Appendix B

- Public Workshop #1 – PPT Presentation

City of Oceanside Local Coastal Program Update Workshop #1

LCP Update Community Workshop #1
November 8, 2018

Local Coastal Program (LCP) Update

What is the LCP?

Why are we updating it?

Where are we in the update process, and what comes next?

What are the expectations of the Coastal Commission?

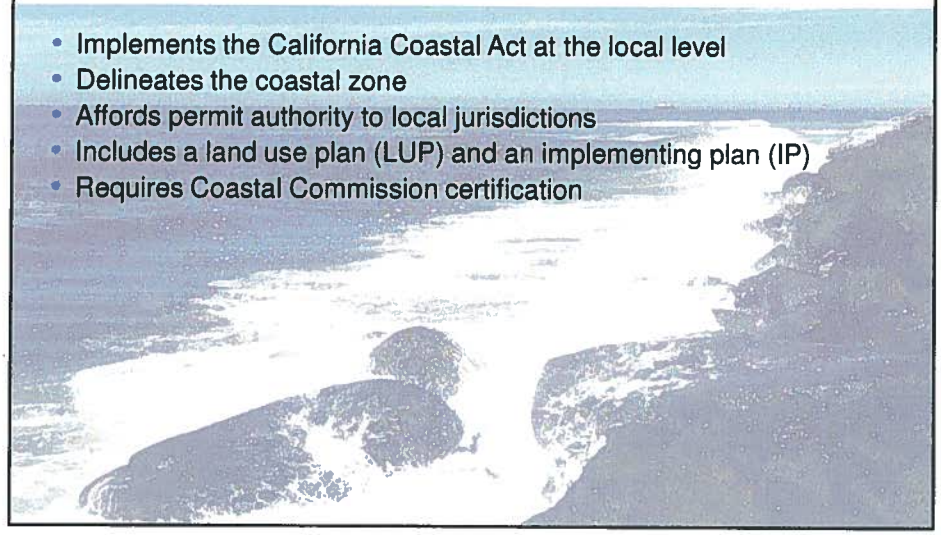
How does the LCP address the priorities and concerns of coastal zone residents?

Russ Cunningham, Principal Planner, City of Oceanside

LCP Update Community Workshop #1
November 8, 2018

What Is the LCP?

- Implements the California Coastal Act at the local level
- Delineates the coastal zone
- Affords permit authority to local jurisdictions
- Includes a land use plan (LUP) and an implementing plan (IP)
- Requires Coastal Commission certification



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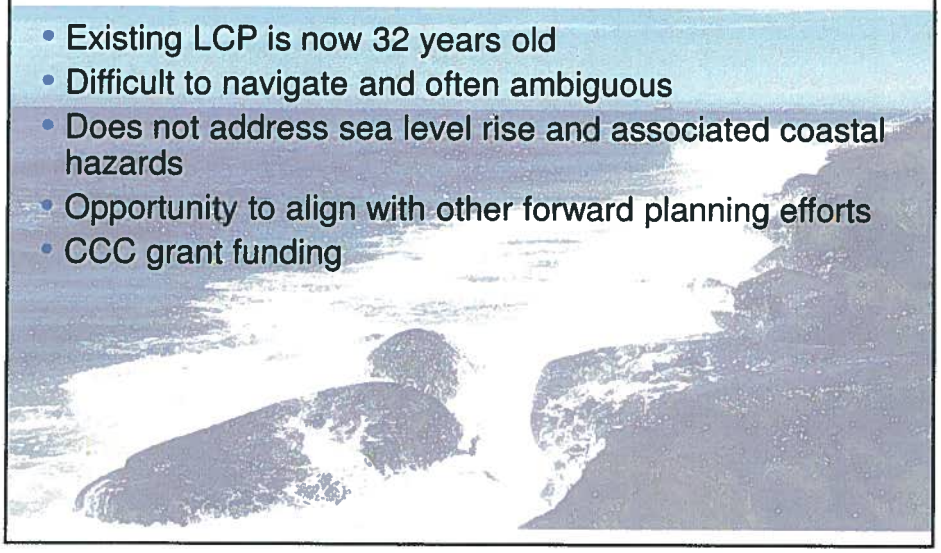
Why Are We Updating the LCP?

- Existing LCP is now 32 years old
- Difficult to navigate and often ambiguous
- Does not address sea level rise and associated coastal hazards
- Opportunity to align with other forward planning efforts
- CCC grant funding



Where Are We in the Process?

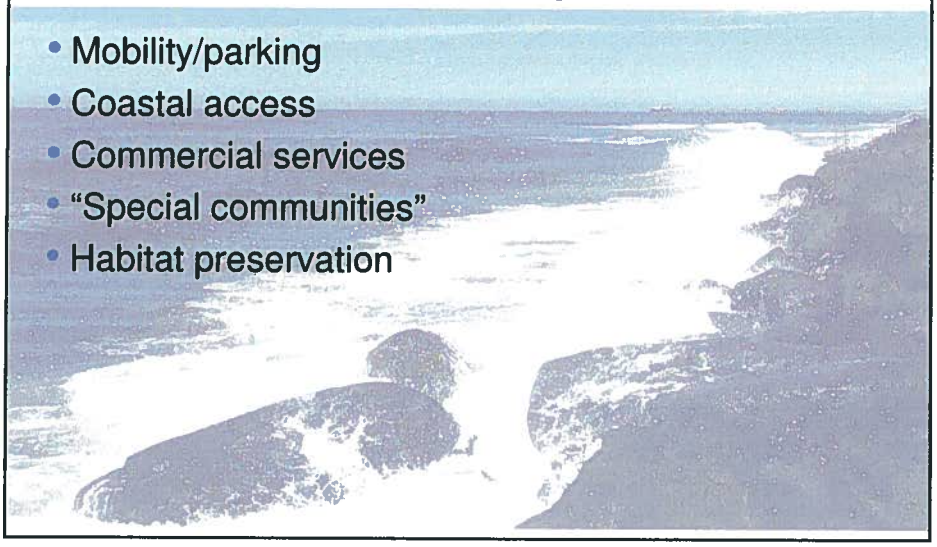
- Public outreach
  - Project webpage
  - Stakeholder interviews
  - Online surveys
- Background studies
- Vulnerability assessment
- Adaptation planning (2nd and 3rd workshops)
- Policy development (4th workshop)
- Public hearings
- CCC certification

What Are the CCC's Expectations?

- Consistency with the California Coastal Act
- Detailed assessment of potential SLR impacts
- Coastal hazard adaptation strategies
  - Protection (hard and soft armoring)
  - Accommodation (resilient design)
  - Siting of new improvements/development
- User friendliness
- Alignment with other forward planning documents

Priorities/Concerns of Coastal Zone Residents?

- Mobility/parking
- Coastal access
- Commercial services
- "Special communities"
- Habitat preservation

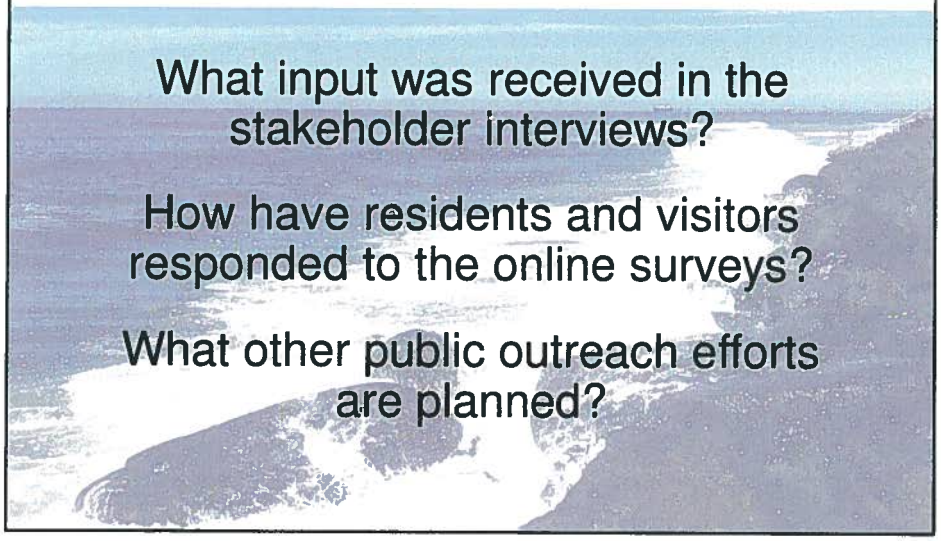


Initial Public Comment on the LCP

What input was received in the stakeholder interviews?

