



Collaboration: Sea-level Marin Adaptation Response Team (C-SMART)



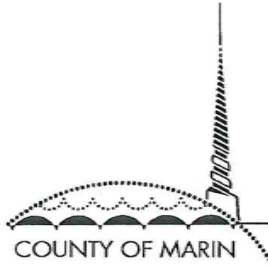
Caden at the Beach September 2013. Credit: Rendel



Community Development Agency
3501 Civic Center Drive, Rm. 308
San Rafael, CA 94903
415 4736269 T
www.marinslr.org

Workshop #4 – Adaptation Planning
Stinson Beach
November 14, 2015

Tom Lai, Deputy Director
TLai@marincounty.org (415) 499-6292



COMMUNITY DEVELOPMENT AGENCY
PLANNING DIVISION

NOTICE OF LAND USE REGULATIONS THAT COULD AFFECT YOUR PROPERTY

July 28, 2015

TO: Owners of Property within the Floodplain of Easkoot Creek, Stinson Beach

Our records indicate that you are the owner of a property in the floodplain of Easkoot Creek. I am writing to inform you of the applicability of an existing coastal development policy that could affect your ability to obtain permits for improvements to your property.



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Workshop overview

- 10:00 Welcome and Update
- 10:15 Elevator Speeches
- 11:20 Community Strategy Option Overview
- 11:30 Open House with Passports
- 12:00 Refreshments + Continued Open House



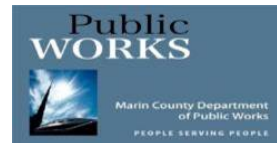
C-SMART Collaborators

GRANTING AGENCIES



CALIFORNIA
COASTAL
COMMISSION

PARTNER AGENCIES

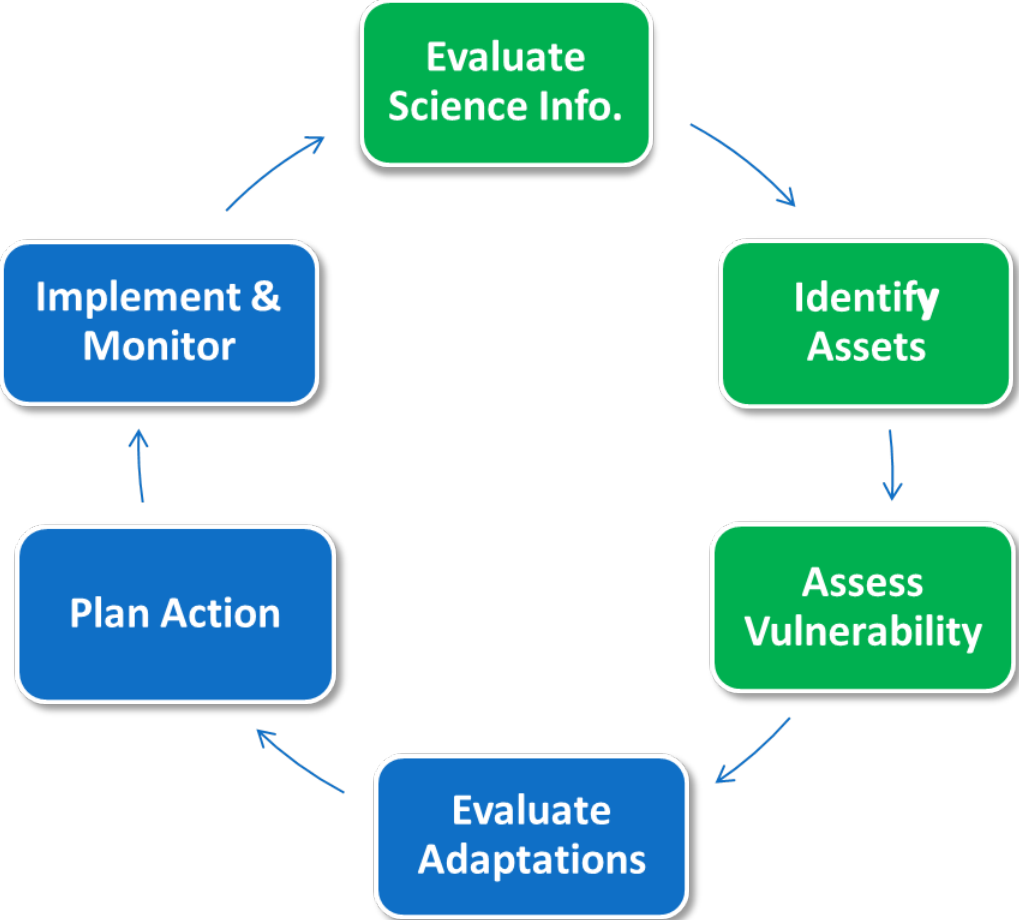


TECHNICAL ADVISORS

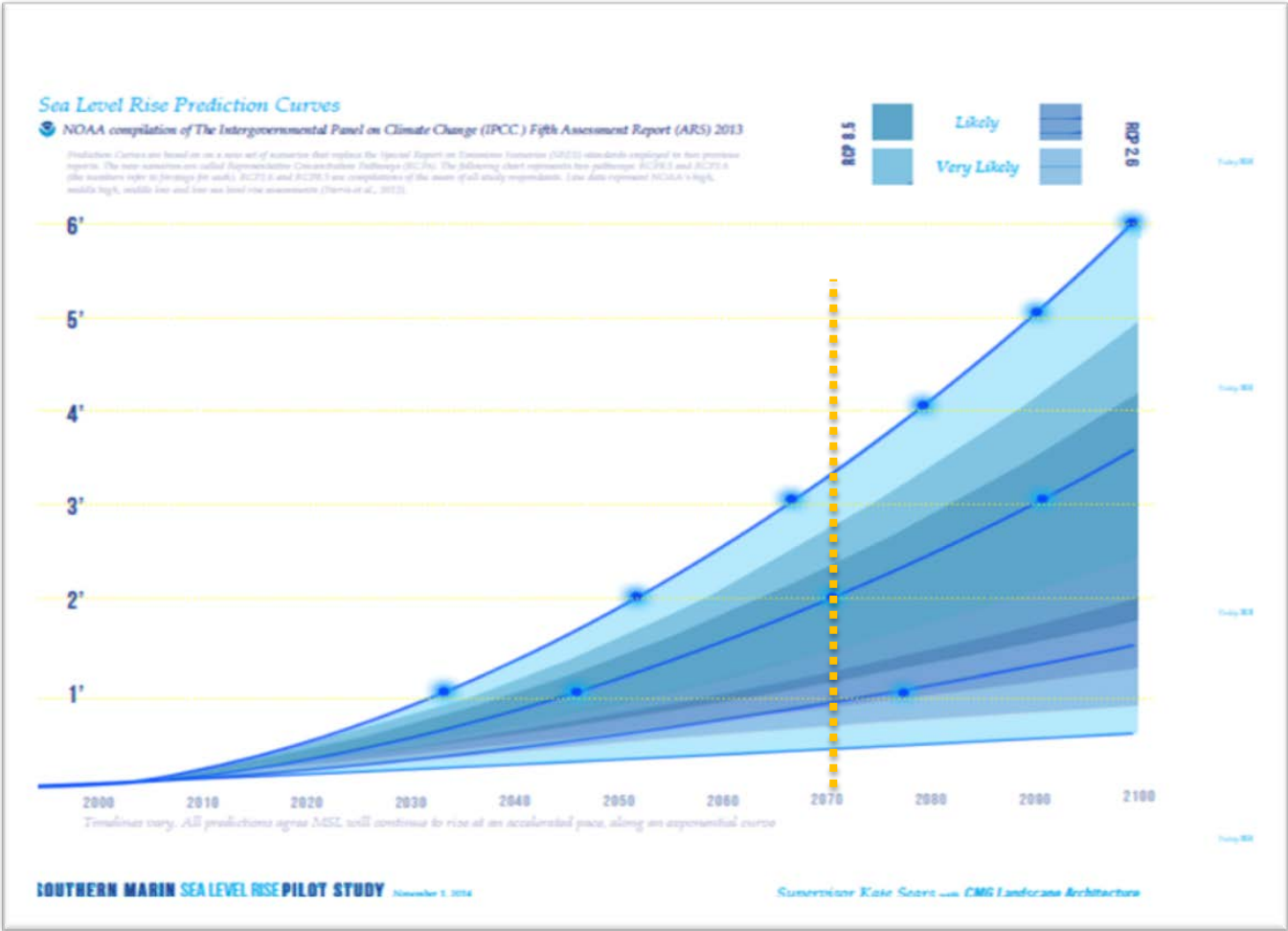


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Overall Process



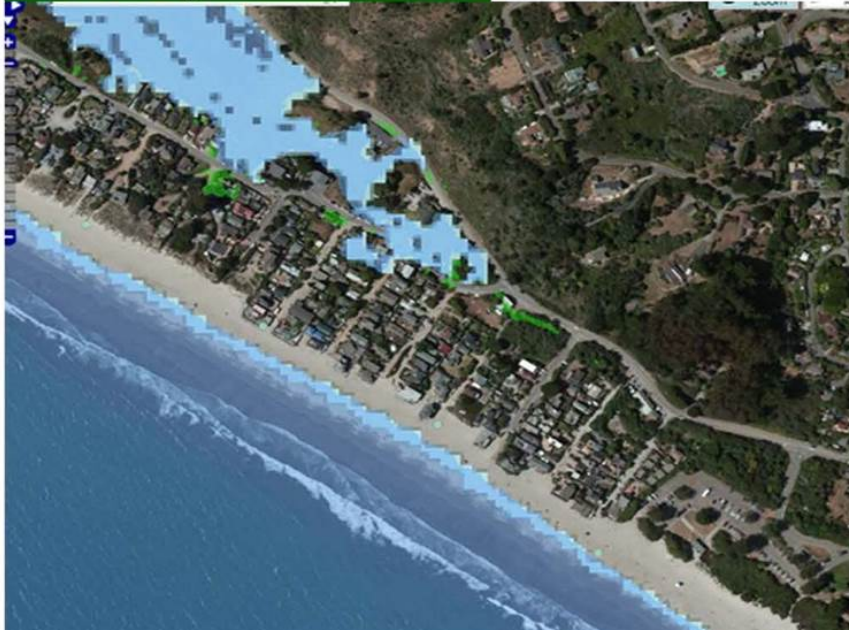
Uncertainty in Estimates



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Uncertainty in Estimates

25 cm, 0 Storm



100 cm, 0 Storm



Community Workshops

KICKOFF & FALL 2014

- C-SMART Kick-off
 - USGS presents sea level rise science and CoSMoS
- Fall 2014
 - Exposure maps to 3 community workshops.
 - Initial community conversations on flooding.
 1. What changes are you seeing in your community due to sea level rise or high tides?
 2. In what ways are you/your community vulnerable to sea level rise and storms?
 3. What are some potential solutions?



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THE GAME OF FLOODS *Marin Island*

START

Sea level rise is being worldwide as warming oceans expand and melt glaciers and ice sheets. Stronger storms coupled with rising seas can significantly damage— even destroy— property, infrastructure, public facilities, natural habitats, and other resources we depend on. And the effects of sea level rise will be felt in coastal communities across the globe. The best way to prepare for sea level rise is to plan now. This game is designed to help you think about the different ways you can prepare for sea level rise. It is a board game for 2-4 players. The goal is to survive the worst-case sea level rise scenario. The player with the most points at the end of the game wins.

1. To begin, each player reads the sea level rise scenario and chooses a starting point on the map.
2. In turn, each player takes an action to accommodate, defend, or retreat from sea level rise. The actions are listed in the scenario. The player with the most points at the end of the game wins.
3. In turn, each player takes an action to accommodate, defend, or retreat from sea level rise. The actions are listed in the scenario. The player with the most points at the end of the game wins.
4. Next, in turn, each player places and values their preferred adaptation strategies on or around the island. Conflicting strategies are allowed.
5. Consider the following factors to inform the proposal: (1) Contributing (2) Private property impacts, (3) Environmental impacts, (4) Equity/social justice concerns, (5) Others. Use your judgment to take notes.



Sea Level Rise 2050 Scenario Key

RED AREA = Permanent Sea Level Rise Flooding
ORANGE AREA = Temporary Sea Level Rise Flooding
YELLOW AREA = Temporary Sea Level Rise Flooding
GREEN AREA = Temporary Sea Level Rise Flooding

- Evacuation Route
- Marina
- Mammal Habitat
- Burch
- Coquery
- Water
- School Site
- Parking
- Hospital
- Storm Shelter
- Gas Station
- Gas Station
- Sewage Lift Station
- Sewage Lift Station
- Electric Sub-Station
- Propane Tanks for Heat
- Homes on public water & private wells & septic. Use propane tanks for heat.
- Homes on public water & sewer. Use propane tanks for heat.
- Homes on public water & sewer requiring lift station. Use propane tanks for heat.
- Homes on private wells & septic. Use propane tanks for heat.
- Apiculture
- Apiculture
- Home
- Beach
- Boat Launch
- Historic Church
- Post Office
- Post Office

LEGEND

<p>Retreat: SSSS</p> <p>Post-storm prohibitions: SSSS</p> <p>Managed Retreat: SSSS</p>	<p>Elevate Buildings: SSSS</p> <p>Floodable Buildings: SSSS</p> <p>Accommodate Water: SSSS</p>	<p>Elevate/New Road: SSSS</p> <p>Revetment/Seawall: SSSS</p> <p>Traditional Levee: SSSS</p> <p>Hard Engineering: SSSS</p>	<p>Tide Gate: SSSS</p> <p>Wall & Pump Station: SSS</p> <p>Soft Engineering: SSS</p>	<p>Horizontal Levee: SSSS</p> <p>Wetland/shoreline vegetation: SSS</p> <p>Offshore Structure: SSS</p> <p>Beach Maintenance: SSS</p>
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GAME PIECES



Adaptation Planning

- Based on Vulnerability Assessment
- Adaptation Strategy Report
- Local Coastal Program Amendment



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King Tides

Nov 24, 25, 26

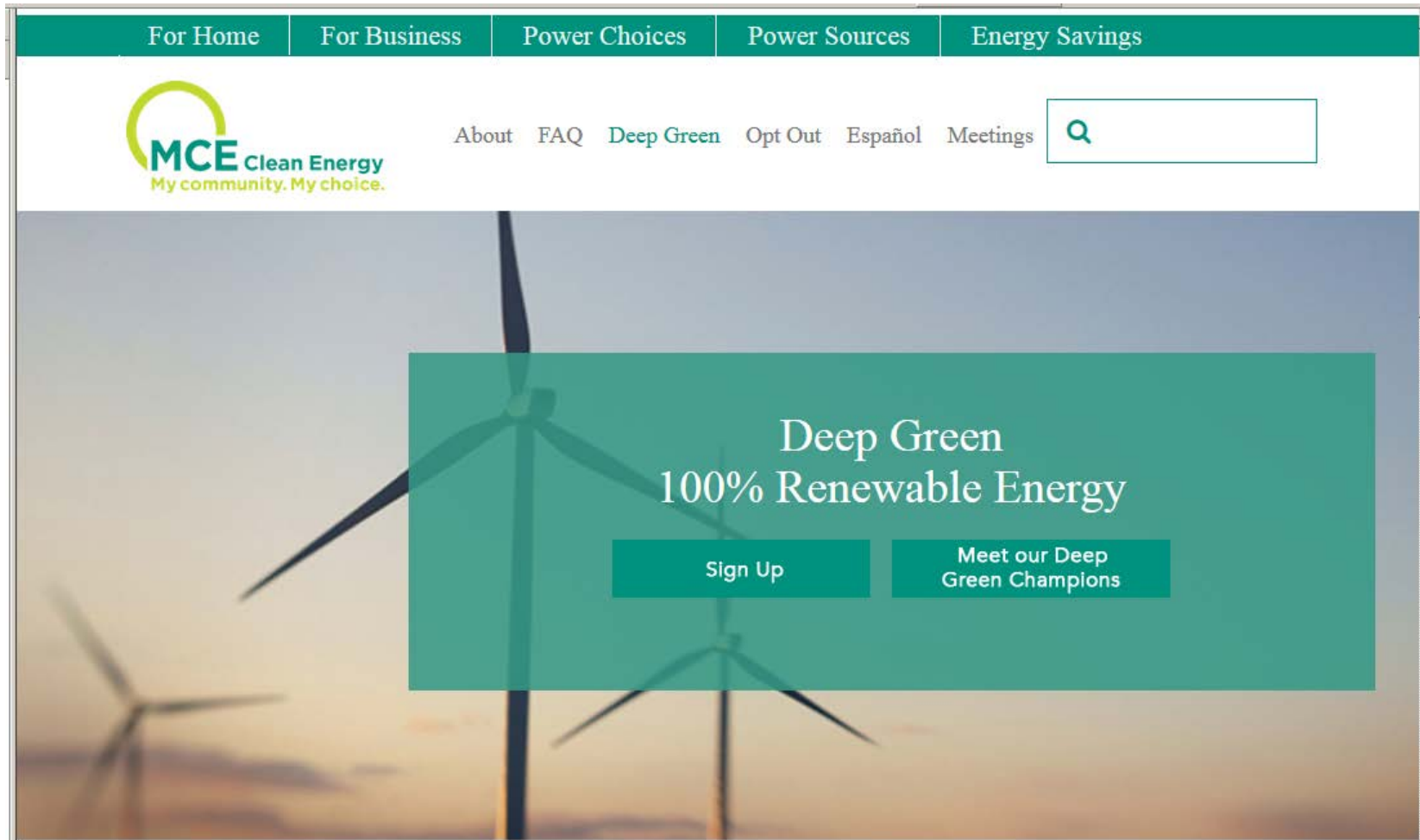
California.kingtides.net Nov. 24 - 9:30 AM



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info@mcecleanenergy.org

1 (888) 632-3674



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Guiding Principles

- Available science
- Environment
- Economy
- Equity and Engagement



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Elevator Speeches

- Vulnerability Assessment
- Emergency Preparedness
- Flood Proofing and Elevating
- Beach Nourishment and Hybrid Approaches
- Coastal Armoring
- Tide Gates, Horizontal Levees, Offshore Structures
- Natural Capital
- Managed Retreat
- Hazard Assessment Districts
- Sustainability Team



Vulnerability Assessment

- Executive Summary
- Introduction
- Methods
- Asset Profiles
 - Parcels & Buildings
 - Transportation
 - Utilities
 - Working Lands: Agriculture & Aquaculture
 - Natural Resources & Recreation
 - Emergency Services
 - Historic & Archeological Resources
- Coastal Zone Community Profiles
 - Muir Beach
 - Stinson Beach
 - Bolinas
 - Inverness
 - Point Reyes Station
 - East Shore
 - Dillon Beach
- Conclusion
- Append A: Workshop Summary
- Append B: Exposed Asset Tables
- Append C: Vulnerability Assessment Interview Tool
- Appendix D: ESA Memorandum on Marsh and Beach Shifts



Introduction

INTENT

- NOT a policy or regulatory document.
- Present available science to tell the story of a of the possible future with higher seas.
- Inform adaptation planning and policy.
- Enable residents, business, governments, and agencies to prepare for potential sea level rise, heightened storm conditions, and accelerated erosion.



