HUMBOLDT BAY AREA PLAN UPDATE

TSUNAMI SAFETY AND SEA LEVEL RISE

Tuesday, March 26, 2019
6:00 to 8:00 PM
Humboldt County Agricultural Center
5630 South Broadway
Eureka, California

WORKSHOP AGENDA

6:00 – Sign-in

6:05 – Introduction

6:10 – Tsunami Safety Planning

- **Staff presentation**
- **Questions and discussion**

6:50 – Sea Level Rise

- **Staff presentation**
- **Questions and discussion**

7:50 – Next steps

8:00 – Workshop concludes

Humboldt Bay National Wildlife Refuge, South Bay.
Photo Credit – Aldaron Laird

HUMBOLDT BAY AREA PLAN UPDATE

2014 LCP Grant

- $125,000 in funding from the Ocean Protection Council ($90,000) and from the Coastal Commission ($35,000)
- Sea level rise – update HBAP background information, vulnerability assessment, policy options
- Tsunami safety planning – Tsunami Safety Plan and inundation mapping
- Other tasks unrelated to sea level rise or tsunami safety planning

2017 LCP Grant

- $50,000 in funding from the Coastal Commission
- Sea level rise planning for communities at risk (King Salmon, Fields Landing, Fairhaven, Finntown)

HUMBOLDT BAY TSUNAMI SAFETY PLANNING

Coastal Commission and Ocean Protection Council Grant Deliverables - Humboldt Bay-wide Tsunami Safety Planning:

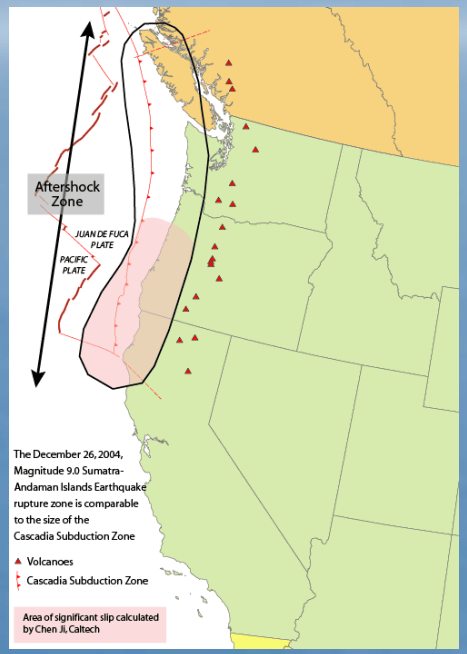
- **Update Hazard Policy 3.17.B. Hazards-Development**
- **TsunamiReady Planning for the entire Humboldt Bay Area based on National Weather Service Instruction**

MAJOR TSUNAMI POLICY QUESTIONS

- What tsunami inundation level/probability should we use for the Tsunami Hazard Zone?
- Should we consider pedestrian evacuation as an appropriate mitigation for new development?
  - What pedestrian evacuation speed should we consider?
- What structural requirements should we place on new development?
  - Elevation of habitable floors?
  - Strengthen to resist tsunami forces?

HISTORIC TSUNAMIS IN HUMBOLDT

- 31 tsunamis recorded on the North Coast since 1933
- Cascadia Subduction Zone
  - Last major rupture was approx. magnitude 9 in Jan. 1700
  - Wave heights estimated to be 25 to 60 feet along the California coast
  - There is a 35% chance that the portion of the zone closest to California will rupture in the next 50 years, generating a smaller but still major, near-shore earthquake/ tsunami.



California's Tsunami Risk, A Call for Action, 2014: California Tsunami Policy Working Group