How have residents and visitors responded to the online surveys?

What other public outreach efforts are planned?



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Online Resident Survey Results

- Nearly 70% of respondents live in or near the City coastal zone.
- Most respondents want to see more food service and grocery uses.
- Over 80% of respondents believe SLR is happening, and over 50% believe the City should prioritize efforts to address it.
- Over 70% of respondents ranked downtown revitalization as the most positive change within the coastal zone over the past 20 years.
- Just under 50% of respondents view beach preservation and adapting to SLR as the greatest challenges now facing the coastal zone, while nearly 20% believe that accommodating additional growth is the greatest challenge.

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Online Resident Survey Results

Please share any additional thoughts you have regarding the future of the City's coastal zone.

Answered: 354 Skipped: 351

- Beach preservation
- Sea level rise
- Coastal access
- Concerns about change
- Support for change
- Homelessness
- Housing/STRs
- Visual quality

Online Visitor Survey Results

- More than 50% of respondents are occasional visitors. Roughly 20% of respondents have visited Oceanside only once.
- The beach, harbor, and pier are the primary draws for Oceanside visitors, along with restaurants, community events, and regional attractions.
- Roughly 80% of respondents typically access the coastal zone by automobile.
- More than 40% of respondents spend at least a week in Oceanside.
- Roughly 35% of overnight visitors stay in hotels, while another 20% stay in short-term rentals.

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Online Visitor Survey Results

- Nearly 40% of respondents say they choose to visit Oceanside because of its unique coastal assets. Almost 20% come to Oceanside because it's easy to access from the communities in which they live. Another 14% choose to visit Oceanside because it's less expensive than other nearby coastal cities.

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Stay Calm, and Plan

Adaptation Principles, Goals, and Strategies

What community values and priorities should inform our adaptation planning efforts?

How do these local values and priorities align with state law and CCC guidance?

To what extent can history guide us, in terms of what to expect and how to respond?

Sea Level Rise: Why all the uncertainty?

Julie Kalansky, Dan Cayan, Sam Iacobellis and David Pierce

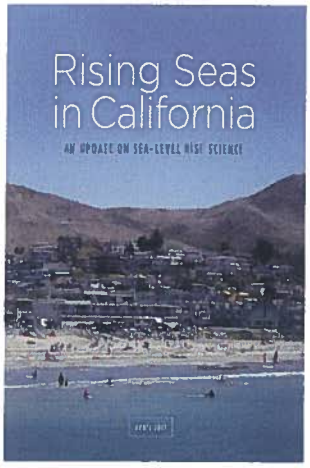
CNAP, Scripps Institution of Oceanography

November 8th, 2018

CNAP
California-Nevada Climate Applications Program
A NOAA RISA team

SCRIPPS INSTITUTION OF OCEANOGRAPHY

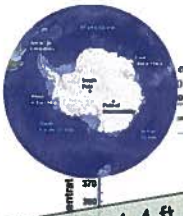
Ocean Protection Council: Rising Seas in California

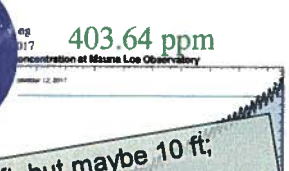


Provides scientific foundation for the pending update to *The State of California Sea Level Rise Guidance Document*

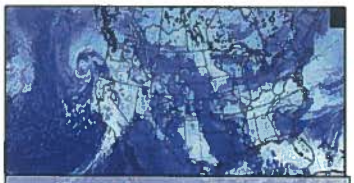
- Gary Griggs, *University of California Santa Cruz, OPC-SAT Working Group Chair)*
- Dan Cayan, *Scripps Institution of Oceanography, OPC-SAT*
- Claudia Tebaldi, *National Center for Atmospheric Research & Climate Central*
- Helen Amanda Fricker, *Scripps Institution of Oceanography*
- Joseph Arvai, *University of Michigan*
- Robert DeConto, *University of Massachusetts*
- Robert E. Kopp, *Rutgers University*

3 Main Points



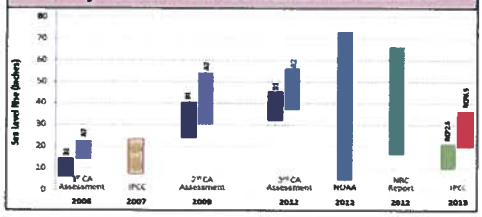


Range ~1-4 ft, but maybe 10 ft; Uncertainty related to Antarctica and Green House Gas Emissions

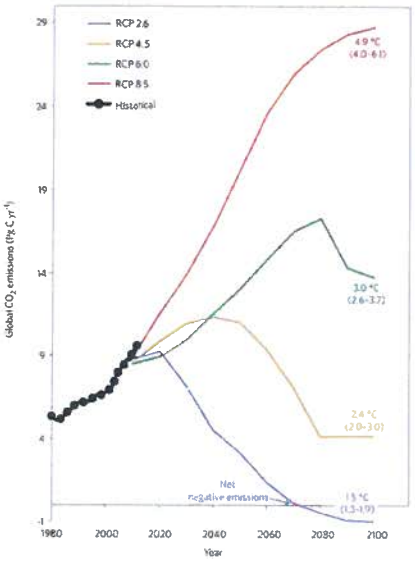


Extreme Events are important in the near term; El Niño, King Tides and E. Pacific Hurricanes

Projections will continue to Evolve



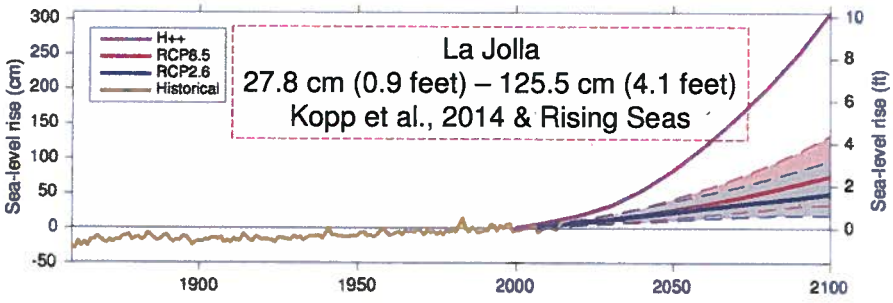
Greenhouse Gas Emission Scenarios



Stanford et al., 2014

What is the Range of SLR projections?

(b) Relative sea level in San Francisco, California

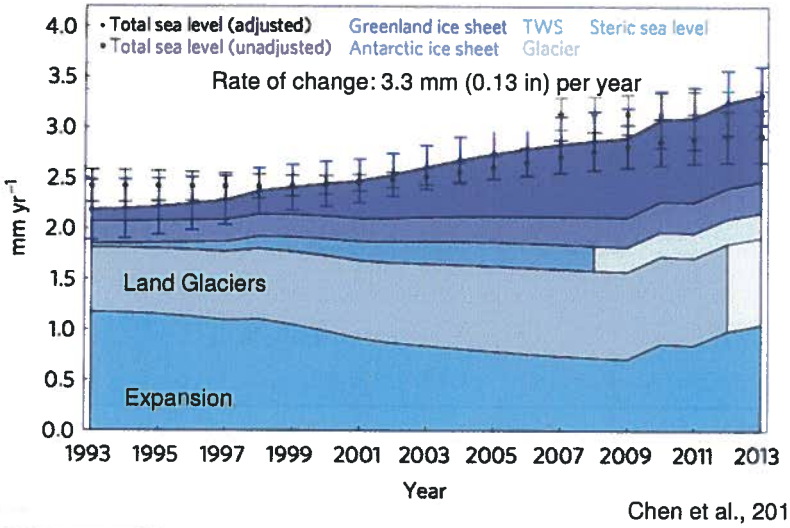


Feet of SLR at 2100

?