Methods

C-SMART SCENARIOS

Table 1. Selected Sea Level Rise & Storms Scenarios

Baseline: No new Sea Level Rise + No storm	
Scenario 1: 10 inches Sea Level Rise + Annual Storm	} Near-term
Scenario 2: 10 inches Sea Level Rise + 20-year Storm	
Scenario 3: 20 inches Sea Level Rise + 20-year Storm	} Medium-term
Scenario 4: 40 inches Sea Level Rise + 100-year Storm	
Scenario 5: 80 inches Sea Level Rise + 100-year Storm	} Long-term



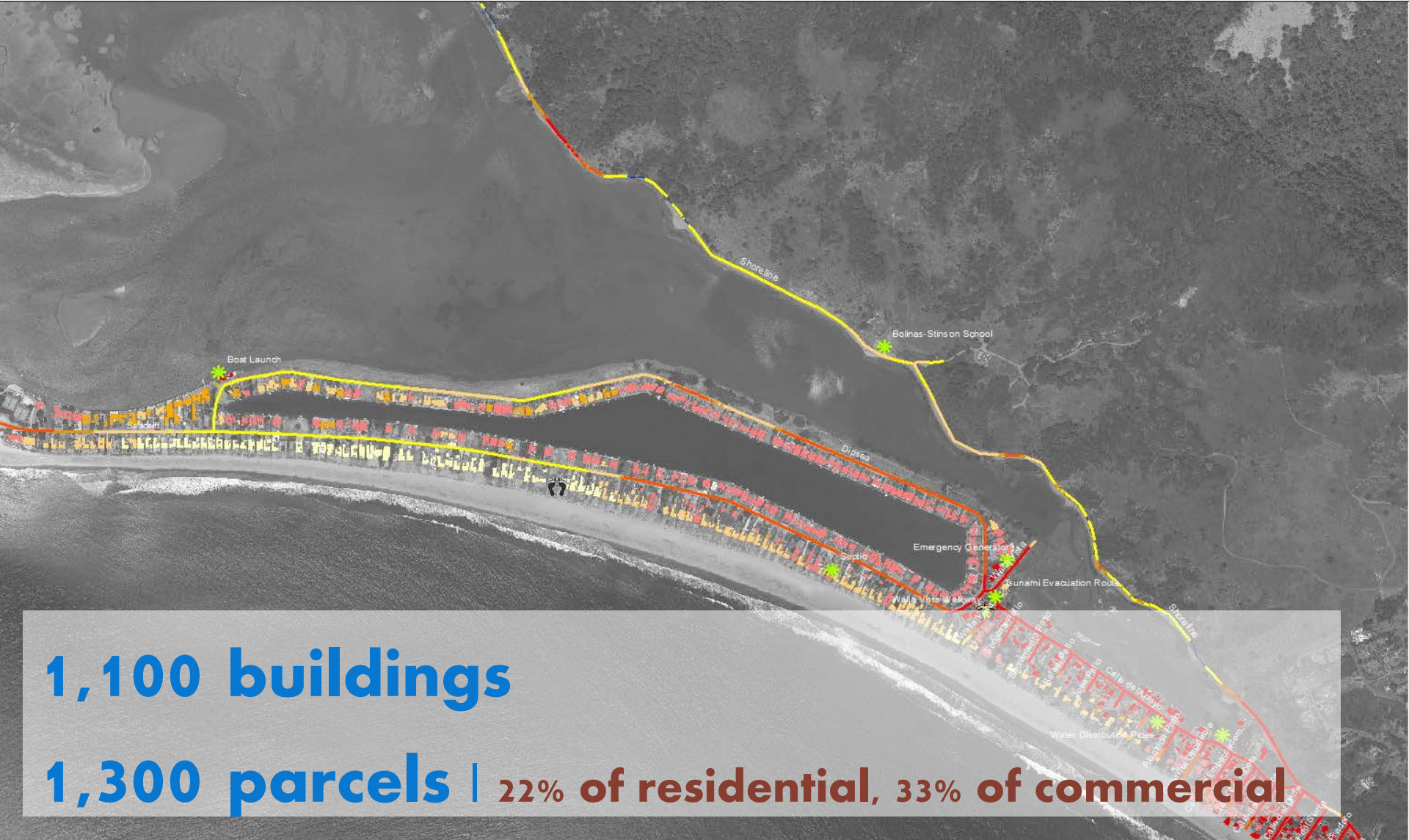


4,700 acres exposed at mean higher high water

Mean higher high water: The average high tide, thus some sites could be dry during lower tides.



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\$300 million in assessed value, market value is higher

\$7 million in property tax

\$700,000 in Transient Occupancy Tax





**20 miles of roads
including Shoreline Hwy, Calle del Arroyo, Olema-
Bolinas Rd., and Sir Francis Drake**



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Every exposed building would face waste and/or drinking water impacts



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Beaches could flood and erode



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Marshes could convert to mud flats, and may move upland



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Key Findings

NEAR-TERM

Assets vulnerable at 10 in. of sea level rise + storms are:

- Muir Beach intertidal rocky habitat
- Stinson Beach
 - Underground on-site wastewater treatment systems
 - Water distribution pipes
 - Calles and Patios buildings and streets including fire station no. 2 and tsunami evacuation routes
- Shoreline Highway between Stinson Beach & Bolinas, @ Green Bridge, & @ Walker Creek
- Bolinas
 - Beaches & inter-tidal rocky habitat
 - Bluff side, beach front, and downtown buildings and streets



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Key Findings

MEDIUM-TERM

Assets vulnerable at 20 in. of sea level rise + storm are:

- Muir Beach and Dillon Beach bluff top buildings
- East Shore and Inverness beaches, septic systems, and buildings on the shores of Tomales Bay.
- East Shore wells near Tomales Bay
- Point Ryes to Inverness water pipe beneath Shoreline Hwy. and Sir Francis Drake Blvd.
- Recreation facilities at Dillon Beach Resort and Lawson's Landing.
- Bridges on Middle Rd. and Valley Ford Lincoln School Rd.



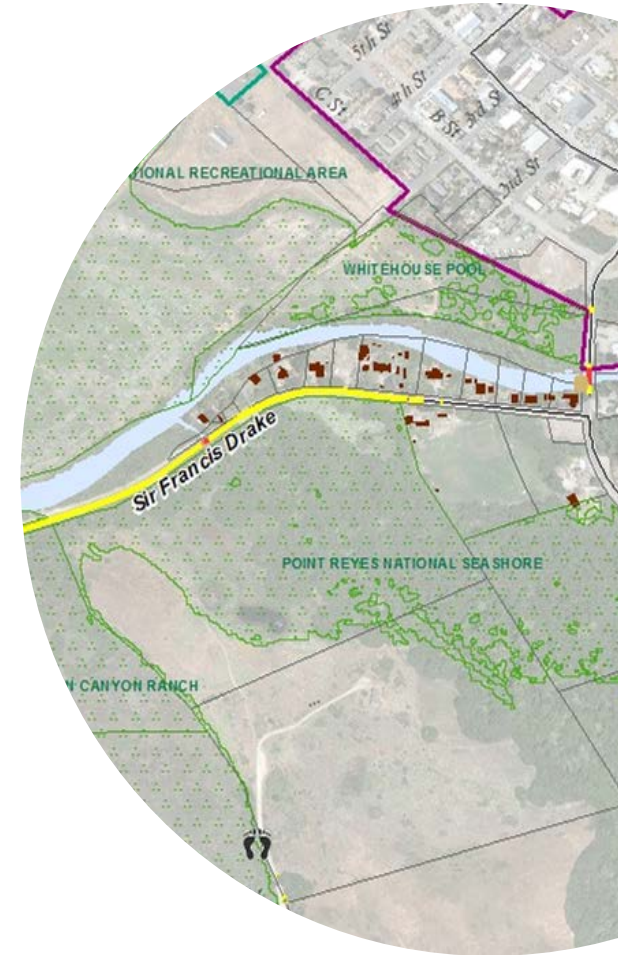
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Key Findings

LONG-TERM

Assets vulnerable at 40 in. & 80 in. of sea level rise +100-year storm are:

- Bolinas
 - The only access road Olema-Bolinas Road
 - Further into downtown, including the historic district.
 - BPUD sewage lift station.
- Shoreline Hwy.in Pt. Reyes Station and East Shore, and Sir Francis Drake Blvd. in Inverness.



Emergency Preparedness

URSULA HANKS, MARIN COUNTY OFFICE OF EMERGENCY SERVICES



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EL NINO 2015/2016





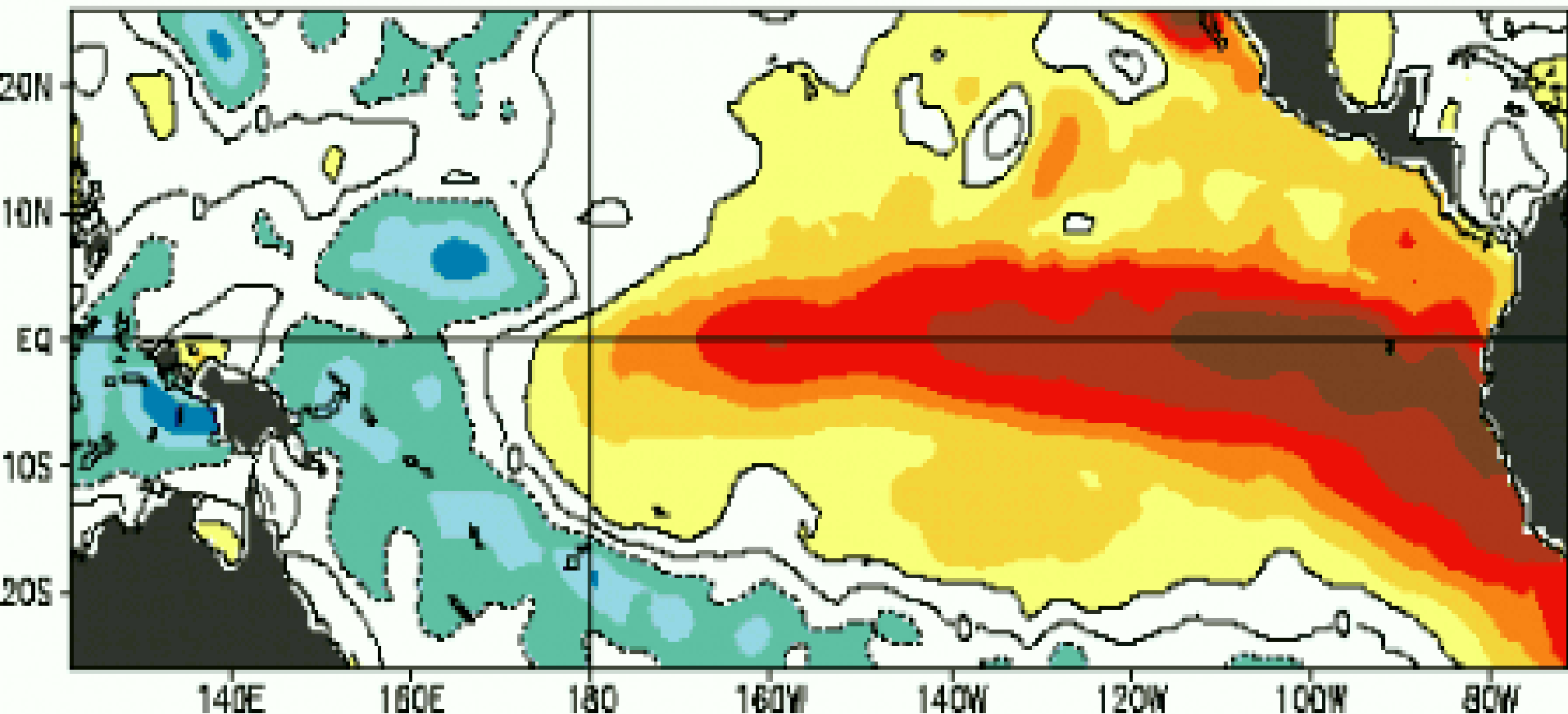
The Last “Monster El Nino” 1997/1998

- Strongest El Nino event
- Unusual extremes
- 2nd warmest and 7th wettest winter
- 170% Statewide precipitation

El Nino 1997 - 1998

- El Nino conditions since June '97
- Unusually warm ocean temperatures
- Sea Surface Temperatures (SST) throughout the equatorial east-central Pacific increased

Observed Sea Surface Temperature Anomaly ($^{\circ}\text{C}$)



7-day average centered on 17 September 1997

Climate Prediction Center/NCEP/NWS

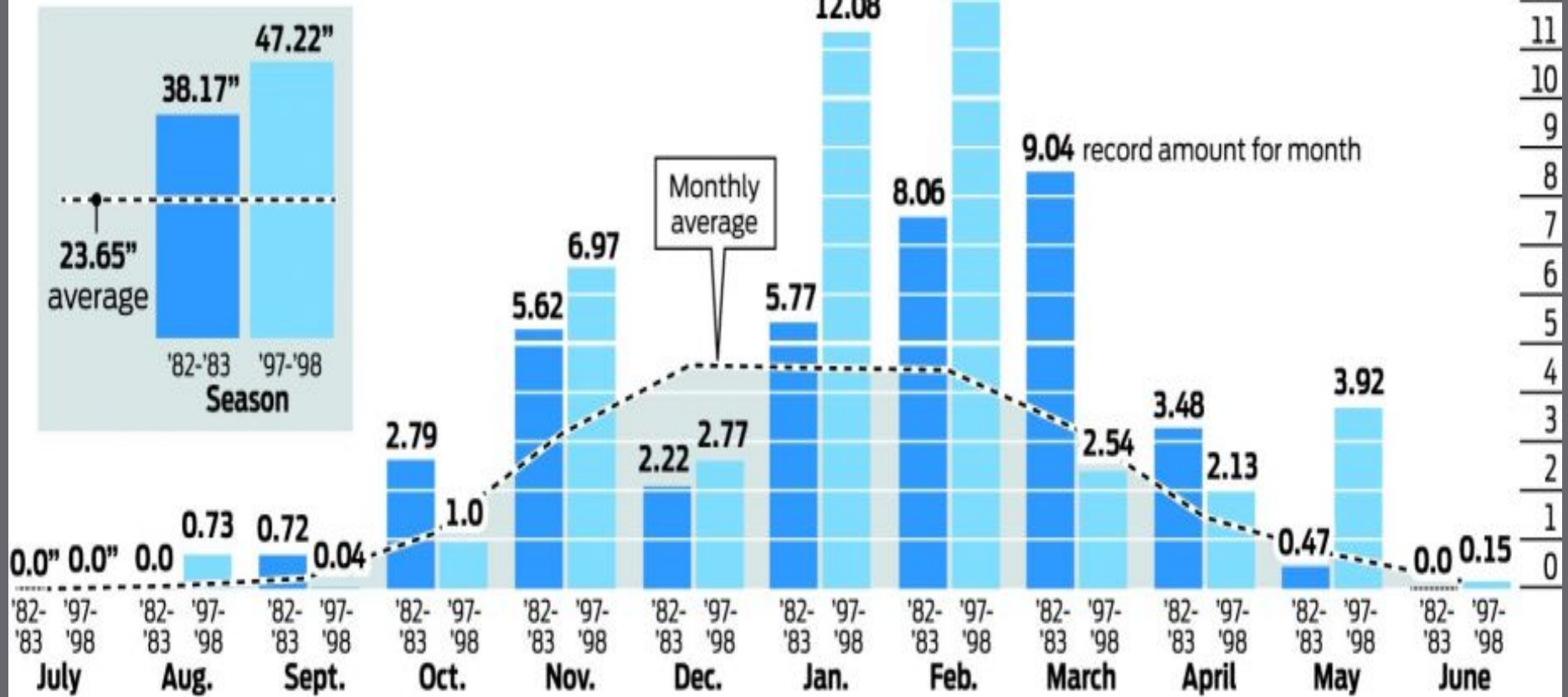
El Nino 1997 - 1998

January '98

- - Persistent storms/record breaking precipitation/strong winds
- Flooding throughout our region and Monterey Bay Area

El Niños by the month

Average rainfall in San Francisco and monthly rainfall during the two strongest El Niño seasons since 1980.



Source: Golden Gate Weather Services

John Blanchard / The Chronicle









El Nino 1997 - 1998

- Spring never arrived
- Rains through May

This was a winter to remember and a spring to forget





June 2018

*Spring flowers
In West Marin*


Skiing in the
Sierras





California

- 17 storm related deaths for the winter
- 35 counties declared federal disaster areas
- Agricultural disruptions
- Over \$550 million in damages for the State

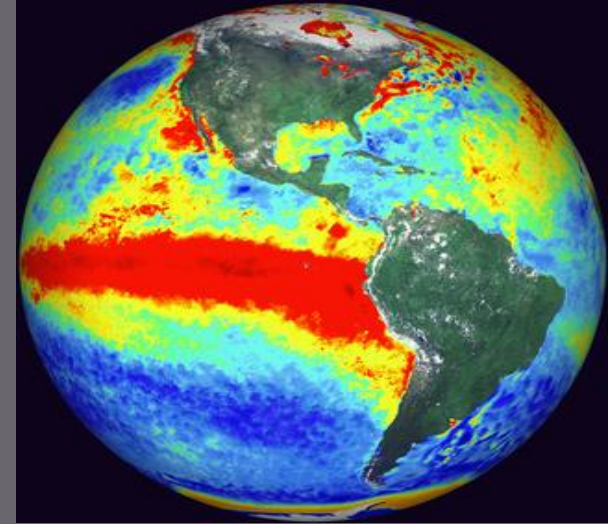
A person wearing a dark jacket and a helmet is riding a bicycle on a snowy street. The background shows a brick building and parked cars covered in snow. The text is overlaid on the image.

