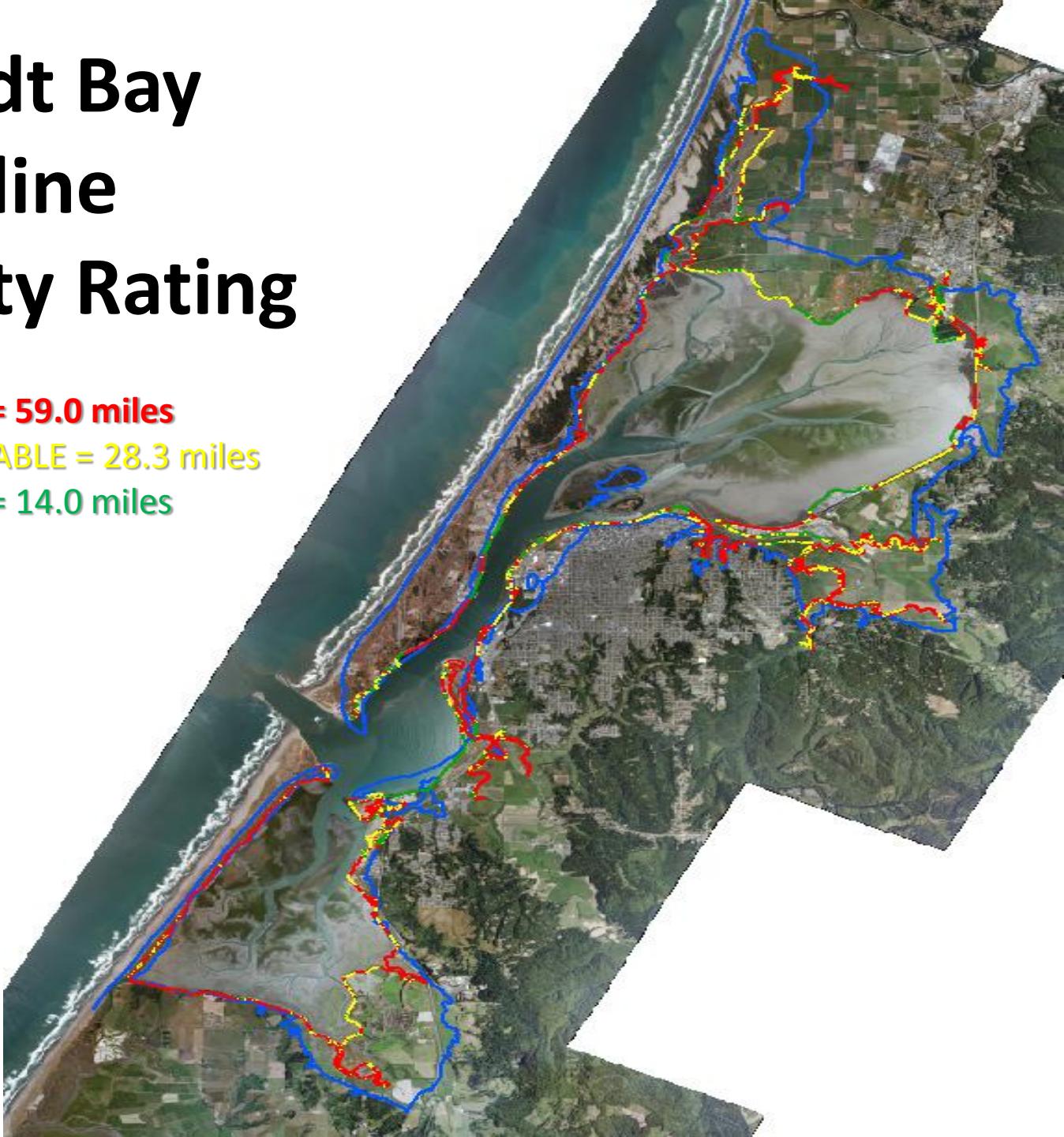




**4.37 miles Highly Vulnerable**

# Humboldt Bay Shoreline Vulnerability Rating

- **HIGHLY VULNERABLE = 59.0 miles**
- **MODERATELY VULNERABLE = 28.3 miles**
- **LOW VULNERABILITY = 14.0 miles**