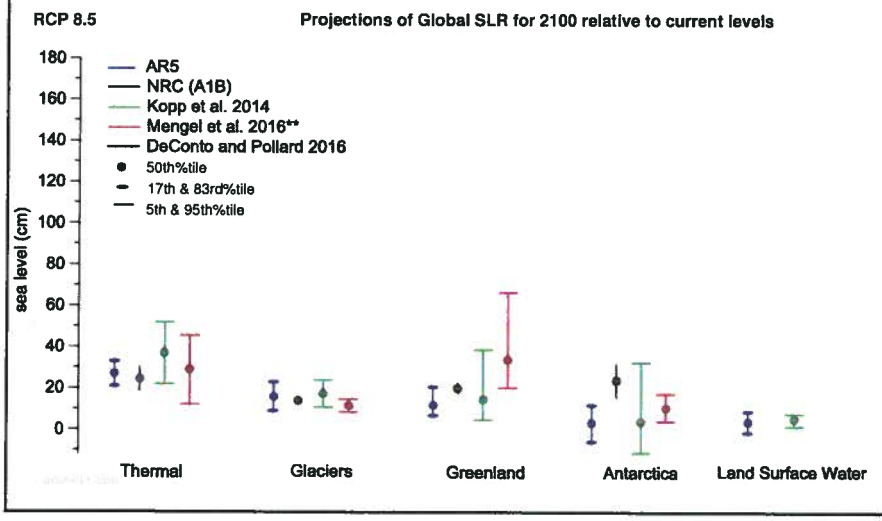
RCP	5th%tile	50%tile	95%tile
RCP 2.6	0.9	1.7	3.0
RCP 4.5	1.0	2.0	3.3
RCP 8.5	1.5	2.6	4.1

Ice Sheets
Now Largest Contributor to SLR



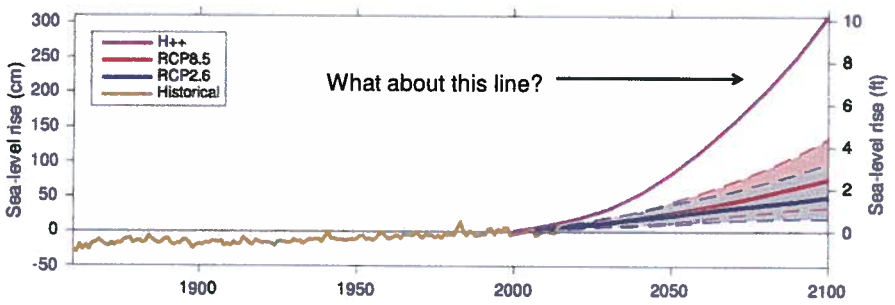
Chen et al., 2017

What Contributes to SLR in the Future?
Ice sheets are most uncertain.



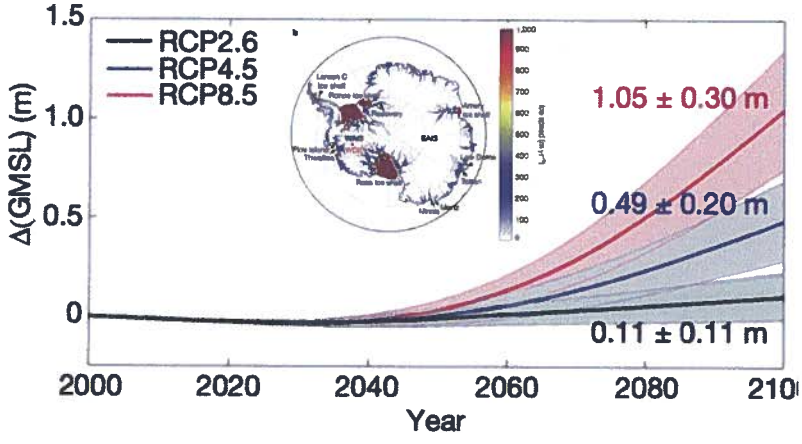
What is H++?

(b) Relative sea level in San Francisco, California



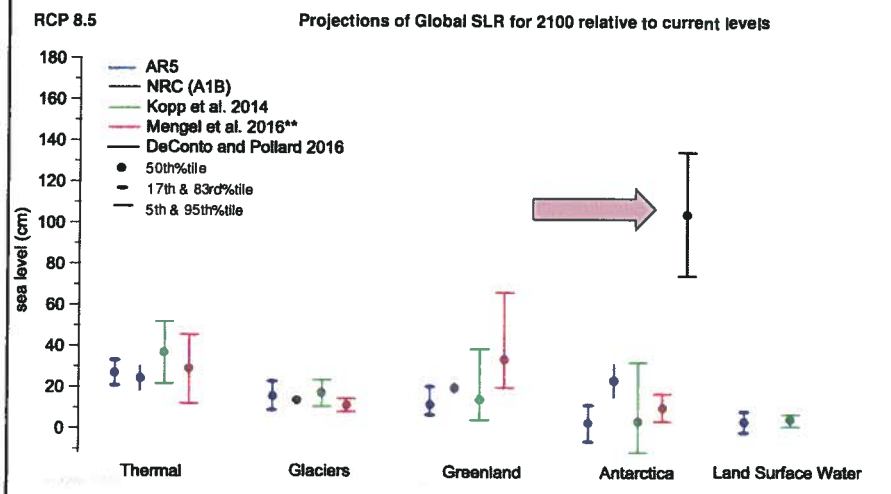
RCP	5th%tile	50%tile	95%tile	99.9th%tile
RCP 2.6	0.9	1.7	3.0	7.8
RCP 4.5	1.0	2.0	3.3	8.0
RCP 8.5	1.5	2.6	4.1	9.0

New Modeling results for Antarctica



Deconto and Pollard, 2016

New Science From Antarctica How does this compare?

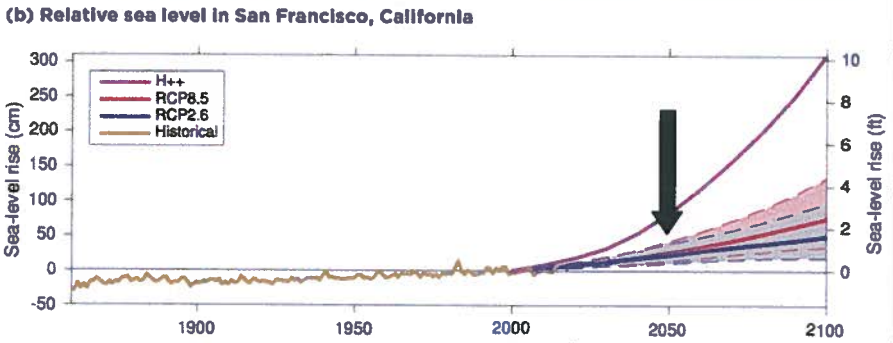


Why so much uncertainty around Antarctica?

- Difficult to model entire continent and land and ocean interactions. Models are just being developed and compared.
- Few observations – hard to get to and only possible part of the year
- Uncertain of snow/ice interactions on top of ice sheet to prevent melt water from fracturing the ice-sheet.
- Have not observed potential mechanisms for future loss of ice from Antarctica.

OPC, Rising Seas, Appendix 2

2050 vs. 2100
small differences at 2050



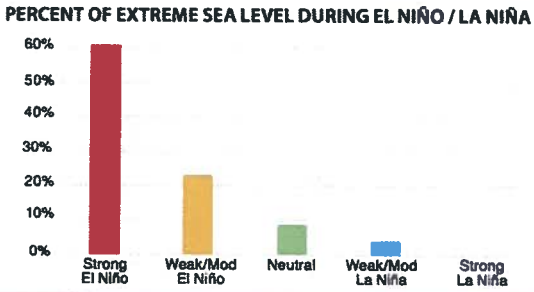
Feet of SLR at 2050/2100

RCP	5th%tile	50%tile	95%tile
RCP 2.6	0.5/0.9	0.8/1.7	1.2/3.0
RCP 4.5	0.5/1.0	0.9/2.0	1.2/3.3
RCP 8.5	0.6/1.5	0.9/2.6	1.3/4.1

SLR Projections Summary

- Projections range between 0.9-4.1 feet at 2100 depending on probability and greenhouse gas scenario
- Ice Sheets (Antarctica and Greenland) are becoming the largest contributors
- New science suggests Antarctica could contribute more than previously thought – still very active area of research
- Relatively small differences between RCPs prior 2050

