

# Sea Level Change: How do you integrate sea level rise into your plans?

May 8, 2020

APA Hazard Mitigation and Disaster Recovery Division

Matt Campo, Senior Research Specialist, Rutgers

Nicole Faghin, Coastal Management Specialist

Washington Sea Grant



RUTGERS

Edward J. Bloustein School  
of Planning and Public Policy



Nicole Faghin  
Washington Sea Grant



Matt Campo  
Rutgers University



**RUTGERS**

Edward J. Bloustein School  
of Planning and Public Policy

The background of the slide is a grayscale photograph of a tide gauge in the ocean. The gauge is a vertical cylindrical structure with a scale on its side, showing numbers from 04 to 09. The water surface is slightly rippled, and the gauge is reflected in the water below. The overall tone is muted and professional.

# An introduction

Nicole Faghin, Washington Sea Grant

# What we covered in the first webinar

Components of sea level change

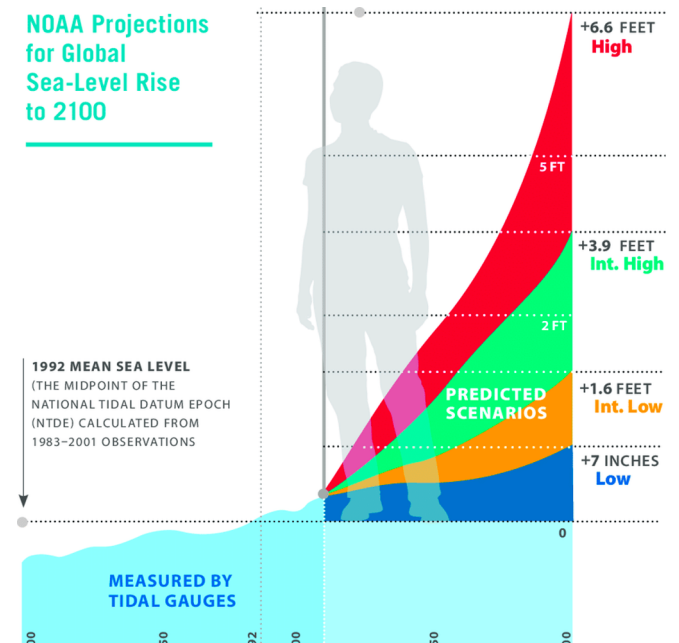
Scenario vs Probabilistic models

Example from Washington State

Tools

Link for our first webinar:

<https://www.youtube.com/watch?v=qpFbcf5Mgpw&feature=youtu.be>

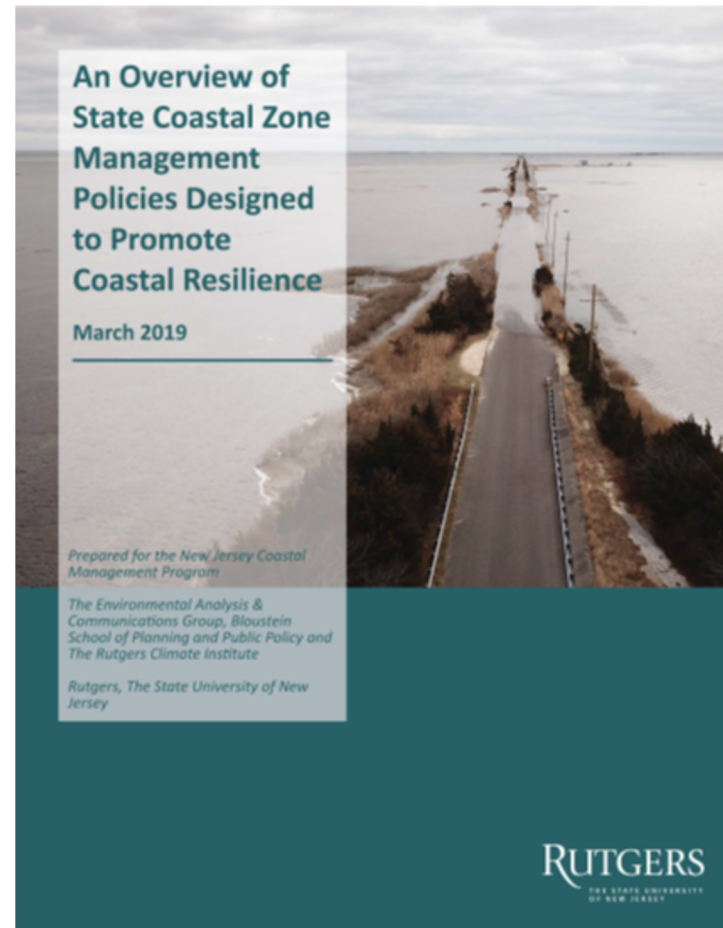


# Overview of how to incorporate SLR into planning documents

Matt Campo, Rutgers University

# Overview

- Lead-up time to official plans and policy
- Policy approaches and authorities vary
  - Planning, Emergency Management, etc.
  - State / Local
- Best Available Science
  - Consultative process to establish
  - Enactment using uncertainty principles
- Partnerships
  - Funding
  - Capacity



Herb, J, M. Kaplan, M. Campo, S. Kennedy, A. Wainwright, and H. Berman. 2019. An Overview of State Coastal Zone Management Policies Designed to Promote Coastal Resilience. Prepared for the New Jersey Department of Environmental Protection. New Brunswick, NJ: The Environmental Analysis & Communications Group, Rutgers University Bloustein School of Planning and Public Policy and Rutgers Climate Institute. DOI: <https://doi.org/doi:10.7282/t3-p3mx-bs83>

The background of the slide is a grayscale photograph of a beach. In the center, a tide gauge is partially submerged in the water. The gauge has a vertical scale with numbers 06, 07, 08, and 09 visible. The water is rippled, and the beach is visible in the foreground and background.

# **Introduction of our guest speakers**

Katie McKain, Charleston, South Carolina

Bobby Tajan, Virginia Beach, Virginia

Liz Bar-El, Santa Monica, California



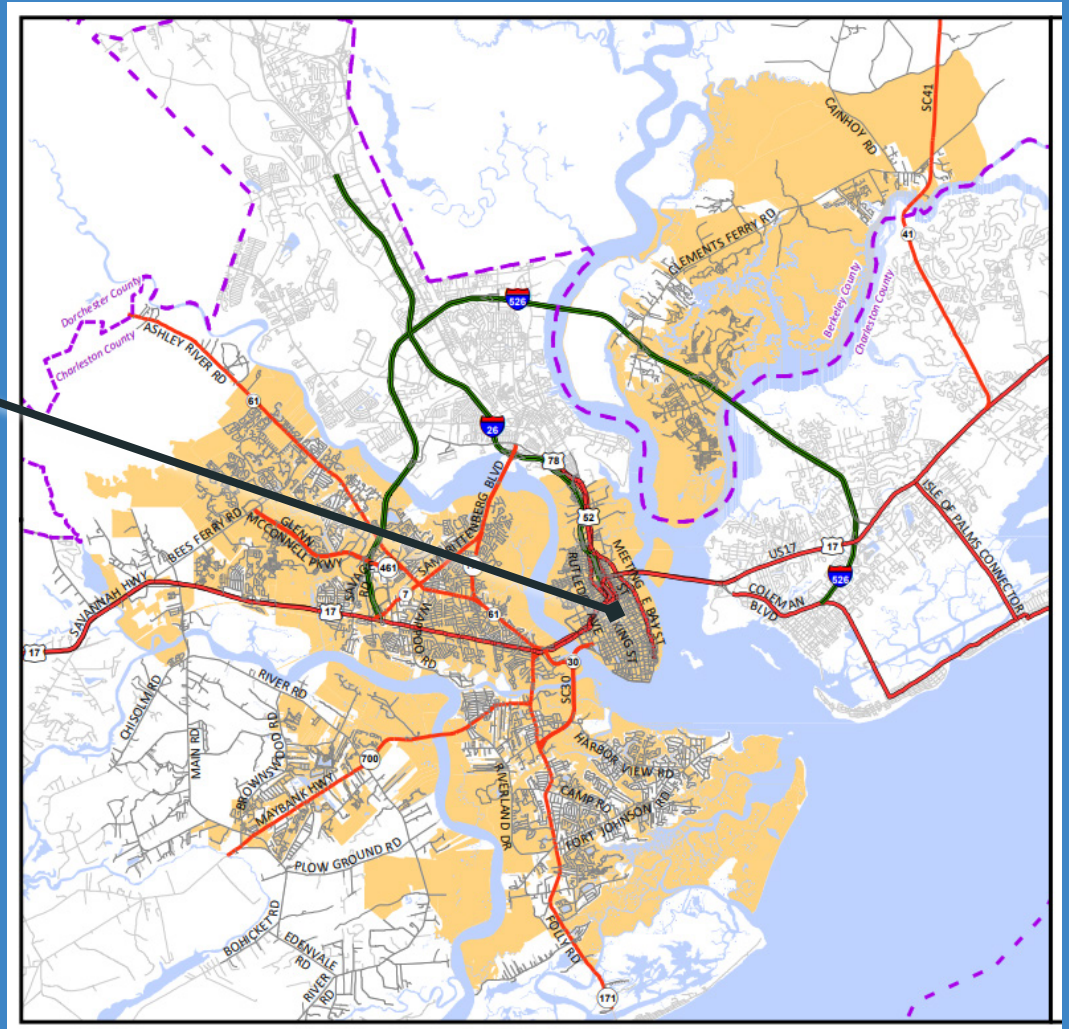
# DATA IN CHARLESTON'S FLOODING AND SEA LEVEL RISE STRATEGY

Katie McKain, AICP  
City of Charleston, SC  
Mayor's Office of Resilience & Sustainability



# Charleston, SC

- 350th anniversary
- Population: 150,000
- Growing fast!
- 120 total sq mi land
- 8 sq mi on Peninsula
- Surrounded by water



# 1949 Halsey Map of the Charleston Peninsula

“Lowcountry” nickname



# Historic Tidal Creeks of the Peninsula



Left: current aerial; Right: 1949 Halsey Map overlaid on current aerial

# Minor Coastal Flooding (Tidal/Nuisance/Sunny Day)

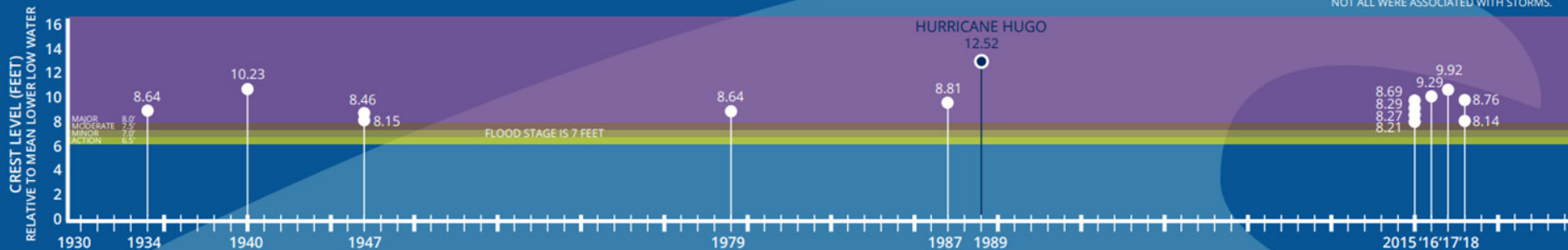


# Major Coastal Flooding: Storm Events

- 2019: Hurricane Dorian
- 2018: Hurricane Florence
- 2017: Hurricane Irma
- 2016: Hurricane Matthew
- 2015: “Thousand Year Flood”
- ...
- 1989: Hurricane Hugo



