

Ventura County Resource Management Agency  
Planning Division



# VC RESILIENT COASTAL ADAPTATION PROJECT

Ventura County Planning Division  
PL17-0147

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Planning Commission Work Session -- March 7, 2019

# WHY PLAN FOR SEA LEVEL RISE NOW?



- Become sea level wise!
  - Preparation now may be less costly than waiting
  - The development “lifetime” of structures can exceed 75+ years
- Existing coastal hazards already pose a threat
  - Coastal erosion, high tides, and coastal storm events
  - Sea level rise adds increased wave heights
- Support long-term coastal resiliency
  - State guidance; grant funding

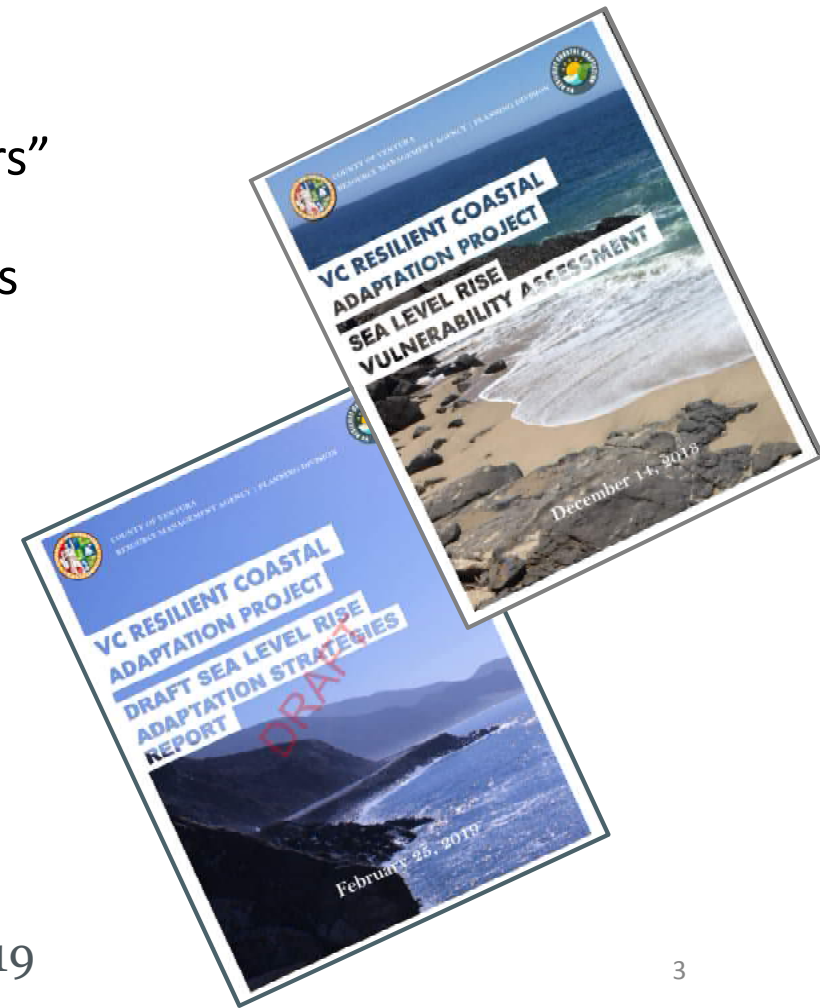


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# VC RESILIENT WORK COMPLETED



- Vulnerability Assessment
  - GIS mapping of vulnerability of 13 resource “sectors” with sea level rise hazards
  - Includes science, State guidance, economic analysis
- **Draft** Adaptation Strategies Report
  - Summary and additional qualitative analysis of vulnerabilities
  - Toolbox of possible strategies
  - Hypothetical case study adaptation pathways
- Public Workshops in April 2018
- Today’s Work Session



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# VC RESILIENT HASN'T COVERED...



- No proposed changes to existing policies, programs, or regulations
- Does not affect current coastal permitting process
- Informational only, no formal proposals
- Does not include FEMA flood map revisions
- Does not represent a coordinated approach among all agencies and stakeholders
- Does not provide solutions to the myriad sea level rise issues



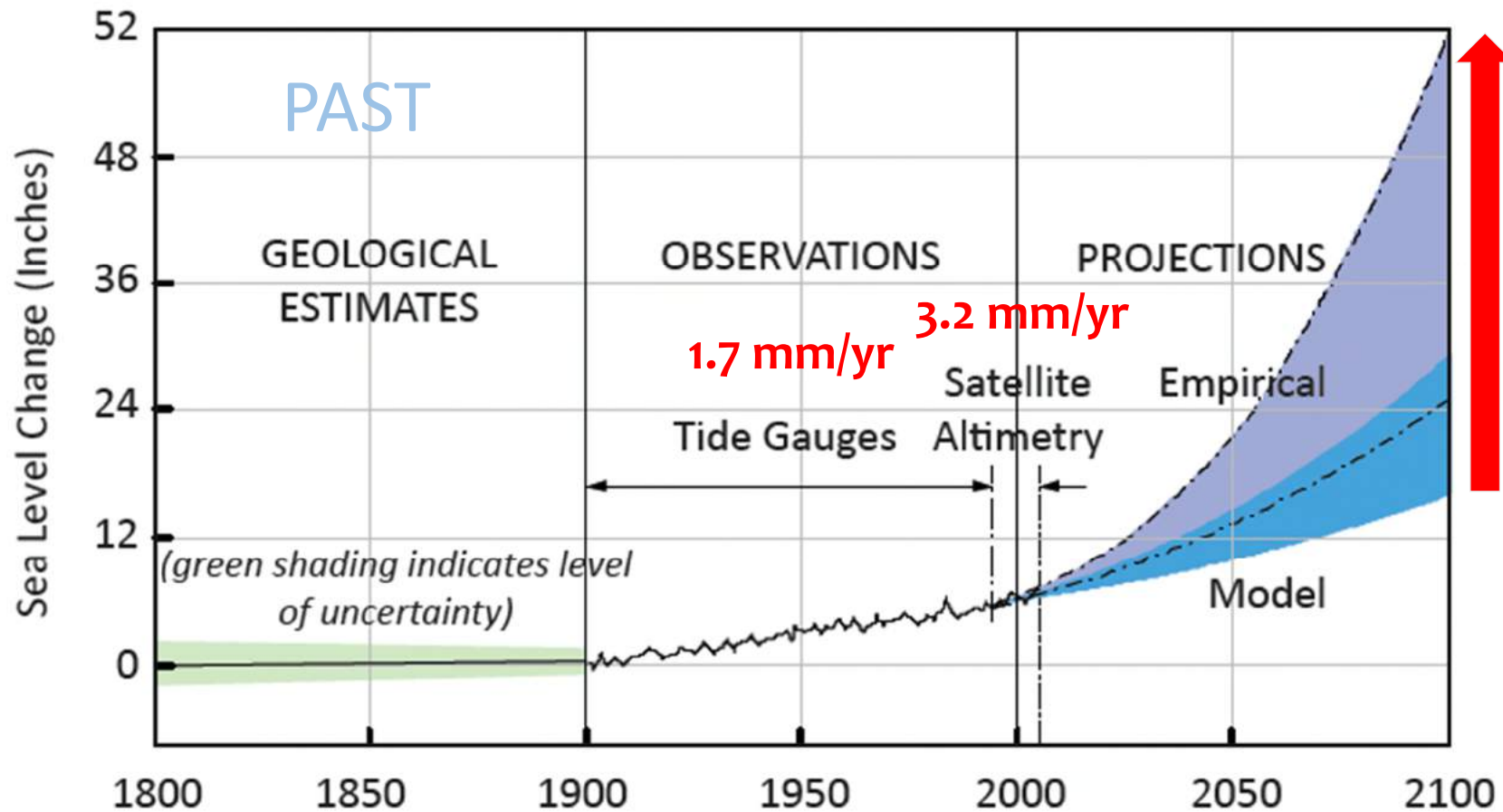
# WHAT IS SEA LEVEL RISE?