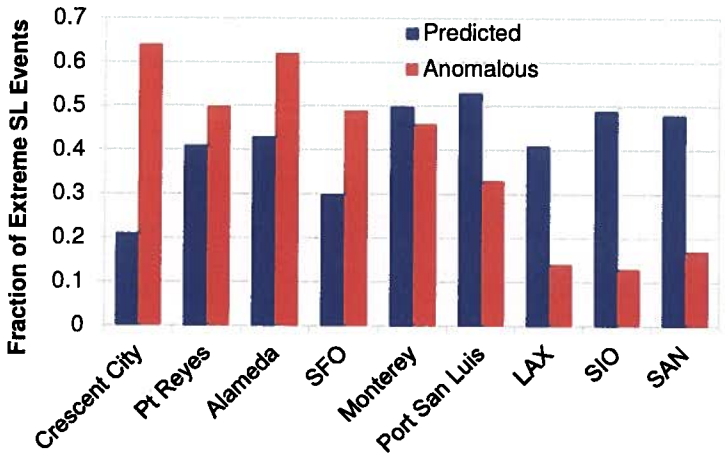
Historical Extreme Events are caused by El Niño events, King Tides and E. Pacific Hurricanes



	Strong El Nino	Weak El Nino	E Pacific Hurricane	Other
Anomalous	67%	10%	15%	8%
Absolute	55%	22%	4%	19%

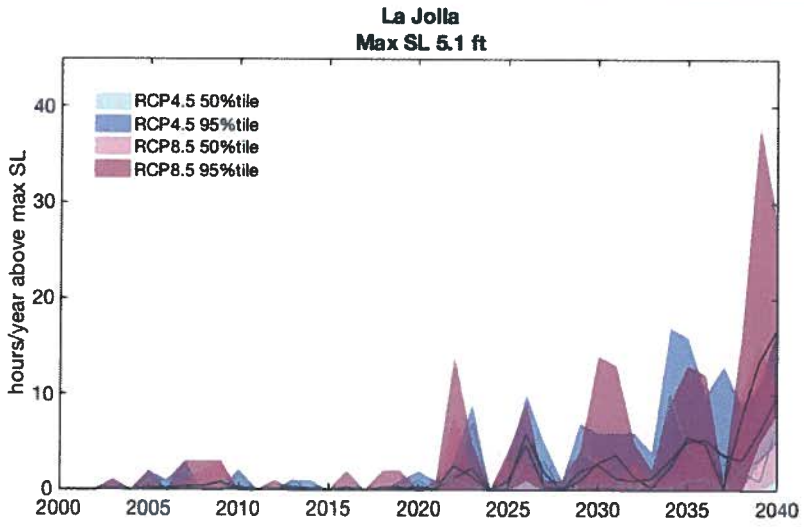
D. Cayan

Southern CA has more predicted extreme events than Northern CA

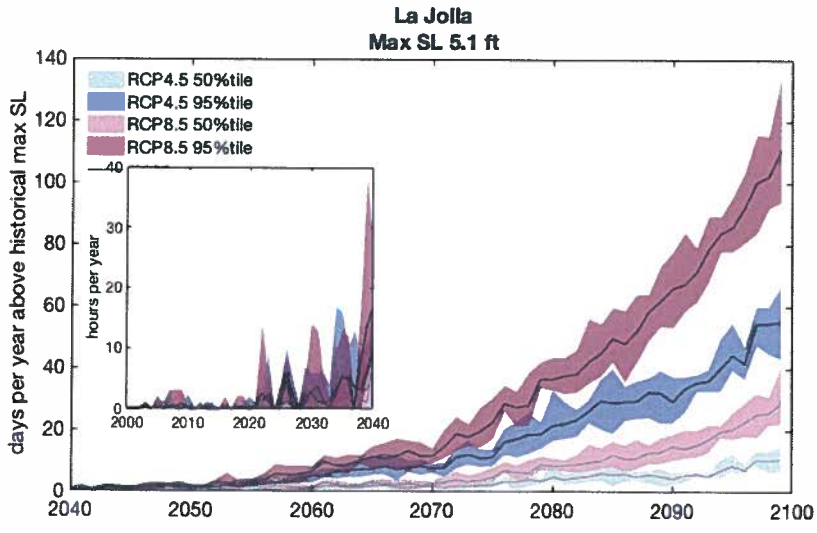


D. Cayan

Extreme Events in the near Future



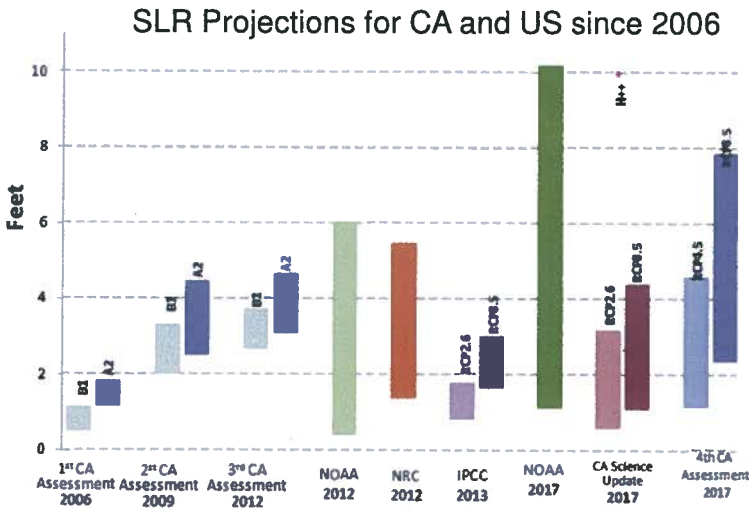
Extreme Events in the Future



Extreme Events Summary

- Extreme event occurrences are related to El Niño events
- In S. CA extreme events often occur with maximum tides
- In the near term, ~2030-2050, extreme events have the potential to be more impactful than long term, secular, SLR

SLR projections Continually Evolve



Conclusions

- Range of SLR projections is between ~1-4 ft, but maybe 10 ft.
- Ice sheets are the largest uncertainty – science is continually evolving. Greenhouse gas emissions uncertain as well.
- Prior to 2050, the greenhouse gas scenarios produce very different SLR projections

- Extreme SL events are driven primarily by El Nino, important to consider for near term.

SLR projections will continue to evolve and need an approach that can accommodate new science and new projections.

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Questions

Vulnerability Assessment Overview

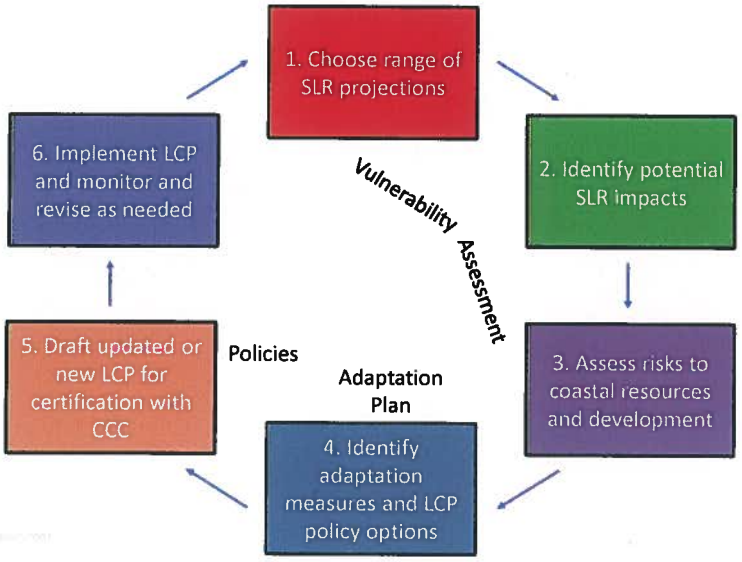
Lindsey Sheehan, ESA

LCP Update Community Workshop #1
November 8, 2018

Where Are We in the Process?