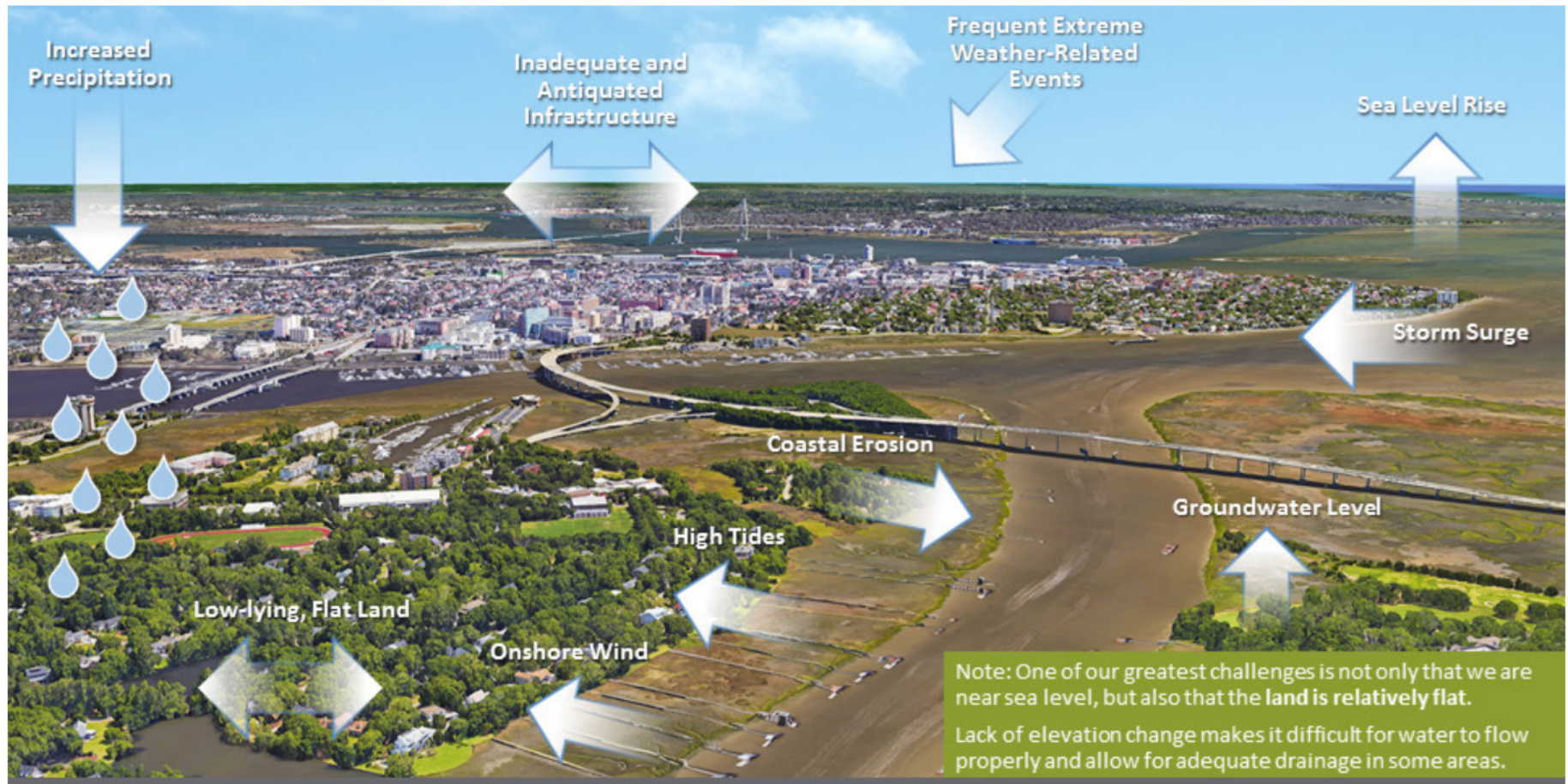
## TOP 15 CRESTS AT CHARLESTON HARBOR<sup>(4)</sup>



# Mix of Causes Form Multi -faceted Challenge

i.e. King Tide with Heavy Rainfall

## WHAT CAUSES FLOODING?



Above: Flooding is caused by many factors, which often combine simultaneously to form a complex, multi-faceted challenge.

# Flooding and Sea Level Rise Strategy

2019 Updated Strategy

2015 Original Strategy

Not required by law

2019 Strategy

recommends planning for  
2-3' of SLR in next 50 years

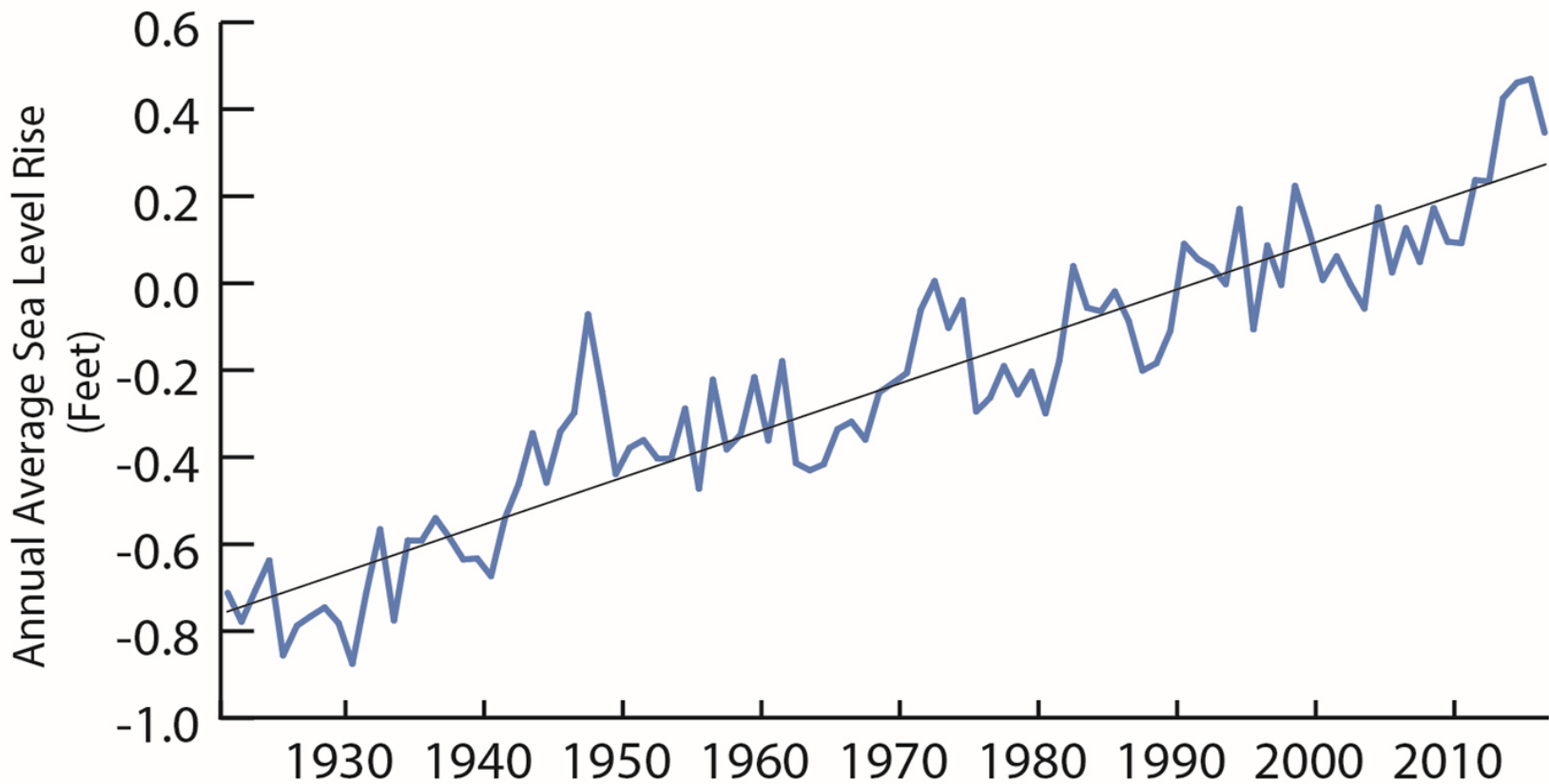
Up from 2015 planning  
horizon (1.5'-2.5')

[www.charleston-sc.gov/slr](http://www.charleston-sc.gov/slr)