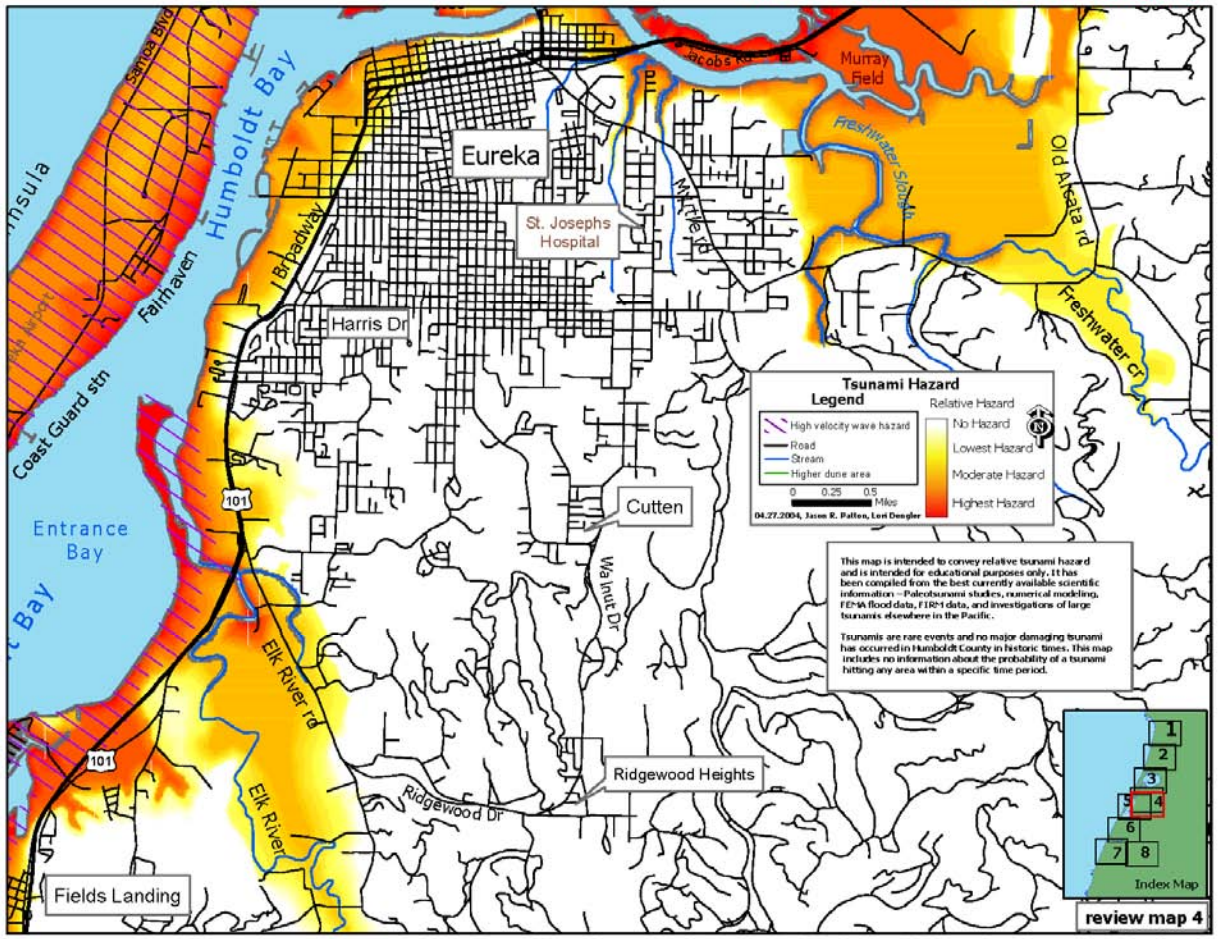
RECOGNITION OF TSUNAMI HAZARDS AND THE NEED FOR LAND USE REGULATION

- **Local Awareness and Action**
  - **Dr. Lori Dengler at Humboldt State University is principally associated with increased local recognition of the tsunami hazard in Humboldt County.**
  - **Redwood Coast Tsunami Work Group, formed 1996**
  - **Relative tsunami hazard maps of Humboldt County coastline 2003 - Humboldt State University**
- **Land Use Applications**
  - **Fairhaven Cottages proposed Coastal Development Permit resulted in a new Tsunami Ready Fee 2005 for sirens**
  - **Samoa Town Master Plan Project EIR published in January 2006 and ultimate approval in 2012**

HUMBOLDT BAY RELATIVE TSUNAMI HAZARD MAP

FOR EMERGENCY PLANNING PURPOSES ONLY

FOR EMERGENCY PLANNING PURPOSES ONLY



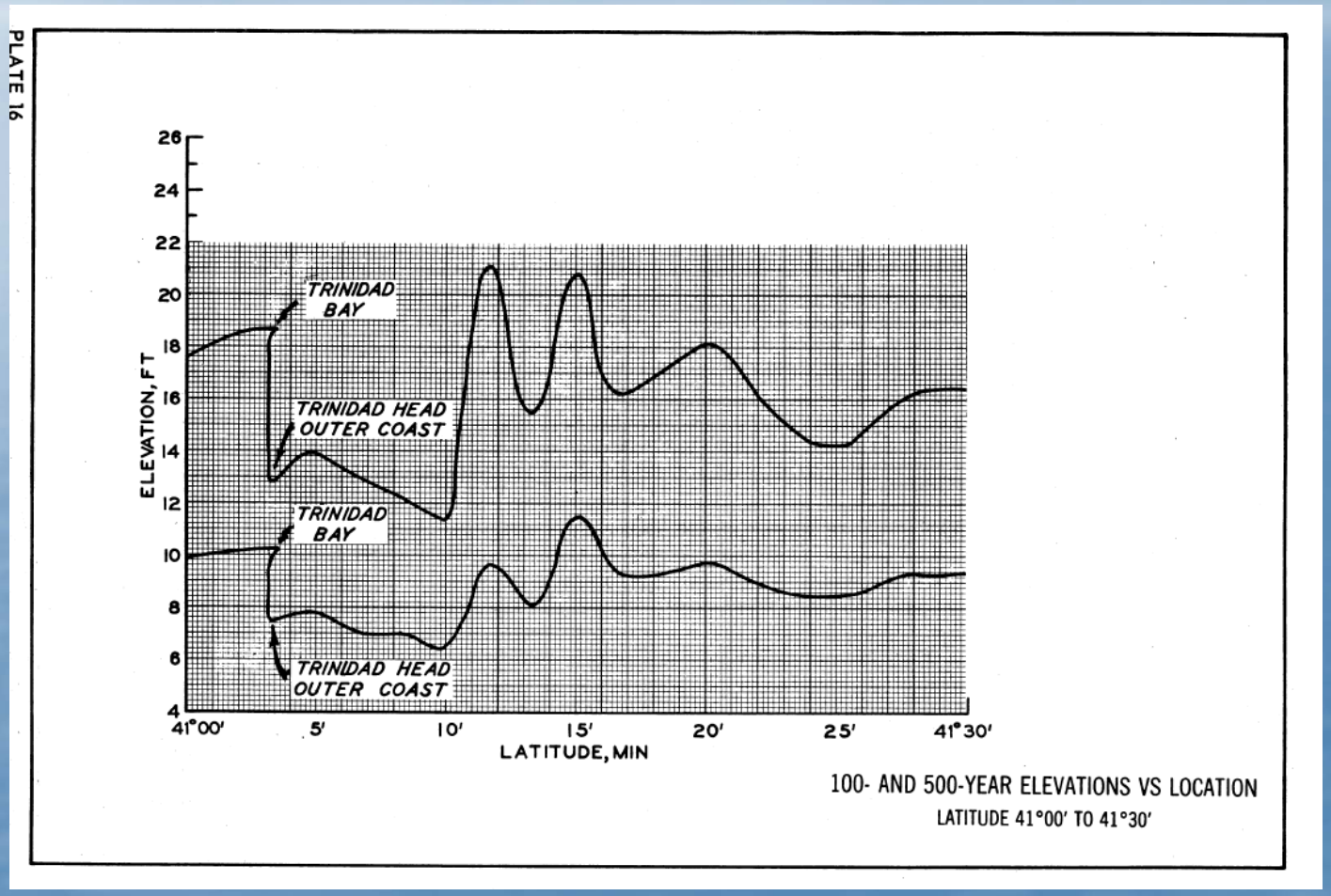
For more information on this map and the source data, please visit http://www.humboldt.edu/~geodept/rctwg/toc.html

HUMBOLDT COUNTY TSUNAMI POLICY

Original Local Coastal Plan Policy (certified in the 1980's):

> **Tsunamis--New development below the level of the 100 year tsunami run-up elevation described in Tsunami Predictions for the West Coast of the Continental United States (Technical Report H-78-26 by the Corps of Engineers) shall be limited to public access, boating, public recreation facilities, agriculture, wildlife management, habitat restoration, and ocean intakes, outfalls, and pipelines, and dredge spoils disposal.**

100 YR. TSUNAMI RUNUP GRAPH



RUNUP ELEVATIONS (ARMY CORPS OF ENGINEERS TECHNICAL REPORT H-78-26)

SAMOA TOWN MASTER PLAN TSUNAMI POLICY

Samoa Town Master Plan Policies (2012):