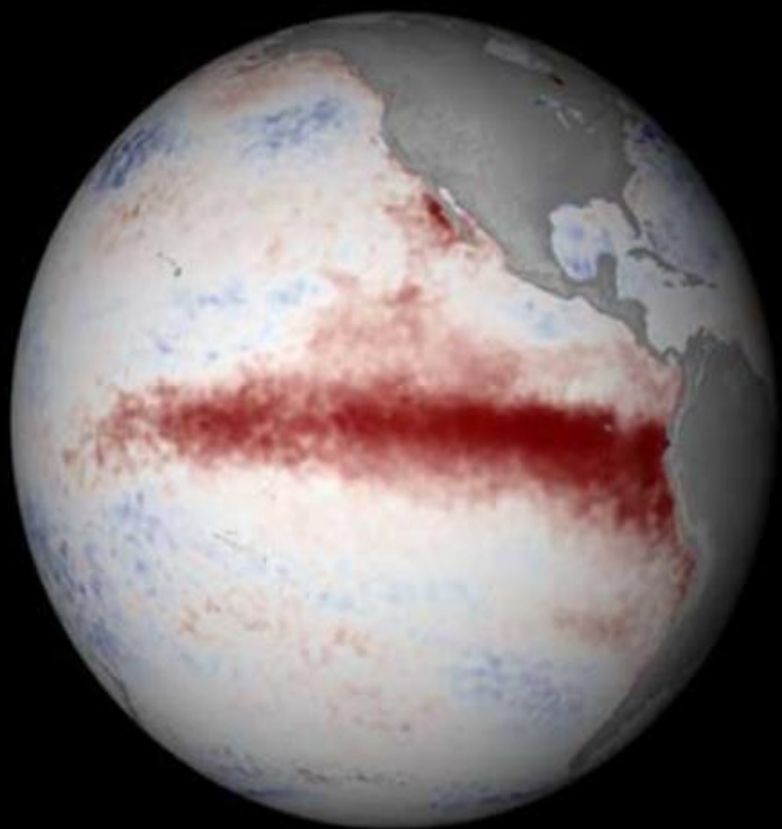
Winter Outlook 2015-2016

El Nino Advisory

- El Nino conditions are present *
- Positive equatorial sea surface temperatures (SST) anomalies continue across most of the Pacific Ocean
- There is an approximately 95% chance that El Nino will continue winter 2015-16 gradually weakening through spring 2016*

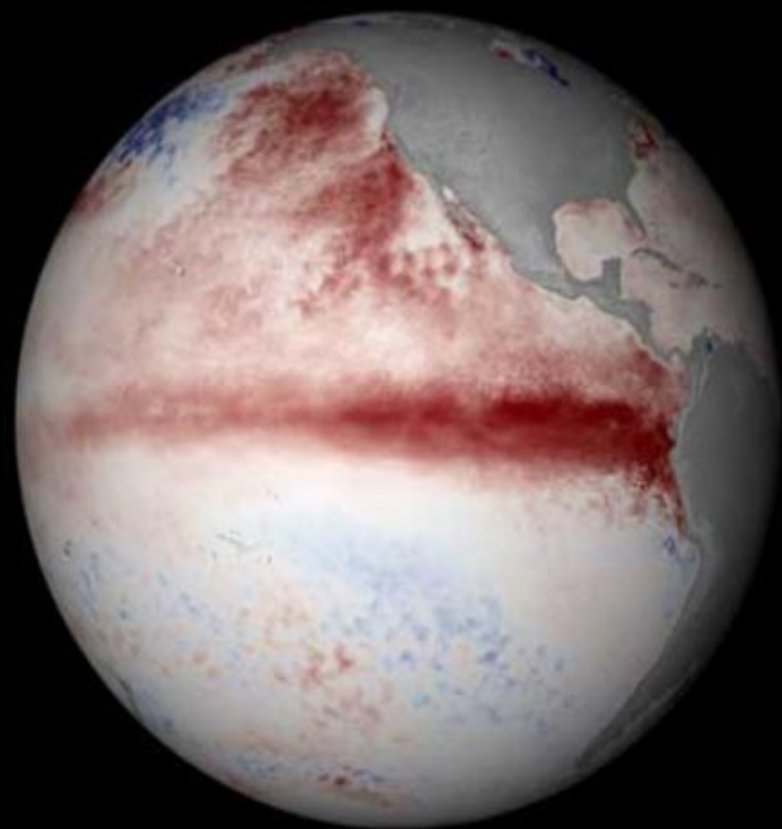
* Note: These statements are updated once a month





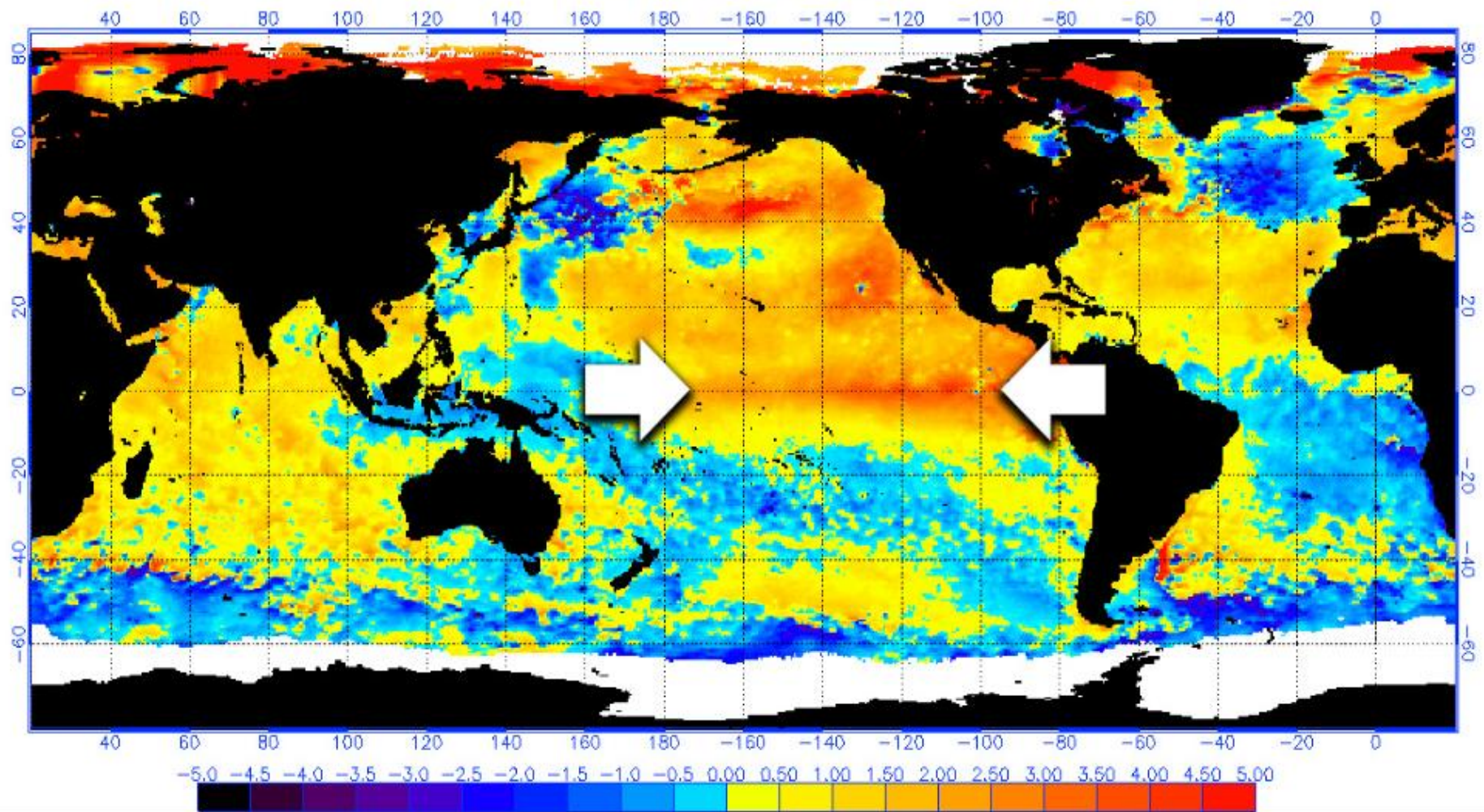
November 1997

NOAA

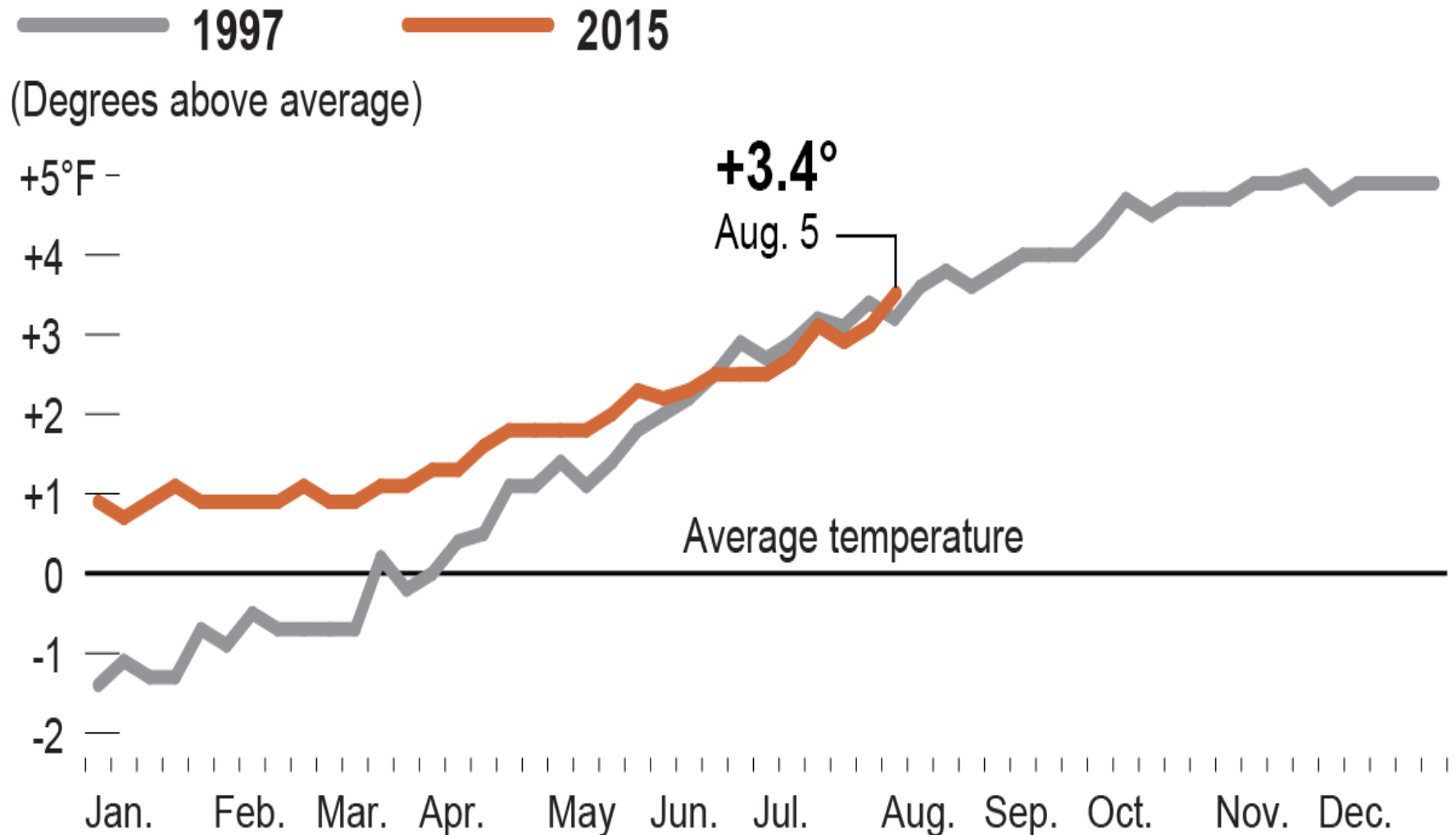


July 2015

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 8/31/2015
(white regions indicate sea-ice)



How recent increases in ocean temperatures compare to strongest El Niño on record



Source: NOAA Climate Prediction Center

@latimesgraphics

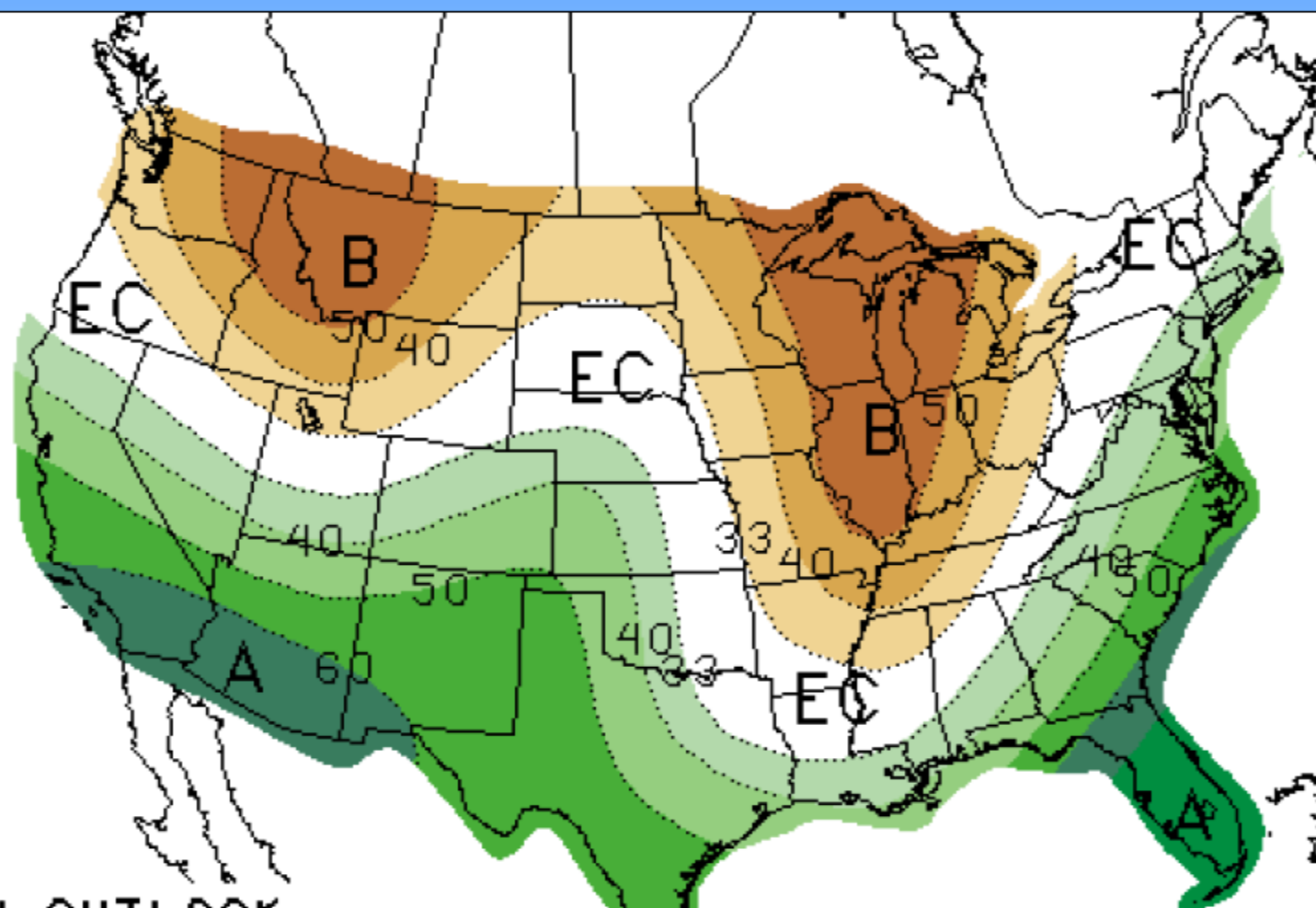


El Nino

Warming water is drawing semi-tropical fish to California's coastlines



January - March



THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
3.5 MONTH LEAD
VALID JFM 2016
MADE 17 SEP 2015

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

El Nino Storms 2015 – 2016 ?



Ferocious storm causing floods and landslides/Inverness 1982

Full Coverage of Catastrophe... Inside
Flood Photos... Pages 6,7

POINT REYES LIGHT



35°

Tossed like a toy



Inverness Ravaged by Pacific Storm

The Inverness community, Pacific coast town, was hit by a ferocious storm that left the town in a state of chaos. The storm, which arrived on the coast of California on Monday, was the most powerful in the area in decades. It brought with it high winds, heavy rain, and a massive surge of water that inundated the town. The storm caused widespread damage to homes and businesses, and many people were injured. The town of Inverness is a small community of about 1,000 people, and the storm was a devastating blow to the town. The storm caused widespread damage to homes and businesses, and many people were injured. The town of Inverness is a small community of about 1,000 people, and the storm was a devastating blow to the town.

Sliding Homes, Washed Out Roads

A massive landslide occurred in the town of Inverness, California, on Monday, as a result of the ferocious storm. The landslide, which occurred in the town of Inverness, California, on Monday, as a result of the ferocious storm, caused widespread damage to homes and businesses, and many people were injured. The landslide, which occurred in the town of Inverness, California, on Monday, as a result of the ferocious storm, caused widespread damage to homes and businesses, and many people were injured. The landslide, which occurred in the town of Inverness, California, on Monday, as a result of the ferocious storm, caused widespread damage to homes and businesses, and many people were injured.