—

# Data

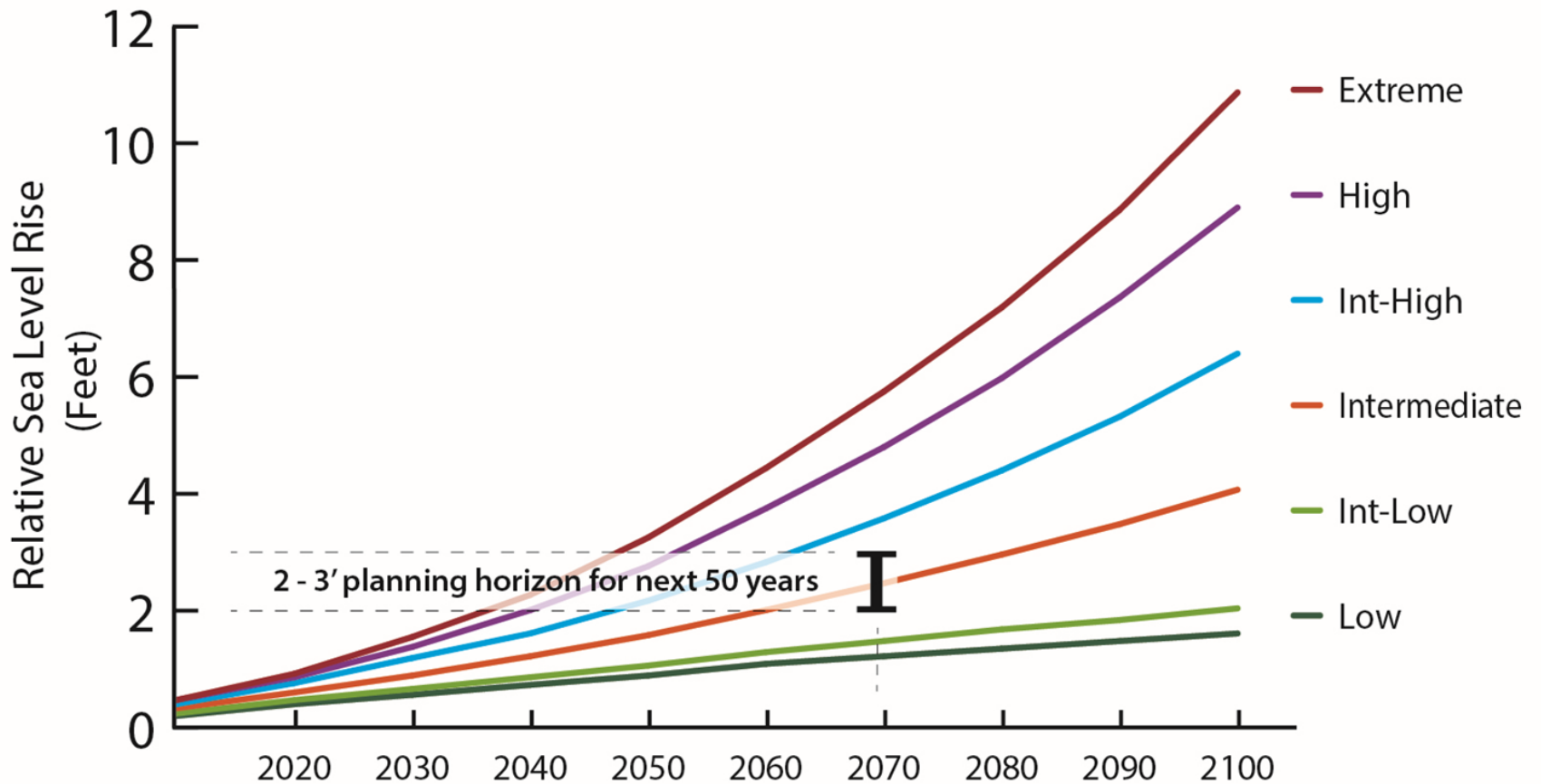
**FIGURE 1: OBSERVED SEA LEVEL RISE IN CHARLESTON HARBOR**  
NOAA Charleston Tide Station





# Data

FIGURE 2: SEA LEVEL RISE PROJECTIONS FOR CHARLESTON  
NOAA NCA4 Scenarios

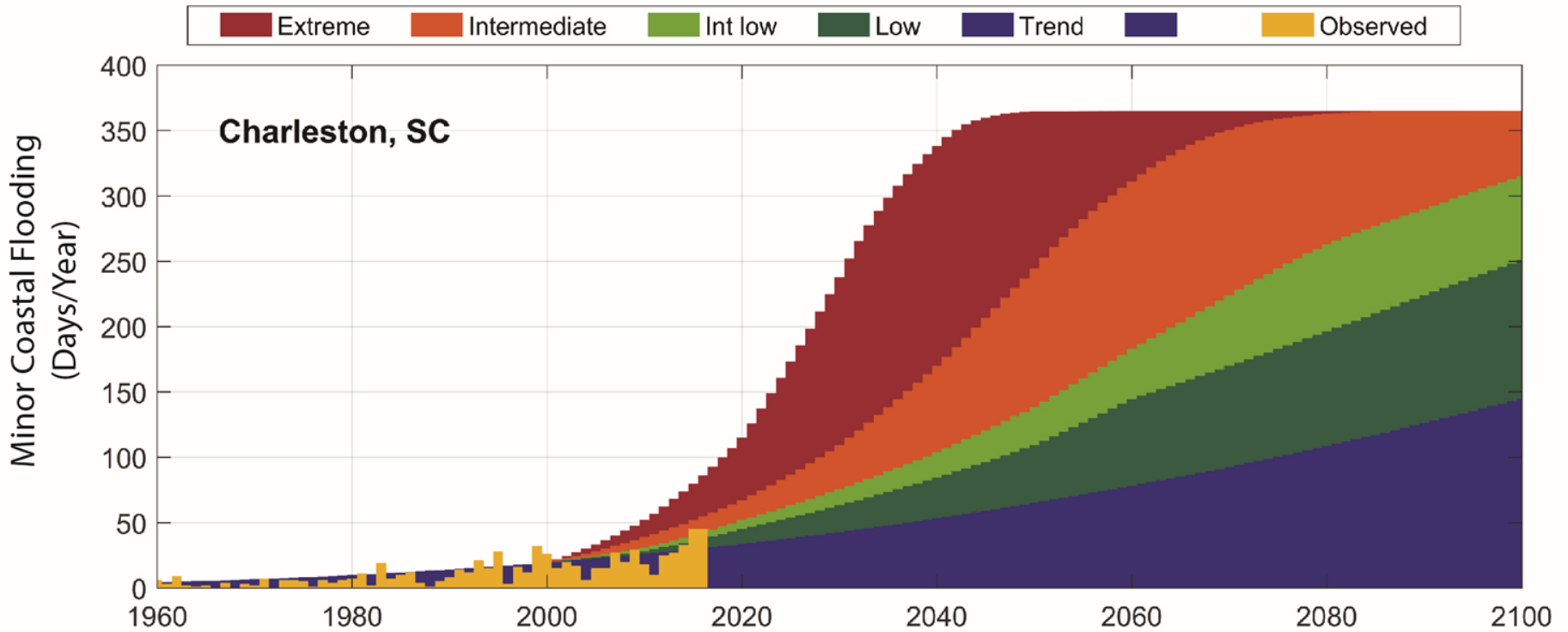


# Data

2019

Minor Tides	Moderate Tides	Major Tides
<b>46</b>	<b>19</b>	<b>4</b>
7.0' - 7.5'	7.5' - 7.99'	>8'

**FIGURE 3: OBSERVED AND PREDICTED MINOR COASTAL FLOODING IN CHARLESTON**  
NOAA NCA4 Scenarios



# Initiatives in Plan

## Track Progress Online

	Completed or Ongoing
	Started
	Not Started / Dependent on others






TRACK PROGRESS ON OUR INITIATIVES!  
2019 Flooding and Sea Level Rise Strategy

MAYOR

CITY OF CHARLESTON

[www.charleston-sc.gov/SLR](http://www.charleston-sc.gov/SLR)

### Champions of the Five Critical Components

	Stormwater, Planning, Parks, Traffic & Transportation, Resilience & Emergency Management	Stormwater, Planning, Parks, Traffic & Transportation, Public Safety, Resilience & Emergency Management	Stormwater; Budget, Finance, & Revenue Collections; Public Safety, Resilience & Emergency Management	Planning, Stormwater, Parks, Housing & Community Development, Resilience & Emergency Management	Stormwater, Planning, Public Information Office, GIS, Resilience & Emergency Management,
					
ID	INFRASTRUCTURE	GOVERNANCE	RESOURCES	LAND USE	OUTREACH
A	<span style="background-color: #92d050; color: white; padding: 2px;">SW</span> Collaborate with federal and state partners on flood protection projects.	<span style="background-color: #92d050; color: white; padding: 2px;">R&amp;EM</span> Annually reevaluate science for appropriate SLR planning levels.	<span style="background-color: #92d050; color: white; padding: 2px;">BFRC</span> Seek new legislation and appropriate streams of revenue to support projects.	<span style="background-color: #d9534f; color: white; padding: 2px;">PL</span> Identify opportunities to improve how City projects are designed with flooding and SLR in mind.	<span style="background-color: #92d050; color: white; padding: 2px;">PL</span> Create design guidelines for retrofitting and elevating historic buildings.
B	<span style="background-color: #92d050; color: white; padding: 2px;">PL</span> Identify coastal edges of the City ripe for flood protection and/or absorption such as seawalls, living shorelines, roadways, etc.	<span style="background-color: #92d050; color: white; padding: 2px;">PS</span> Implement building codes that support construction and retrofits more resilient to SLR.	<span style="background-color: #92d050; color: white; padding: 2px;">BFRC</span> Aggressively participate in FEMA programs to protect private property.	<span style="background-color: #ffd700; color: white; padding: 2px;">PL</span> Evaluate and implement tree planting and protection recommendations for private development projects.	<span style="background-color: #92d050; color: white; padding: 2px;">R&amp;EM</span> Continue partnerships with agencies, organizations and institutions of higher education that actively engage in resilience.
C	<span style="background-color: #92d050; color: white; padding: 2px;">SW, PK</span> Implement shoreline protection, natural or otherwise, to protect public infrastructure and mitigate erosion.	<span style="background-color: #ffd700; color: white; padding: 2px;">SW</span> Increase additional freeboard to 2.0 feet above Base Flood Elevation for all new and substantially improved structures.	<span style="background-color: #92d050; color: white; padding: 2px;">SW</span> Annually align City operational priorities to reflect the current assessment of Flooding and SLR impacts.	<span style="background-color: #ffd700; color: white; padding: 2px;">PL</span> Update the City's Comprehensive Plan for SLR and reevaluate the City's Zoning Ordinance.	<span style="background-color: #d9534f; color: white; padding: 2px;">PL</span> Assist property owners in developing resilient design solutions for existing and new development, i.e. floodproofing.
D	<span style="background-color: #92d050; color: white; padding: 2px;">SW</span> Identify opportunities for and install check valves to prevent tidal inundation.	<span style="background-color: #92d050; color: white; padding: 2px;">SW</span> Strengthen stormwater management regulations to take into account SLR.	<span style="background-color: #92d050; color: white; padding: 2px;">R&amp;EM</span> Identify and implement strategies to fund wetland restoration.	<span style="background-color: #d9534f; color: white; padding: 2px;">HCD</span> Update the City's Consolidated Plan for SLR.	<span style="background-color: #92d050; color: white; padding: 2px;">R&amp;EM</span> Develop a central web portal that is dedicated to all items related to flooding.
E	<span style="background-color: #ffd700; color: white; padding: 2px;">SW</span> Complete Spring/Fishburne Drainage Improvement Project.	<span style="background-color: #d9534f; color: white; padding: 2px;">CP</span> Consider building or retrofitting City owned facilities for greater than 3 feet of SLR.	<span style="background-color: #92d050; color: white; padding: 2px;">PSF</span> Acquire appropriate flood response assets for public safety.	<span style="background-color: #92d050; color: white; padding: 2px;">R&amp;EM</span> Complete an all-hazards Vulnerability Assessment.	<span style="background-color: #92d050; color: white; padding: 2px;">R&amp;EM</span> Conduct an annual review of SLR Strategy.