# SEA LEVEL RISE PROJECTIONS



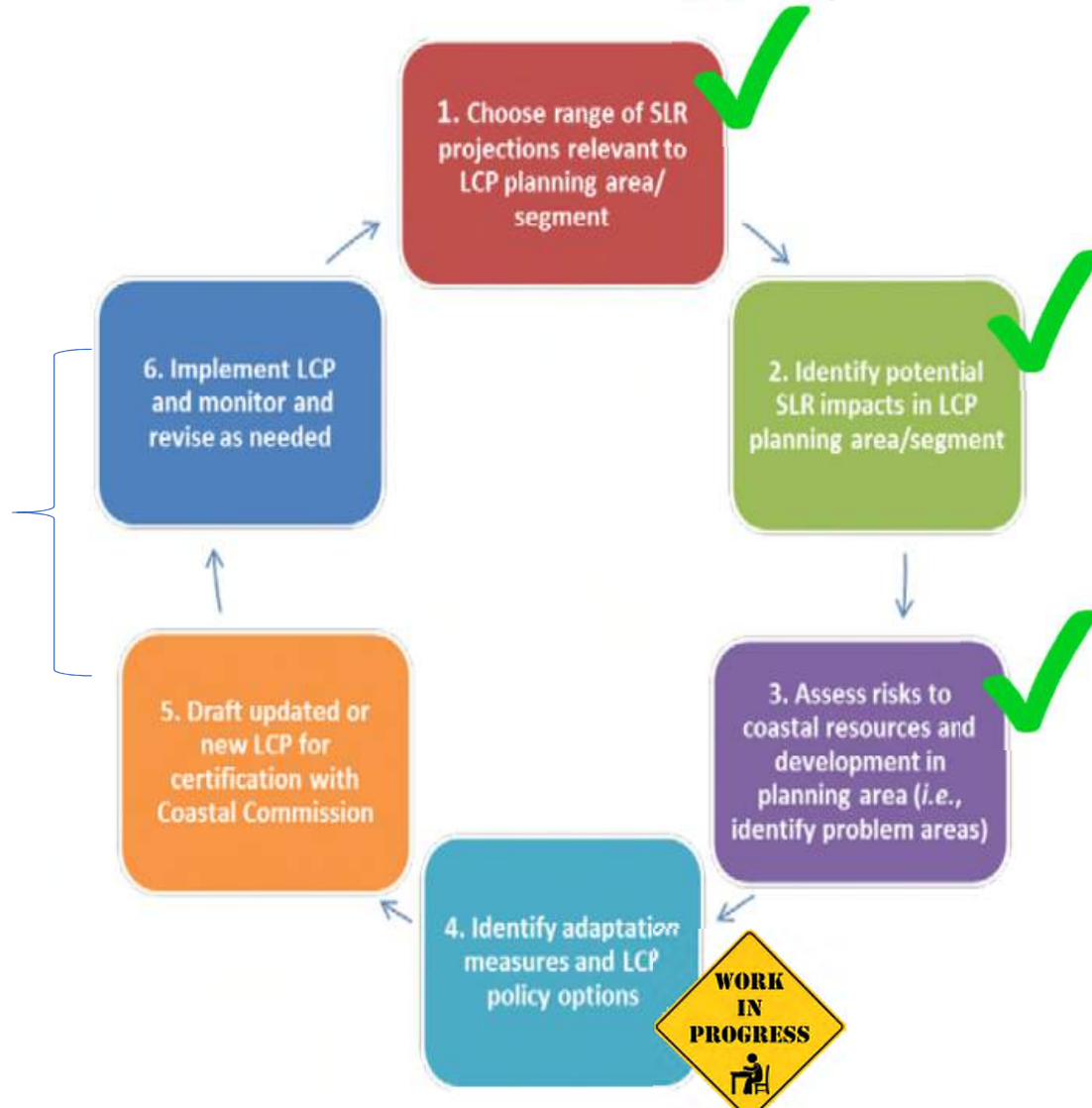
The rate of global sea-level rise was measured from tide gauges historically and satellites since 1993



# SEA LEVEL RISE PLANNING



Certification and implementation not included under current grant



# SELECTED SEA LEVEL RISE PROJECTIONS



EXISTING  
=1.51  
mm/year

8"  
(2030-ish)

16"  
(2060-ish)

58"  
(2100-ish)

Measured at Santa  
Monica tide gauge

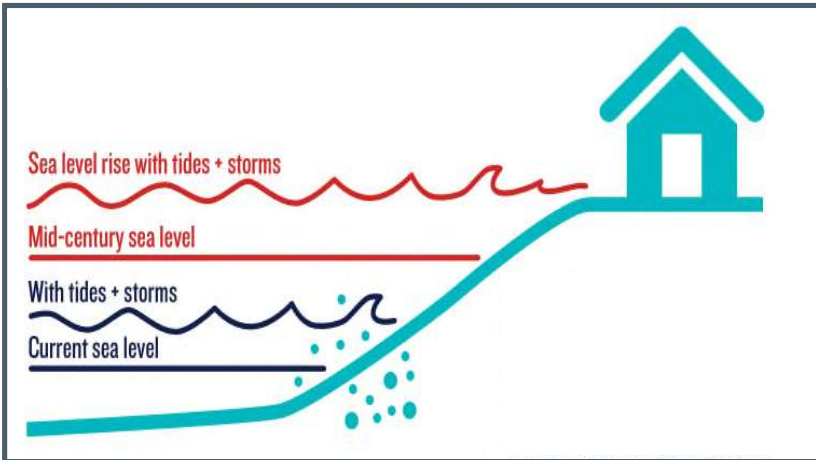
There is more certainty about how much sea level rise will occur, than  
by when....

	Low	Medium	High
Ranges of Projections in Coastal Resilience Model	2.3"	5.2"	8.0"
	7.4"	16.1"	25.3"
	17.1"	36.5"	58.1" <sub>8</sub>