B STREET

SHORELINE HWY

DANCE PALACE
COMMUNITY CENTER
4 BLOCKS →

it Today







- El Nino Patterns
- Changing conditions in the ocean
- Storm Season Preparation and Response
- Community Awareness and Preparedness

DROUGHT

Will El Nino make a difference?

- Seasonal Climate Forecast
- Accuracy
- Global warming influence



The Perfect Storm





Lifebuoy 1994

- Lessons learned
- Flood forecasting
- Joint Information System
- EOC Improvements
- Agency Partnerships
- Communications Capabilities

Thank you!

Flood Proofing and Elevating Structures

FEDERAL EMERGENCY MANAGEMENT AGENCY

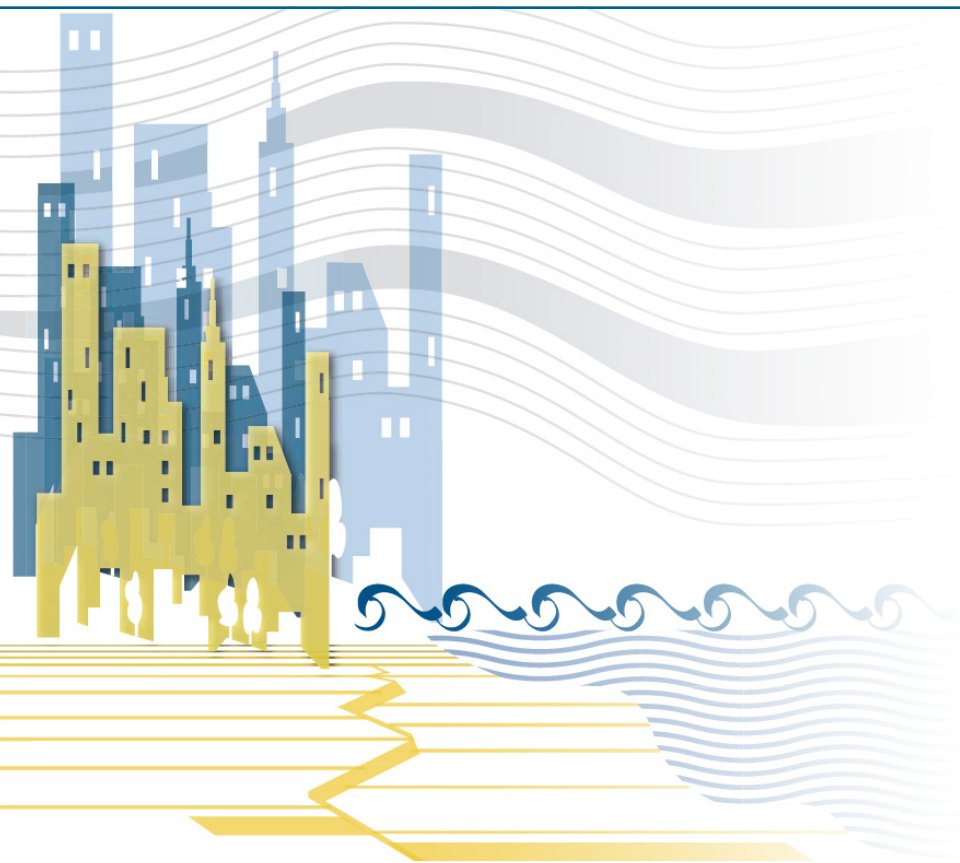
Pros: Effective for storm flooding

Cons: Costs, not effective for permanent tidal flooding



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Coastal Construction Overview

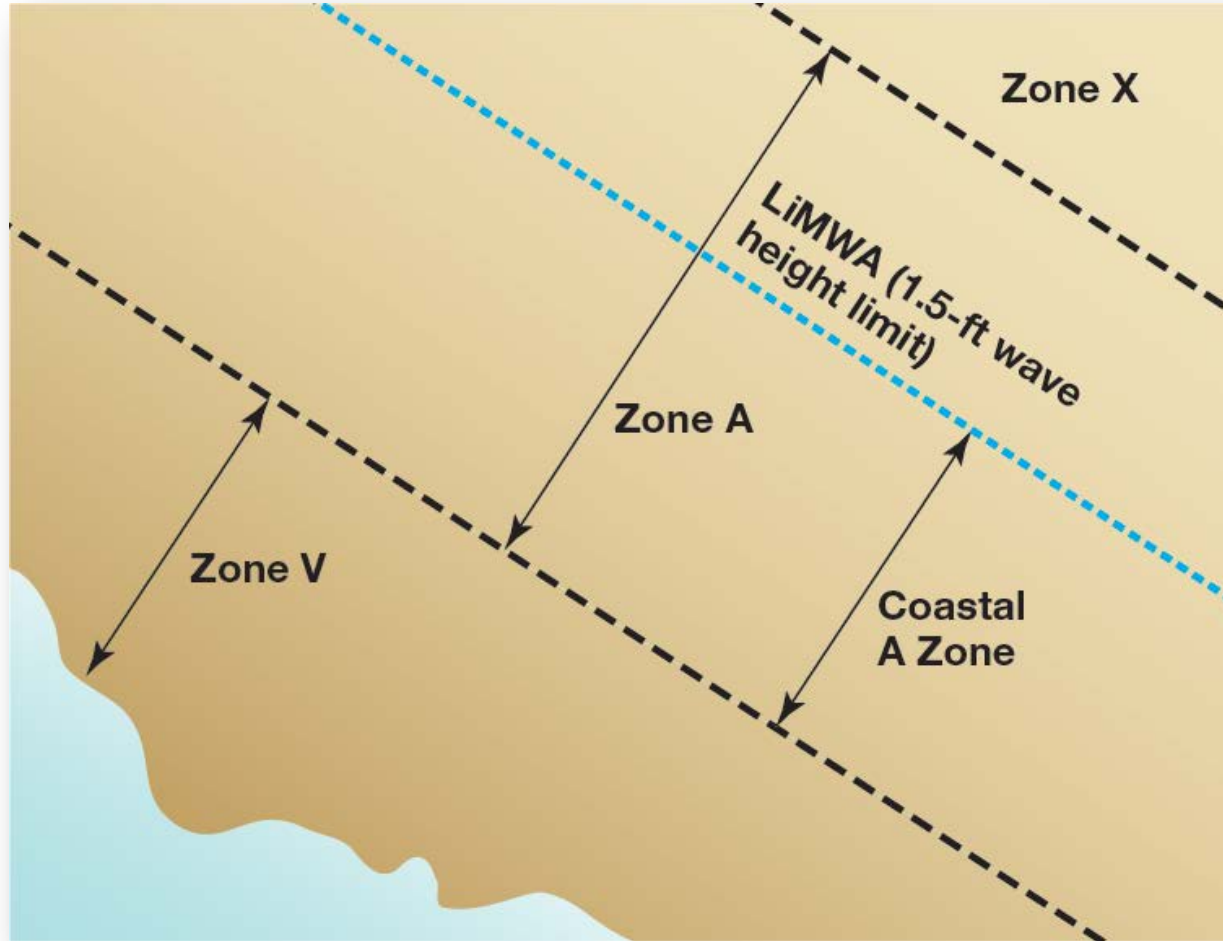


FEMA

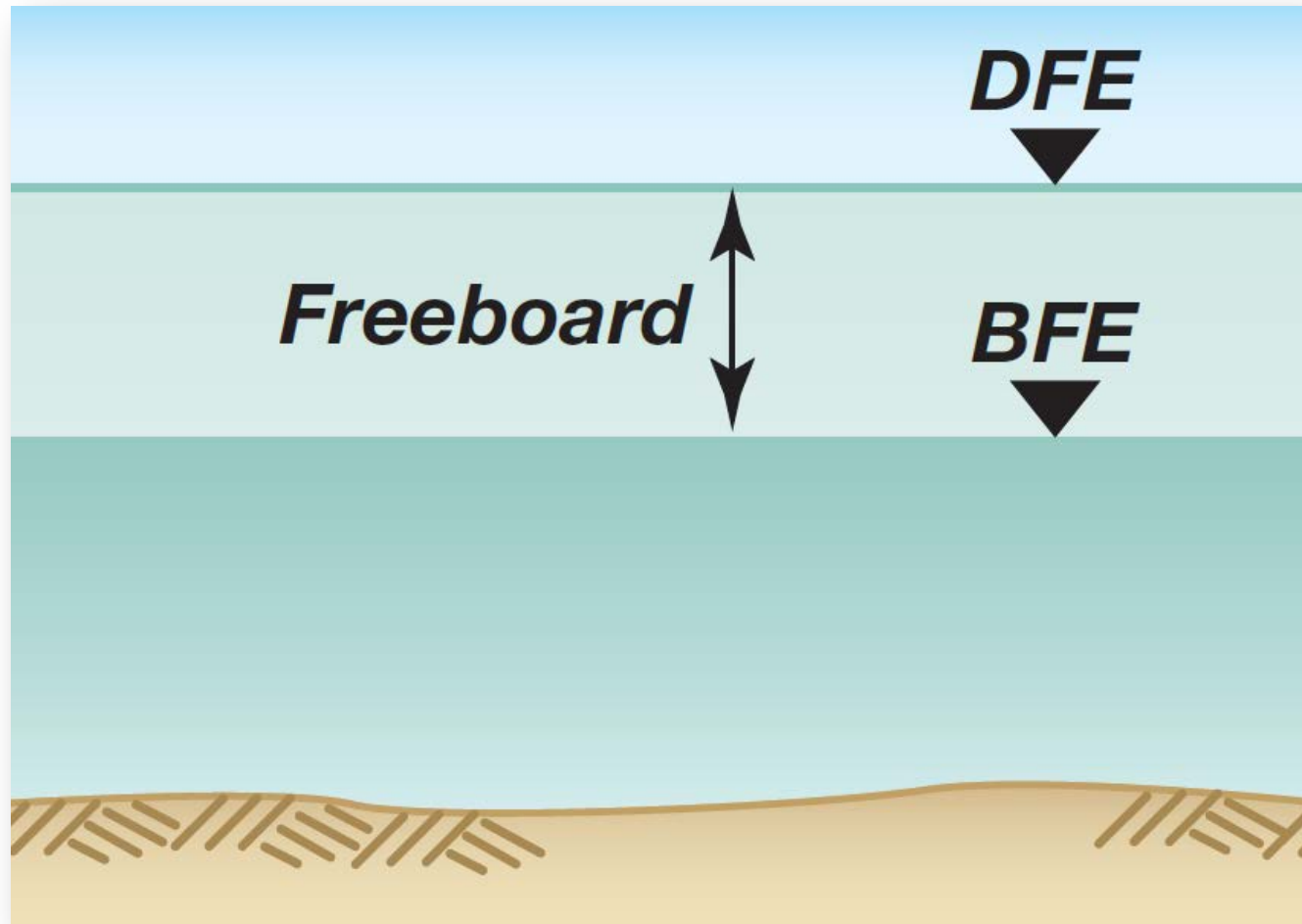
Building Standards, Design, and Construction Do Make a Difference