# Connected Planning Projects

1. Dutch Dialogues
2. All Hazards Vulnerability & Risk Assessment
3. Hazard Mitigation Plan (regional consistency)
4. USACE Peninsula Flood Risk Mgmt. Study
5. Stormwater Program Management Team & Update of City's 1984 Master Drainage Plan
6. Comprehensive Plan Update, followed by Zoning Ordinance Update

## PROGRESS SPOTLIGHT

### DUTCH DIALOGUES™

**"If the City of Charleston is carrying out the initiatives in its Strategy to battle flooding and sea level rise, then you are on the right path."**

- Delegate from the Royal Netherlands Embassy

This was the light-hearted but genuine comment that City staff heard during a visit from representatives of the Netherlands in March 2018, a country well-versed in adapting to frequent floods. The visit gave the Dutch guests an opportunity to understand our City's relationship and vulnerabilities to the very thing that attracts many of us to the area – the sea.

The Netherlands has executed a variety of successful flood mitigation methodologies, and the emerging relationship has already proved to be a valuable one. Select City staff and elected officials visited the Netherlands in October 2018 to witness their innovative practices first hand and bring back lessons learned to Charleston. The City is looking to the Netherlands for ideas to better help us live more naturally with water and integrate water into the fabric of our City through a series of dialogues designed to bring world renowned experts together from multiple disciplines to discuss resilience and risk mitigation challenges in Charleston.

The project commenced in Charleston in January 2019.



Delegates from the Royal Netherlands Embassy are joined by Mayor Tecklenburg as they share Dutch ideas on living with water before an intrigued Charleston community in March 2018.



City staff meet with Dutch experts in March 2018.

# FLOODING AND SEA LEVEL RISE STRATEGY

WEB ENABLED

[www.charleston-sc.gov/SLR](http://www.charleston-sc.gov/SLR)



Left, a historic Halsey Map depicts original creek bed lines on the Peninsula, and to the right this map is overlaid on a current aerial image.

# Questions?

Katie McKain, AICP  
Director of Sustainability  
City of Charleston

(843) 724-3789

[mckain@charleston-sc.gov](mailto:mckain@charleston-sc.gov)

[www.charleston-sc.gov/SLR](http://www.charleston-sc.gov/SLR)

# Integrating Sea Level Rise into Plans – City of Virginia Beach, VA

APA Webinar May 8, 2020

Robert J. Tajan, AICP, CFM

Director of Planning and Community Development

CJ Bodnar, P.E.

Technical Services Engineer – Public Works Stormwater Engineering Center

-City Established:  
January 1, 1963  
-Land area:  
310 square miles and  
38 miles of shoreline  
on the Atlantic Ocean  
and the Chesapeake  
Bay

-5 Military Installations  
-Population (July 1,  
2019): 452,643  
(largest for a city in  
Virginia)

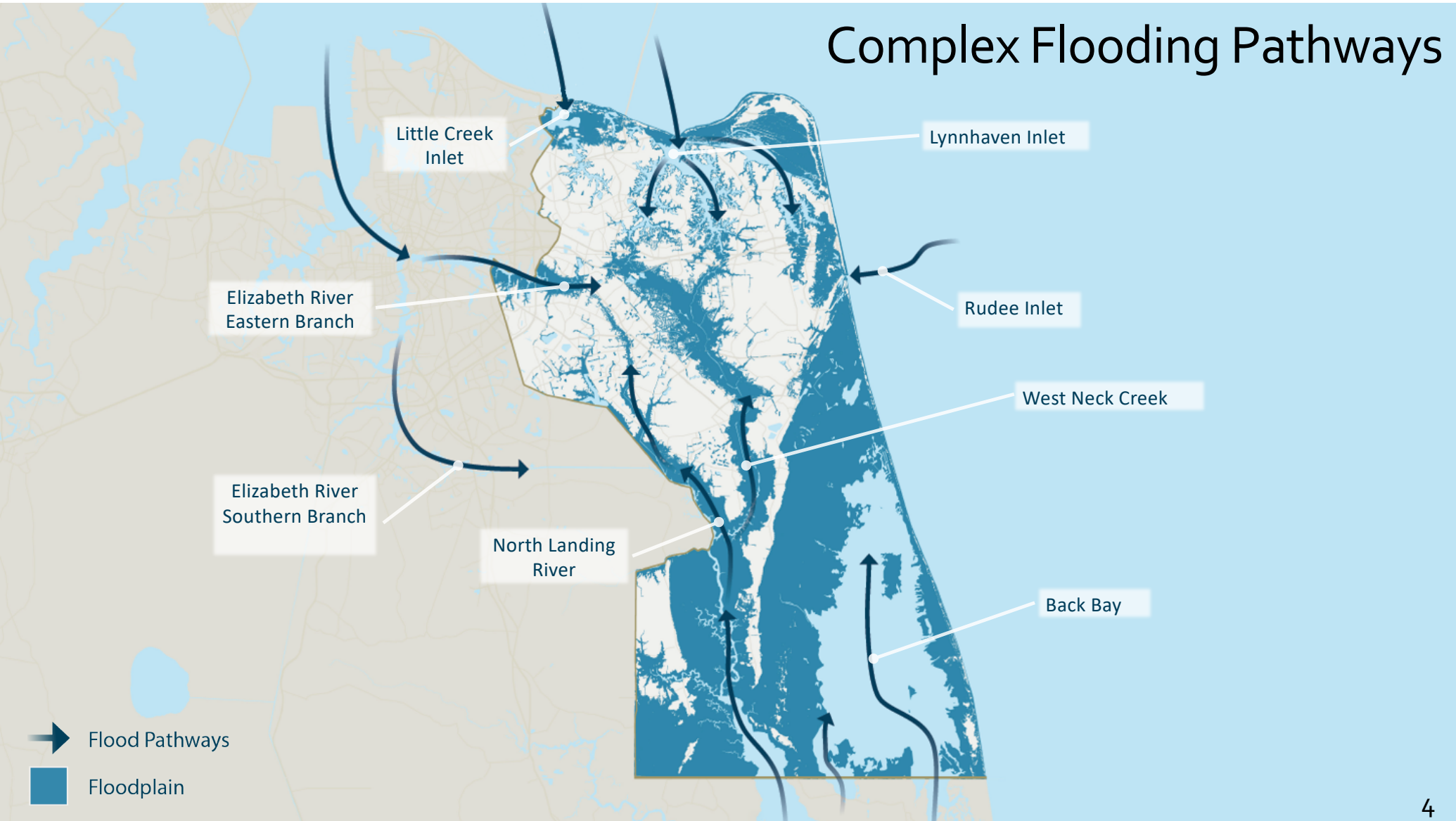




Not just  
beaches...



# Complex Flooding Pathways



# Opening Our Eyes – 2016

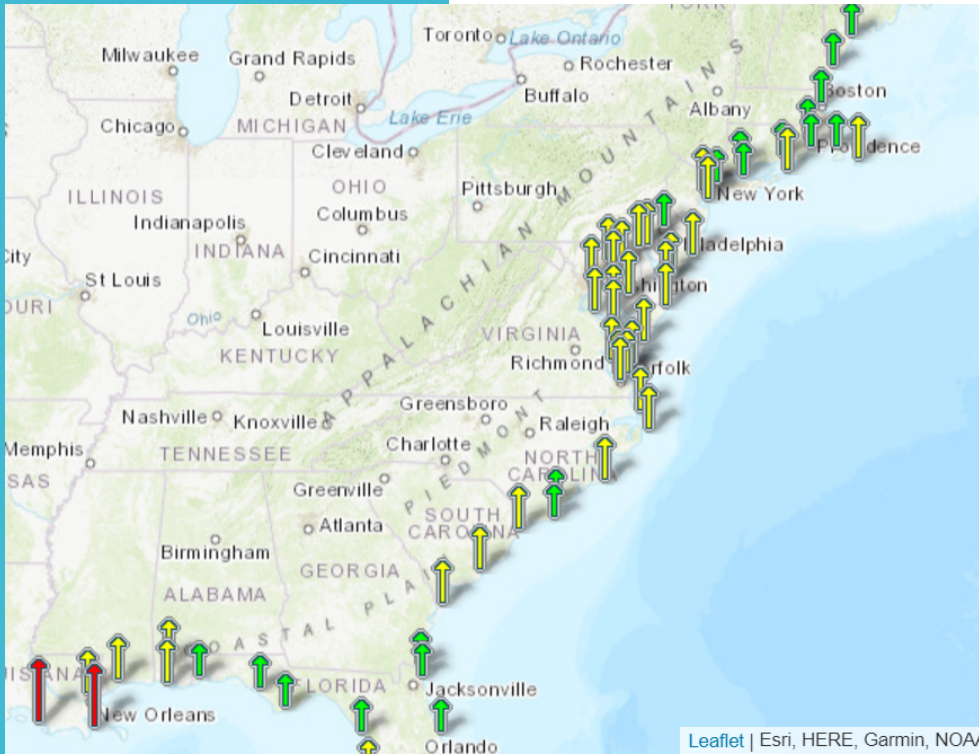
July 31 – heavy rainfall  
500 to 1000-yr recurrence  
interval at the  
2-hr duration

September 19 – Julia  
100 to 200-yr event at the  
24-, 48-hr durations

October 8-9 – Matthew  
500 to 1000 event at the  
24-hr durations



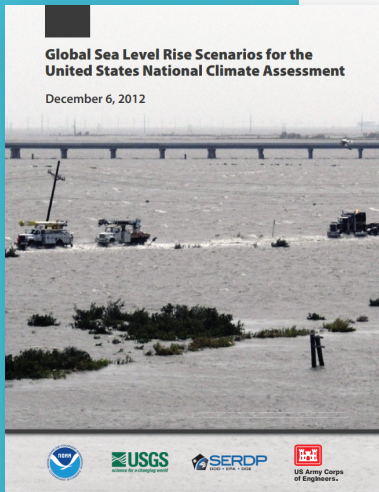
# Top 10%



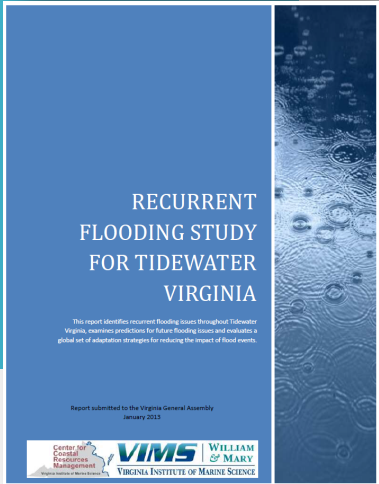
Water Level Recording Station	Record length (years)	Sea Level Rise (feet/century)	Rank
Eugene Island, LA	35	3.2	1
Grand Isle, LA	69	3.0	2
Galveston Pleasure Pier, TX	54	2.2	3
Galveston Pier 21, TX	112	2.1	4
Chesapeake Bay Bridge Tunnel, VA	41	2.0	5
Sabine Pass, TX	58	1.9	6
Ocean City Inlet, MD	41	1.8	7
Rockport, TX	79	1.8	8
Wachapreague, VA	38	1.8	9
Lewisetta, VA	46	1.7	10
New Canal, LA	34	1.7	11
Colonial Beach, VA	38	1.6	12
North Spit, CA	39	1.5	13
Sewells Point, VA	89	1.5	14
Cape May, NJ	51	1.5	15
Duck, NC	38	1.5	16
Apra Harbor, Guam	23	1.5	17
Freeport, TX	36	1.5	18
Bay Waveland, MS	38	1.4	19
Corpus Christi, TX	33	1.4	20