# Humboldt Bay

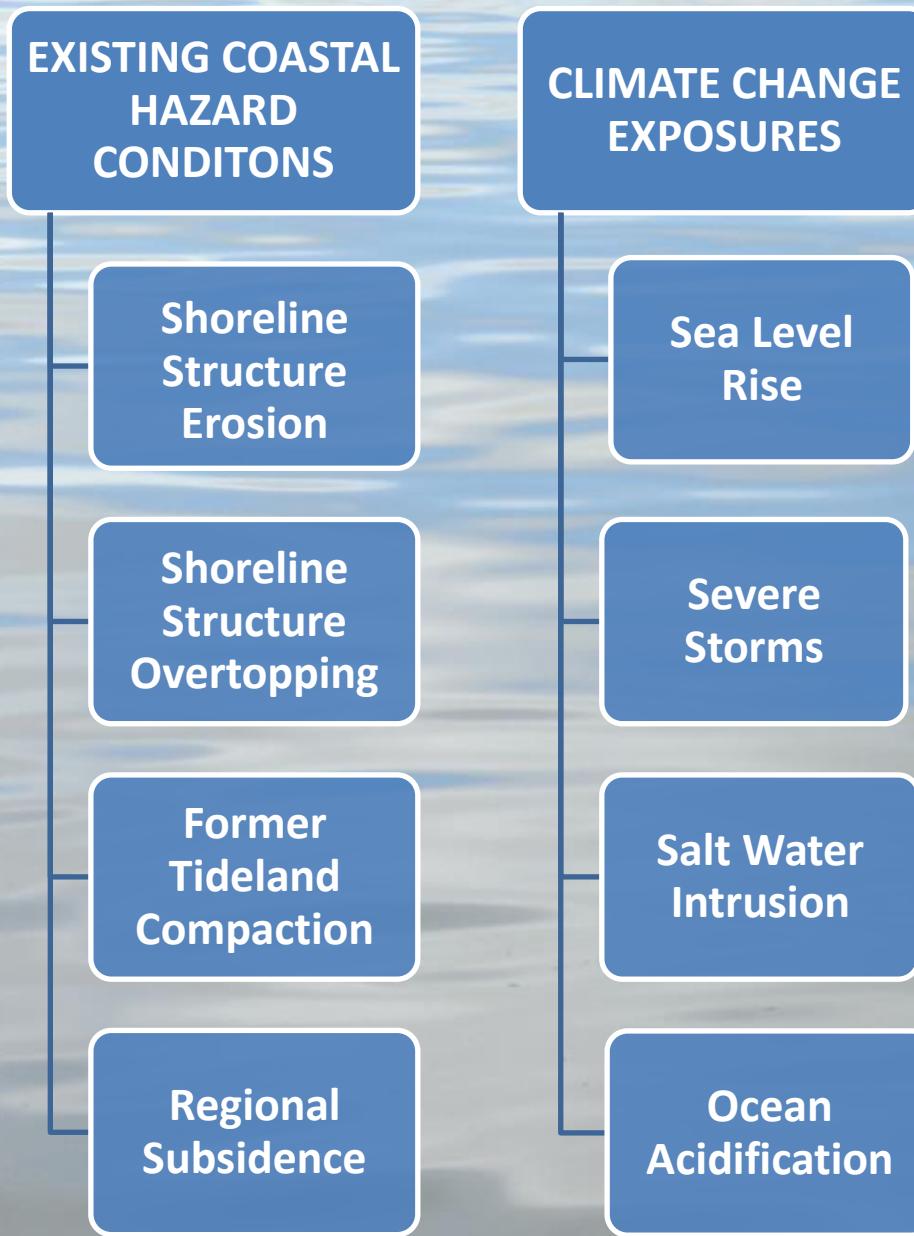
## Shoreline Vulnerability Rating

- Eureka Slough has the greatest length of shoreline by structure rated **highly vulnerable**, 7.1 miles of dike;
- South Bay has 5.1 miles of dike,
- Mad River Slough has 4.4 miles of dike,
- Arcata Bay has 4.0 miles of railroad,
- Elk River Slough 3.0 miles of natural bank-no structure) and 2.7 miles of dike,
- Eureka Bay 1.3 miles of fortified and 1.3 miles of natural bank-no structure.



Sum of Length (miles)	Vulnerability Rating									
	Low		Medium					High		
	2	3	4	5	6	7	8	9	10	Total
<b>Mad River Slough</b>										
Bulwark	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Dike	0.0	0.3	0.5	1.5	2.3	1.9	1.7	0.6	0.1	9.0
Fill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Fortified	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3
None	0.0	0.1	0.0	0.0	0.1	0.3	0.7	1.7	0.0	2.8
Railroad	0.0	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.6
Road	0.0	0.0	0.1	0.1	0.1	0.3	0.2	0.1	0.0	0.9
Boat Ramp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Eureka Slough</b>										
Bridge Abutment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bulwark	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3
Cliff/Bluff	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.9	0.0	1.3
Dike	0.0	0.4	1.0	1.9	3.9	4.6	1.9	0.6	0.0	14.3
Fill	0.0	0.0	0.0	0.1	0.1	0.2	0.4	0.4	0.0	1.2
Fortified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
None	0.0	0.0	0.0	0.0	0.1	0.6	0.7	1.4	0.0	2.9
Railroad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Road	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.7
Tidegate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boat Ramp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Elk River Slough</b>										
Bridge Abutment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bulwark	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cliff/Bluff	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.0	0.6
Dike	0.0	0.0	0.0	0.0	0.2	0.5	0.7	1.5	0.0	2.9
Fill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
Fore Dune	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1.3	0.1	1.8
Fortified	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1
None	0.0	0.0	0.0	0.0	0.1	0.3	0.6	2.0	0.1	3.0
Railroad	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Road	0.0	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.6
Tidegate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	3.2	5.2	5.7	10.0	18.2	21.5	16.1	19.9	2.0	101.8