- Public outreach
  - Project webpage
  - Stakeholder interviews
  - Online surveys
- Background studies
- Vulnerability assessment
- Adaptation planning (2nd and 3rd community workshops)
- Policy development (4th community workshop)
- Public hearings
- CCC certification

Follows CCC Sea Level Rise Policy Guidance



Vulnerability Assessment Preparation

- Establish planning horizons and sea-level rise scenarios
- Develop asset inventory
- Map flood and erosion hazards
- Overlay hazards with assets to develop vulnerability assessment

Scenario	Date Range	Sea-Level Rise
Existing conditions	Now	0 m
Short-term	2025 – 2045	0.25 m
Mid-term	2040 – 2070	0.5 m
Long-term	2070 – 2100	1 m
Longer-term	2100 – 2140	1.75 m

Vulnerability Assessment Preparation

- Establish planning horizons and sea-level rise scenarios
- Develop asset inventory
- Map flood and erosion hazards
- Overlay hazards with assets to develop vulnerability assessment

- Building Assets 
- Infrastructure Assets 
- Hazardous Materials 

- Natural Assets 
- Cultural Assets 
- Public Access and Recreation Assets 

Vulnerability Assessment Preparation

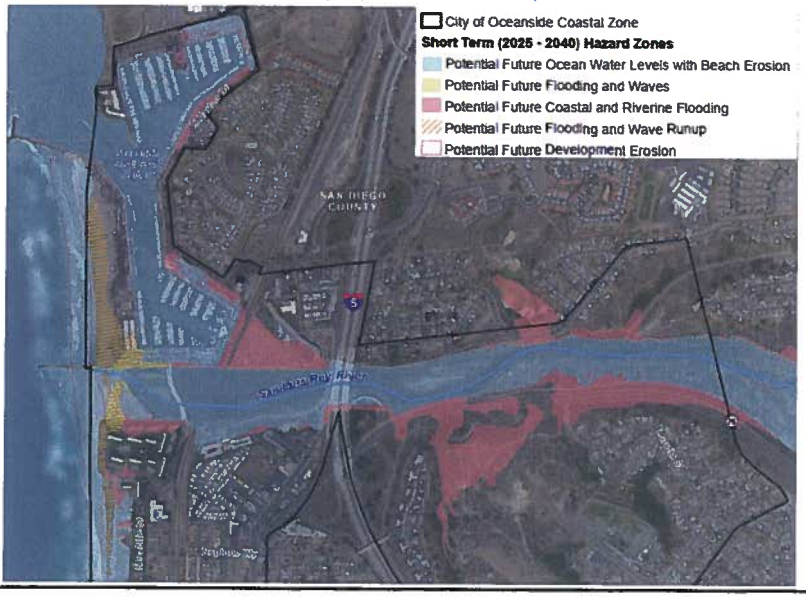
- Establish planning horizons and sea-level rise scenarios
- Develop asset inventory
- Map flood and erosion hazards
- Overlay hazards with assets to develop vulnerability assessment


Inundation

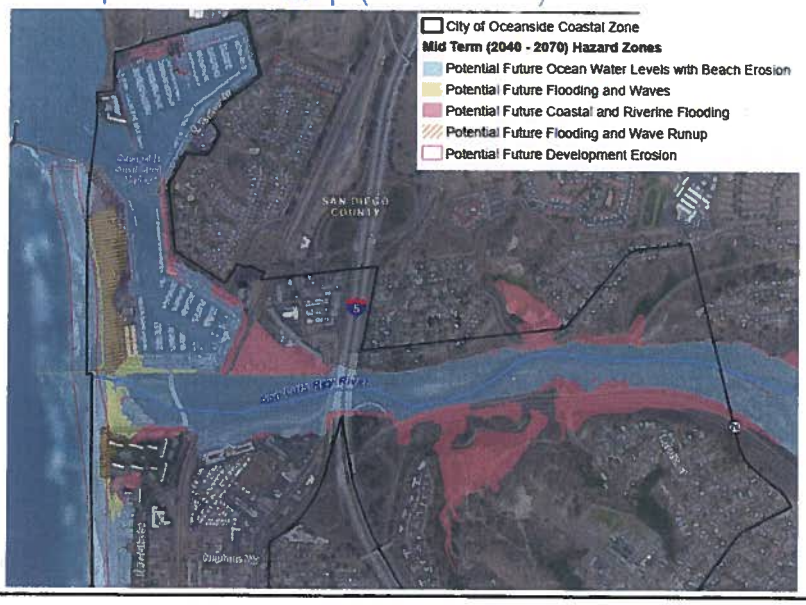
Wave runup

Erosion

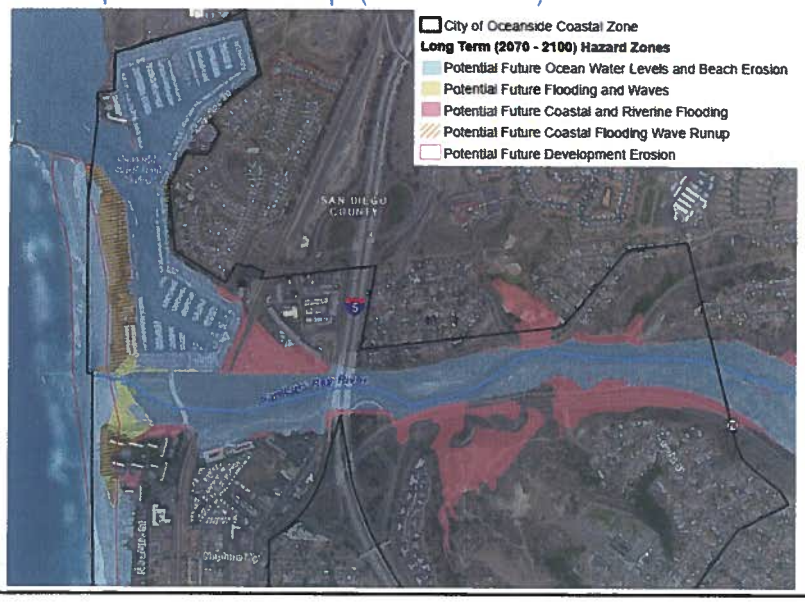
Example Hazard Map (2025-2040)



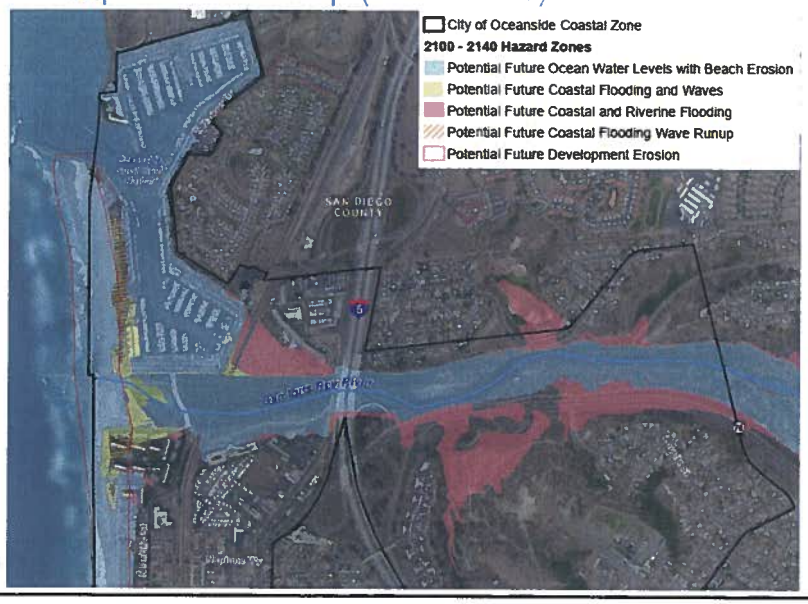
Example Hazard Map (2040-2070)



Example Hazard Map (2070-2100)



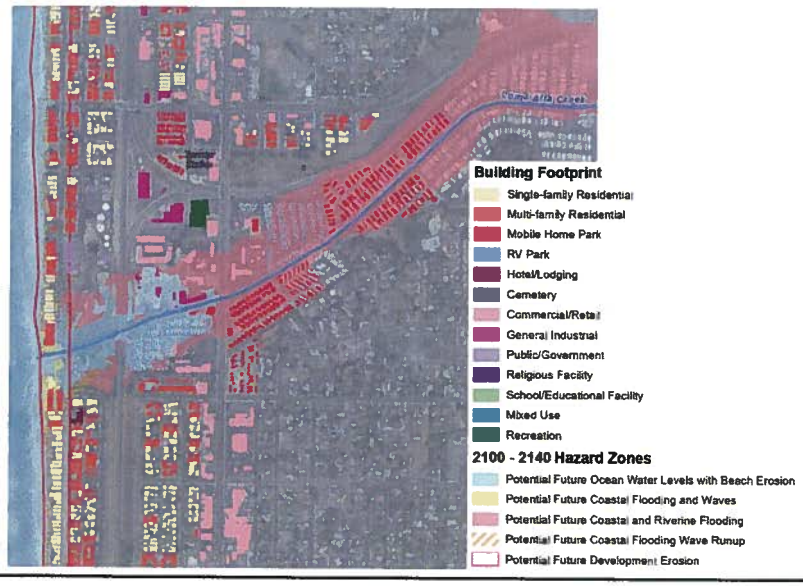
Example Hazard Map (2100-2140)



Vulnerability Assessment Preparation

- Establish planning horizons and sea-level rise scenarios
- Develop asset inventory
- Map flood and erosion hazards
- Overlay hazards with assets to develop vulnerability assessment