# Sea Level Rise Planning Scenarios

Sourced from:



Consistent with:



Life Cycle Agreement	Time Horizon/ Time Period	SLR Value	Relevance	Use
Municipal Planning	20-40 Years 2035-2055	1.5 feet	Comprehensive Plan & Outcomes Commercial & Utility Life Cycles	Vulnerability Assessment Key Planning Value Basis for Evaluation of All Adaptation Strategies
Critical Infrastructure  Long-Term Awareness  Adaptive Capacity	50-70 Years 2065-2085	3.0 feet	Utility Infrastructure Life-Cycle  Transportation Infrastructure Life-Cycle  Residential Structure Life-Cycle	Secondary Vulnerability Assessment to Provide Insight Into Long-term Risk  Basis for Long-Term Infrastructure Decisions  Evaluate Cost-Effectiveness of Additional Protection for Adaptable Resilience Strategies

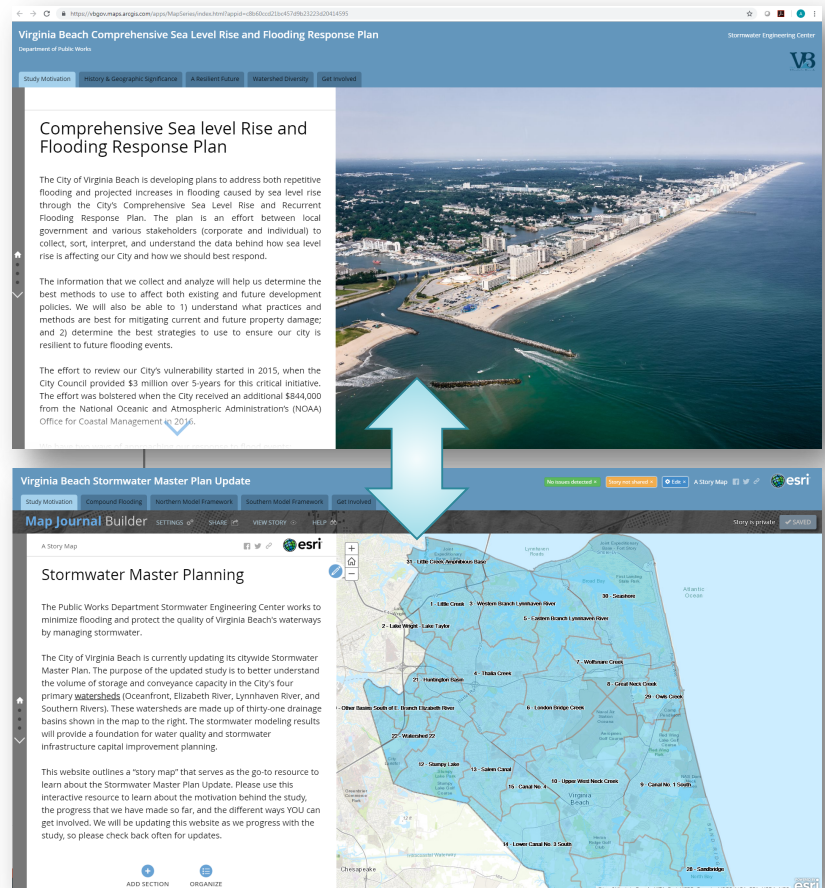


**Master Drainage Study**  
Detailed inventory and performance assessment of the City's stormwater system

**Stormwater Master Plan**  
Identification and prioritization of needed improvements to stormwater system

**Comprehensive Sea Level Rise and Recurrent Flooding Study**  
Assessing existing and future flood vulnerabilities and identifying strategies to ensure our City is resilient to future flooding events

Project Website:  
<http://www.vbgov.com/pwSLR>

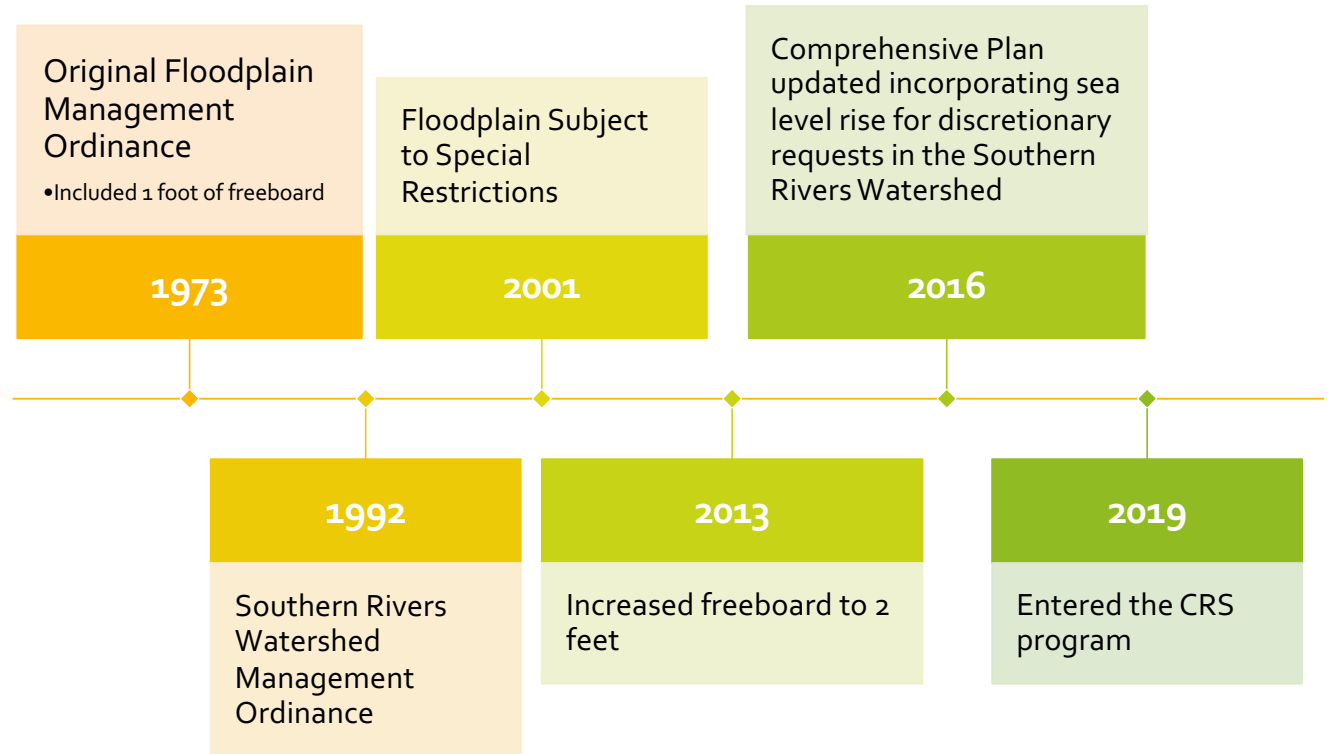




## What is the purpose?

- Summarize work activities in a unified framework
- Present a wide range of potential adaptation initiatives
- Relate strategies across the City's diverse watersheds
- Provide high-level implementation timeline for potential projects
- Identify additional research needs

But not the first time it has been addressed in Planning



Planning with the best information available



# Questions?

- CJ Bodnar, PE

Stormwater Engineering Center  
CBodnar@vbgov.com

- Robert J. Tajan, AICP, CFM

Director of Planning and Community Development  
Rtajan@vbgov.com

Additional slides for  
information

# Public Engagement



## Over 500 Residents

contributed their perspectives either in meetings or online.



### Resident Perspectives

Only 39 percent of polled residents identified as well informed or very well informed regarding flooding causes and risks, indicating a need for further educational outreach.

### Resident Perspectives

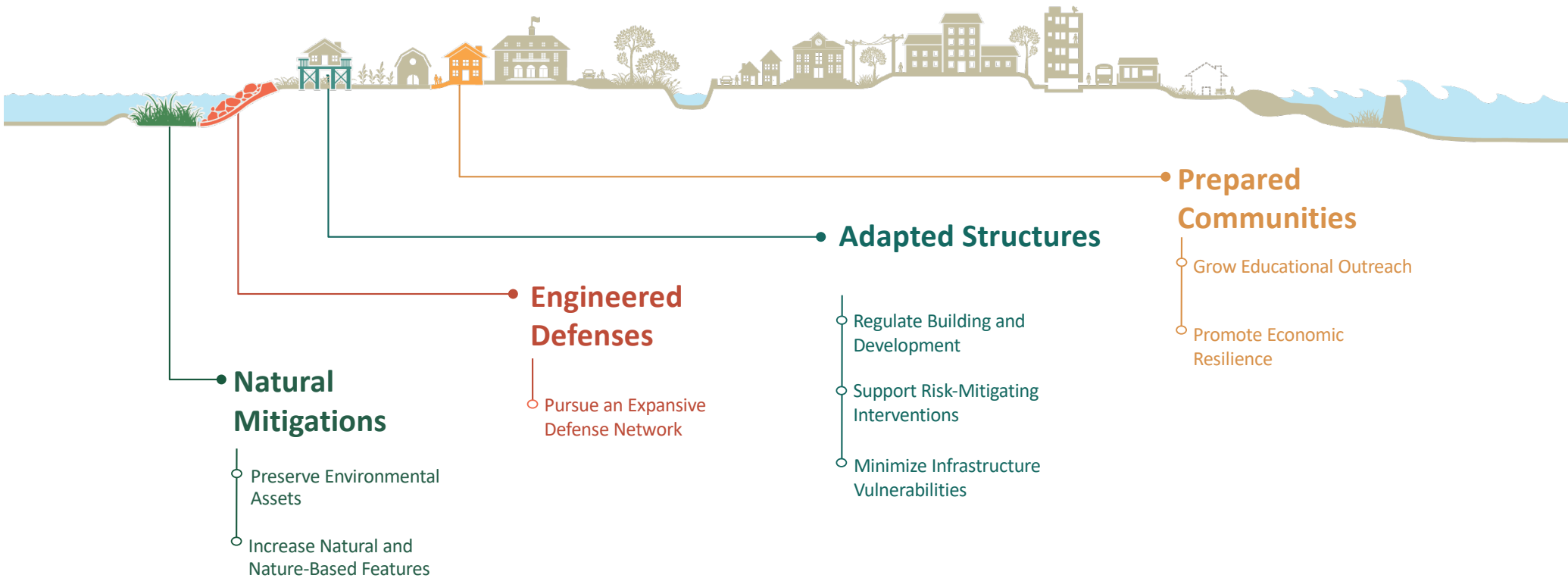
91 percent of polled residents strongly supported encouraging the maintenance of natural flood buffers, including living shoreline approaches for managing erosion.