# WHAT IS SEA LEVEL RISE?



Coastal Erosion



Wave Flooding



Tidal Inundation



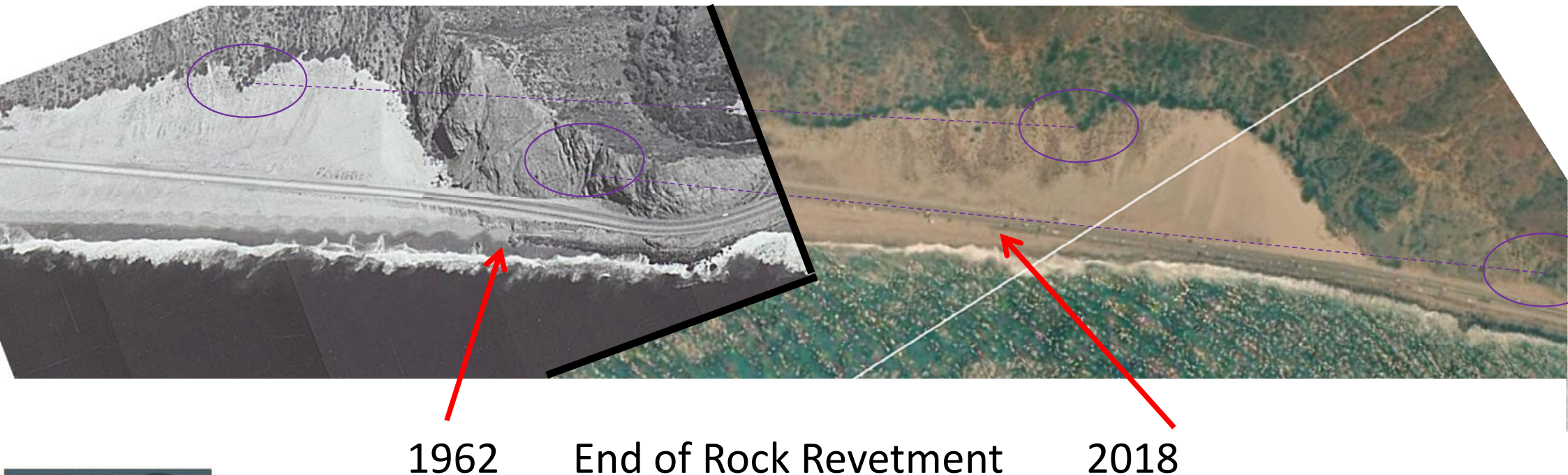
Fluvial Flooding



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# COASTAL EROSION

Coastal Erosion at Thornhill-Broome Beach has resulted in approximately 0.4 miles of additional rock revetment over 56 years.



1962

End of Rock Revetment

2018



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# VULNERABILITY ASSESSMENT



Land Use



Agriculture



Wastewater



Storm Water



Water Supply



Public Access



Roads and  
Parking



Public Transit



Oil and Gas



Hazardous  
Materials

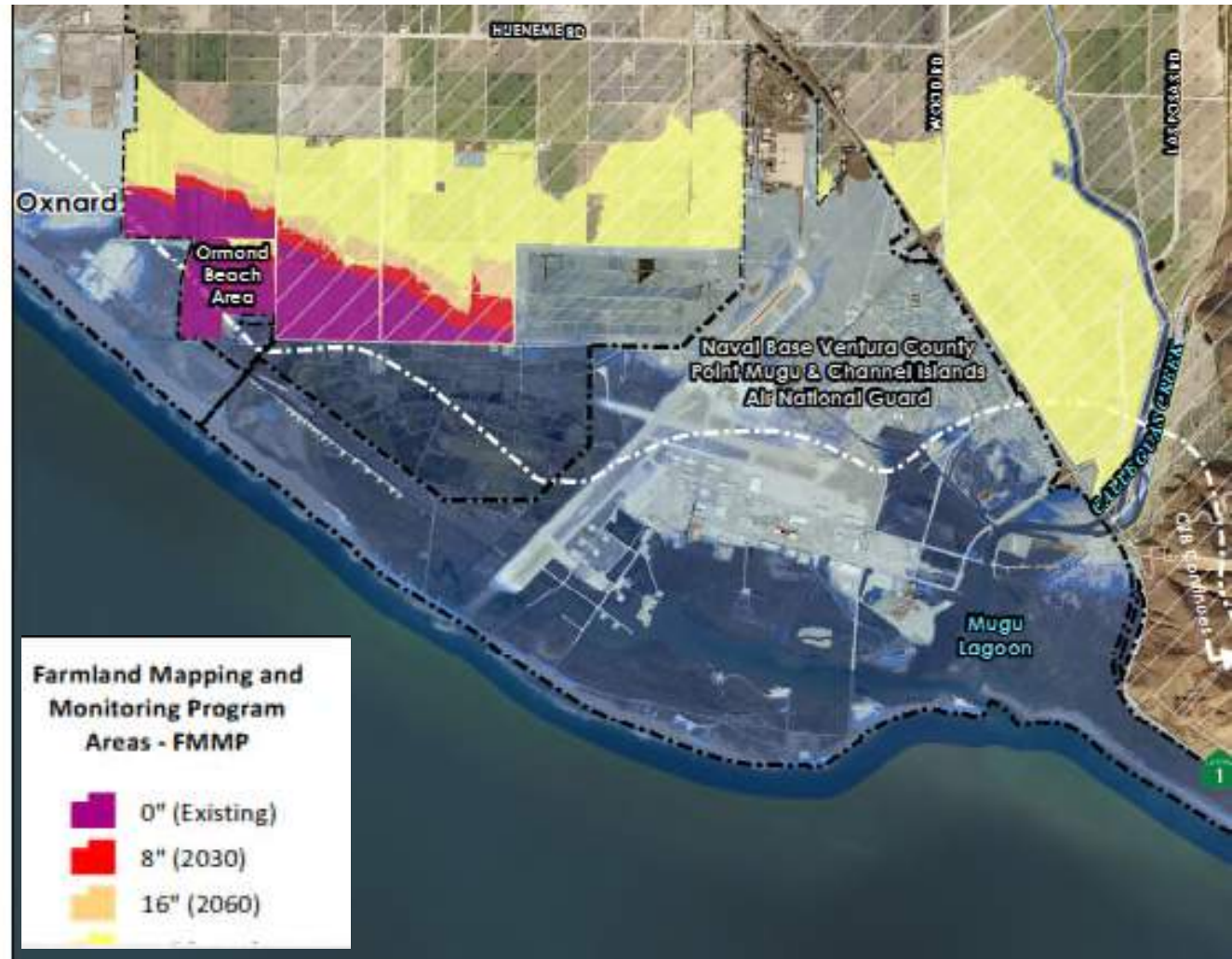
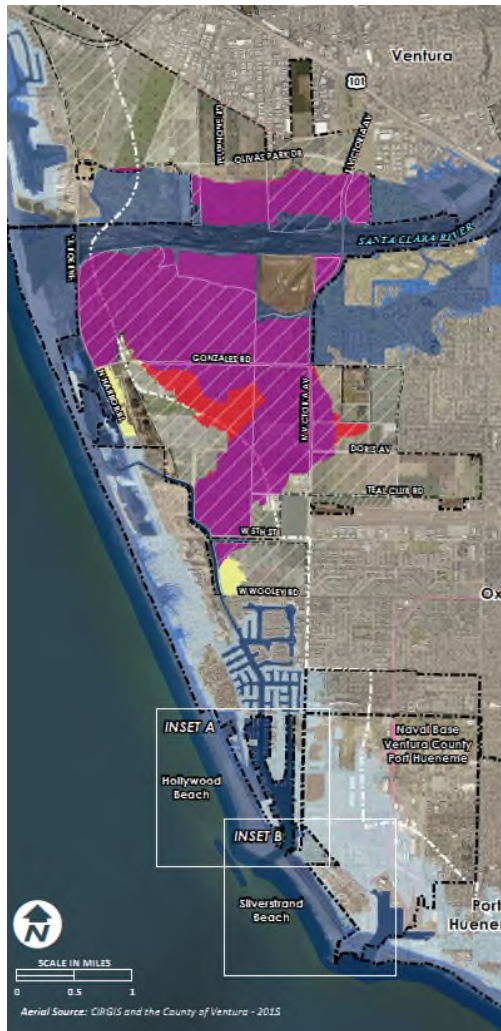