- **Deed restriction requiring earthquake/tsunami hazard disclosure**
- **Residential livings space must be elevated 32 feet above sea level and be designed to withstand tsunami forces**
- **The Business Park must also be designed with a vertical tsunami evacuation and assembly area**
- **Tsunami Safety Plan, earthquake and tsunami shelter (emergency services vehicle storage building), signed evacuation routes and assembly area (visitor brochures)**

UPDATED HUMBOLDT BAY AREA PLAN TSUNAMI POLICY

Humboldt Bay Area Plan Policies (2012):

- **100 year tsunami run-up policy unchanged**
- **Residential subdivisions or one or more additional housing units must:**
  - **Have living space above predicted run-up plus one foot of freeboard and three feet sea level rise**
  - **Must meet requirements of a Tsunami Safety Plan based on NWS TsunamiReady Guidelines prepared for subject site by civil engineer with appropriate tsunami hazards experience**
  - **Development must be found to be safe from catastrophic failure or inundation caused by tsunami per engineer's recommendations**

TSUNAMIREADY® RECOGNITION

National Weather Service TsunamiReady® Recognition:

- **Tsunami Ready is a voluntary community recognition program**
- **What is involved [Planning for *Mitigation*, *Preparedness*, *Response*]:**
  - **Establish tsunami hazard zones, evacuation maps and evacuation route signs**
  - **Ongoing tsunami public education and outreach, including to schools in tsunami hazard zones**
  - **24-hour warning point and coordination with emergency operations center operations**
  - **More than one way to receive tsunami warnings and to alert the public**
  - **Formal tsunami operations plan and annual exercises**

PROGRESS TOWARDS A TSUNAMIREADY® HUMBOLDT BAY

HBAP – TsunamiReady®:

- ✓ Manila, Samoa – Recognized as TsunamiReady Communities
- ✓ Town of Samoa, Tsunami Safety Plan (2007)
- ✓ Tsunami Hazard Zone and Evacuation Maps – Redwood Coast Tsunami Work Group
- ✓ Public Educational Products - Redwood Coast Tsunami Work Group / Humboldt Earthquake Education Center at Humboldt State University
- ✓ Tsunami Zone Road Signs –Caltrans and Humboldt County
- ✓ Tsunami Evacuation Sirens - Fairhaven, Fields Landing, Manila, Orick, PG&E/King Salmon, and Woodley Island with activation coordinated through Eureka National Weather Service (NWS) with Humboldt County OES
- ✓ RCTWG/Community Drills and response planning
- ✓ Humboldt Alert Emergency Notification System (ALERT)
- ✓ Humboldt County Emergency Operations Plan (2015)
- ✓ Humboldt County Local Hazard Mitigation Plan (2014, update in process)

HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

Tsunami Preparedness Policy - Humboldt Bay-wide TsunamiReady Recognition:

- **Coordinate closely with County Departments, RCTWG, HSU, National Weather Service, and first responders**
- **Policy requirement to maintain:**
  - **NWS TsunamiReady recognition**
  - **Ongoing public education**
  - **Regular evacuation drills**

HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

Existing development within the Tsunami Hazard Zone:

- **Seek funding to develop vertical evacuation facilities where needed**
- **Annual TsunamiReady public education and evacuation drills**

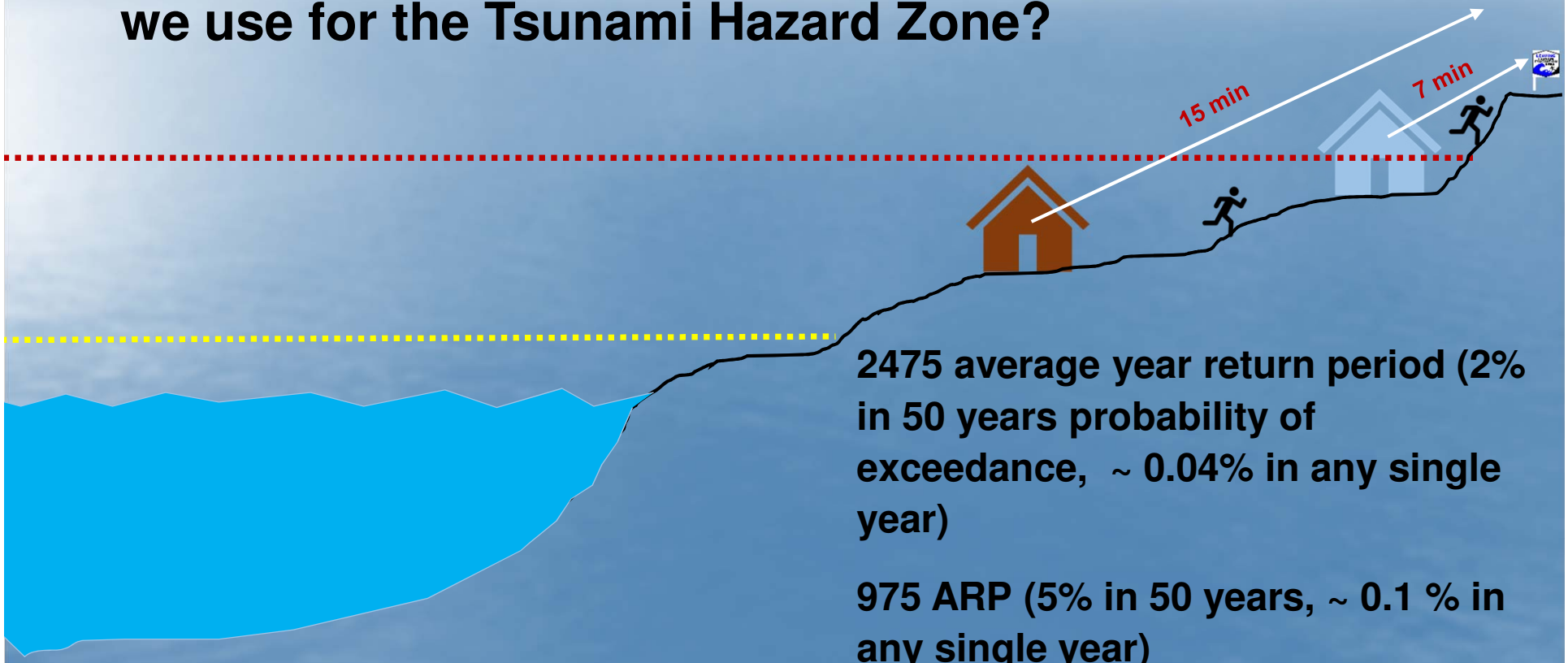
HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

Major Tsunami Policy Questions:

- **What probability / average return period should be used to establish the Tsunami Hazard Zone?**
  - **California Geologic Survey planning underway under the Seismic Hazards Mapping Act – to be complete in 2020**
- **Should we consider pedestrian evacuation as an appropriate mitigation for new development?**
- **Land Use Applicability – expand beyond just the intensification of residential uses?**
- **What structural requirements should we place on new development?**

HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

What tsunami inundation level/probability should we use for the Tsunami Hazard Zone?