### Resident Perspectives

When it comes to funding flood-reduction infrastructure...

- 64 percent of polled residents expressed support to reallocate existing revenues
- 73 percent expressed support for using dedicated revenue, and
- 71 percent expressed support for creating new revenue sources.

# Multiple Layers of Adaptation





Paralysis by Analysis



Money



Silos



Regulatory updates

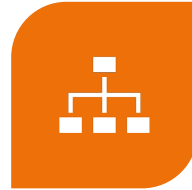
What are some  
of the issues?



CITY COUNCIL AND  
EXECUTIVE LEADERSHIP  
VISION



ENGINEERING EXPERTISE



PLANNING AND  
COMMUNITY  
DEVELOPMENT  
STRUCTURE



REGIONAL CONSENSUS



CITIZEN UNDERSTANDING

What has  
helped to push  
forward?

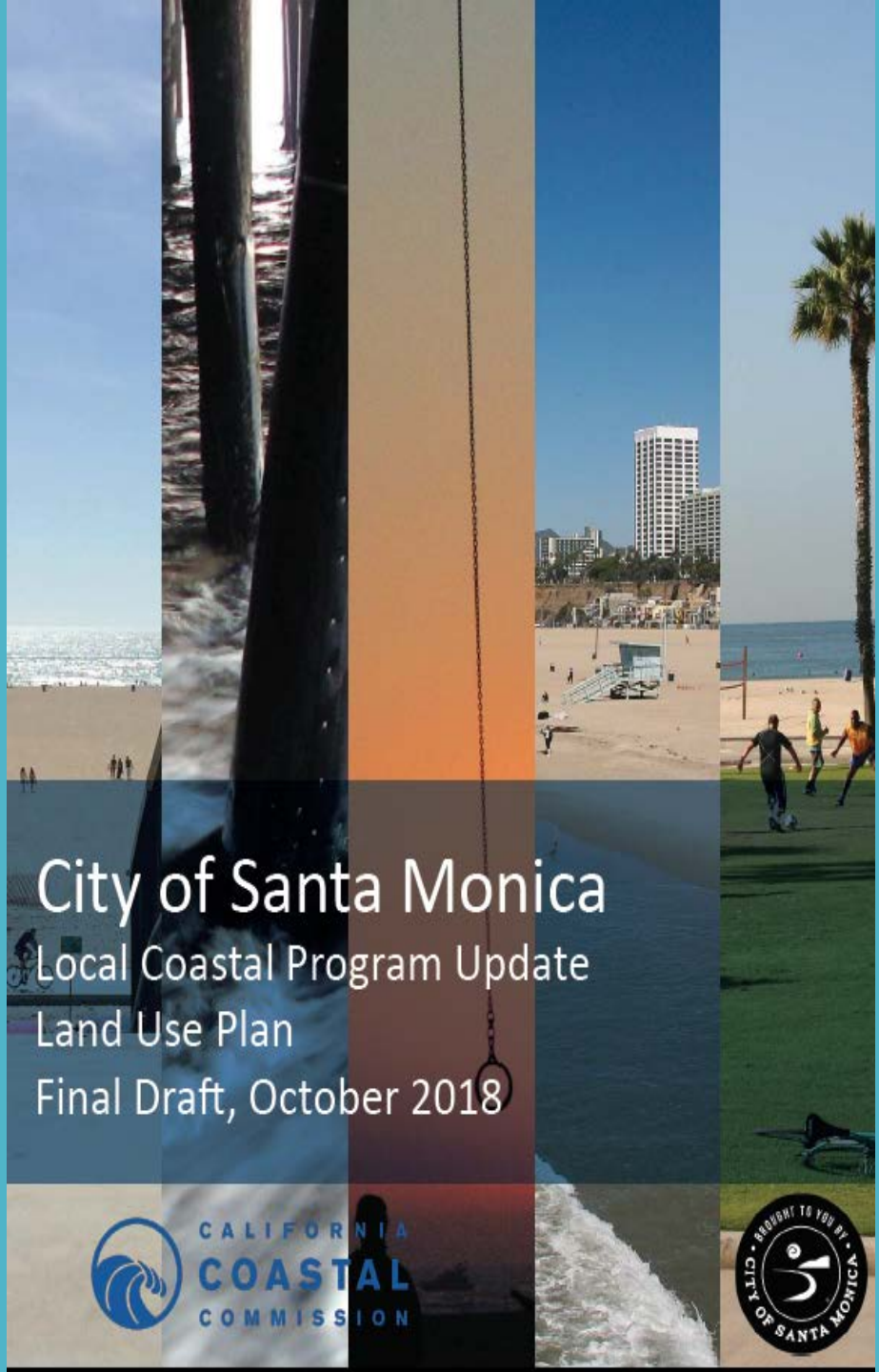


# Using SLR Science to Shape Coastal Policy

City of Santa Monica Local Coastal Program  
Land Use Plan



Presented by: Elizabeth Bar-El, AICP  
Senior Planner, LCP Project Manager



City of Santa Monica  
Local Coastal Program Update  
Land Use Plan  
Final Draft, October 2018





Background

# The City of Santa Monica, California





Santa Monica Basics: 8.3 square miles, located in Los Angeles County; population 92,000; 1.5 square miles are in the Coastal Zone.



17 million people from the region and around the world visit annually. Santa Monica is best known for its wide beaches and the Santa Monica Pier.

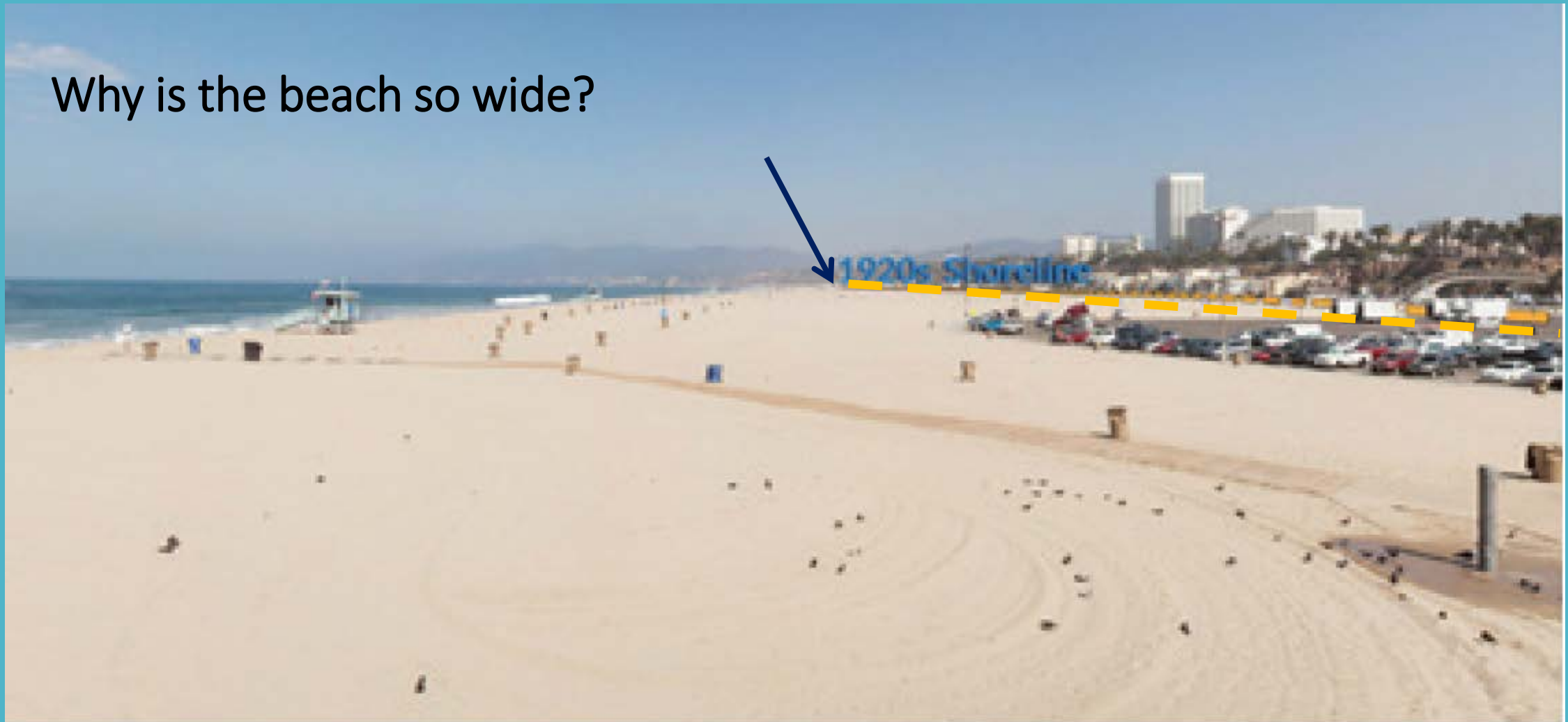


17 million people from the region and around the world visit annually. Santa Monica is best known for its wide beaches and the Santa Monica Pier.



And a current pilot project is allowing a small area to “go wild” without beach grooming to create sand dunes.

Why is the beach so wide?



*The beach today, noting the location of the shoreline in 1920.*

Santa Monica beach was “nourished” over time, widened by 150-500 feet with sand removed to create Marina del Rey and other sources



Guidance for LCP  
Sea Level Rise  
Policies

# Scientific Predictions of Sea Level Rise



## 2016 Shoreline Studies

Purpose : To forecast coastal erosion and flood hazards under projected future climate scenarios for the LA County coastline.