Critical Services



Natural  
Resources

# VULNERABILITY ASSESSMENT



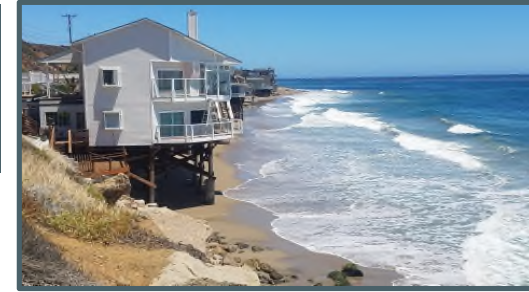
# ADAPTATION STRATEGIES



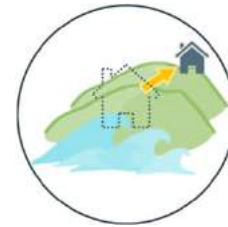
"Failure to plan is planning to fail."  
- Ben Franklin

Wait and See

Accommodate



Hybrid



Protect

Inland Relocation



# ADAPTATION APPROACHES



Natural: Existing features that form and change over time with the environment

Nature-Based: Engineered systems that mimic natural approaches

Structural: Engineered systems designed to reduce flooding and erosion

Regulatory: Includes policies and development standards



# ADAPTATION: PROTECT



**Armor Seawalls**



**Armor Rock Revetments**



**Sand Dunes and Berms**

# ADAPTATION: ACCOMMODATE



**Homes on Pilings**



**Agricultural Conservation Easements**



**Design to Accommodate Flooding**



# ADAPTATION: MANAGED RETREAT\*



**\*Focus on public facilities and undeveloped lands**

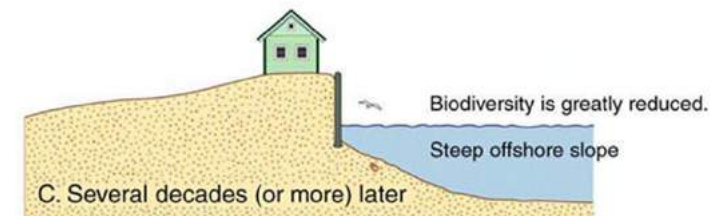
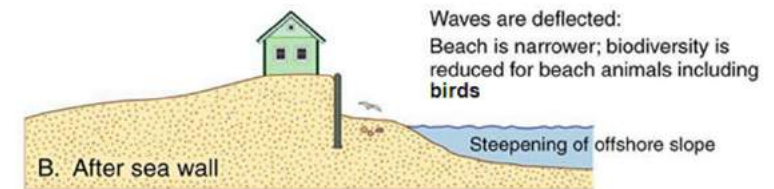
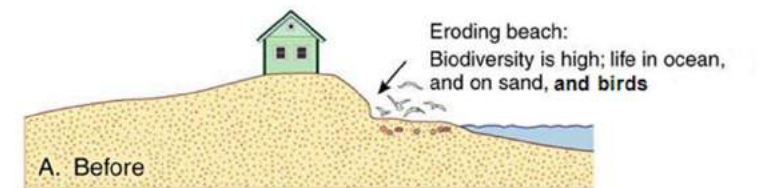
# ADAPTATION - TRADEOFFS



- Construction Costs
- Escalating Maintenance Costs
- Ecology
- Recreation
- Views
- Aesthetics



## Armor impacts beaches and views



# ADAPTATION - TRIGGERS



- By sea level rise elevation
- By rate of sea level rise
- By time
- By exposure
- By damages
- By beach width



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# VULNERABILITY AND ADAPTATION RESULTS



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# POSITIVE FINDINGS



With up to 5 feet of sea level rise:

- No airport, water/sewer plants, power plants are vulnerable within County's jurisdiction
- No critical facilities such as fire, police stations, or hospitals at risk of tidal inundation
- No coastal erosion of active oil and gas facilities
- Inland ecosystems such as back dunes and rivers/streams likely to persist
- Most of the coastal armor is predicted to withstand up to 5 feet of sea level rise