Example Asset Maps



Follows CCC Guidance on Vulnerability Assessment

- **Exposure:** will SLR impacts affect the resource at all? (Vulnerability Assessment)
- **Sensitivity:** if exposed, to what degree will resources be affected? (Vulnerability Assessment)
- **Adaptive Capacity:** how easily can the resource adapt to SLR? (Vulnerability Assessment)
- **Consequences:** what are the economic, ecological, social, cultural, and legal consequences to impacts? (Vulnerability Assessment)
- **Land Use Constraints:** should the types and intensities of land use be altered to minimize hazards? (Adaptation Plan)

Example Vulnerability Table

Coastal Structures	
Asset	**Several types of coastal structures exist in Oceanside:** ▪ **Shoreline protective devices (seawalls, riprap);** ▪ **San Luis Rey River levees and floodwalls;** ▪ **San Luis Rey River groin; and** ▪ **Oceanside Harbor jetties and breakwaters.**

Example Vulnerability Table

	Coastal Structures
Exposure to Hazard and Consequences	All of the coastal structures are specifically designed and intentionally located to be in the hazard zones. However, over time, the exposure of the structures will likely increase, so that riprap that experiences occasional flooding today could experience deeper floodwaters and stronger wave action in the future. ▪ Shoreline protective devices: High ▪ San Luis Rey River levees and floodwalls: Medium ▪ San Luis Rey River groin: High ▪ Oceanside Harbor jetties and breakwaters: High
	Hazard exposure grade: Medium to High depending on structure

Example Vulnerability Table

	Coastal Structures
Sensitivity to Hazard and Adaptive Capacity	Coastal structures are designed to be in hazard zones, however: ▪ Increased water levels and wave-runup during storms can cause damage to the structures; and ▪ Increased erosion of riprap can lead to incremental reduction in the level of flood protection and/or increased maintenance costs.
	Sensitivity grade: ▪ Low (assuming some level of maintenance) ▪ Oceanside Harbor jetties and breakwaters: Medium

Example Vulnerability Table

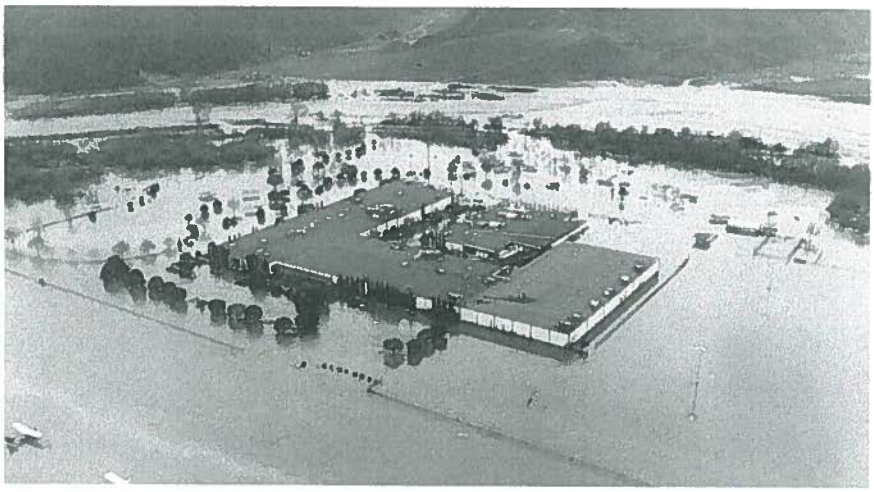
	Coastal Structures
Vulnerability Summary	▪ Shoreline protective devices: Medium ▪ San Luis Rey levees and floodwalls: Medium-Low ▪ San Luis Rey River groin: Medium ▪ Oceanside Harbor jetties and breakwaters: Medium-High

Conclusions

- Vulnerable areas include:
  - Beaches and coastal assets
  - Assets along rivers/creeks
  - Harbor assets
- Oceanside's current vulnerabilities are projected to increase in frequency, intensity, and extent
- Next step is to identify adaptation measures to reduce these risks