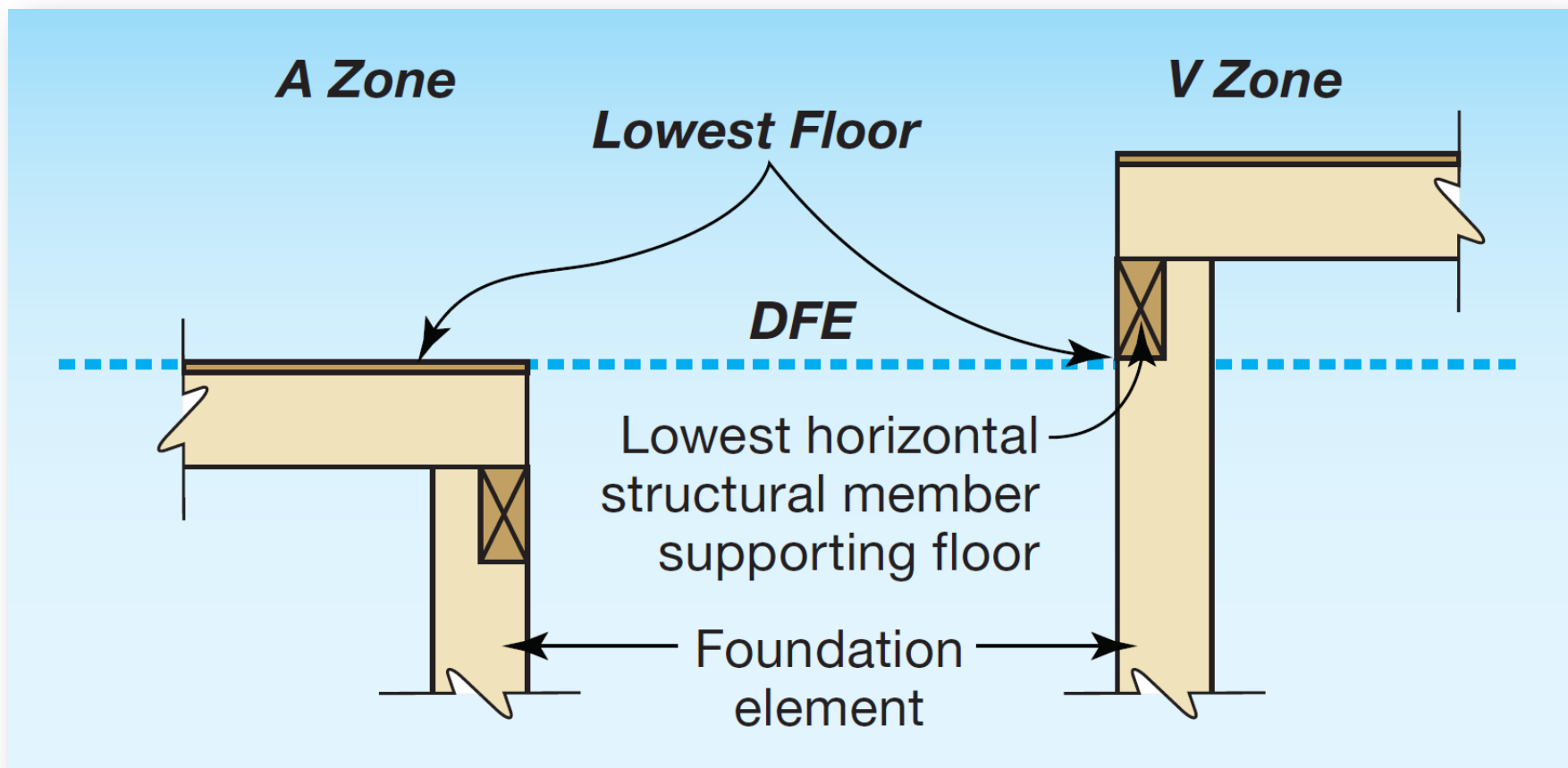
Coastal Flood Hazard Zone



Design Flood Elevation



Minimum Elevation of Lowest Floor



A Zone Permissible Foundation Types

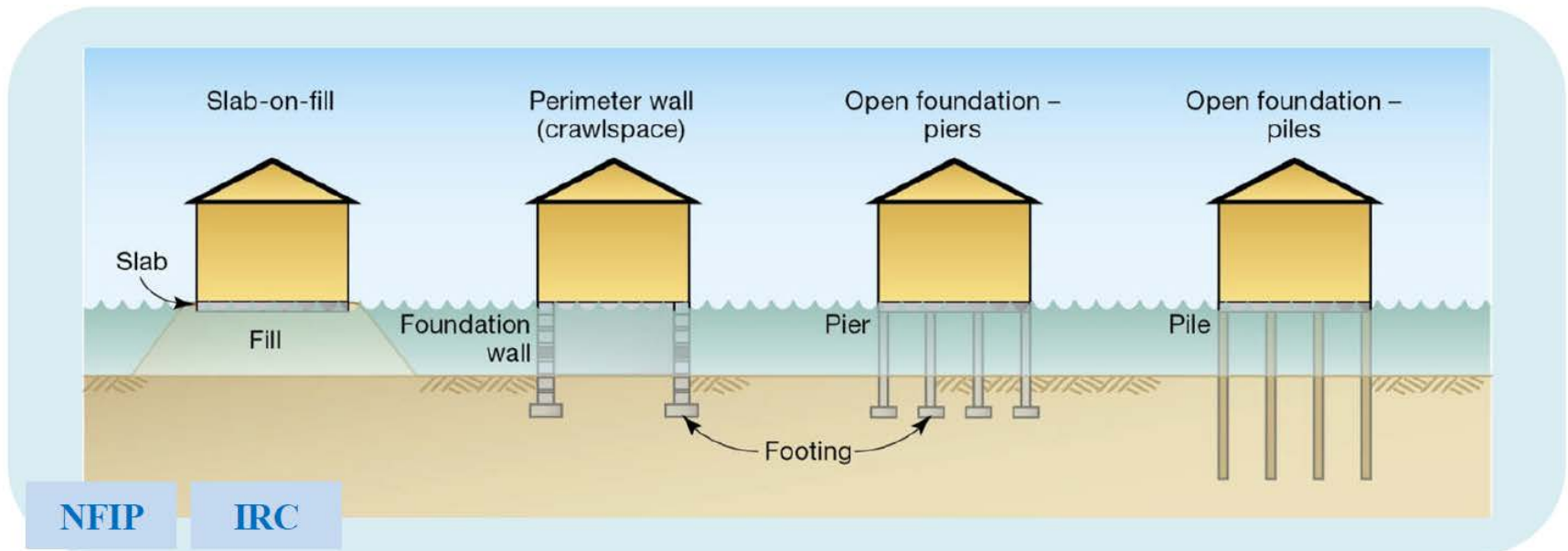
NFIP



Zone A

IRC

FOUNDATIONS



V Zone Permissible Foundation Types

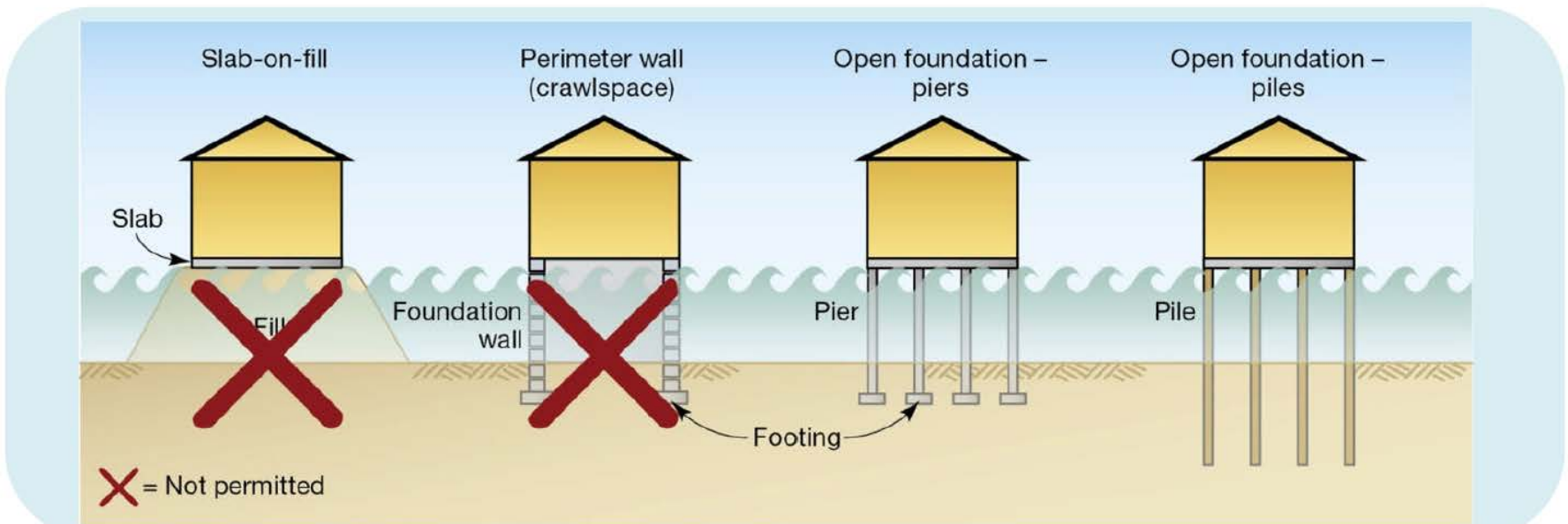
NFIP



Zone V

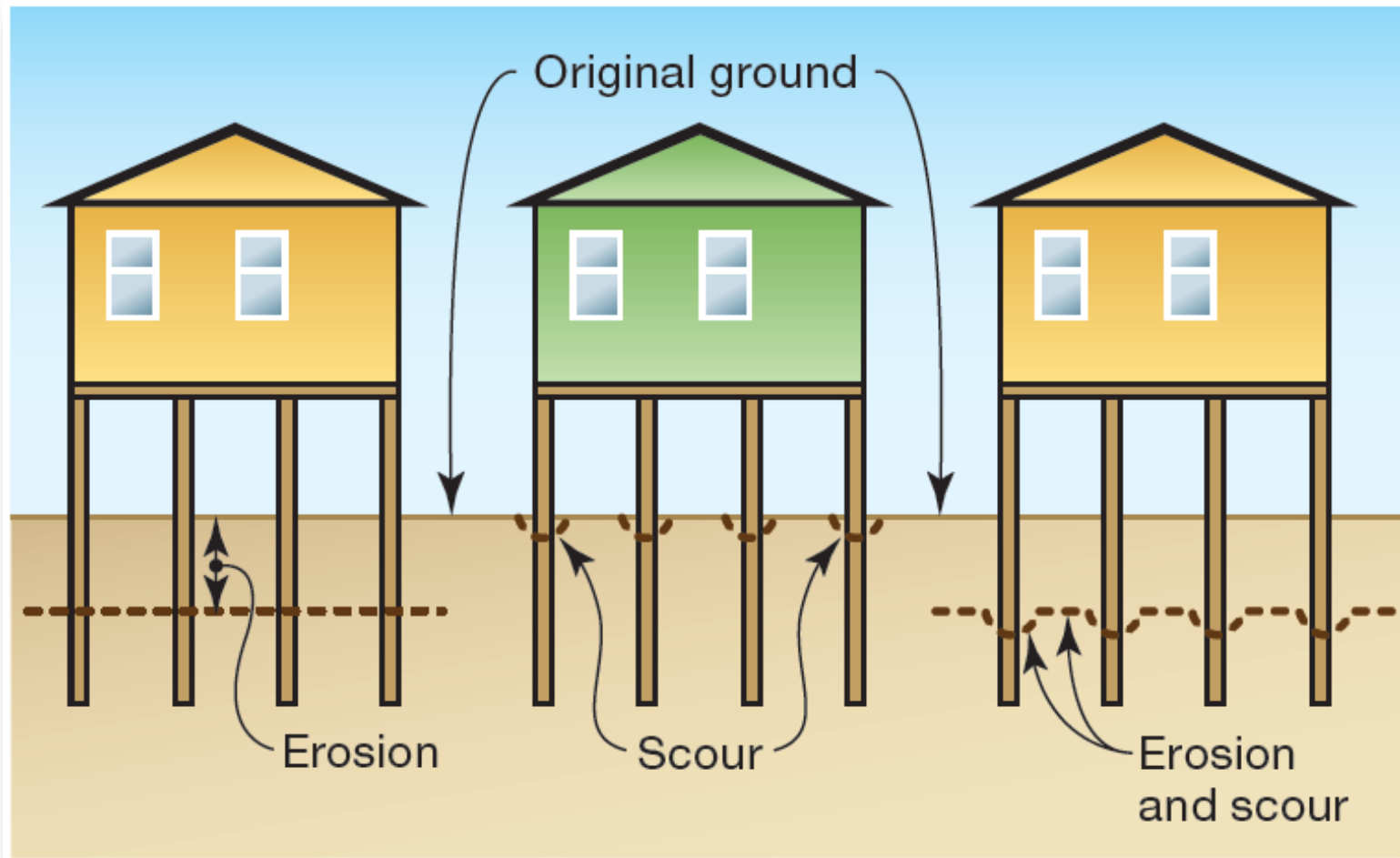
IRC

FOUNDATIONS



FEMA

Erosion and Scour



Foundations



Shallow Foundation Failures



Shallow Foundation Failures



Pile Embedment Insufficient



Pile Failure



Erosion/Scour



Flood-borne Debris



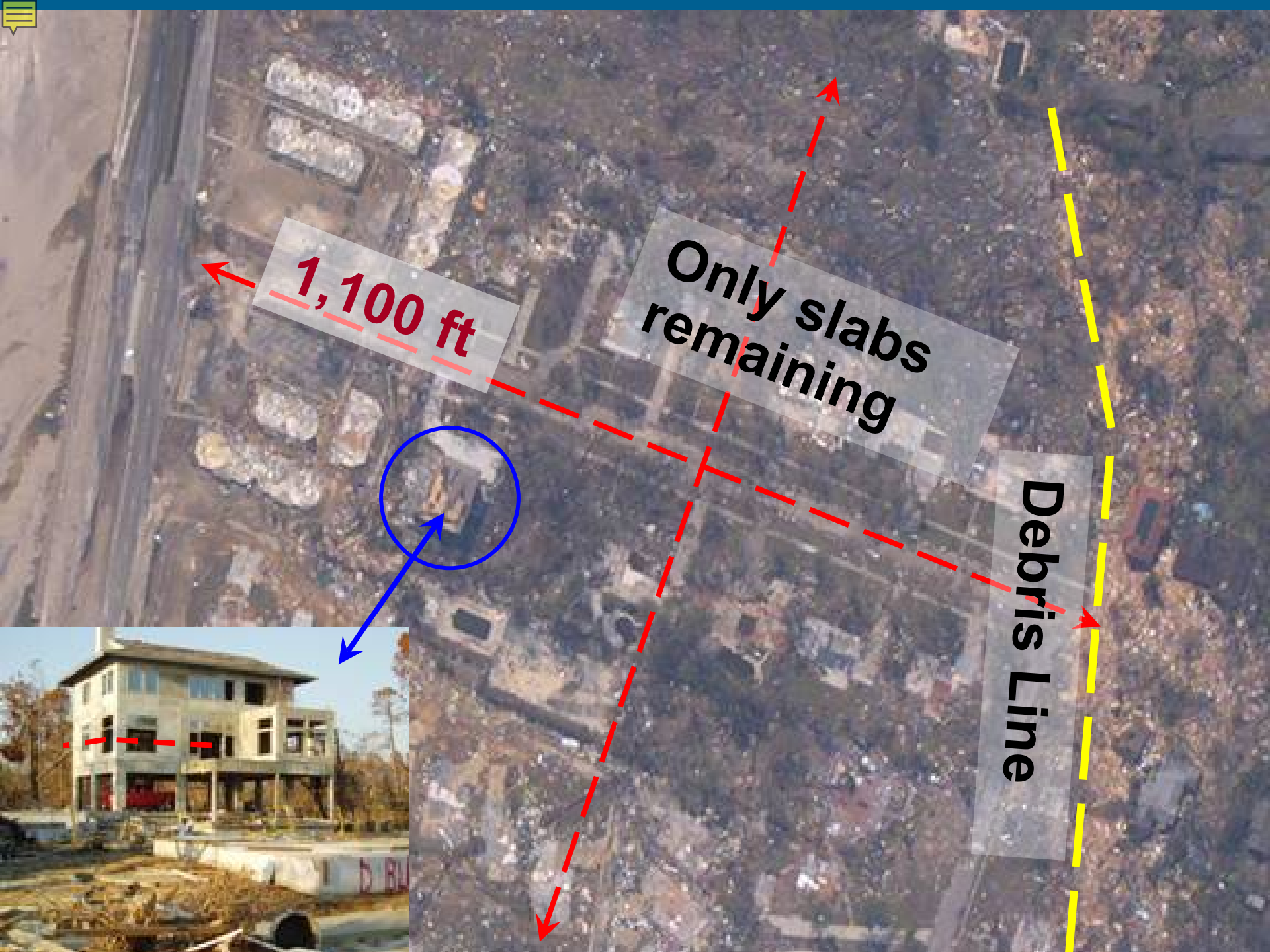
Design Conditions Exceeded



Storm Surge/Wave Damage

**Out of 100 +/- homes in the area,
we counted 2 homes that survived**





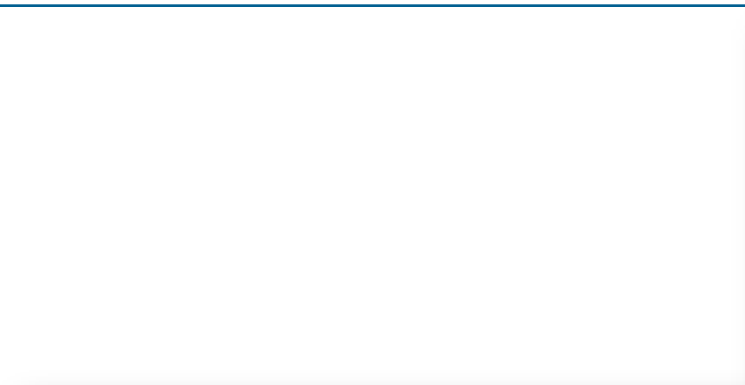
1,100 ft

Only slabs remaining

Debris Line



Hurricane Ike



To Obtain FEMA Publications...

Call the FEMA warehouse (1-800-480-2520)

Request publication by number:

FEMA P-55

Coastal Construction Manual

FEMA P-499

Home Builder's Guide to Coastal Construction

(or order via FEMA's Website)



Questions?



Viewshed Analysis

MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY

*Views from Shoreline Highway
Bolinas ~ Stinson Beach
Marin County CDA, 9/5/15*



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Dunes and Hybrid Adaptation Strategies

Bob Battalio, PE
Environmental Science Associates (ESA)
Stinson Beach Community Center
Marin County
November 14 2015

Speaker: Bob Battalio

Chief Engineer, Vice President, ESA

Professional Civil Engineer (CA,WA,LA,OR)

Coastal Processes training from UC Berkeley, 1985

Chief Engineer, Vice President @ ESA, San Francisco

Engineering Criteria Review Board, BCDC



Practices Coastal Zone Engineering and Management



Vice President, California Shore and Beach Preservation Association (Non profit)

Surfer

WAVES ARE GOOD !



Pacifica State Beach

Managed retreat and dune restoration (grading and planting) and sand placement

State funding

Constructed 2005

Coastal design ESA (PWA)

Photograph, courtesy of City of Pacifica



Pacifica State Beach Restoration



2004 - Before



2009 – After
(constructed 2005)

Surfers' Point, Ventura, CA

Managed retreat and dune restoration (grading and planting) and sand and cobble placement

State funding

Constructed 2010-12

Coastal design ESA (PWA)

West End of Surfer's Point



Existing Bike Path

1994 Eroded Area

Applied Geomorphology – Reference Site



Reference site provides vision of coastal restoration

- Cobbler berm
- Sand cover
- Vegetated dune
- Active profile resilient to high waves and water levels
- Re-nourish to maintain

Surfers Point Shore Realignment and Restoration



Previous project damages
Photo: P. Jenkin

Project post construction

Photo: L. White



Adjacent (next phase)

Photo: L. White

Wind-induced sand transport ! – Vegetated Dunes Needed !



November 2012



January 2013



Spring 2012
Photo courtesy of Paul Jenkin



April 2013

Post Phase 1 but Pre-Dunes

Photos courtesy of:
Rasmussen Construction,
Ventura County Fairgrounds,
City of Ventura



Ocean Beach, San Francisco, CA

Shore built seaward over 200 feet with linear sand dune and then armoring, then more sand and some retreat and then lots of problems and now more sand and retreat

City, State and Federal funding

Constructed 1890s to present, ongoing

Future adaptation plan coastal analysis – ESA (PWA)



**Seal Rock House and Dunes circa. 1865 (Source, Olmstead
& Olmstead, Bancroft Library)**



The wider the Great Highway, the more it crumbled, ca. 1907. Plenty of space for buggies and automobiles but not much beach is left. (Bancroft) The Pile Driver at Work on the first Esplanade, May 5, 1916. (Bureau of Engineers) The Cement Bleachers are in Place in Esplanade, Section A. (Calif. Historical Society)

Source Photo: Olmsted and Olmsted, 1979



Aerial View of Ocean Beach, June, 1915. These two views were made before the Esplanade development to the north had started. By 1915 there was a new Great Highway atop the dune to the west of the Great Highway at the turn of the century. Much of the Sunset District (around Pacheco) was still to be reclaimed into home sites. (Bureau of Engineers)

Dune
(and all other)
construction too
far seaward has
short life on
eroding shore,
especially in
future with
sea level rise



Figure 9: South Ocean Beach: Top: Post construction in 1990s. Bottom: eroded in early 2000s. The wood posts (top photo) were removed by erosion, and were replaced in the parking remaining parking lot (bottom photo). Photographs, Bob Battalio.

Source Photo: Battalio

Beach grading is still done but has negative effects to ecology, and often is counter productive in terms of developing an unstable geometry



1. Sand Placement – 2 episodes
 - Fall, 1999 15,000 tons
 - Second Placement in 2001 (?)
2. Bypass Roadway in Median





Figure 19
Photographs of Sand Placement in 1999-2000 at Reaches 1 and 2,
between the South Parking Lot and the SWOO (© Bob Battalio)



Figure 20
Photos of sand embankment and wind-blown sand transport on April 30, 2013,
after the 2012 sand backpass project (© Bob Battalio)

Beach Nourishment using pumped sand slurry proposed

Example Photo Source Photo: SanDag



Corps of Engineers maintenance dredging of Bar Channel produces about 200,000 to 500,000 cubic yards every 1 - 2 years, varies and declining

Plan to place about 300,000 cubic yards of sand on beach by 2017

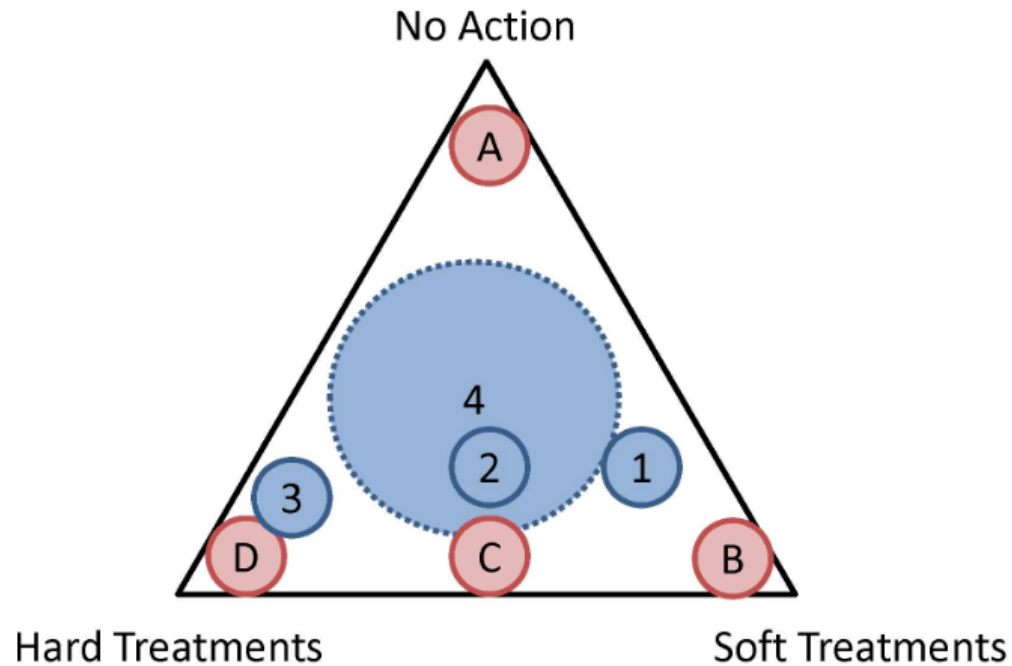
Need about 1 – 2 Million cubic yards to rebuild dunes and beach to 1990's dimensions, recurring every 1 to 3 decades

Probably need another 10 Million +/- cubic yards to mitigate sea level rise through 2100