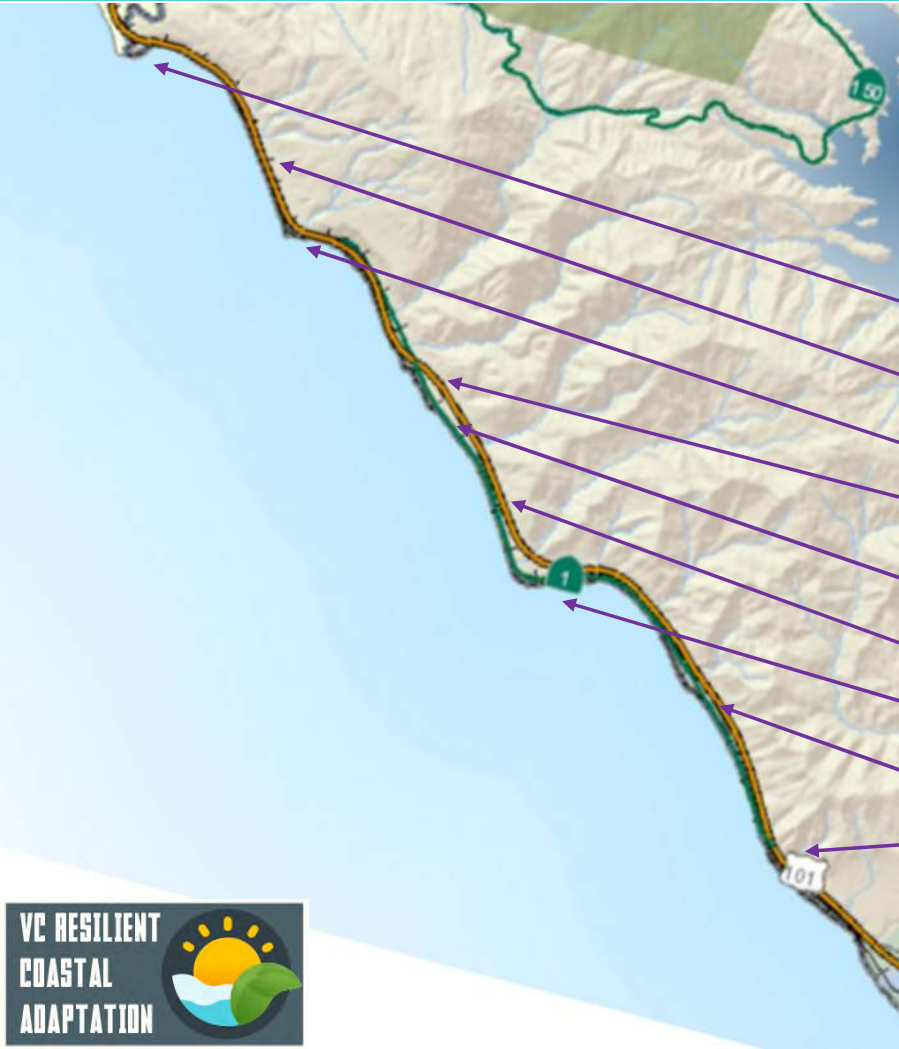


# NORTH COAST VULNERABILITIES



✓ = Partially Exposed    ✗ = Severely Exposed

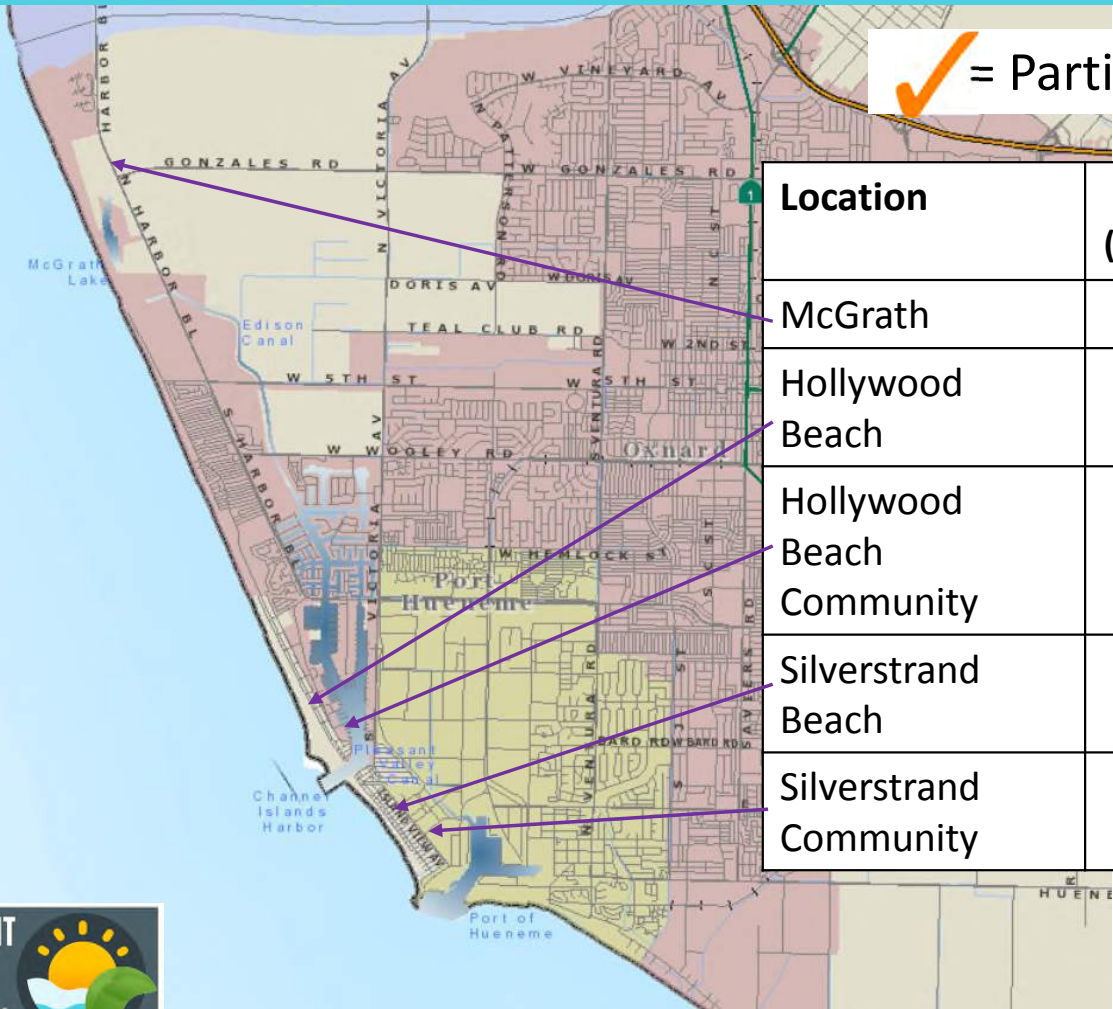
Location	8" (2030)	16" (2060)	16" to 5' (2060-2100)	5' (2100)	1% Storm
Rincon Point			✓	✗	✗
La Conchita					✓
Mussel Shoals				✓	✓
Seacliff			✓	✗	✗
Hobson Park			✗	✗	✗
Rincon Pkwy.				✓	✗
Faria				✓	✗
Solimar				✓	✗
Emma Wood		✓	✓	✓	✗
Narrow Beaches	✗	✗	✗	✗	✗



# CENTRAL COAST VULNERABILITIES



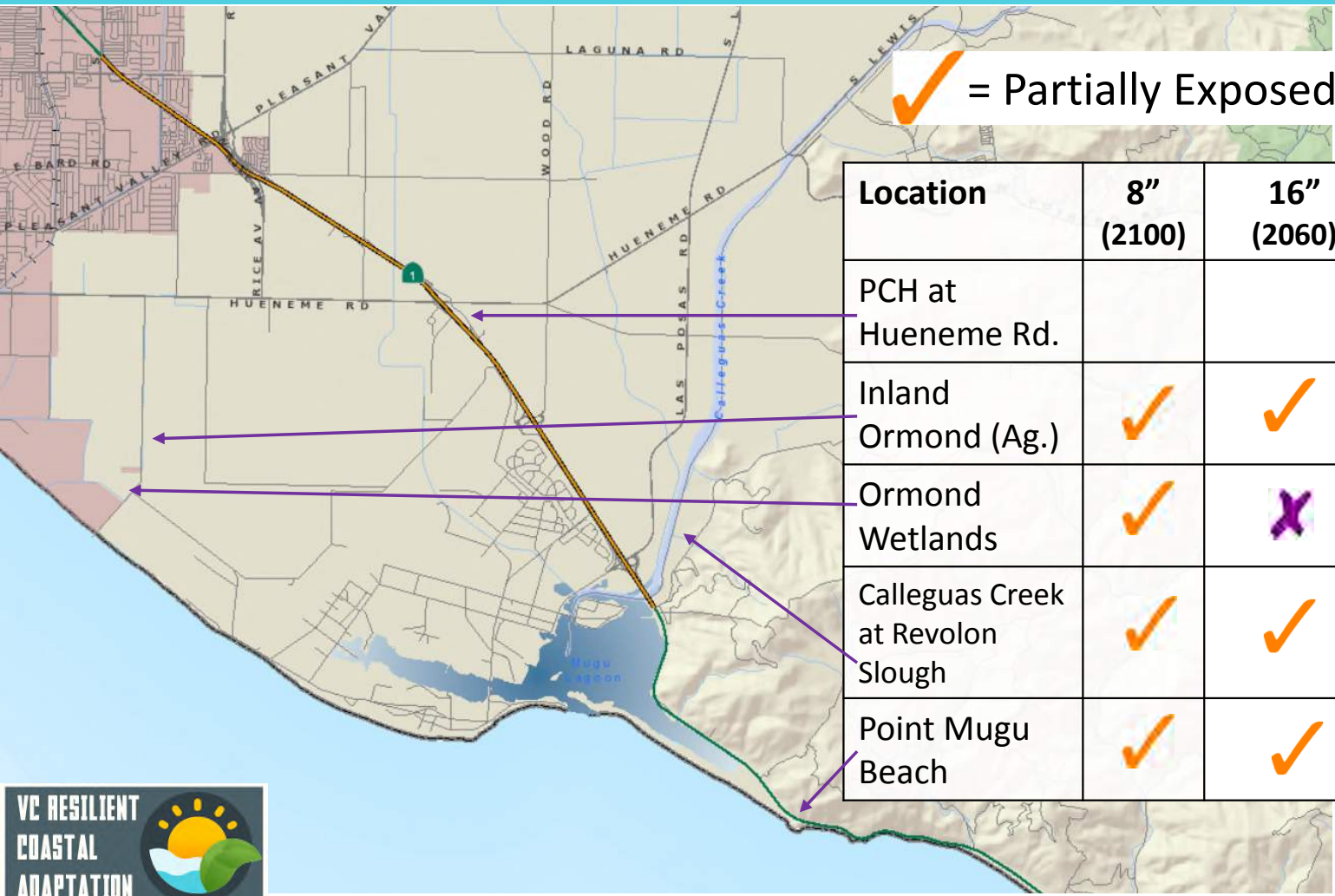
✓ = Partially Exposed    ✗ = Severely Exposed