- Ocean Protection Council (OPC) grant
- Administered by City of Santa Monica
- 11 participating jurisdictions
- Many collaborators:
  - *USC Sea Grant*
  - *USGS*
  - *LA Regional Collaborative on Climate Change (LARC)*
  - *Adapt LA*
  - *Heal the Bay*
  - *Bay Restoration Commission*

## Sea Level Rise Studies

- **TerraCosta Consulting Group**, *Los Angeles Region Shoreline Change Projections (2016)*
- **Environmental Science Associates (ESA)**, *LA County Coastal Hazard Modeling and Vulnerability Assessment (2016)*
- *In coordination with USGS Coastal Storm Modeling System (CoSMoS)*



## *TC/ESA Study Highlights*

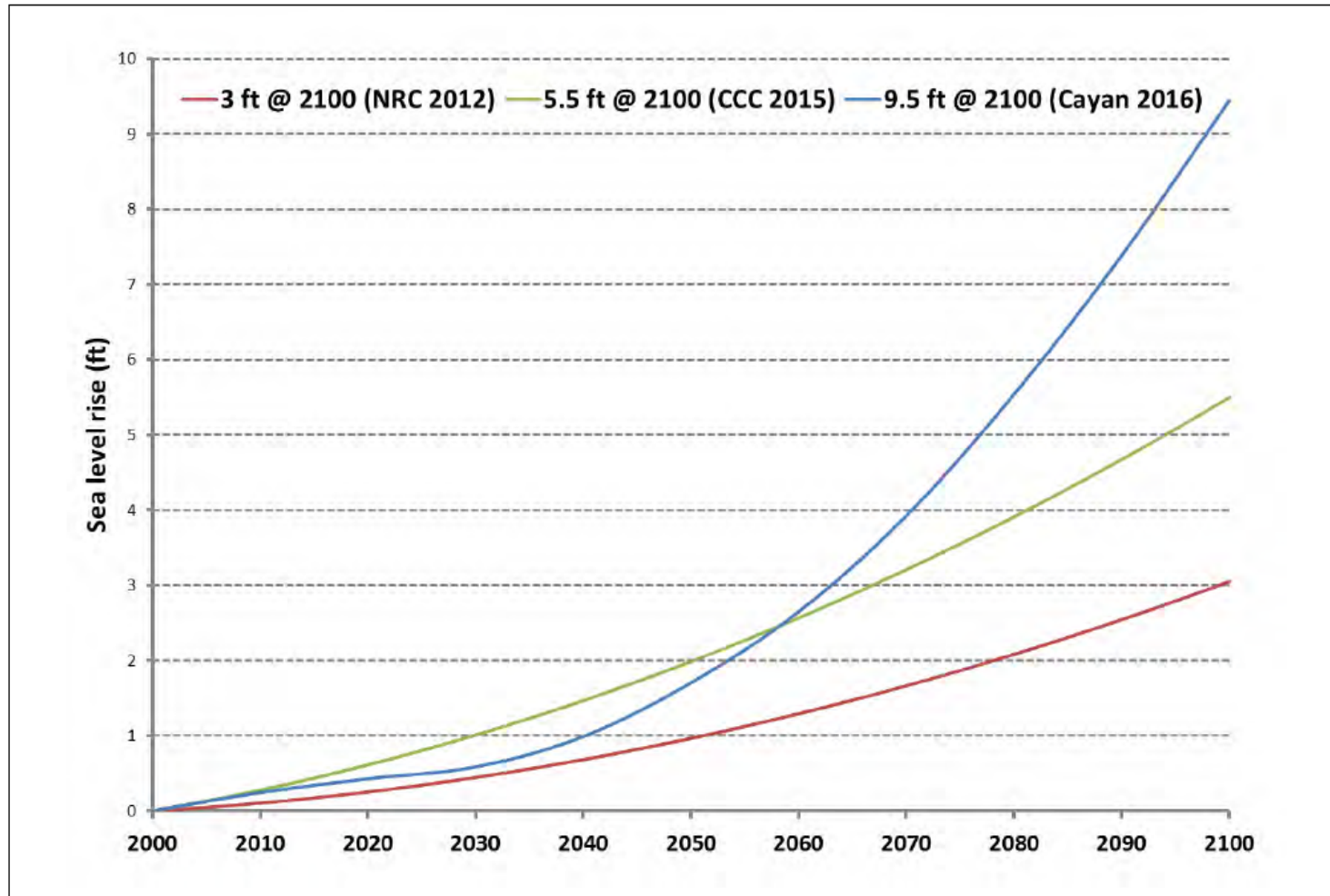
- Planning horizons (2030, 2050 and 2100): Based on guidance from California Coastal Commission (2015) and other stakeholders to be consistent with Local Coastal Program planning
- Scenario-based planning: Examined the consequences of multiple sea level rise projections, as well as extreme water levels and waves associated with storms.

## Sea Level Rise Studies

- TerraCosta Consulting Group, Los Angeles Region Shoreline Change Projections (2016)
- Environmental Science Associates (ESA), LA County Coastal Hazard Modeling and Vulnerability Assessment (2016)
- *In coordination with* USGS Coastal Storm Modeling System (CoSMoS)



## SLR Findings: Highlights

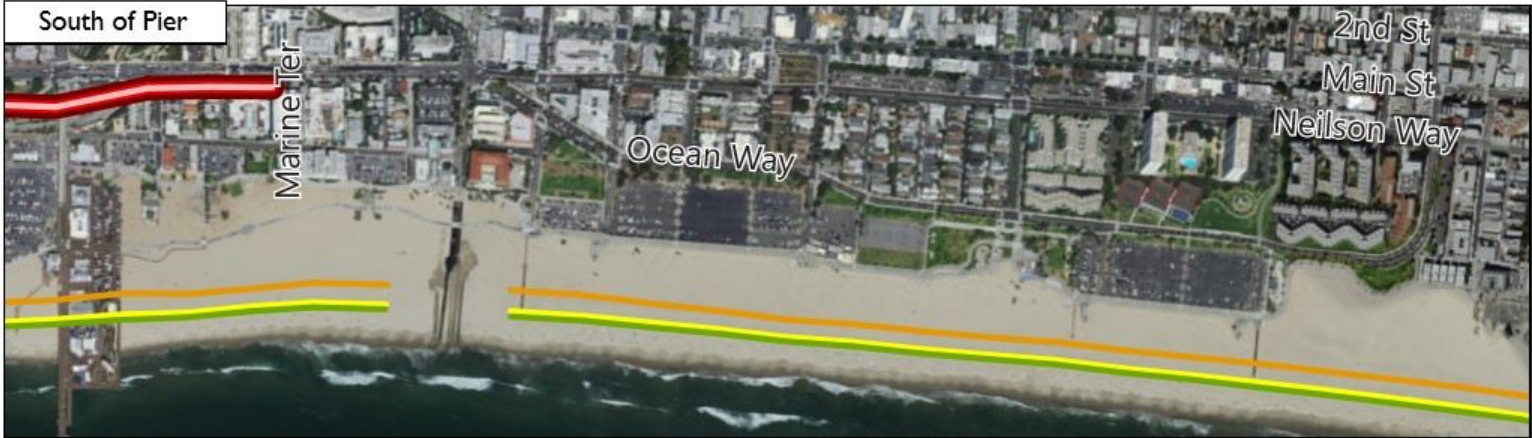
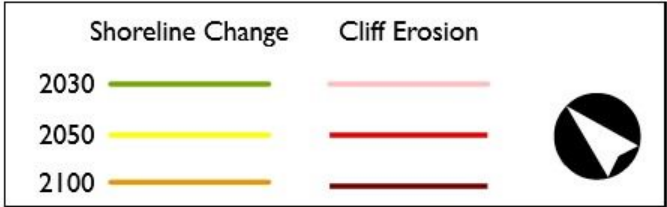


## Sea Level Rise Studies

- TerraCosta Consulting Group, Los Angeles Region Shoreline Change Projections (2016)
- Environmental Science Associates (ESA), LA County Coastal Hazard Modeling and Vulnerability Assessment (2016)
- *In coordination with* USGS Coastal Storm Modeling System (CoSMoS)

# SLR Findings: Highlights

Shoreline and Cliff Retreat from .93m of Sea Level Rise



# Sea Level Rise Studies

- TerraCosta Consulting Group, Los Angeles Region Shoreline Change Projections (2016)
- Environmental Science Associates (ESA), LA County Coastal Hazard Modeling and Vulnerability Assessment (2016)
- *In coordination with* USGS Coastal Storm Modeling System (CoSMoS)



# SLR Findings: Highlights

Shoreline and Cliff Retreat from 1.67m of Sea Level Rise



# Sea Level Rise Studies

- TerraCosta Consulting Group, Los Angeles Region Shoreline Change Projections (2016)
- Environmental Science Associates (ESA), LA County Coastal Hazard Modeling and Vulnerability Assessment (2016)
- *In coordination with* USGS Coastal Storm Modeling System (CoSMoS)



Developing Policy  
Recommendations

# Incorporating the studies into LUP Sea Level Rise Policies

SLR Scenario (Expected Time Period)	Southern California SLR Range (Inches)	City of Santa Monica SLR Range (Inches)
Near-Term (Current - 2030)	2" - 12"	5.3" - 12"
Mid-Term (Around 2030-2050)	5" - 24"	11.6" - 23.8"
Long-Term (Around 2050 - 2100)	17" - 66"	36.6" - 66"
Long-Term Extreme (By 2100)	113"	113"

Figure 3 Sea Level Rise Projections (Adapt LA Memo, May 2016)

# Explaining the Scientific Basis for SLR Policies

- LUP Existing Conditions section provides background on the scientific research.



## Incorporating the Planning Horizons

- Scientific research forecast to specific years, but establishing policy tied to years seemed arbitrary.
- Decision to reference the dates, but tie policy applicability to measured rise in sea levels.
- Present (current) was determined to be “Near Term”



# Using Thresholds to Trigger Policy

53. Sea Level Rise Projections. Table 1 identifies the range of Sea Level Rise (SLR) projections that the City’s coastal zone will be potentially subject to through approximately Year 2100, based on the best available scientific data and in accordance with the California Coastal Commission Sea Level Rise Policy Guidance, adopted August 12, 2015 and is used as the basis for the sea level rise policies of this chapter.

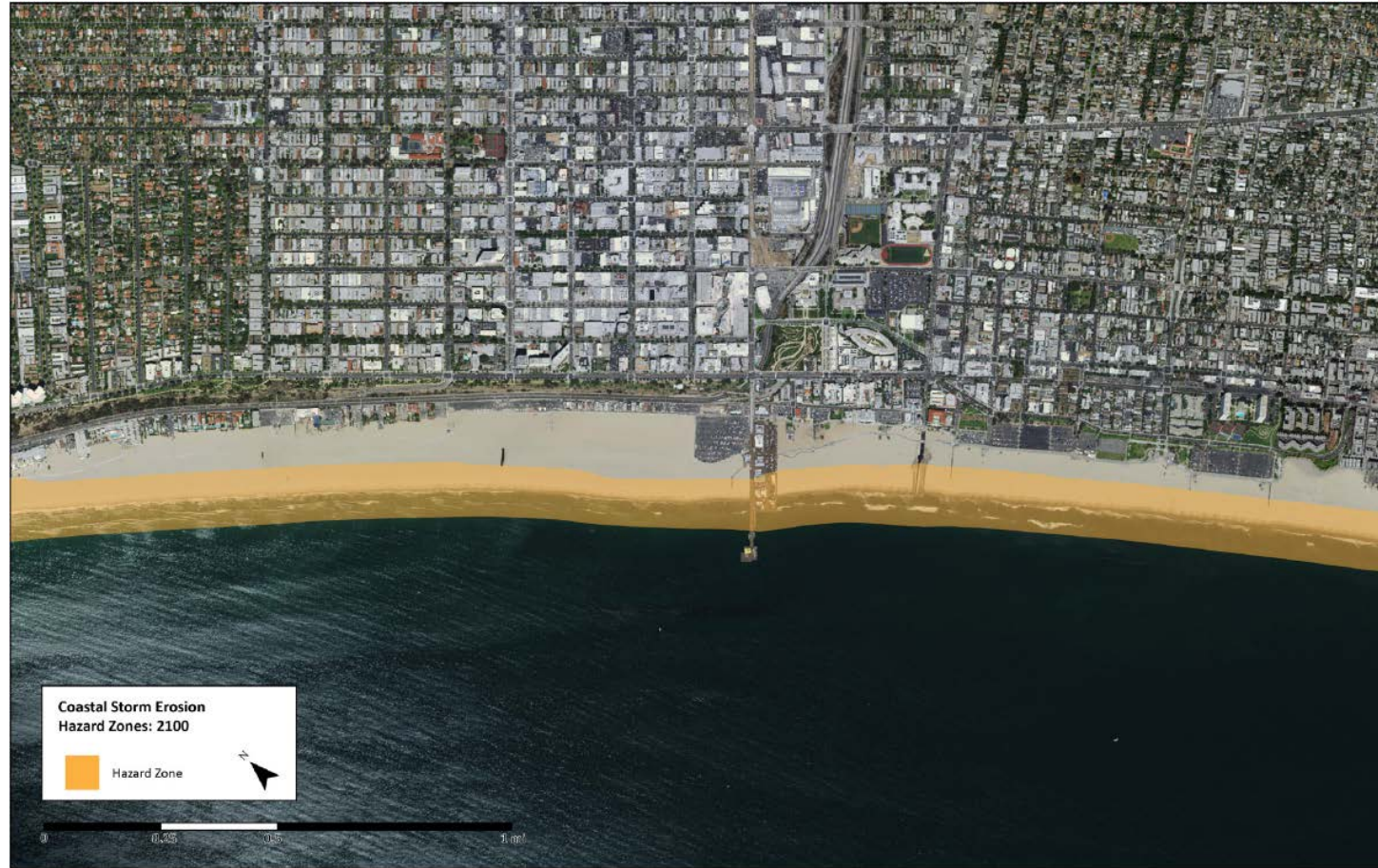
**Table 1** Sea Level Rise Policy Thresholds