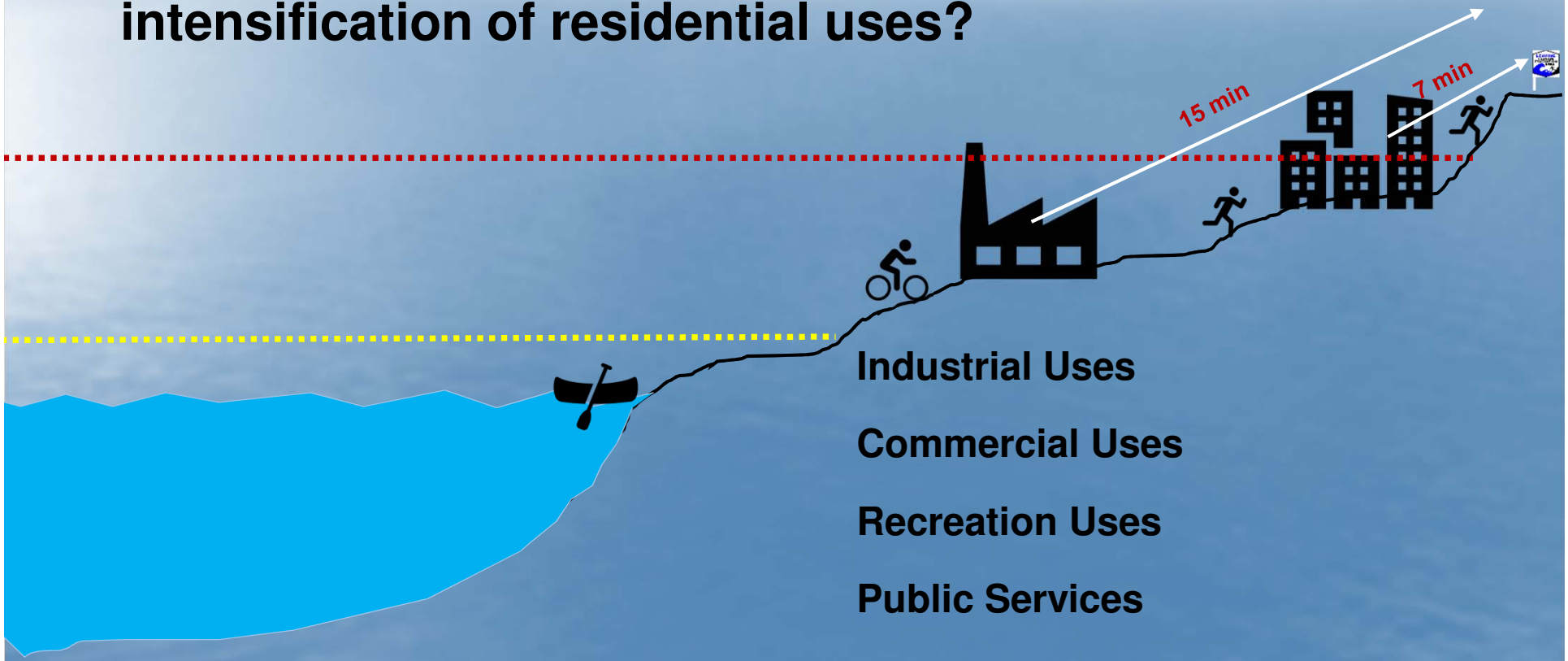
2475 average year return period (2% in 50 years probability of exceedance, ~ 0.04% in any single year)

975 ARP (5% in 50 years, ~ 0.1 % in any single year)

475 ARP (10% in 50 years , ~ 0.21 % in any single year)

HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

Land Use Applicability – expand beyond just the intensification of residential uses?



Industrial Uses

Commercial Uses

Recreation Uses

Public Services

HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

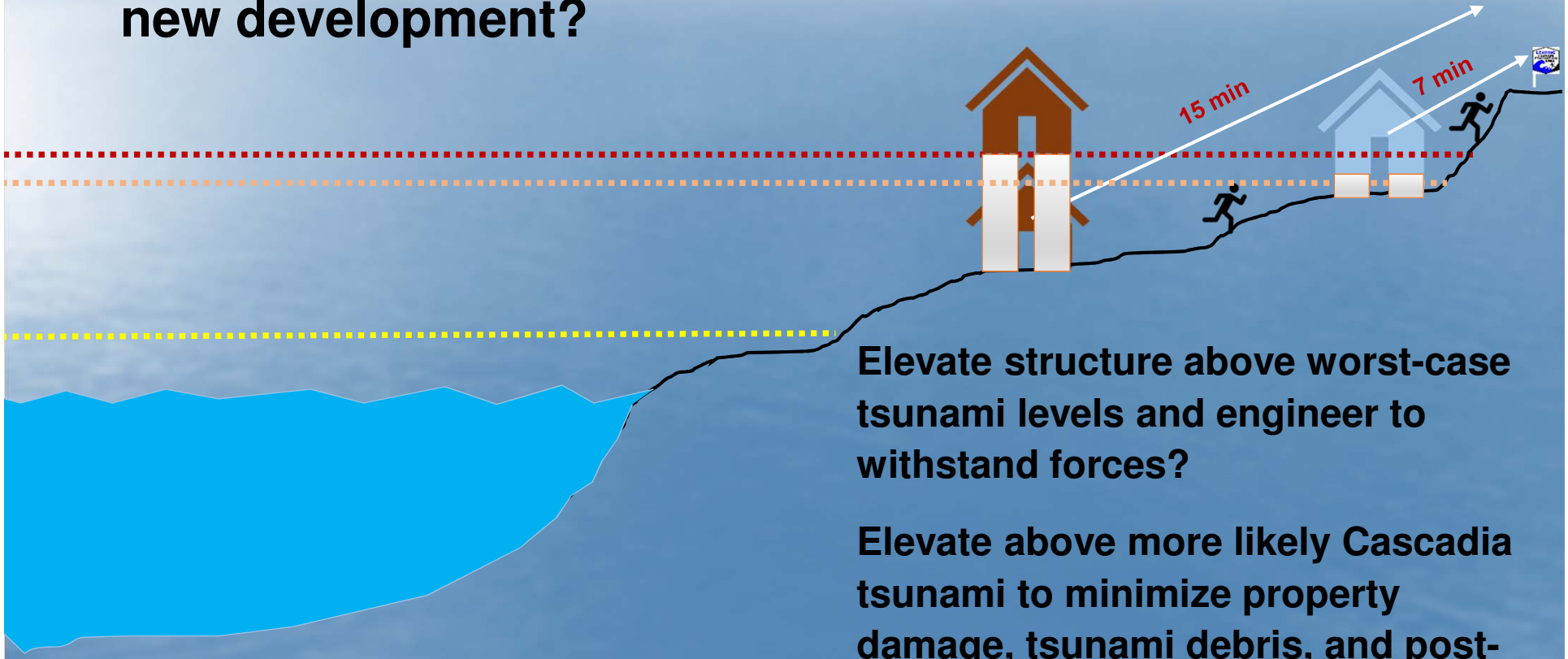
Should we consider pedestrian evacuation as an appropriate mitigation for new development?