Questions

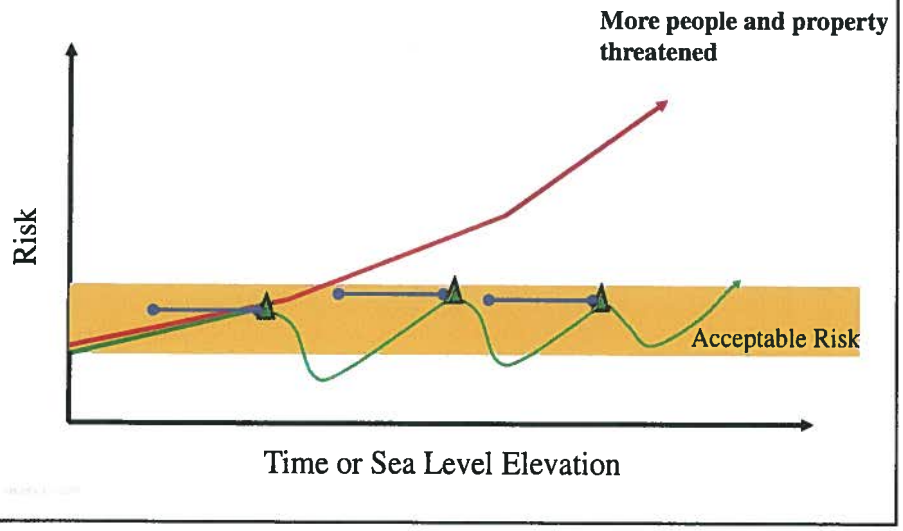
Small-Group Discussions



Kimiko Lizardi, ESA

Introduction to Adaptation Planning Process and Strategies

Adaptation Planning

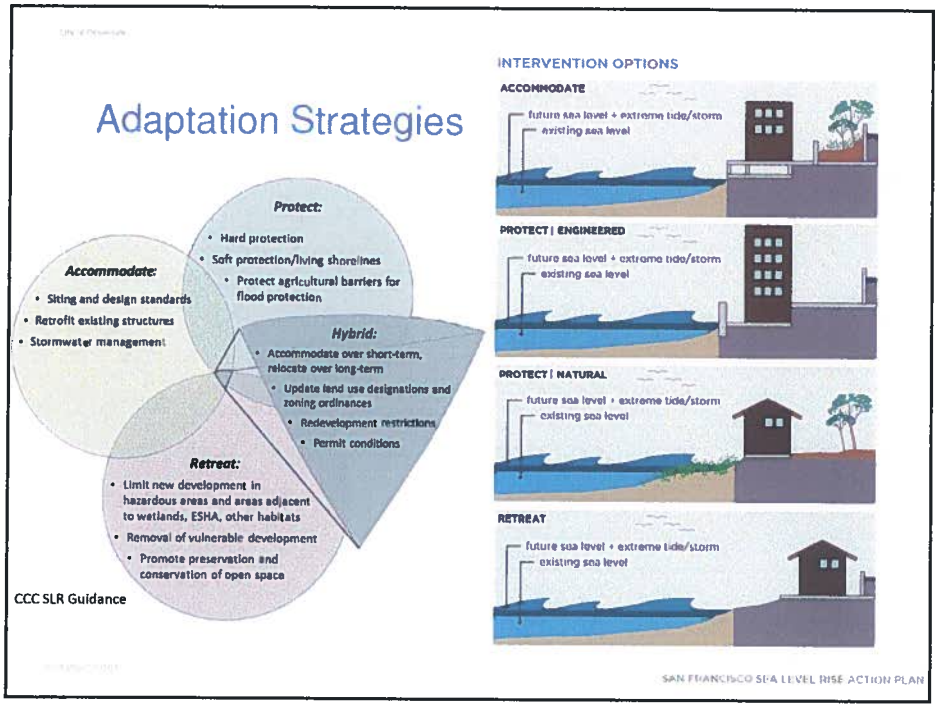


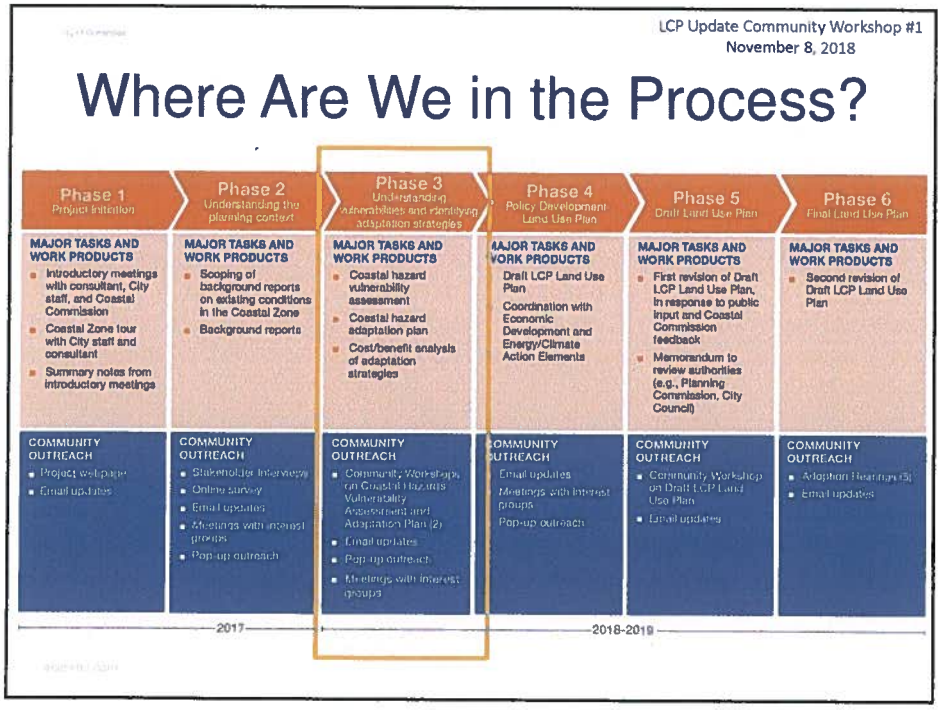
The Adaptation Planning Framework

- In order to plan for this cycle, we need an Adaptation Plan to lay out the framework
- The framework includes:
  - Monitoring (e.g., sea-level rise, increased flooding, beach width)
  - Project-level planning (project design, permitting, construction)
  - Reevaluation (is this strategy achieving the community's goals?)

The City needs an Adaptation Toolbox

Having an adaptation toolbox will allow Oceanside to start planning now for both near-term strategies and those that will take a long time and many resources to implement.


Adaptation Strategies
Protect:
• Hard protection
• Soft protection/living shorelines
• Protect agricultural barriers for flood protection
Accommodate:
• Siting and design standards
• Retrofit existing structures
• Stormwater management
Hybrid:
• Accommodate over short-term, relocate over long-term
• Update land use designations and zoning ordinances
• Redevelopment restrictions
• Permit conditions
Retreat:
• Limit new development in hazardous areas and areas adjacent to wetlands, ESHA, other habitats
• Removal of vulnerable development
• Promote preservation and conservation of open space
CCC SLR Guidance
INTERVENTION OPTIONS
ACCOMMODATE
future sea level + extreme tide/storm
existing sea level
PROTECT | ENGINEERED
future sea level + extreme tide/storm
existing sea level
PROTECT | NATURAL
future sea level + extreme tide/storm
existing sea level
RETREAT
future sea level + extreme tide/storm
existing sea level
SAN FRANCISCO SEA LEVEL RISE ACTION PLAN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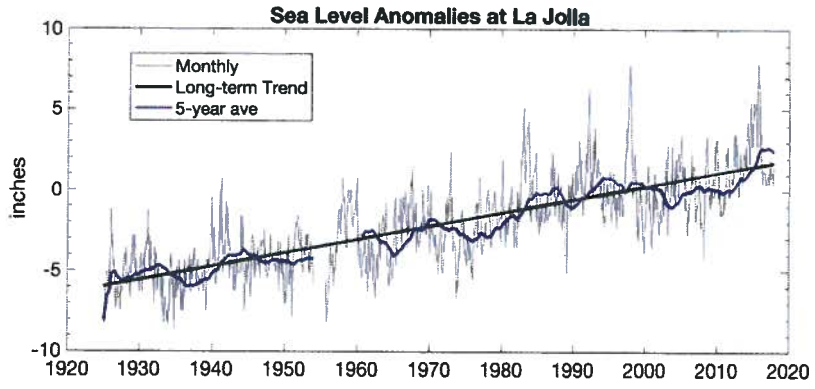
November 8, 2018
Where Are We in the Process?
Phase 1
Project Initiation
Phase 2
Understanding the planning context
Phase 3
Understanding vulnerabilities and identifying adaptation strategies
Phase 4
Policy Development Land Use Plan
Phase 5
Draft Land Use Plan
Phase 6
Final Land Use Plan
MAJOR TASKS AND WORK PRODUCTS
Introductory meetings with consultant, City staff, and Coastal Commission
Coastal Zone tour with City staff and consultant
Summary notes from introductory meetings
MAJOR TASKS AND WORK PRODUCTS
Scoping of background reports on existing conditions in the Coastal Zone
Background reports
MAJOR TASKS AND WORK PRODUCTS
Coastal hazard vulnerability assessment
Coastal hazard adaptation plan
Cost/benefit analysis of adaptation strategies
MAJOR TASKS AND WORK PRODUCTS
Draft LCP Land Use Plan
Coordination with Economic Development and Energy/Climate Action Elements
MAJOR TASKS AND WORK PRODUCTS
First revision of Draft LCP Land Use Plan, in response to public input and Coastal Commission feedback
Memorandum to review authorities (e.g., Planning Commission, City Council)
MAJOR TASKS AND WORK PRODUCTS
Second revision of Draft LCP Land Use Plan
COMMUNITY OUTREACH
Project webpage
Email updates
COMMUNITY OUTREACH
Stakeholder interviews
Online survey
Email updates
Meetings with interest groups
Pop-up outreach
COMMUNITY OUTREACH
Community Workshops on Coastal Hazards Vulnerability Assessment and Adaptation Plan (2)
Email updates
Pop-up outreach
Meetings with interest groups
COMMUNITY OUTREACH
Email updates
Meetings with interest groups
Pop-up outreach
COMMUNITY OUTREACH
Community Workshop on Draft LCP Land Use Plan
Email updates
COMMUNITY OUTREACH
Adoption Hearings (3)
Email updates
2017
2018-2019

Extra Slides

La Jolla Gauge SL



Alaska's Glaciers

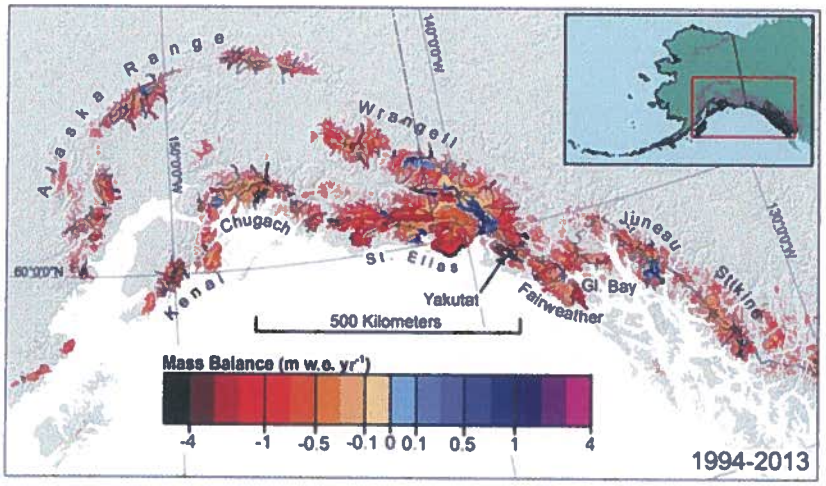
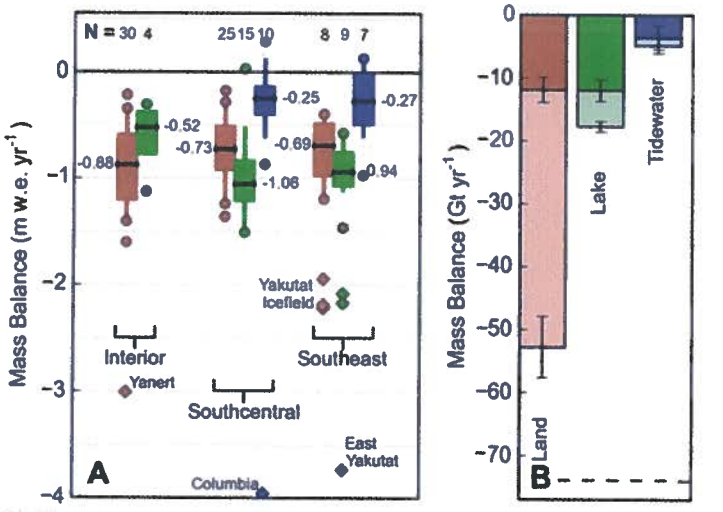


Figure 1. Estimated mass balance (1994–2013) for surveyed and unsurveyed glaciers in the most densely glacierized subregion of Alaska. The inset shows the entire region. Black lines indicate survey flight lines.