# Assets at Risk Assessment



# **Risk Assessment**

## **Assets, Land Uses, Resources**

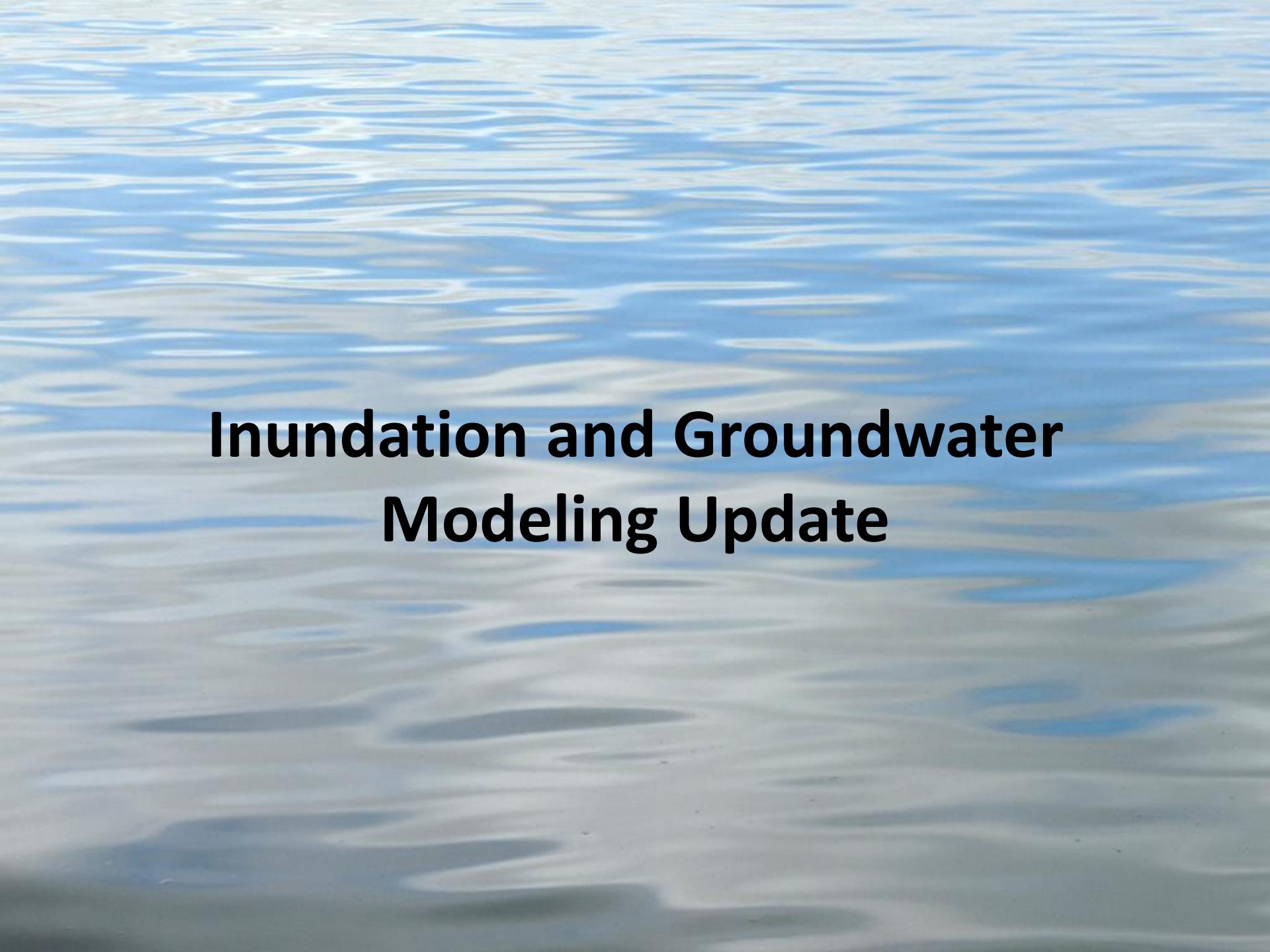
- Dikes, Harbor, Airport, Electrical Power Plant, Wastewater Treatment Plants, Pump and Lift Stations, Highways, Railroad, Wells, Water Transmission Pipes, Gas Lines, Fuel Depot, Electrical Transmission Lines, and Communications Towers
- Agricultural lands, Wildlife Refuges, Recreational Areas, Public Facilities, Commercial, Retail and Residential [King Salmon]
- Wiyot Cultural Sites, Aleutian Goose Forage, Waterfowl Habitat, Grazing Lands, and Estuary and Salmonid Habitat Enhancement Projects