What pedestrian evacuation speed should we consider?

- **Impaired walk 0.89 meters/sec**
- **Slow walk 1.0 m/s**
- **Faster rates?**

HUMBOLDT BAY AREA PLAN
TSUNAMI HAZARD POLICY FRAMEWORK

What structural requirements should we place on new development?



Elevate structure above worst-case tsunami levels and engineer to withstand forces?

Elevate above more likely Cascadia tsunami to minimize property damage, tsunami debris, and post-tsunami cleanup

HUMBOLDT BAY AREA PLAN UPDATE
SEA LEVEL RISE

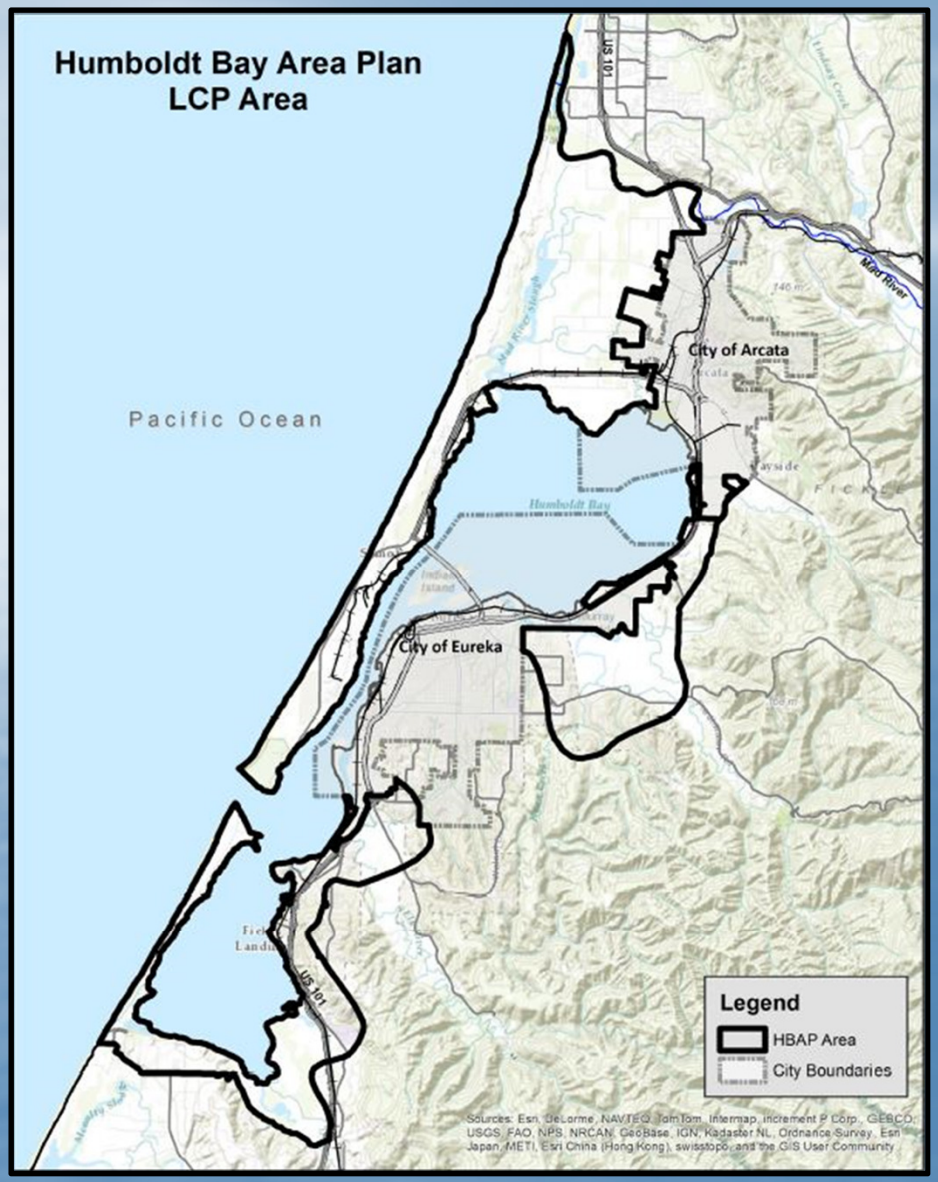
SEA LEVEL RISE WORKSHOPS

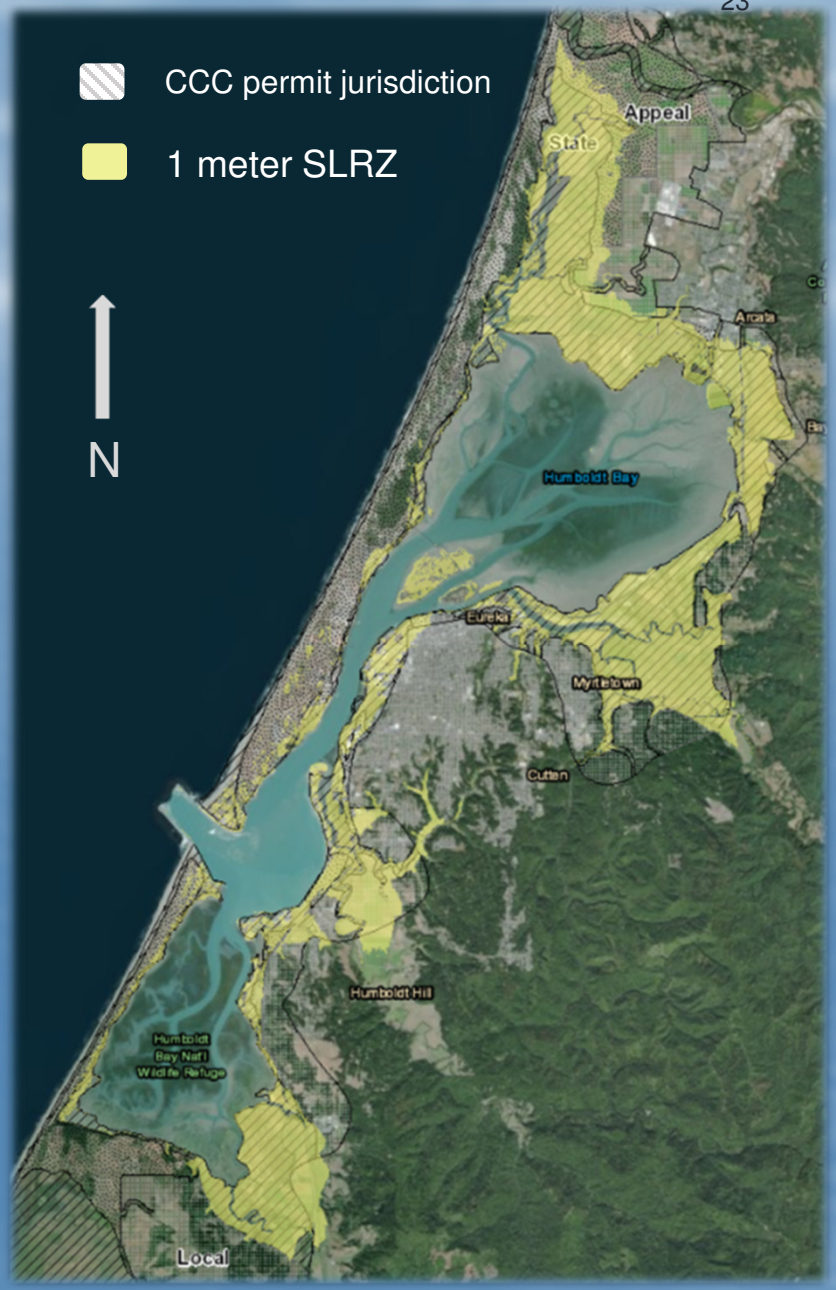
- August 2018 Strategic Sea Level Rise Adaptation Planning Public Workshops for King Salmon/Fields Landing and Fairhaven/Finntown
- Four Planning Commission workshops focused on the Sea Level Rise Adaptation Policy Background Study – one in November 2018, one in December 2018, and two in January 2019
- March 2019 Sea Level Rise and Tsunami Safety Planning for the HBAP

SEA LEVEL RISE DOCUMENTS:

https://humboldtgov.org/1678/Local-Coastal-Plan-Update

- Sea Level Rise Adaptation Policy Background Study
- Diked Shoreline Adaptation Feasibility Study
- Sea Level Rise Vulnerability Assessment
- King Salmon, Fields Landing, Fairhaven and Finntown workshop documents


Humboldt Bay Area Plan
LCP Area
Pacific Ocean
City of Arcata
City of Eureka
US 101
Mad River
Humboldt Bay
Legend
HBAP Area
City Boundaries


CCC permit jurisdiction
1 meter SLRZ
N
Appeal
State
Arcata
Humboldt Bay
Eureka
Myrtletown
Cutten
Humboldt Hill
Humboldt Bay Nat'l Wildlife Refuge
Local

HIGH PROJECTIONS FOR SEA LEVEL RISE
NORTHERN HYDROLOGY AND ENGINEERING
NORTH SPIT TIDE GAUGE

SLR Planning Horizon	High Projection NHE 2014	North Spit Elevation NAVD 88	Corresponding NHE 2015 Map	North Spit Elevation NAVD 88
2030	0.9 ft.	8.6 ft.	MAMW (1.1 ft.)	8.8 ft.
2050	1.9 ft.	9.6 ft.	0.5 M (1.6 ft.)	9.3 ft.
2070	3.2 ft.	10.9 ft.	1.0 M (3.3 ft.)	11.0 ft.
2100	5.4 ft.	13.1 ft.	1.5 M (4.9 ft.)	12.6 ft.

- **102 miles of Humboldt Bay shoreline**
- **76.7 miles artificial structures; 71.5 miles comprised of five predominant types: dikes, railroad grades, fill (new bay shoreline), fortified (armored natural shoreline) and roadbeds**