Location	8" (2030)	16" (2060)	16" to 5' (2060-2100)	5' (2100)	1% Storm
McGrath					✗
Hollywood Beach	✓	✓	✗	✗	✗
Hollywood Beach Community			✓	✗	✗
Silverstrand Beach	✓	✓	✗	✗	✗
Silverstrand Community		✓	✗	✗	✗



# SOUTH COAST VULNERABILITIES (1 of 2)



✓ = Partially Exposed      ✗ = Severely Exposed

Location	8" (2100)	16" (2060)	16" to 5' (2060-2100)	5' (2100)	1% Storm
PCH at Huene Rd.					✓
Inland Ormond (Ag.)	✓	✓	✗	✗	✗
Ormond Wetlands	✓	✗	✗	✗	✗
Calleguas Creek at Revolon Slough	✓	✓	✓	✓	✗
Point Mugu Beach	✓	✓	✓	✓	✗





# SOUTH COAST VULNERABILITIES (2 of 2)



✓ = Partially Exposed    ✗ = Severely Exposed



Location	8" (2030)	16" (2060)	16" to 5' (2060-2100)	5' (2100)	1% Storm
Thornhill-Broome Beach	✓	✓	✗	✗	✗
Sycamore Cove Beach	✓	✓	✗	✗	✗
Residences on Pilings*	✓	✓	✓	✓	✗
Yerba Buena Beach	✓	✗	✗	✗	✗
Residences with Armor					✗
County-Line Bluffs *	✗	✗	✗	✗	✗
Narrow Beaches	✗	✗	✗	✗	✗

\*Further analysis needed to determine extent of exposure.



# ADAPTATION STRATEGIES: COUNTYWIDE



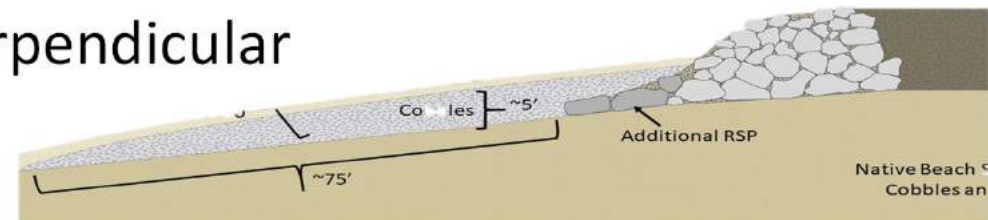
- Coastal Hazard Overlay Zone
- Real Estate Disclosures
- Standards to Elevate New Development
- Interjurisdictional Conservation Planning for Vulnerable Focal Species
- Adaptive Management Planning for Sensitive Habitats
- Voluntary Managed Retreat: Purchase with Lease Back, Easements
- Regulatory Mechanisms: Buffers, Repetitive Loss, Mitigation
- Sediment Management
- Opportunistic Sediment Placement
- Bridges, Roads, and other Major Infrastructure Design



# ADAPTATION STRATEGIES: NORTH AND SOUTH COAST



- Includes Countywide Strategies Listed Above
- Continued Use of Armor
- Standards for Bluff Setbacks
- Continued Use of Pilings
- Sand Retention with Non-Permanent Perpendicular Cross-Shore Features
- Sediment Bypassing Around Point Mugu
- Horizontal Levees (Ormond Beach and Revolon Slough/Calleguas Creek areas)



# ADAPTATION STRATEGIES: CENTRAL COAST



- Includes Countywide Strategies Listed Above
- Re-Establish Native Coastal Dune Habitat
- Dredge Sediment for Beach
- Storm Drain Improvements for Streets at Hollywood Beach and Silverstrand Communities

Map of Potential “Groundwater Daylighting” at Silverstrand



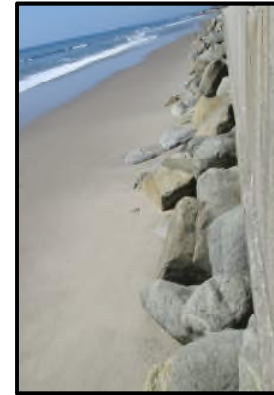
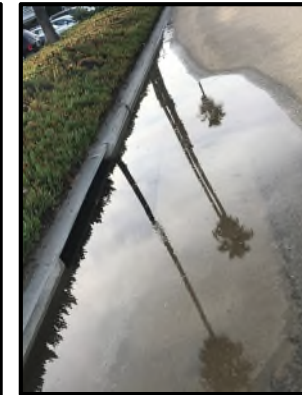
# HIGH PRIORITY PUBLIC-RELATED USES



- Sand retention on narrow beaches
- Dune restoration and drainage at Hollywood Beach sand trap
- Flood-proofing at Silverstrand near Hobie Beach (w/Harbor Dept. and City of Oxnard)
- Accommodation or protection at inland Ormond Beach, Calleguas Creek and Revolon Slough
- Accommodation and potential relocation of Campsite at Thornhill-Broome Beach
- New bridge designs: PCH at Sycamore Cove, and Harbor Boulevard at Santa Clara River



# HIGH PRIORITY PUBLIC-RELATED USES



# WHAT HAVE OTHERS DONE?



**Managed Retreat:** City of Ventura, City of Pacifica, Goleta, City of Monterey

**Dune Restoration:** City of Ventura, City of Santa Monica, Humboldt County, Encinitas, US Navy at Point Mugu

**Beach Nourishment:** Port Hueneme, Los Angeles, Imperial Beach, many areas with harbor dredging practices

**Horizontal Levees:** San Francisco Bay (hasn't been used on CA coast)

**LCP Amendments:** many underway, but few have been certified—Marin County, City of Del Mar

**Regulatory Approach:** County of Ventura and Caltrans include sea level rise projections in discretionary permit technical studies and infrastructure design.



# ADAPTATION PATHWAY EXAMPLE : HOLLYWOOD BEACH



## Before year 2030 (8''):

- Conduct dune restoration near the Channel Islands Harbor jetty
- Improve drainage at Ocean Drive, inland of the dunes
- Begin requiring new development to be designed to accommodate flooding

## Between years 2030 (8'') and 2060 (16''):

- If dune restoration is successful, extend along more shoreline, possibly in coordination with City of Oxnard
- Plan stormwater system improvements for local streets