Crissy Field SF



Conceptual Adaptation Solution Space with Hybrid Strategies



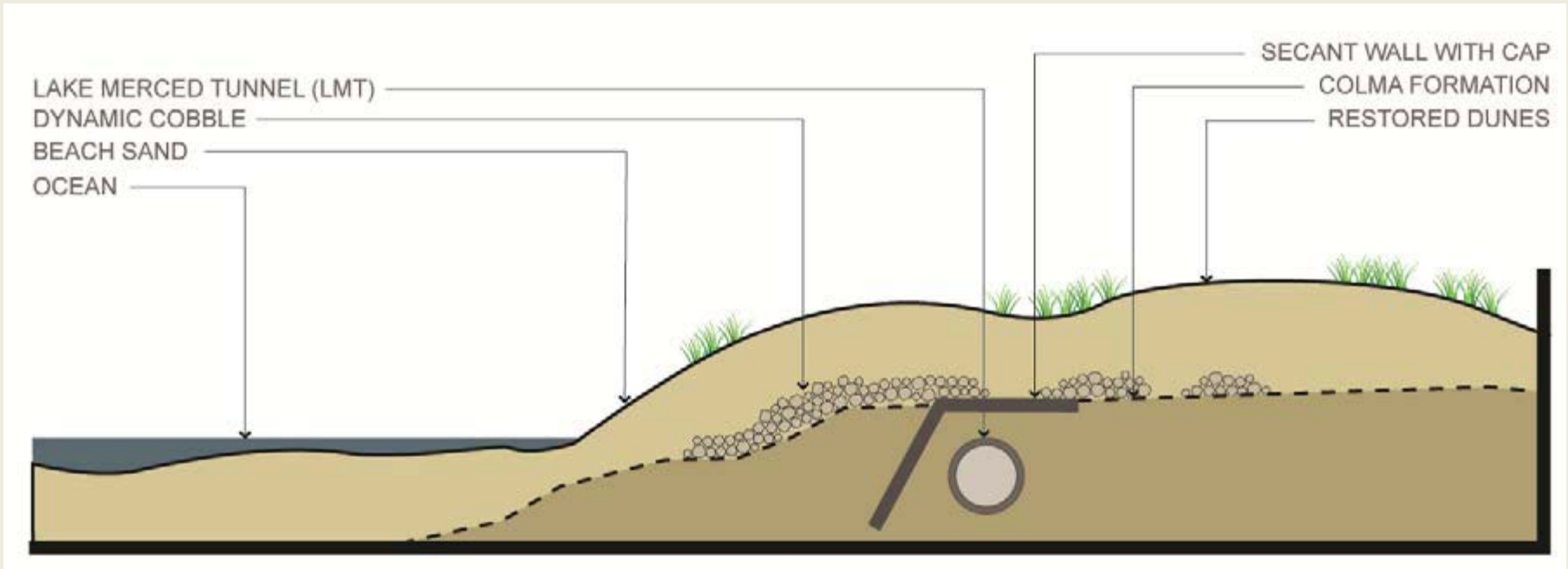
Measures

- A No Action
- B Sand Placement
- C Sand Placement w/ Reefs
- D Hold the Line

Implementation Options

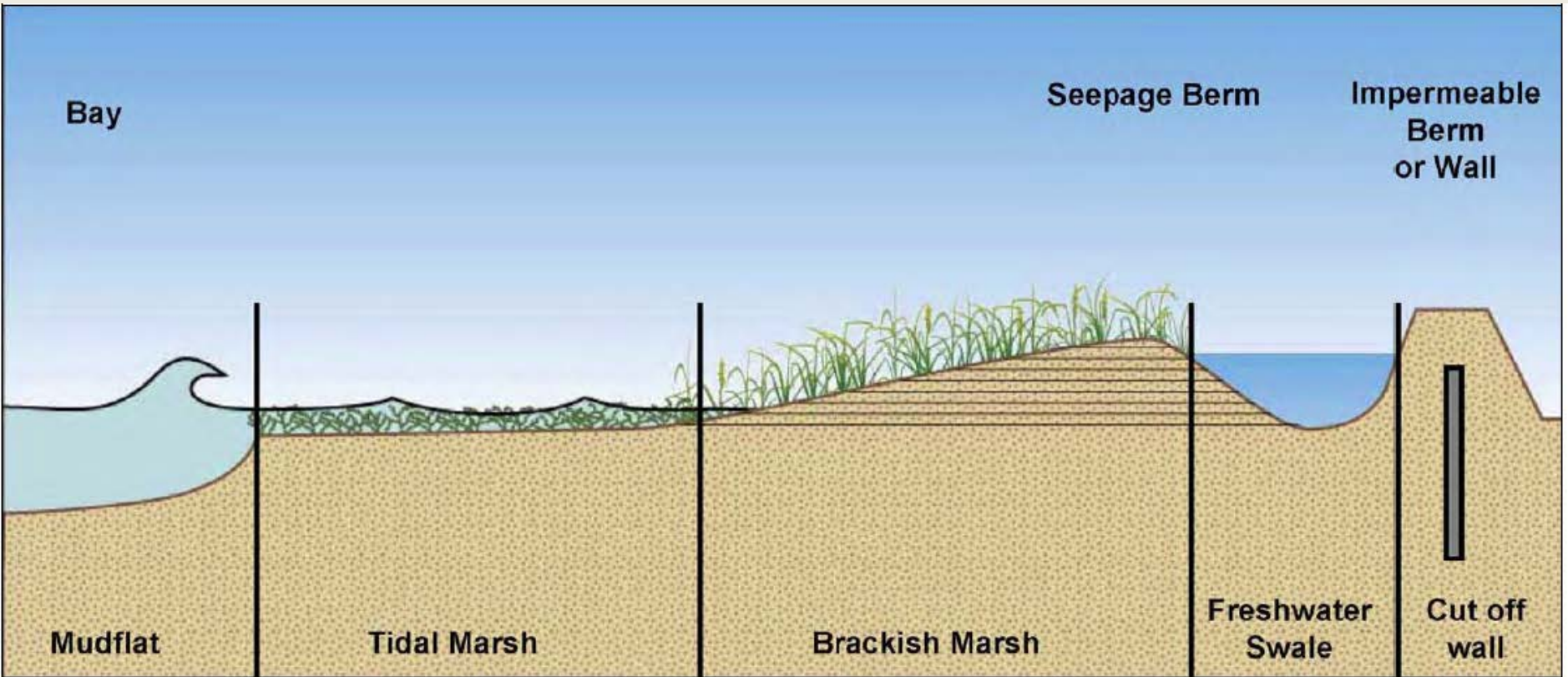
- 1 Beach Nourishment
- 2 Beach Nourishment w/ Reefs
- 3 Armor
- 4 Hybrids

Hybrid Approaches



Ocean Beach Master Plan Vision and
Low-Profile Protection of the LMT In-Place
Source: ESA 2015

Living Levee



Source:

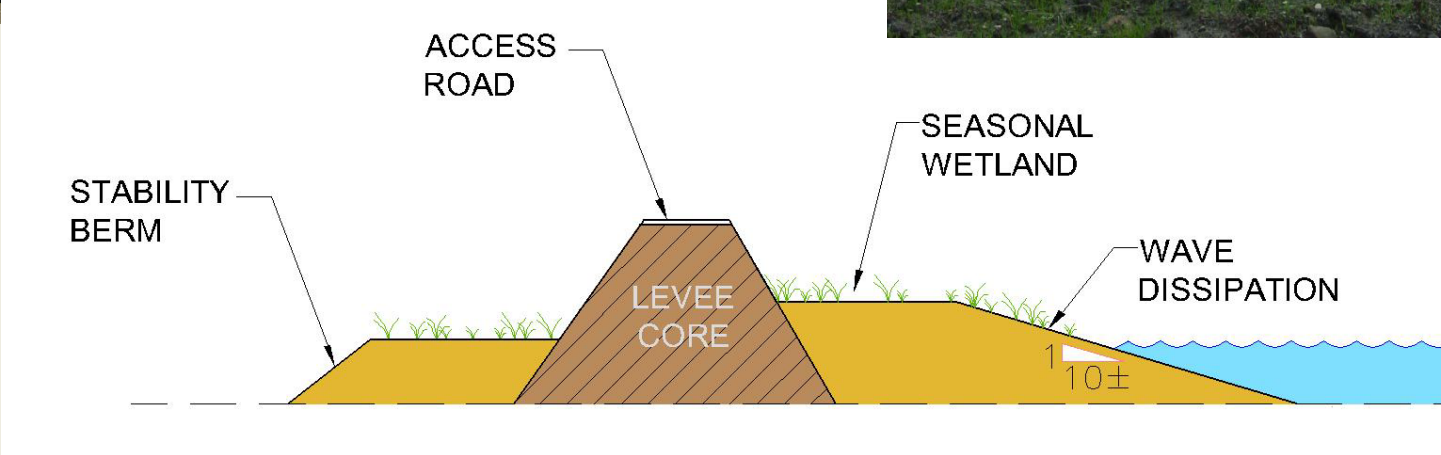
figure 7.5
HASPA Sea Level Rise Study

Gradual Steepening Concept

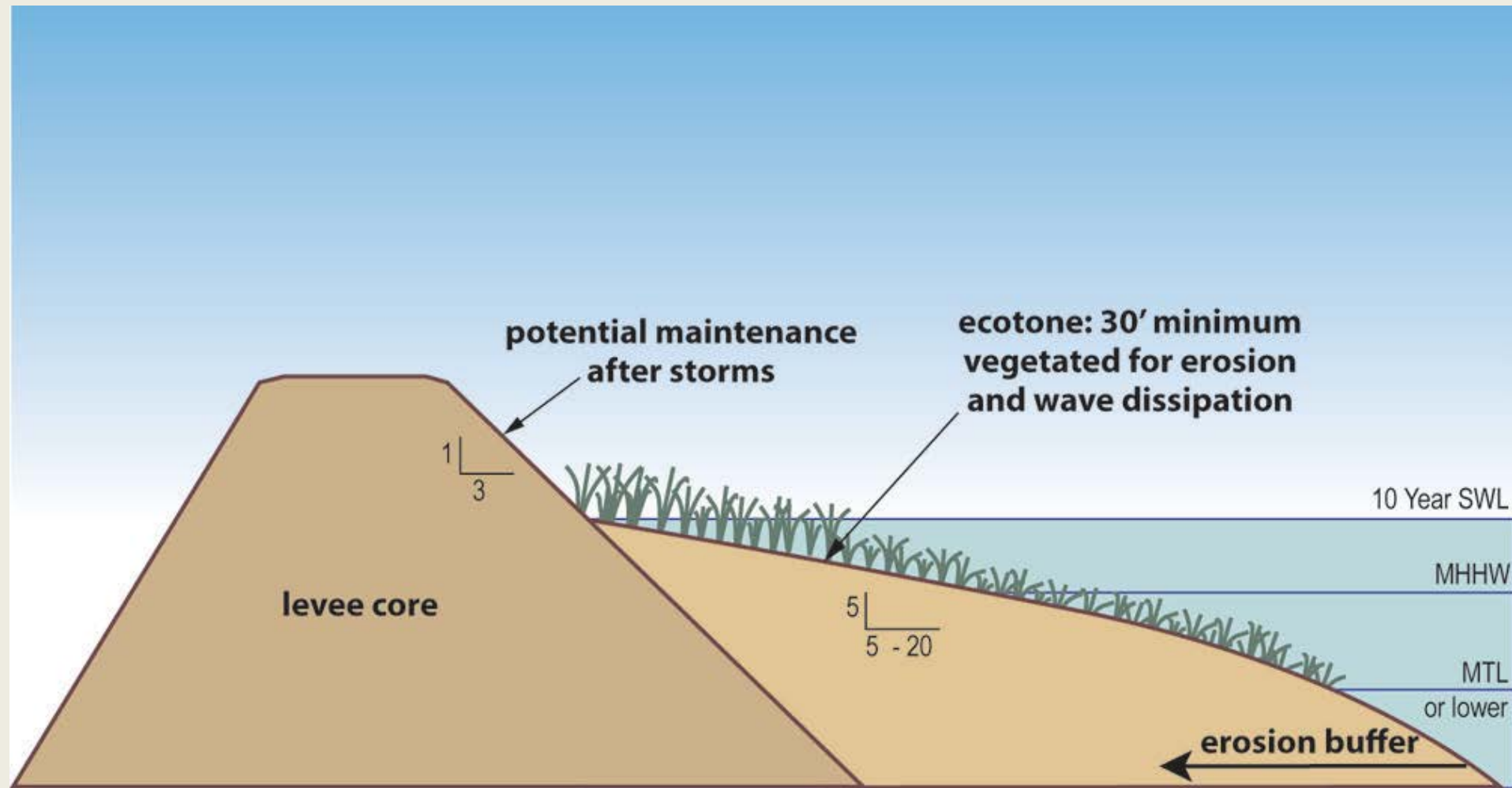
PWA Ref# 1955.00



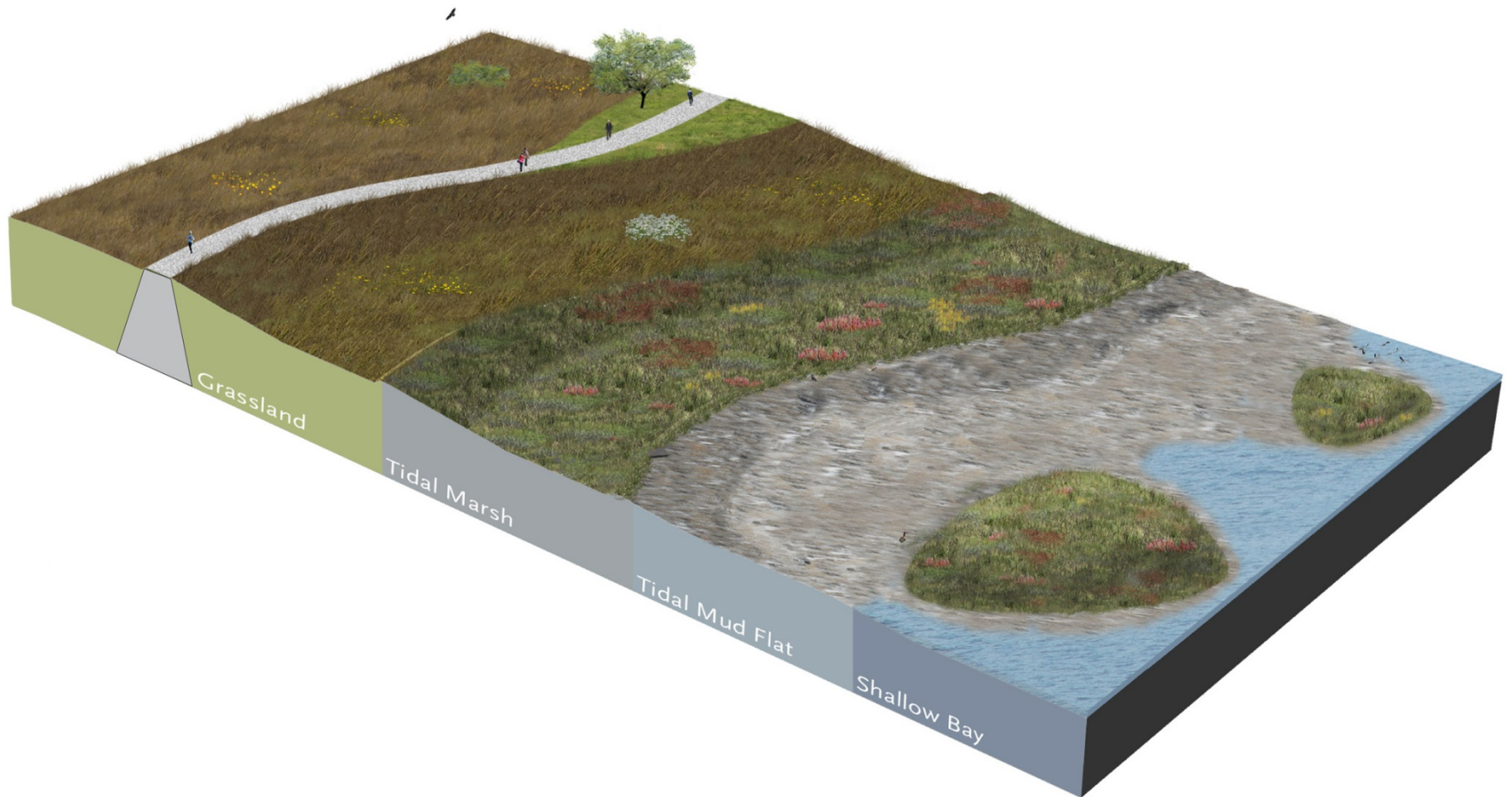
Petaluma Marsh Levee



“Habitat Friendly” erosion, flood hazard mitigation, Hamilton Wetlands, Novato



Horizontal Levee



Warm Springs Bench 1987



Warm Springs Bench 1999

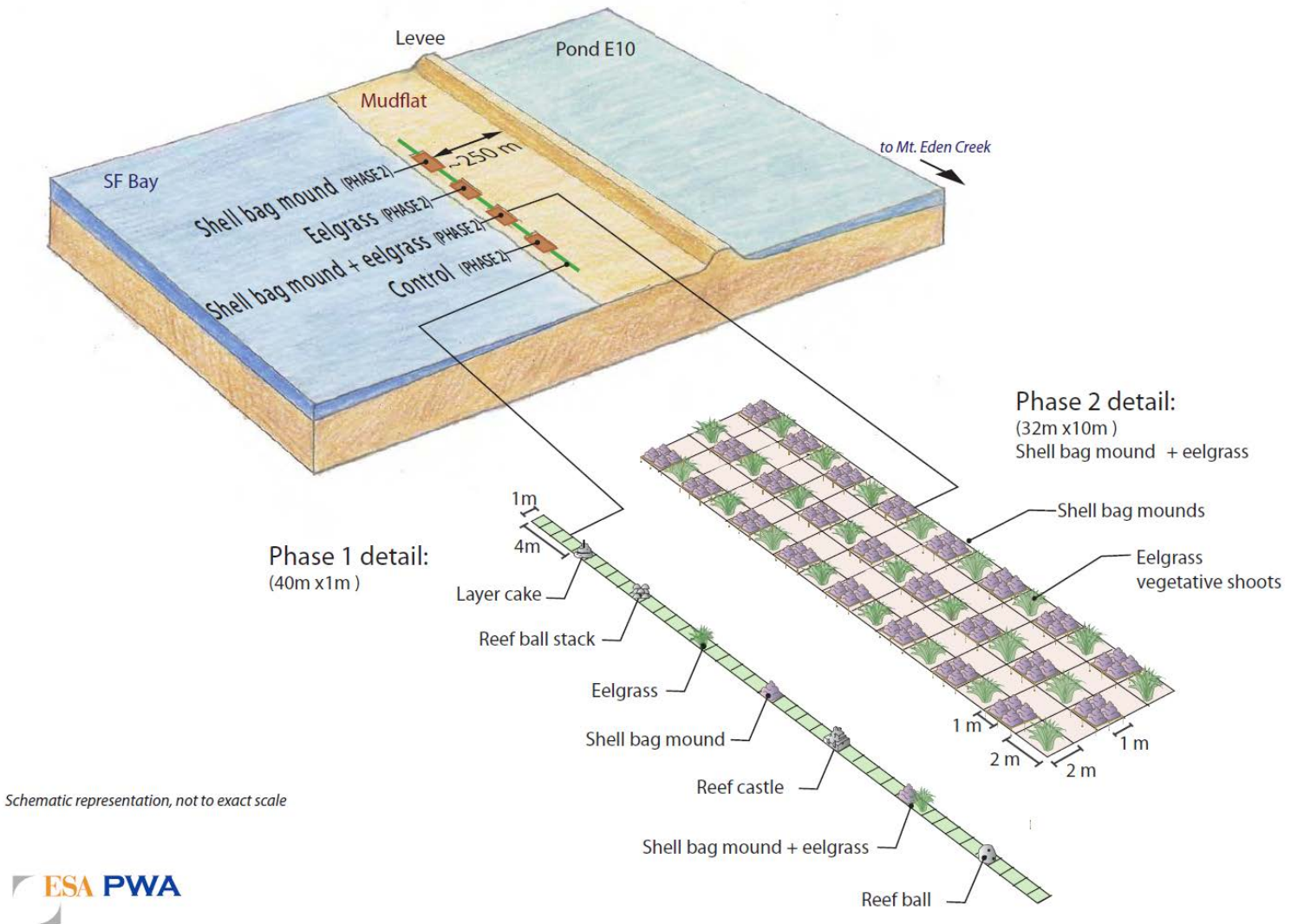




Oyster Reef Complex

Proposed Array of Treatments at Eden Landing Ecological Reserve North
Phase 1 and Phase 2