- **56 miles of barrier shoreline structures (dike, railroad, road); 3 ft. of SLR would overtop approximately 33 miles (59%) assuming no change in current shoreline conditions; king tides could reach this level by 2050**
- **Approximately 62% (6,600 acres) of the 10,680 acres of HBAP agricultural land could be inundated with 3 ft. of sea level rise assuming no change in shoreline conditions**

DIKE BREACH DURING A KING TIDE INUNDATING LOW-LYING LANDS ON SOUTH BAY

Photo Credit – Aldaron Laird

EXPOSED ERODING DIKE ON EUREKA SLOUGH

Photo Credit – Aldaron Laird

TRANSPORTATION ASSETS THAT COULD BE TIDALLY INUNDATED WITH 3 FEET OF SEA LEVEL RISE

- The only access road to King Salmon, the Humboldt Bay Generating Station and the interim spent nuclear fuel storage site
- Highway 101 as it traverses South Bay, Elk River Slough, and Arcata Bay
- Highway 255 on the Mad River Bottoms
- Approximately 12 miles of railroad and the current and future sections of the Humboldt Bay Trail within the HBAP planning area

UTILITY ASSETS THAT COULD BE TIDALLY INUNDATED WITH 3 FEET OF SEA LEVEL RISE

- Approximately 9.6 miles of municipal water transmission lines
- The Truesdale pump station, seven wastewater lift stations, and 10.5 miles of sewer lines
- 30 electrical transmission towers and 113 transmission poles

MARINE AND CULTURAL ASSETS THAT COULD BE TIDALLY INUNDATED WITH 3 FEET OF SEA LEVEL RISE

- Sections of the South and North Jetties (867 ft. and 1,214 ft. respectively)
- 3 of the 10 bulk cargo/commercial docks
- 52 Wiyot cultural sites (four additional sites would be impacted from bluff erosion and retreat)

GOAL: MINIMIZE COASTAL HAZARDS AND PROTECT EXISTING DEVELOPMENT FOR AS LONG AS FEASIBLE

- Plan for highest inundation levels projected within the planning period
- Sea level rise overlay zone for areas subject to inundation
- Repair, maintain, enhance and allow new shoreline structures to protect resources and existing development
- Programmatic permits for dike repair, maintenance, enhancement and construction
- Government funding for dike work through local measures such as a Flood Control District or Special District