Sea Level Rise Scenario	Estimated Time Range	Sea Level Rise Policy Thresholds <sup>a</sup>
NEAR-TERM	Current - 2030	5.3” - 12”
MID-TERM	Around 2030 - 2050	12.1” - 24”
LONG-TERM	Around 2050 - 2100	24.1” - 66”
LONG-TERM EXTREME	BY 2100	113”

<sup>a</sup> These Santa Monica-specific Sea Level Rise Policy Thresholds were developed based on the NRC medium and high scenarios for Los Angeles region, the ESA Los Angeles County Coastal Hazard Modeling and Vulnerability Assessment (2016), the Terra Costa Group Los Angeles Region Shoreline Change Projections modeling (2016) and the Cayan et al 2016 Extreme scenario (RCP 8.5 and the 99.9% probability that the SLR will be at or below this level). These thresholds are relative to mean sea levels baseline in 2000 as used in the 2012 NRC report and Cayan et al. 2016.

# LCP Sea Level Rise Policies

- The Sea Level Rise Policy section of the LCP includes 35 policies.
- 29 Policies are immediately applicable upon adoption
- 2 Policies become effective in the Mid-Term SLR scenario
- 4 Policies become effective in the Long-term SLR



# Short-, Mid-, and Long-Term Hazard Zone Scenarios

Five Key Hazard Zone Map Sets:

A. Coastal Erosion

B. Coastal Storms

C. Monthly Tidal Flood

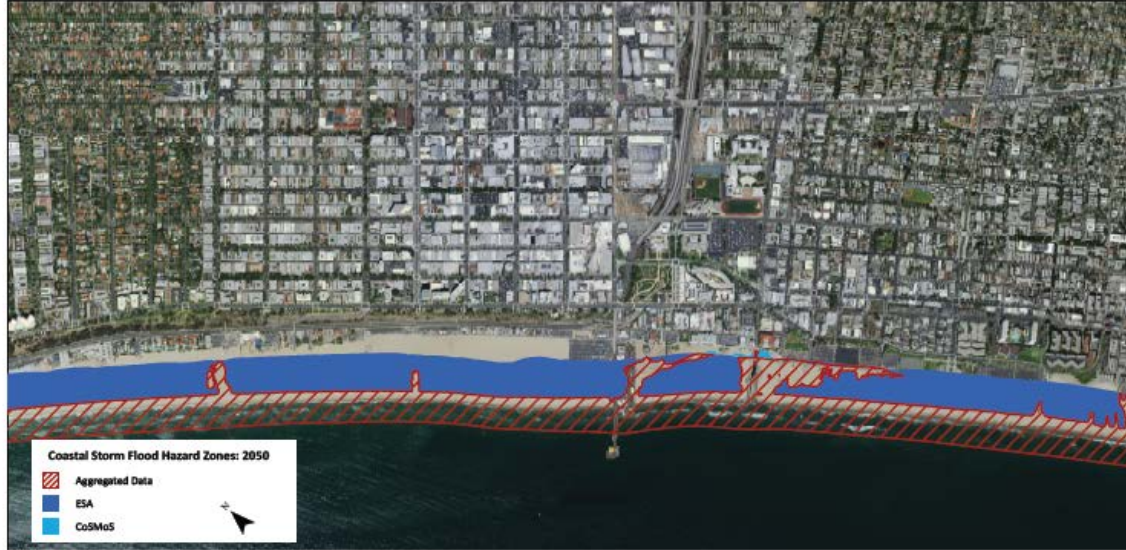
D. Coastal Seismic & Liquefaction

E. Tsunami



## Coastal Storm Flood Hazard Zones

Mid-Term Sea Level Rise Scenario (24")



Long-Term Sea Level Rise Scenario (66")



# Short-, Mid-, and Long-Term Hazard Zone Scenarios

Five Key Hazard Zone Map Sets:

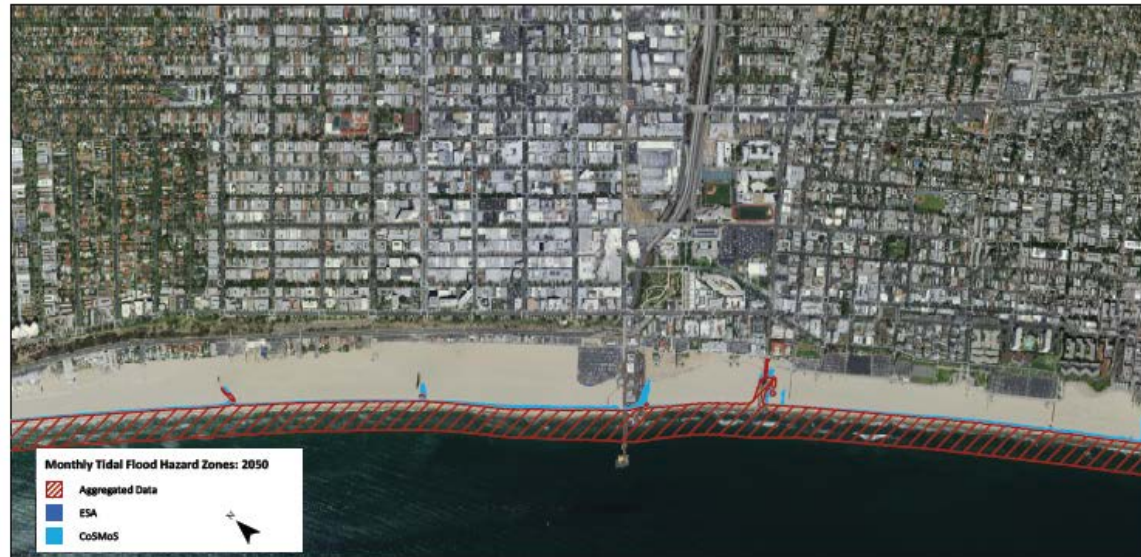
- A. Coastal Erosion
- B. Coastal Storms
- C. Monthly Tidal Flood
- D. Coastal Seismic & Liquefaction
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## Monthly Tidal Flood Hazard Zones

Mid-Term Sea Level Rise Scenario (24")



Long-Term Sea Level Rise Scenario (66")



# Short-, Mid-, and Long-Term Hazard Zone Scenarios

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# Short-, Mid-, and Long-Term Hazard Zone Scenarios

Five Key Hazard Zone Map Sets:

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## SLR Policy Highlights (Immediate)

- Requirements based on anticipated lifespan of development
  - Additional setbacks, technical analysis,
- Real Estate Disclosure
  - Hazard zones disclosed at time of sale
- Requirement for technical hazards analysis to support CDP applications in coastal hazard zones
- Restrictions on non-conforming structures
- Shoreline Protective Devices

## LCP Sea Level Rise Policies

- The Sea Level Rise Policy section of the LCP includes 35 policies.
- 29 Policies are immediately applicable upon adoption
- 2 Policies become effective in the Mid-Term SLR scenario
- 4 Policies become effective in the Long-term SLR



## SLR Policy Highlights (Immediate)

- Adaptive Management Plans
  - City to prepare shoreline management plan identifying a realistic timeline and monitoring strategy for high priority areas.
  - Timeframe: When shoreline has narrowed by 30% compared with Fall 2017 OR
  - Goals:
    - *Protect and maximize public access and recreation;*
    - *Prioritize “soft” adaptation strategies, such as managed retreat, beach nourishment, living shorelines and dunescapes*

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## SLR Policy Highlights (Mid-Term)

- Only allow small, easily moveable structures on properties experiencing more than 30% damage from storm flooding for a tide cycle (6 hrs) more than once a year
- City may develop a Development Impact Fee Program:
  - CDP approval would require payment of impact fee.
  - Used to finance activities/programs that address coastal conditions

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## SLR Policy Highlights (Long-Term)

- Public Access to Blufftop
  - Restrictions to reduce erosion, maintain safety
- Move visitor-serving facilities further inland
  - Emphasize providing sandy areas
  - Allow removal of beach parking in favor of more sandy area
- Restrict replacement of public infrastructure that is damaged.
- Consider a Coastal Property Purchase Program.

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# Santa Monica LCP: Status Update

Council adopted the LUP in October 2018; it is currently pending Coastal Commission certification.

The LCP Implementation Plan, or Coastal Zoning Ordinance, is currently in development. The CZO will contain the City's first sea level rise regulations.



Elizabeth Bar-El, AICP  
Sr. Planner, LCP Project  
Manager

City of Santa Monica





*Wave run-up in a major storm with three meters of SLR.*



*Sand dunes as an adaptation measure to respond to wave run-up due to SLR*

# Explaining Sea Level Rise to the Community

- “Owl on the Pier” visualization
- Community Presentation, panel of experts
- Pilot Project: The Bay Foundation Dunes project



# QUESTIONS? Contact information

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The background of the slide is a grayscale photograph of a tide gauge in the ocean. The gauge is a vertical post with a scale and a float mechanism. The water is rippled, and the gauge is reflected in the surface below. The text is overlaid on the left side of the image.

# **NEXT IN THE SERIES....**

**TOPIC: Creating Coastal Hazard Zones:**

**Best Management Practices, Permitting and Planning**

**DATE: Fall 2020**