FIGURE 6





Bob Battalio, PE
Principal Engineer

550 Kearny Street, Suite 900
San Francisco, CA
415.262.2300
www.pwa-ltd.com
bbattalio@esassoc.com 415-262-2313



Coastal Armoring

PETER WIJSMAN, ARCADIS

Pros: Moderate ROW required

Cons: Cost, Impacts

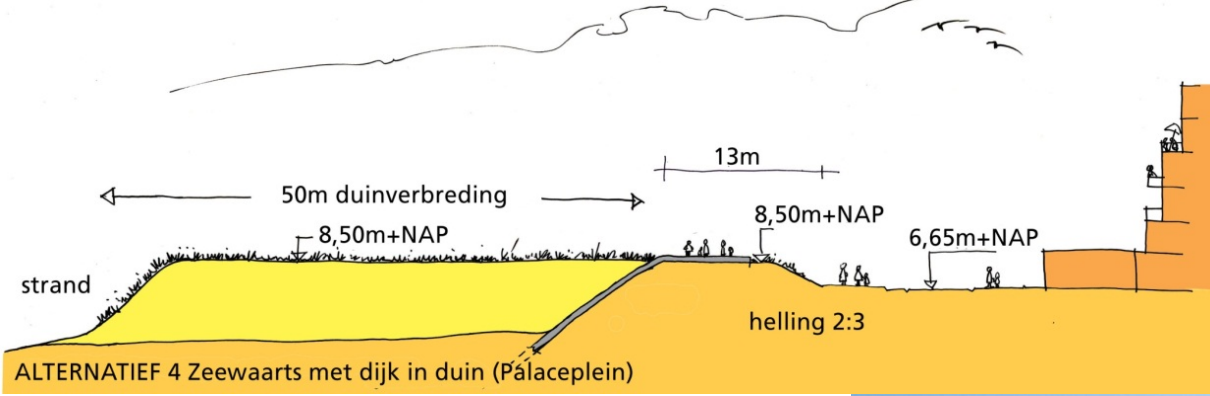


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Collaboration: Sea-level Marin Adaptation Response Team
Nov. 14, 2015 | www.marinslr.org

New Storm Surge Barrier New Orleans











Tide Gate

ROGER LEVENTHAL, MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

Pros: Temp solution to tidal riverine flooding

Cons: Cost, limited effectiveness over time

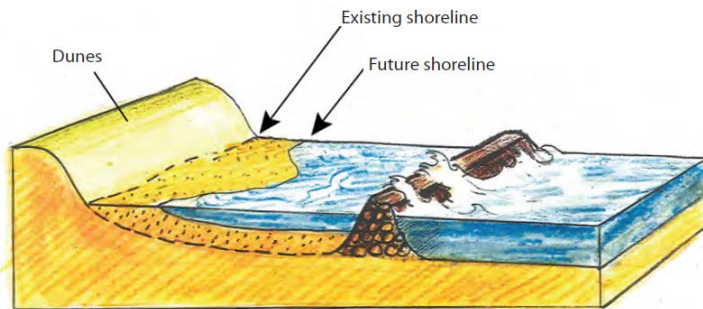
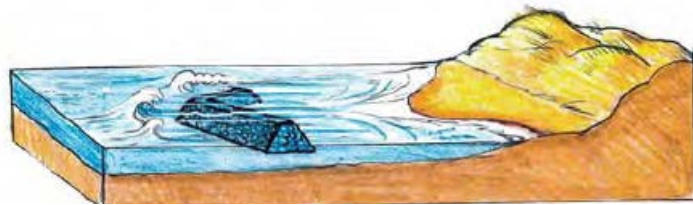


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Offshore Structures

Pros: Uses landscape to attenuate waves, provides habitat

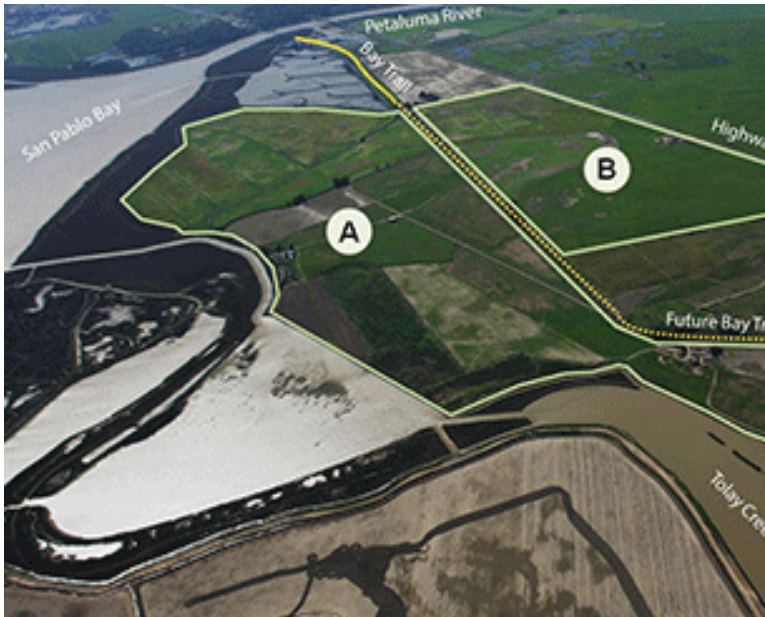
Cons: Cost for earthwork, larger ROW



Horizontal Levees & Tidal Marshes

Pros: Uses landscape to attenuate waves, provides habitat

Cons: Cost for earthwork, larger ROW

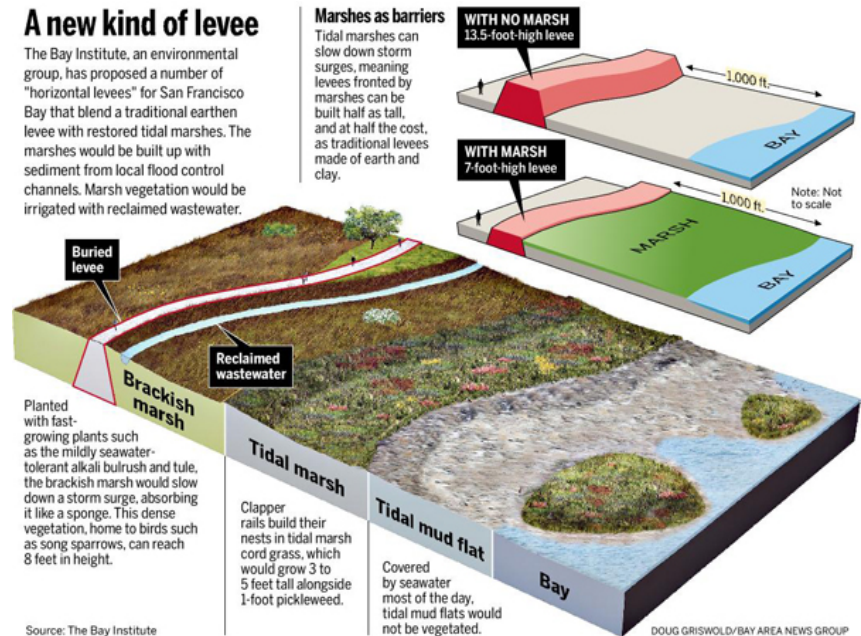


A new kind of levee

The Bay Institute, an environmental group, has proposed a number of "horizontal levees" for San Francisco Bay that blend a traditional earthen levee with restored tidal marshes. The marshes would be built up with sediment from local flood control channels. Marsh vegetation would be irrigated with reclaimed wastewater.

Marshes as barriers

Tidal marshes can slow down storm surges, meaning levees fronted by marshes can be built half as tall, and at half the cost, as traditional levees made of earth and clay.



Natural Capital

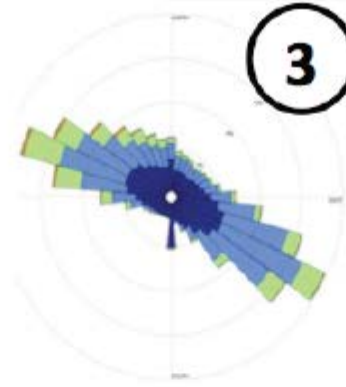
CENTER FOR OCEAN SOLUTIONS



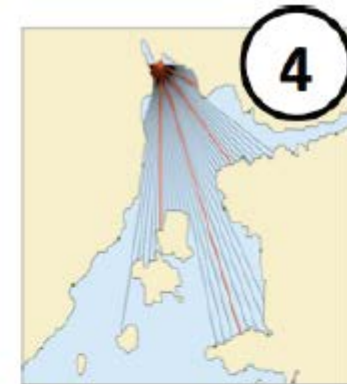
GEOMORPHOLOGY



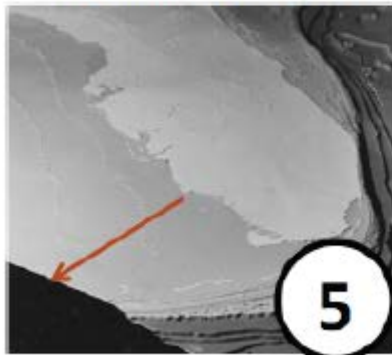
COASTAL HABITATS



WIND EXPOSURE



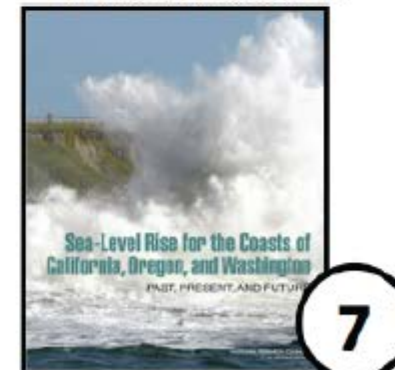
WAVE EXPOSURE



SURGE POTENTIAL



RELIEF



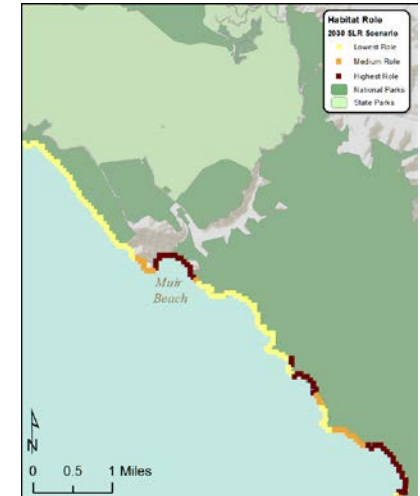
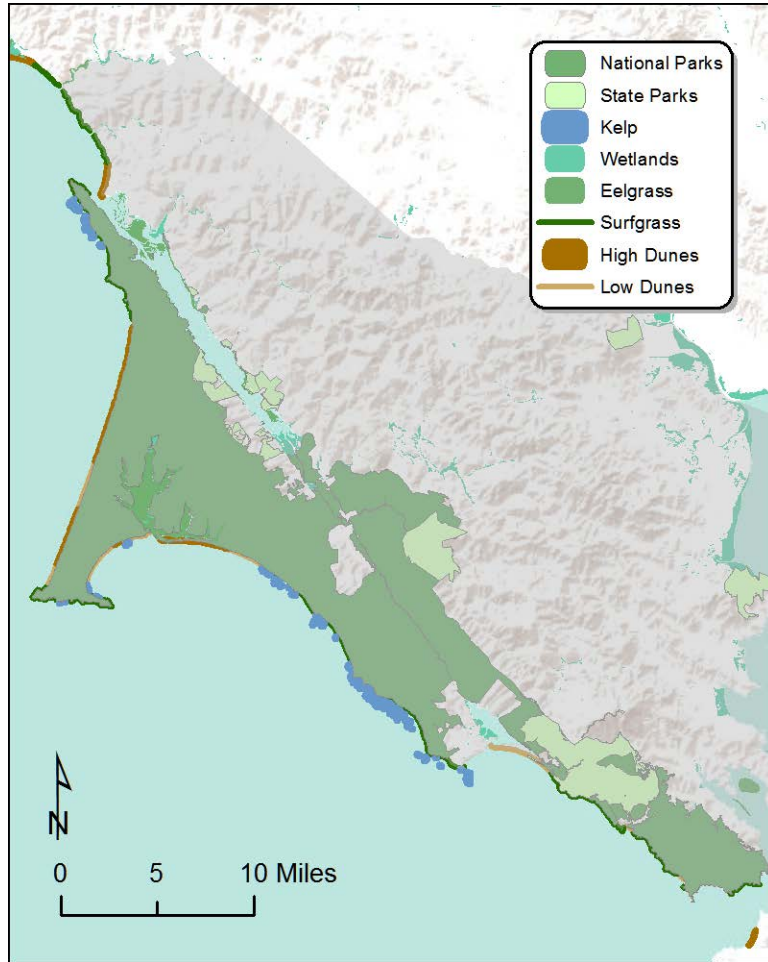
SEA LEVEL RISESM



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Natural Capital

CENTER FOR OCEAN SOLUTIONS



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Managed Retreat

SHANNON FIALA & KELSEY DUCKLOW, CALIFORNIA COASTAL COMMISSION

Overview

Managed retreat involves relocating or removing existing development out of hazard areas. Examples include acquisition and buyout programs, transfer of development rights programs, and others.

Pros

- a) Prevents property destruction from hazards and damage to public access areas and ecosystems
- b) Promotes preservation and conservation of open space
- c) Allows for the inland migration of wetlands and other environmentally sensitive habitats
- d) Allows for continued or enhanced public access and recreational opportunities
- e) Maintains the open spaces commonly used by people with a range of socio-economic backgrounds.