GOAL: MINIMIZE COASTAL HAZARDS AND PROTECT EXISTING DEVELOPMENT FOR AS LONG AS FEASIBLE

- Explore use of dredge spoils or other material to raise elevation of diked former tidelands
- Encourage increase in diked former tidelands drainage capacity
- Explore “letting water in” rather than attempting to “defeat it”
- Restrict allowable land uses and developments and/or limit improvements to existing development
- Explore relocation potential for land uses and assets, including use of Transfers of Development rights

GOAL: HIGH DEGREE OF PUBLIC AWARENESS OF SEA LEVEL RISE IMPACTS THROUGH CONSIDERATION OF THESE IMPACTS IN FUTURE INVESTMENTS

- Within the Sea Level Rise Zone, require real estate disclosures prior to close of escrow regarding permit conditions, and property and structure vulnerability, related to sea level rise
- Consider County acquisition of properties within the Sea Level Rise Overlay Zone that are in tax default and are to be sold

GOAL: PUBLIC ACCESS, RECREATION AND SENSITIVE COASTAL RESOURCES ARE PROTECTED

- **Retain, protect, and where feasible expand public access to the bay**

Photo Credit – Aldaron Laird

GOAL: MAXIMIZE AGENCY COORDINATION AND PUBLIC PARTICIPATION

- Coordinate planning and regulatory decision making with other Local Coastal Program jurisdictions, the Humboldt Bay Harbor, Conservation and Recreation District, and the Coastal Commission
- Maximize public participation in sea level rise adaptation planning process

HBAP SEA LEVEL RISE ADAPTATION GOALS

Goal Option 1: Coastal hazards are minimized and existing development is protected from sea level rise inundation for as long as feasible.

Goal Option 2: High degree of public awareness of sea level rise impacts through consideration of these impacts in future investments

Goal Option 3: Public access, recreation, and sensitive coastal resources are protected with sea level rise

Goal Option 4: Maximize agency coordination and public participation

Should there be different goals, or additional goals?

KEY ISSUES OR CONCERNS

<u>Uncertainty</u>: Science is not precise in terms of timing and magnitude of sea level rise, making planning for sea level rise a significant challenge.

- **Based on community input so far, the County's overarching approach should be to protect for as long as logistically and financially feasible while planning for a future measured retreat.**

  Should protection be the immediate priority?

- **The Coastal Commission strongly suggests sea level rise planning be based on high sea level rise projections, but will also allow for an adaptive management approach.**

  How conservative in our sea level rise projections and planning horizon should we be?

KEY ISSUES OR CONCERNS

<u>Dike Repair, Maintenance, Enhancement or Construction</u>: Dike repair, etc., will be required to protect agricultural lands and existing community assets

- **Wetland fill will be required that may not be consistent with the Coastal Act or wetland fill policies.**

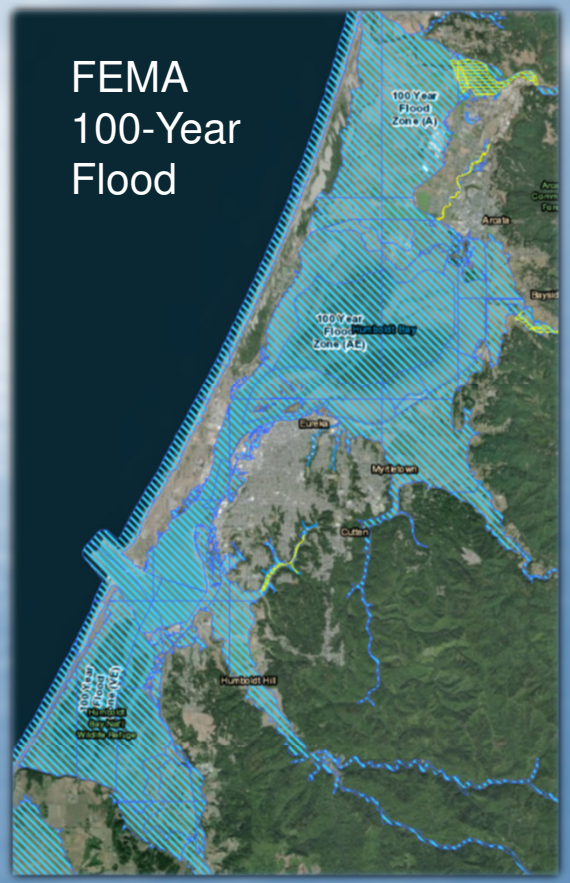
  Should wetland fill be allowed in order to protect agricultural lands, including agricultural wetlands, from sea level rise inundation?

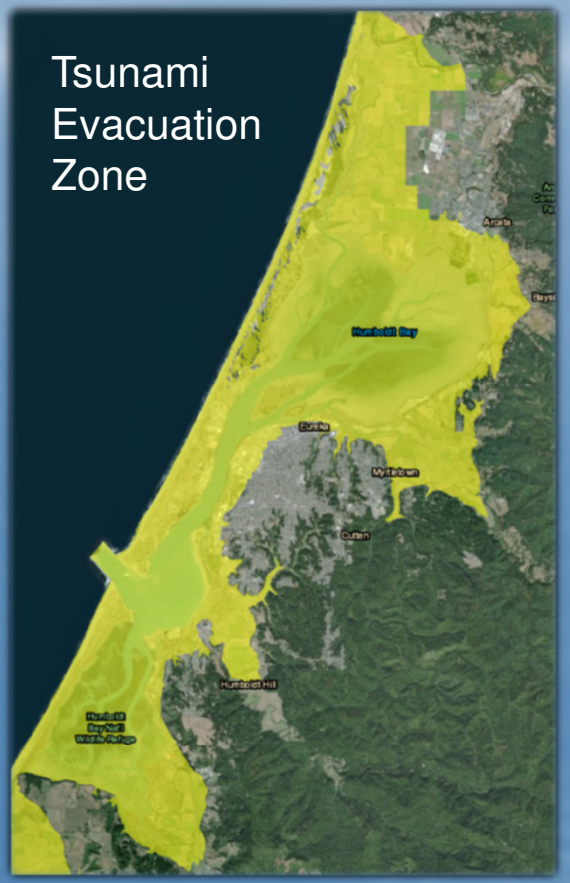
- **Dikes protect both private property and public assets.**

  Who should pay for dike repair?

  How involved should the County be in dike repair, etc., located on private property?