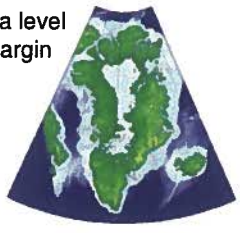
Alaska's Glaciers



Larsen et al., 2015, *GFDL*

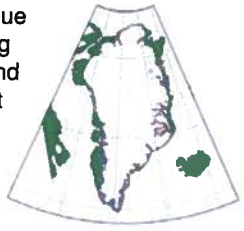
Antarctica and Greenland are different

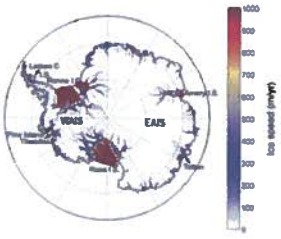
Above sea level around margin



Below sea level around margin

Ice loss due to ice berg calving and melting at end of glaciers

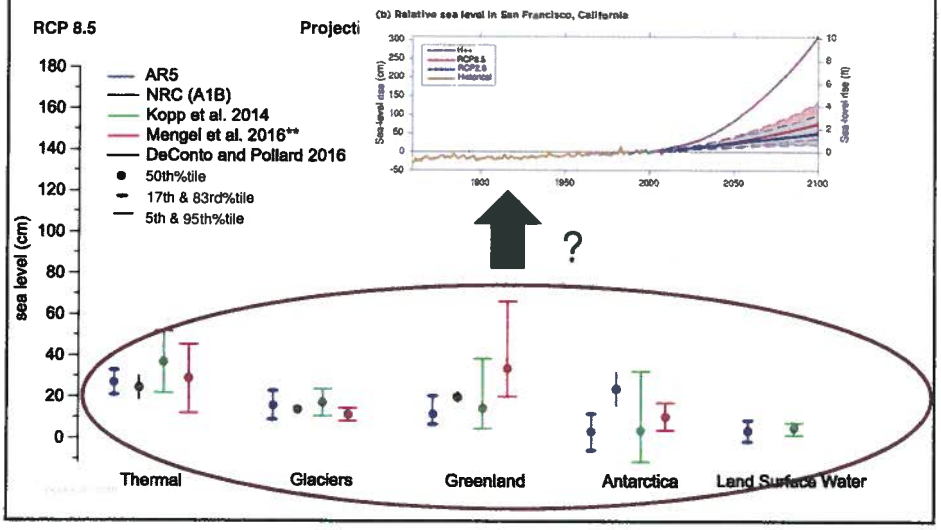




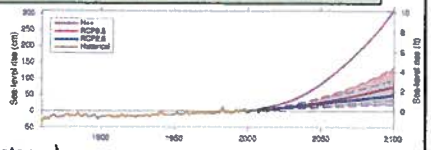
Ice loss at ice shelves, and occurs in the ocean

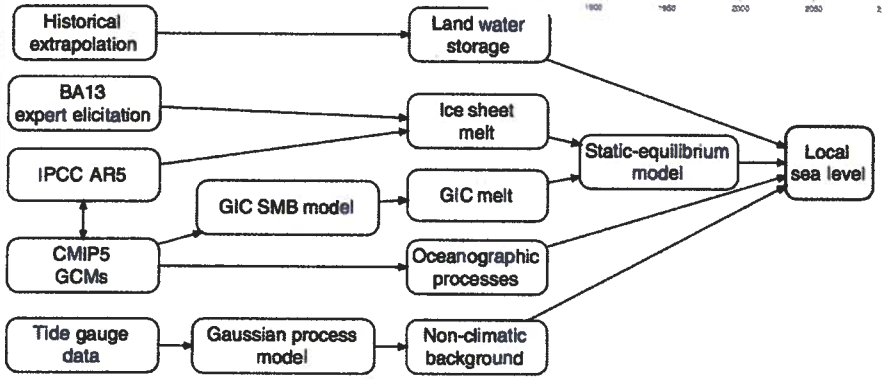
OPC, Rising Seas

How are probabilistic projections developed?

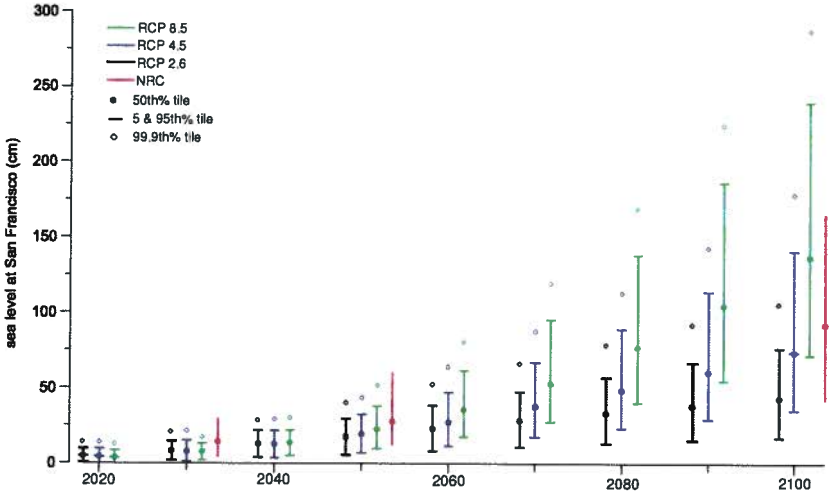


Probabilistic Projections – Kopp et al., 2014
Projections provided by R. Kopp, Rutgers University

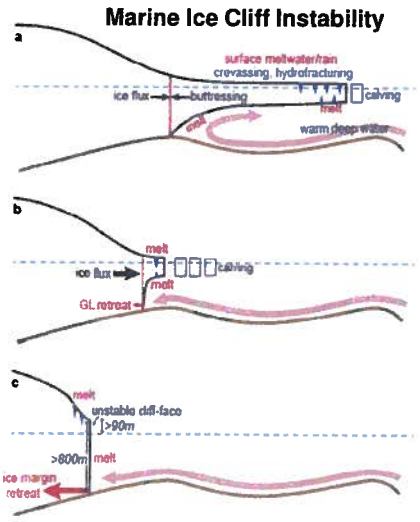




Sea Level Future Projections:
3 different GHG scenarios relative to 2000



Ice Sheet Mass Loss at Marine Interface



- Ice shelf seaward flow is inhibited by "buttressing." **Buttressing ice shelves** are vulnerable to climate change.
- Many marine-based Antarctic outlet glaciers rest on bedrock these have reverse-sloped beds. In places with this reverse-sloped geometry, the ice sheet is susceptible to a **Marine Ice Sheet Instability**.
- Another glaciological process: **Marine Ice Cliff Instability,** not previously considered at the continental ice-sheet scale, was shown to have a profound effect on ice sheet simulations in

Sea-level Fingerprint of West Antarctic Ice Sheet Mass Loss

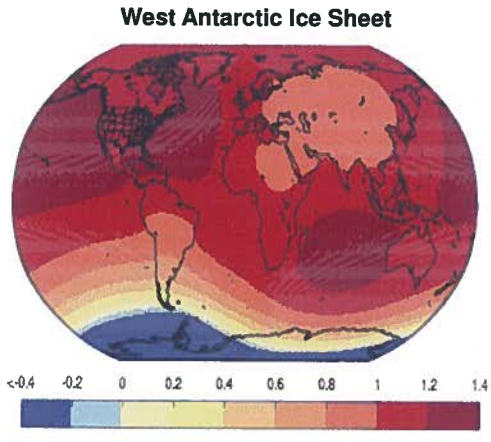


Figure 1. Sea-level 'fingerprints' resulting from the distribution of ice and water around the Earth and ensuing gravitational and rotational effects.

- There is no worse place for California for land ice to be lost than from the West Antarctic Ice Sheet, because of globally-uneven gravitational and rotational effects.
- For every foot of global sea-level rise caused by the loss of ice on West Antarctica, sea-level will rise about 1.25 feet along the California coast.