Cons

- a) Space may not be available immediately inland of existing development
- b) Expensive, potentially time-consuming planning process
- c) Political and social barriers



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Ventura, Surfer's Point

- Relocated public access parking lot and bike path
- Incorporated dune restoration



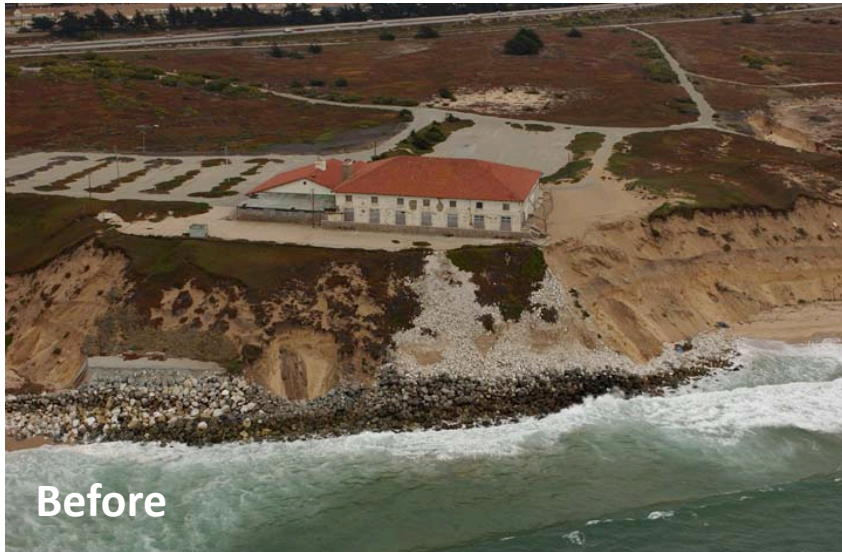
source: CA California Records Project



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Monterey, Fort Ord

- Removed blufftop structure and revetment that was protecting it
- Allowed for restored lateral access along the beach as natural processes took over



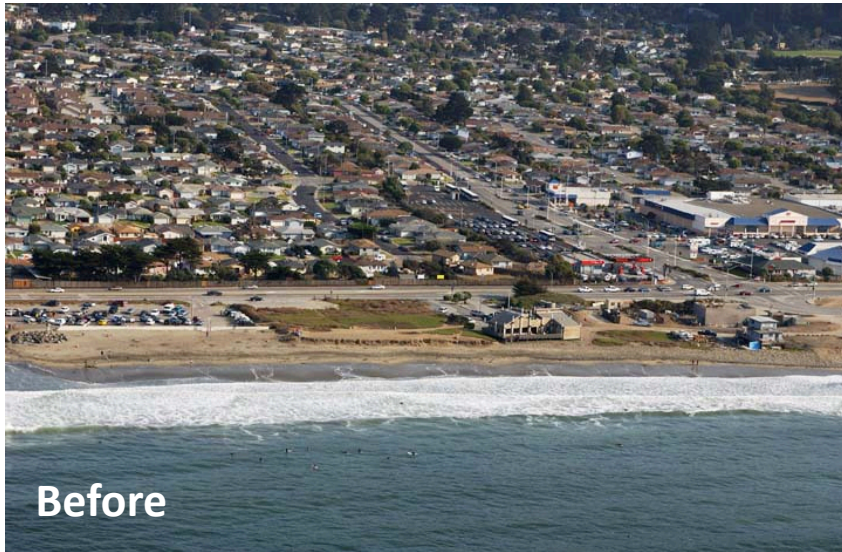
source: CA California Records Project



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Pacifica State Beach

- Purchased two homes and surrounding acreage in order to remove the homes, rebuild the dunes, and restore four acres of beach and the nearby estuary



source: CA California Records Project



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Malibu, Broad Beach (Planned)

- Removal of septic systems and conversion to centralized wastewater treatment



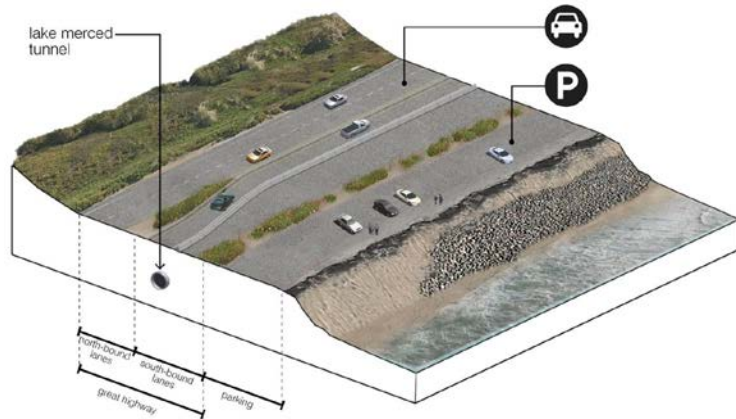
source: CA California Records Project



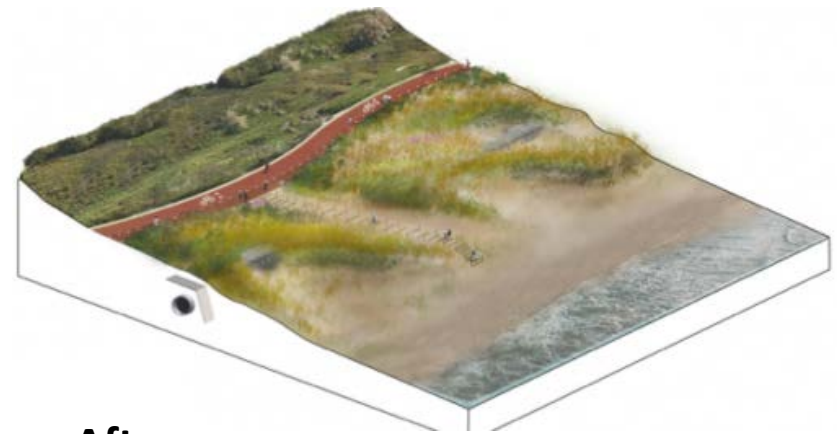
Community Development Agency
Collaboration: Sea-level Marin Adaptation Response Team
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San Francisco, Ocean Beach (Planned)

- Removal of Great Highway and conversion to open space with public coastal access
- Associated dune/habitat restoration and enhancement



Before



After

source: SPUR



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San Luis Obispo, Piedras Blancas

- Relocation of Highway One inland



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Hazard Assessment Districts

KATHY SCHAEFFER



Community Development Agency
Collaboration: Sea-level Marin Adaptation Response Team
Nov. 14, 2015 | www.marinslr.org

Sustainability Team

KELLEN DAMMANN



Community Development Agency
Collaboration: Sea-level Marin Adaptation Response Team
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Stinson Beach Community Center

November 14th, 2015



Home Upgrade



Energy Upgrade California[®] Home Upgrade

- Funded by California rate payers under the auspices of the California Public Utilities Commission and the California Energy Commission
- Goals include:
 - Increasing energy efficiency in the existing building stock (70% built before 1980)
 - Helping homeowner save on utility bills
 - Lowering state greenhouse gas emissions
 - Meeting goals set by Assembly Bill 32, California Air Resources Board, and local Climate Action Plans

Part of the Energy Upgrade California[®] Statewide Program



Energy Upgrade California® Home Upgrade

- Rebate program for making energy efficient upgrades to the home
 - Up to \$3,150 for Home Upgrade
 - Up to \$6,800 for Advanced Home Upgrade
- Projects can include:
 - Upgrading duct systems
 - Upgrading HVAC
 - Installing insulation
 - Sealing air leaks
 - Upgrading hot water heaters
 - And more!



What issues is a Home Upgrade project meant to address?

- Home comfort issues
- Indoor air quality
- High utility bills
- Plus: reducing emissions



Common building performance problems

- Lack of insulation
- Air leaks
- Disconnected/leaky ducts



Building Science in Action

- Blower door test measures your home's total air leakage
- Duct blaster does the same for your duct system
- Thermal imager shows where your home is lacking insulation



Home Upgrade Advisor Service

How can they assist contractors?

- Free resource to help homeowners and contractors participate in the program
- Independent third-party providing individual service and ongoing support
- Available via toll-free number and limited in-home advising visits
- Remove barriers and convert more leads
- Advisors are BPI-certified Building Analysts
- Clearinghouse for information on complementary energy and water efficiency programs



1-866-878-6008

Financing

- **Property Assessed Clean Energy (PACE) Financing**
 - PACE Financing is a voluntary means for local home and business owners to finance energy efficiency, water conservation, and renewable energy improvements to their properties
 - The up-front costs of the energy and water related improvements are financed and then repaid via a special voluntary assessment placed on the property
 - Repayments are made twice yearly on the property tax bill
 - Eligible improvements include those permanently affixed to the property

Financing

- PACE Benefits

- PACE assessments are attached to the property—not the individual (when the property is sold the assessment may stay with the property)
- Not considered personal debt
- Varied payback terms—long term payback allows for lower payment to be offset by energy savings
- Interest is tax-deductible

Financing

- There are many other financing products on the market; the Home Upgrade Advisors can help you identify the best options.
 - Conventional Cash Out Refinance
 - FHA 203K Renovation Loan
 - Energy Efficiency Mortgage
 - Traditional Line of Credit

Resources for Renters and Small Business Owners

- **California Youth Energy Services**
 - Available to everyone
 - Free home energy and water evaluation with free replacement of incandescent lights, free aerators, and more
- **SmartLights Program**
 - Free start-to-finish technical assistance and instant rebates for energy efficiency projects
 - Free no-obligation energy Assessment and report





Community Preference Survey

- Conceptual options - NOT a list of projects/policies ready to implement
- Ideas from workshops, technical experts, guidance documents, County staff
- Feedback from professionals and stakeholders
- Results guide Adaptation Strategy Report and LCPA
- Opportunities for ongoing involvement





Policy Questions for Entire Coastal Zone

- 1. Planning timeframes for construction standards in hazard zones should take into consideration the life expectancy of the structure or development being proposed.**
- 2. Require a sea level rise hazards analysis as part of a Coastal Development Permit for new projects on vacant land or for projects that expand the size of existing development.**



Policy Questions for Entire Coastal Zone

- 3. Allow waivers or seek a Categorical Exclusion for projects in coastal hazard areas, including structures in the 100-year floodplain, that meet certain standards**
- 4. Raise building height limits in coastal hazard areas to allow for adaptation to sea level rise.**
- 5. Encourage the creation of local self-funded assessment districts to manage common hazard risks.**
- 6. Establish a managed retreat program.**



Policy Questions for Entire Coastal Zone

- 7. Prioritize adaptation options that protect, enhance, and maximize protection of coastal resources and public access.**
- 8. Please provide any other suggestions for policy initiatives to address sea level rise in Marin County.**



Survey available at www.MarinSLR.org

STINSON BEACH

Please mark the **CONCEPTUAL** adaptation strategies you support. Feel free to write in additional comments. The numbers refer to locations on the community maps. *Entities in blue italics represent potential implementing agents.*

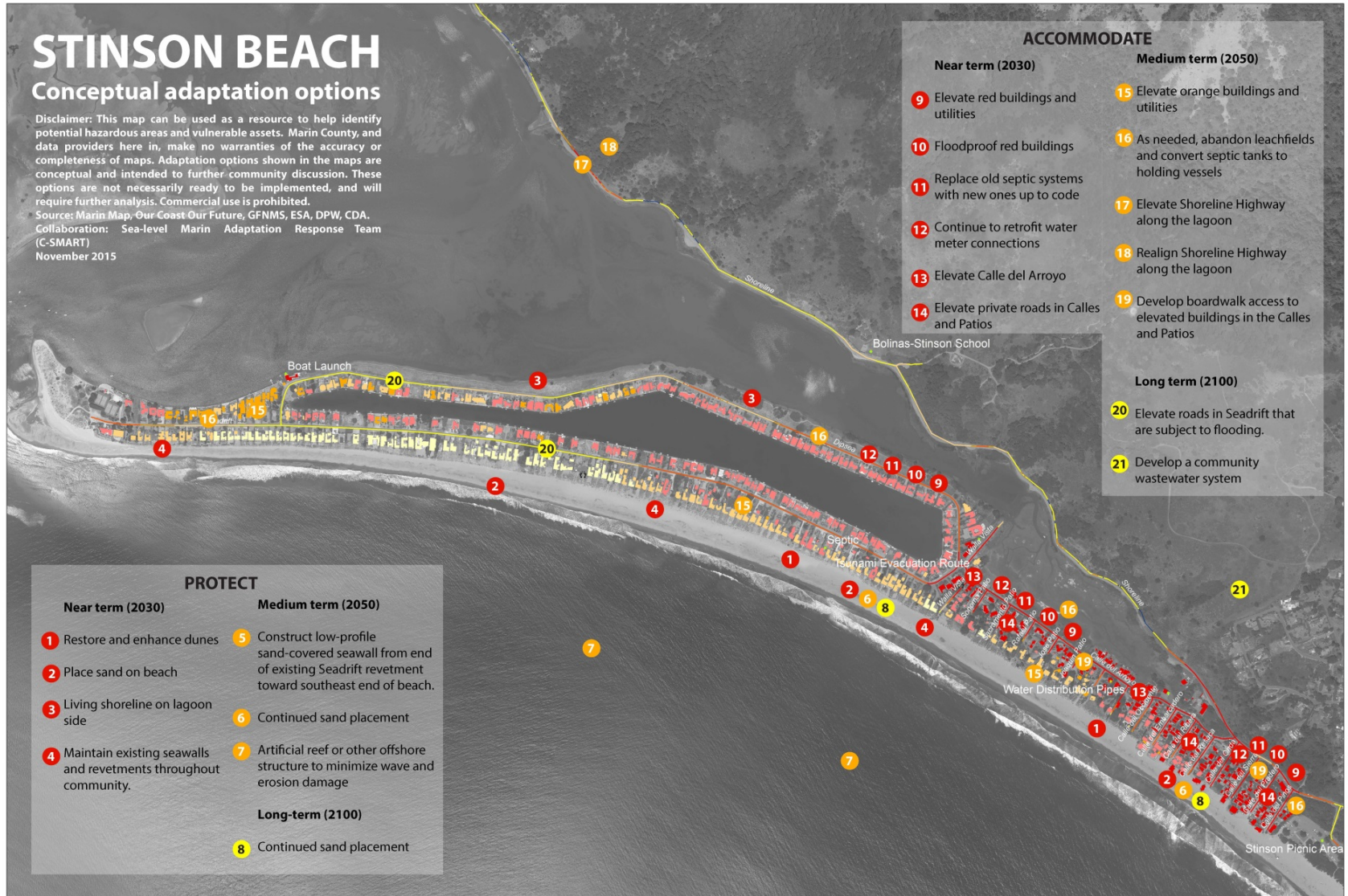
	Near term (2030)	Medium term (2050)	Long term (2100)
Protect	<input type="checkbox"/> 1) Restore and enhance dunes. <i>Local assessment district</i> <input type="checkbox"/> 2) Place sand on beaches. <i>Local assessment district</i> <input type="checkbox"/> 3) Enhance living shoreline on lagoon side for temporary flood protection. <i>Local assessment district</i> , <i>Government grants</i> <input type="checkbox"/> 4) Maintain existing seawalls and revetments throughout community. <i>Landowners</i> <input type="checkbox"/> 5)	<input type="checkbox"/> 6) Construct low-profile sand-covered seawall from end of existing Seadrift revetment toward southeast end of beach. <i>Local assessment district</i> <input type="checkbox"/> 7) Continue to place sand on beaches. <i>Local assessment district</i> <input type="checkbox"/> 8) Construct artificial reef or other offshore structure to minimize wave and erosion damage. <i>Local assessment district</i>	<input type="checkbox"/> 9) Continue to place sand on beaches. <i>Local assessment district</i>
Accommodate	<input type="checkbox"/> 10) Elevate red buildings impacted in the near-term (see p. 3 #2). <i>Landowners</i> <input type="checkbox"/> 11) Floodproof red buildings (see p.3 #2). <i>Landowners</i> <input type="checkbox"/> 12) Replace old septic systems with new ones. <i>Landowners</i> <input type="checkbox"/> 13) Continue to retrofit water meter connections. <i>Landowners</i> <input type="checkbox"/> 14) Elevate Calle del Arroyo. <i>County, local assessment district</i> <input type="checkbox"/> 15) Elevate private roads in Calles and Patios. <i>Local assessment district</i>	<input type="checkbox"/> 16) Elevate orange buildings and utilities (impacted in the medium-term). <i>Landowners</i> <input type="checkbox"/> 17) As needed, abandon leachfields and convert septic tanks to holding vessels. <i>Landowners</i> <input type="checkbox"/> 18) Elevate Shoreline Highway along Bolinas lagoon. <i>State</i> <input type="checkbox"/> 19) Realign Shoreline Highway along Bolinas lagoon. <i>State</i> <input type="checkbox"/> 20) Develop boardwalk access to elevated buildings in the Calles and Patios. <i>Local assessment district</i>	<input type="checkbox"/> 21) Elevate roads in Seadrift that are subject to flooding. <i>Local assessment district</i> <input type="checkbox"/> 22) Develop community wastewater system. <i>Local service providers, local assessment district</i>
Retreat	<ul style="list-style-type: none"> Enact policies to minimize risk and impacts of development in coastal hazard areas (see p. 3 #1, 3, 5). <i>County, State</i> Prohibit replacement of structures destroyed by disasters (see p.3 #4). <i>County, State</i> Encourage landowners to relocate upland (see p. 4 #7, 8). <i>County, Land trust</i> Relocate critical facilities such as fire station and/or emergency generator. <i>Local service providers, County</i> 	<ul style="list-style-type: none"> Relocate red buildings. <i>Landowners</i> Remove shoreline protective devices that limit inland migration of beach. <i>Landowners</i> Remove development that limits inland migration of beach. <i>Landowners</i> Realign section of Shoreline Hwy along lagoon (would require cutting into bluffs and stabilizing them). <i>State</i> 	<ul style="list-style-type: none"> Relocate orange buildings. <i>Landowners</i> Continue managed retreat program for affected assets. <i>County, State</i>
Other	<p><i>Write in other suggestions.</i></p>		



Community-Specific Adaptation Concepts

STINSON BEACH Conceptual adaptation options

Disclaimer: This map can be used as a resource to help identify potential hazardous areas and vulnerable assets. Marin County, and data providers here in, make no warranties of the accuracy or completeness of maps. Adaptation options shown in the maps are conceptual and intended to further community discussion. These options are not necessarily ready to be implemented, and will require further analysis. Commercial use is prohibited.
Source: Marin Map, Our Coast Our Future, GFNMS, ESA, DPW, CDA.
Collaboration: Sea-level Marin Adaptation Response Team (C-SMART)
November 2015



PROTECT

Near term (2030)

- 1 Restore and enhance dunes
- 2 Place sand on beach
- 3 Living shoreline on lagoon side
- 4 Maintain existing seawalls and revetments throughout community.

Medium term (2050)

- 5 Construct low-profile sand-covered seawall from end of existing Seadrift revetment toward southeast end of beach.
- 6 Continued sand placement
- 7 Artificial reef or other offshore structure to minimize wave and erosion damage

Long-term (2100)

- 8 Continued sand placement

ACCOMMODATE

Near term (2030)

- 9 Elevate red buildings and utilities
- 10 Floodproof red buildings
- 11 Replace old septic systems with new ones up to code
- 12 Continue to retrofit water meter connections
- 13 Elevate Calle del Arroyo
- 14 Elevate private roads in Calles and Patios

Medium term (2050)

- 15 Elevate orange buildings and utilities
- 16 As needed, abandon leachfields and convert septic tanks to holding vessels
- 17 Elevate Shoreline Highway along the lagoon
- 18 Realign Shoreline Highway along the lagoon
- 19 Develop boardwalk access to elevated buildings in the Calles and Patios

Long term (2100)

- 20 Elevate roads in Seadrift that are subject to flooding.
- 21 Develop a community wastewater system

Exposed Buildings

Near-term

- @ 10 in. & annual storm
- @ 10 in. & 20-year storm

Medium-term

- @ 20 in. & 20-year storm

Long-term

- @ 40 in. & 100-year storm
- @ 80 in. & 100-year storm

Exposed Roads

Near-term

- @ 10 in. & annual storm
- @ 10 in. & 20-year storm

Medium-term

- @ 20 in. & 20-year storm

Long-term

- @ 40 in. & 100-year storm
- @ 80 in. & 100-year storm

LEGEND