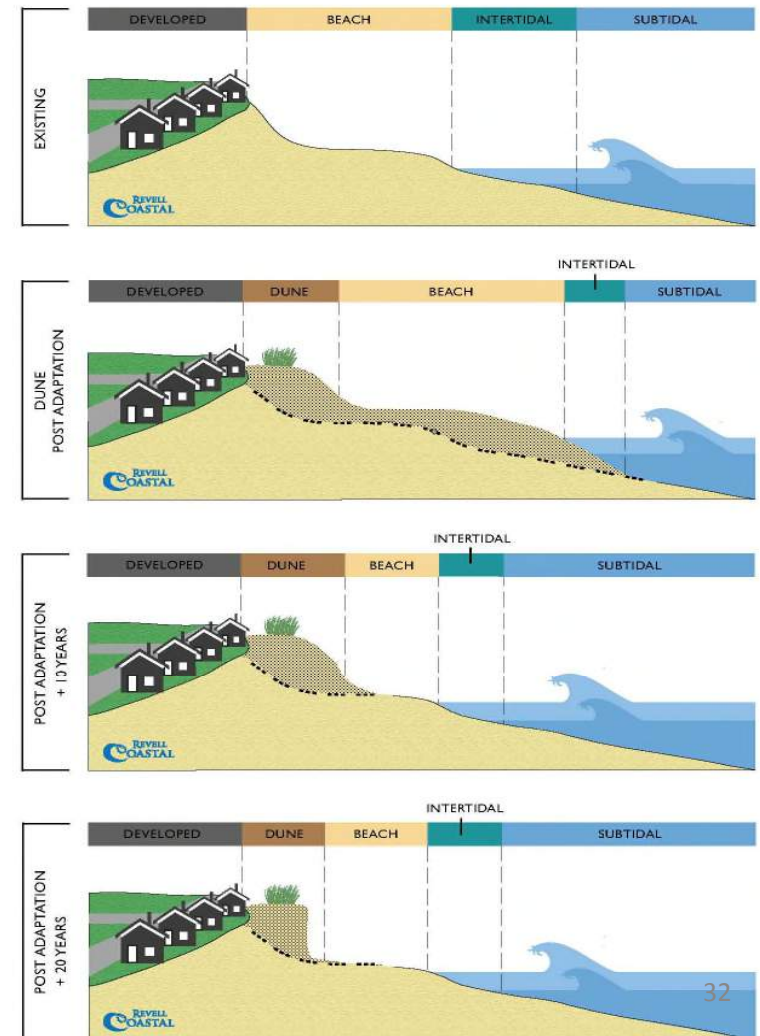
## Between years 2060 (16'') and 2090 (or sooner if the dunes are eroded):

- Replace the restored dunes with cobble berm-based dunes
- Add storm drain system with pumps
- Implement Harbor Improvements

## By approximately 2100 (5'):

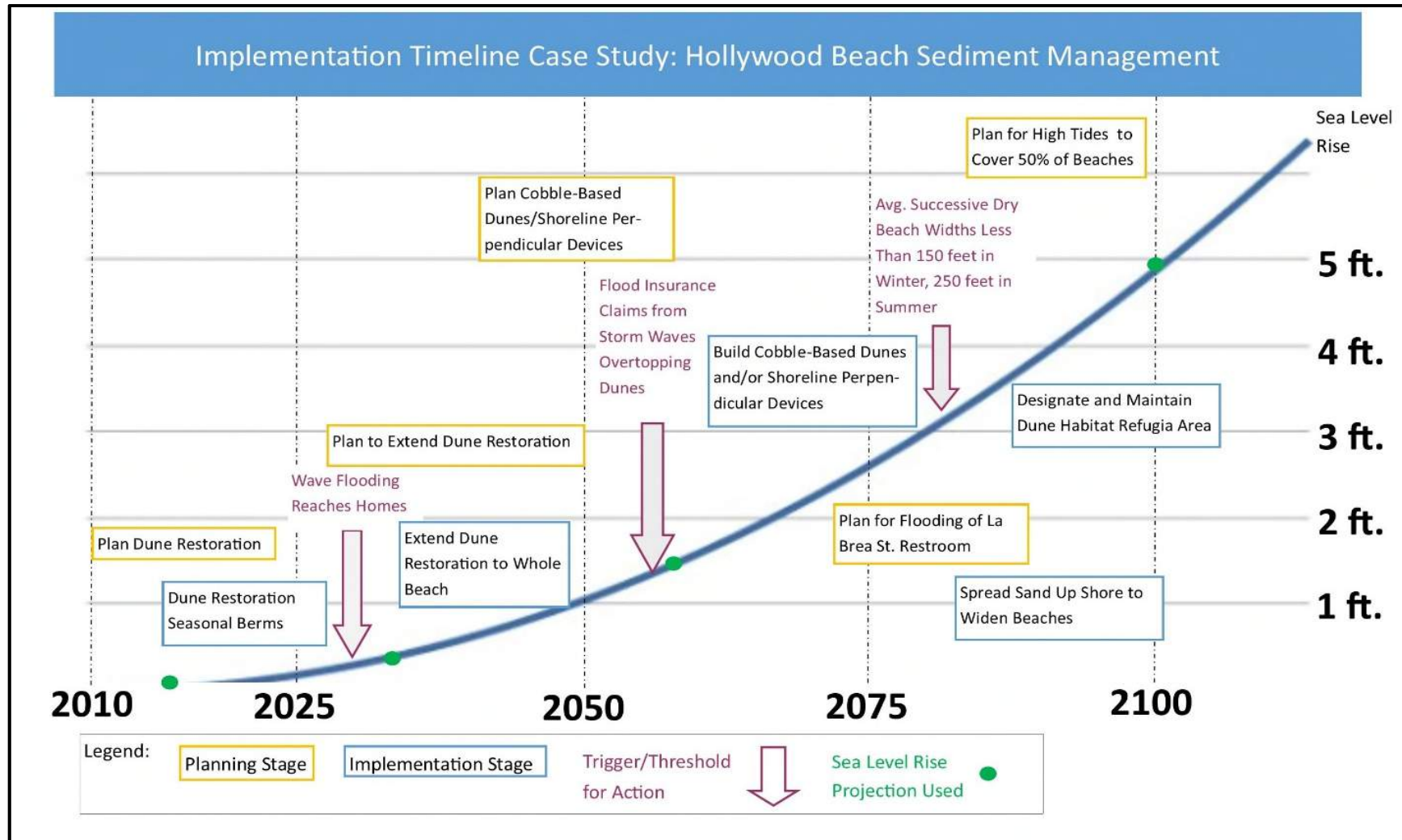
- If erosion continues, review dredging practices
- Install perpendicular structures to retain sand, such as groins or cobble-berms