# Assets at Risk Inventory

ASSETS		AREA	JURISDICTION				AREA	JURISDICTION				AREA	JURISDICTION			AREA	JURISDICTION			AREA	JURISDICTION				
CRITICAL INFRASTRUCTURE		AB	CCC	H.CO.	ACV	EKA	EB	CCC	H.CO.	EKA	SB	CCC	H.CO.	MRS	CCC	H.CO.	ES	CCC	H.CO.	EKA	ERS	CCC	H.CO.	EKA	
Dikes		YES	YES	YES	YES	YES	NO				YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Interstate Highway		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	YES	YES	
Utilities																									
Water		YES	YES	YES	YES	?	YES	YES	YES	YES	?			YES	YES	YES	YES	YES	YES	YES	?				
Wastewater		YES	YES	NO	YES	NO	YES	YES	NO	YES	YES	NO	YES	NO		YES	YES	NO	YES	YES	NO	YES	YES	NO	YES
Communications		?					YES	YES	NO	YES	?			NO		YES	YES	YES	YES	NO					
Electric power		YES	YES	YES	YES	NO	YES	YES	YES	?	YES	YES	YES	NO		YES	YES	YES	NO	YES	NO	YES	NO	YES	NO
Nuclear Power Facilities		NO					YES	YES	YES	NO	YES	YES	YES	NO											NO
Fuel		NO					YES	YES	NO	YES	NO			NO		NO									NO
Natural Gas		YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO	NO		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Hospitals		NO					NO				NO			NO		NO		NO		NO		NO		NO	
Schools		NO					NO				NO			NO		NO		NO		NO		NO		NO	
Government Facilities		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	NO	YES	
OTHER INFRASTRUCTURE																									
Railroad		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	NO	YES	
Harbor/Marina/Waterfront		YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES		
State Highways		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	NO	NO	NO	NO	NO			
Roads		YES	YES	YES	YES	YES	NO				YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES
Streets		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	YES	NO	
Bridges		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Tidegates		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Drainage Structures		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Airport		YES	YES	NO	NO	YES	NO				NO			NO		NO		YES	YES	NO	YES				
Waste Transfer		NO					YES	YES	NO	YES	NO			NO		NO		NO	NO	NO	NO	NO			
LAND USES																									
Agriculture		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Natural Resource		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Residential		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	YES	?	
Commercial		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	?	YES		NO		
Industrial		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO			
Public Facility		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
PROPERTY																				YES	YES	YES			
Private		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Local		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO		YES	YES	YES	YES	YES	YES	YES	NO	YES	
State		YES	YES	YES	NO	YES	NO				YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Federal		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	
HIST/CULT/ARCH RESOURCES		YES	YES	YES	?	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	?	
HAZARDOUS MATERIAL SITES		?									?														
CONTAMINATED LANDS		?									?														
NON-STRUCTURAL SHORELINES		YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
NATURAL AREAS		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	

# **Project Web Site Update**

- **Sea Level Rise Fact Sheet**
- **In the News-Current Sea Level Rise  
Adaptation Planning Events**
- **Humboldt Bay Sea Level Rise  
Adaptation Planning Project**
- **SLRAP Resources**



# **Inundation and Groundwater Modeling Update**

# **Humboldt Bay Sea Level Rise Adaptation Planning Project**

## **Goal**

**The goal of the project is to support informed decision-making and encourage a unified, consistent regional adaptation strategy to address the hazards associated with sea level rise in the Humboldt Bay region.**

# Objectives

- Understand the current hazards associated with coastal flooding in the Humboldt Bay region and the predicted future effects of continued sea level rise.
- Gather the most current technical information regarding historical and future sea level rise in the Humboldt Bay region and the contributing effect of vertical land motion.
- Understand the linkages between sea level rise adaptation planning and related planning efforts.
- Identify opportunities for integrated adaptation strategies and coordinated response efforts across jurisdictional boundaries.

# **Humboldt Bay Sea Level Rise Adaptation Planning Project**

## **Stakeholder and Public Outreach**

**Share with the public and stakeholders:**

- Current tidal and sea level rise inundation model/maps
- Share groundwater and sea level rise inundation model/maps
- Humboldt Bay Sea Level Rise Adaptation Planning Project



# **California Coastal Commission Presentation-September-Eureka**

# Meeting Schedule: 2013-2015

<u>2013</u>	<u>2014</u>	<u>2015</u>
<del>2/27</del>	2/26	
<del>4/24</del>	4/30	
(7/15)	6/25	
8/28	8/27	
10/30	10/29	
12/18		1/7