FEMA 100-YEAR FLOOD
1 METER AT MMMW SEA LEVEL RISE ZONE
TSUNAMI EVACUATION ZONE





1 meter MMMW SLRZ is contained within the FEMA 100-year flood hazard zone, which is contained within the Tsunami Evacuation Zone

KEY ISSUES OR CONCERNS

<u>Sea Level Rise Overlay Zone (SLRZ)</u>: Can provide benefits and/or restrictions that are in addition to the underlying zone

- **SLRZ is being considered for the 1 meter inundation area**
- **Potential benefits of the SLRZ:**
  - **allowance for streamlined dike repair**
  - **financial assistance for dike repair**
- **Potential restrictions of the SLRZ:**
  - **Prohibit all new development and repairs**
  - **Prohibit/allow development and repairs based on location within the zone**
  - **Prohibit/allow certain types based on a site-specific sea level rise hazard analysis**
- **No benefits or restrictions (serves as only as notification of SLR hazard)**

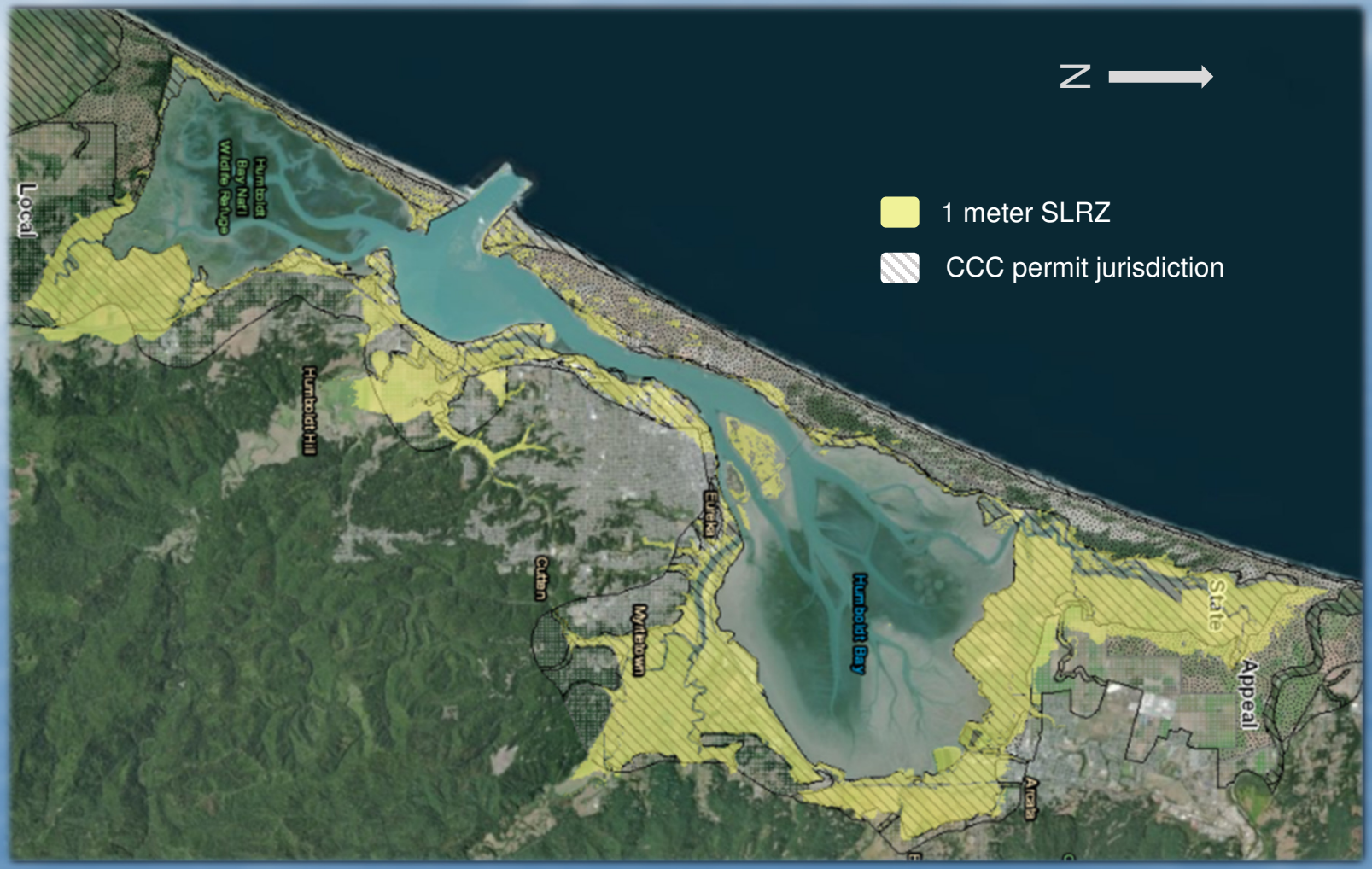
Should we have a SLRZ? Is 1 meter inundation the appropriate area for the zone?

How should we use the SLRZ to inform the public, and protect the public health, safety and welfare, without unnecessarily restricting development potential?

What options should or should not be included?

How should the County plan for retreat in the SLRZ?

1 METER SEA LEVEL RISE ZONE AND COASTAL COMMISSION CDP JURISDICTION



KEY ISSUES AND CONCERNS

<u>Coastal Commission Jurisdiction</u>: The Commission has coastal development permit jurisdiction over approximately 75% of the Sea Level Rise Zone being considered.

- **Virtually all shoreline protection permitting will be through the Coastal Commission. When issuing CDPs, the Coastal Commission uses Coastal Act Chapter 3 coastal resource policies as the standard for review, and uses the County's LCP only as guidance.**

  Is it important to have the Coastal Commission comply with our LCP and if so, how can we make that happen?

KEY ISSUES AND CONCERNS

Existing Development and Shoreline Armoring: Shoreline armoring can have detrimental resource impacts while also serving to protect development.

- **The Coastal Commission's interpretation of the Coastal Act is that by statute, the allowance for shoreline armoring to protect existing structures in danger of erosion applies only to pre-Coastal Act (1972) structures.**
- **There are contrary opinions that the Coastal Act statutorily allows armoring for any existing structure (not just pre-1972 structures), significantly increasing the potential extent of armoring along the coast.**

  How should "existing structure" be defined, as any structure existing at the time of application for armoring, or as a structure that existed prior to the Coastal Act?

QUESTIONS AND DISCUSSION

Humboldt Bay Area Plan Update webpage:
https://humboldtgov.org/1678/Local-Coastal-Plan-Update

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