## DUNE





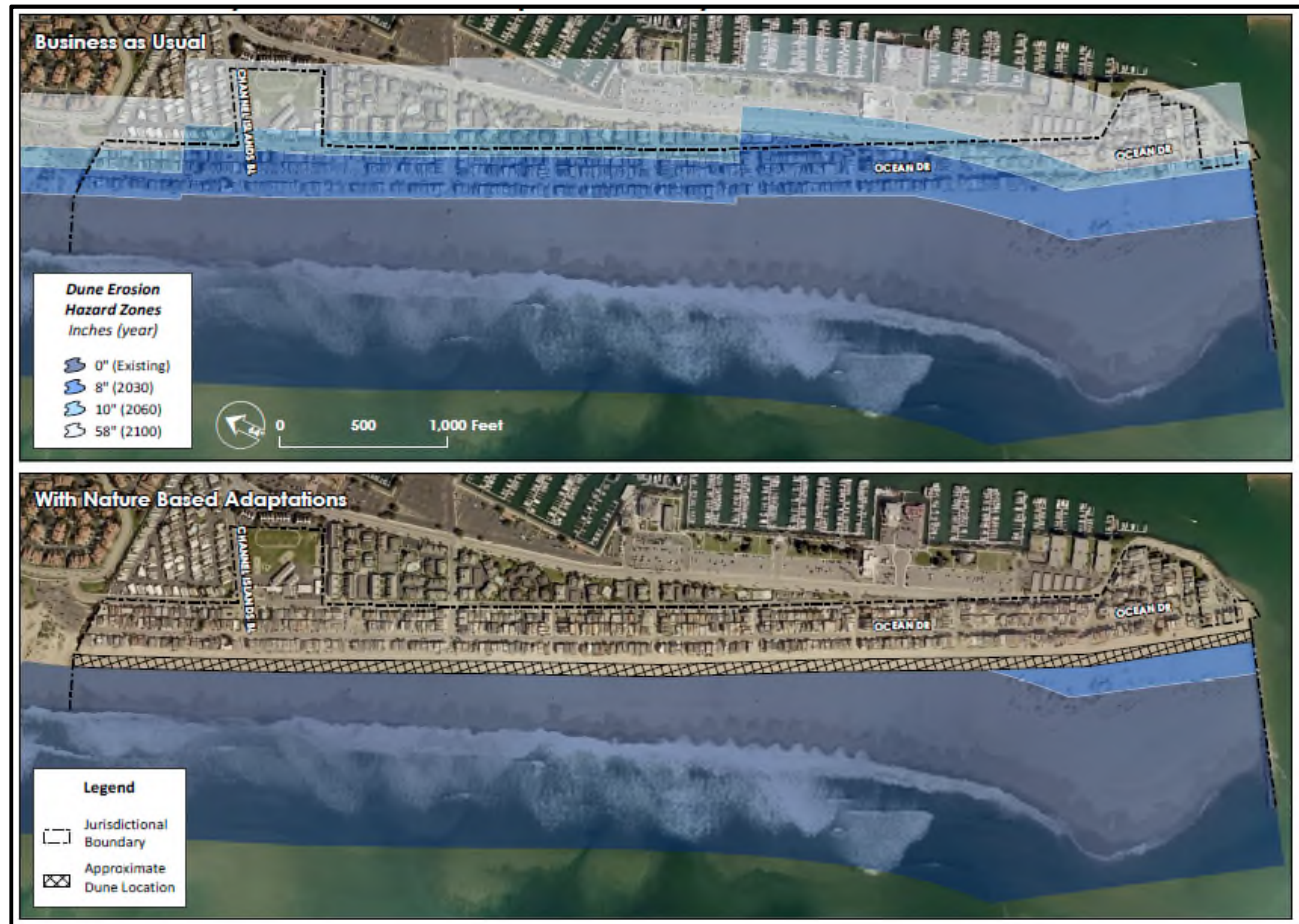
# ADAPTATION PATHWAY EXAMPLE : HOLLYWOOD BEACH



# ECONOMIC ANALYSIS OF DUNES AT HOLLYWOOD BEACH



- \$2.1 to \$25.7 million to build and maintain dunes along Hollywood Beach for about 20 years
- \$41 to \$207 million in flood damages avoided
- \$368 to \$712 million in losses from erosion avoided
- Doesn't include storm clean-up costs



# ADAPTATION PATHWAY EXAMPLE: RINCON PARKWAY, HOBSON AND FARIA PARKS



## Before year 2030 (8''):

- Coordinate with GSA and Caltrans to construct pilot projects such as
  - cobble-based groins and
  - small-footprint seawall
- Supplement with beach nourishment as feasible

## Between 2030 (8'') and 2060 (16''):

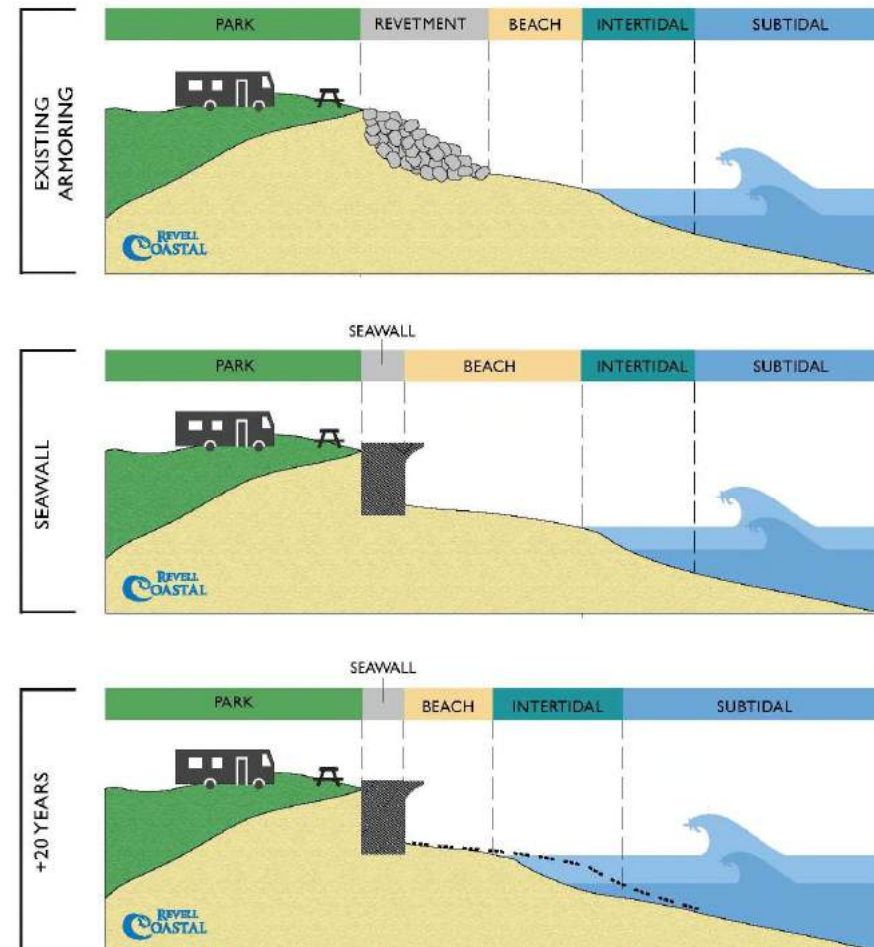
- Develop more sophisticated beach nourishment programs
- Install permanent rock groins if cobble-based groins underperform
- Plan alternatives to rock revetments, such as curved seawalls that have smaller structural footprints
- Coordinate with Caltrans regarding long-term options for Old Coast Highway

## Between years 2060 (16'') and 2090:

- If pilot projects perform well, extend to other areas

## By approximately 2100 (5'):

- Either acquire access to inland areas for relocation of recreational facilities, or
- If armor is selected, then a well-planned design should include public access and recreation improvements



# DISCUSSION TOPIC #1



## **Should the County Retreat or Protect Public Facilities?**

Use sediment retention and beach nourishment through about 8 to 16 inches of sea level rise, but then more difficult decisions are needed...

- Hard protection would maintain most facilities for up to about 5 feet of sea level rise, but at the expense of beach loss
- Relocation of public facilities may be feasible in a few areas on the South Coast (will depend on decisions by State Parks)
- Fewer retreat options for public facilities on the North Coast, and likely to cause additional exposure of headlands





# DISCUSSION TOPIC #2

## **What Would be the Best Adaptation Planning Process?**

This phase of VC Resilient provides some initial information, and will generate some possible Local Coastal Program amendments. Moving forward, should the County :

- Gather technical experts to refine and prioritize adaptation strategies?
- Focus on public assets under County's Local Coastal Program and County-owned facilities?
- Further coordination with broad array of stakeholders and other agencies to find a regional approach to sea level rise?
- Other?



# DISCUSSION TOPIC #3



## What should the County start monitoring, counting, and measuring for sea level rise planning?

Adaptation planning can include storm damages or other triggers such as those listed below. Some are easier to monitor than others. Which adaptation pathway triggers seem best?

Options include:

Storm Waves Flood/Damage Assets	Flood Insurance Claims Exceed a Certain Amount	Frequency of Closures
Tide Gauge Data	Emergency Permit Requests	Decreasing Average Beach Widths



# FEEDBACK AND QUESTIONS?



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