

Climate Change Vulnerability Assessment of the Bay Restoration Plan (BRP)



There has been broad consensus in our region that climate change will have significant impacts on local communities and we must prepare to adapt to these impacts.

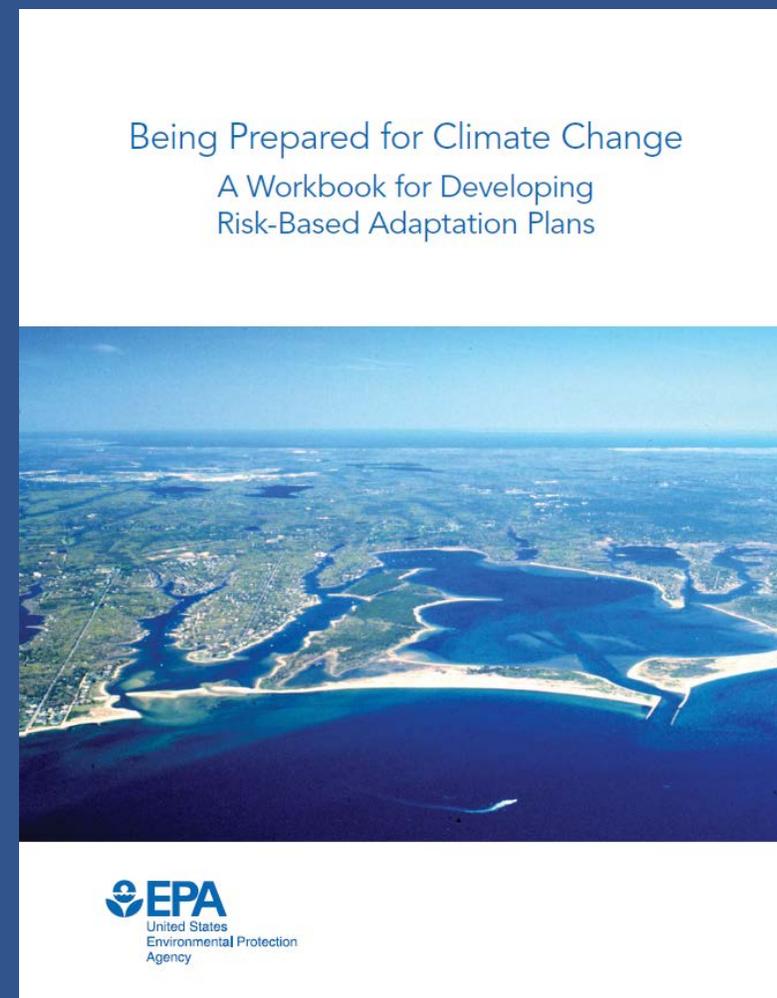


media credit: McClatchy-Tribune News Service



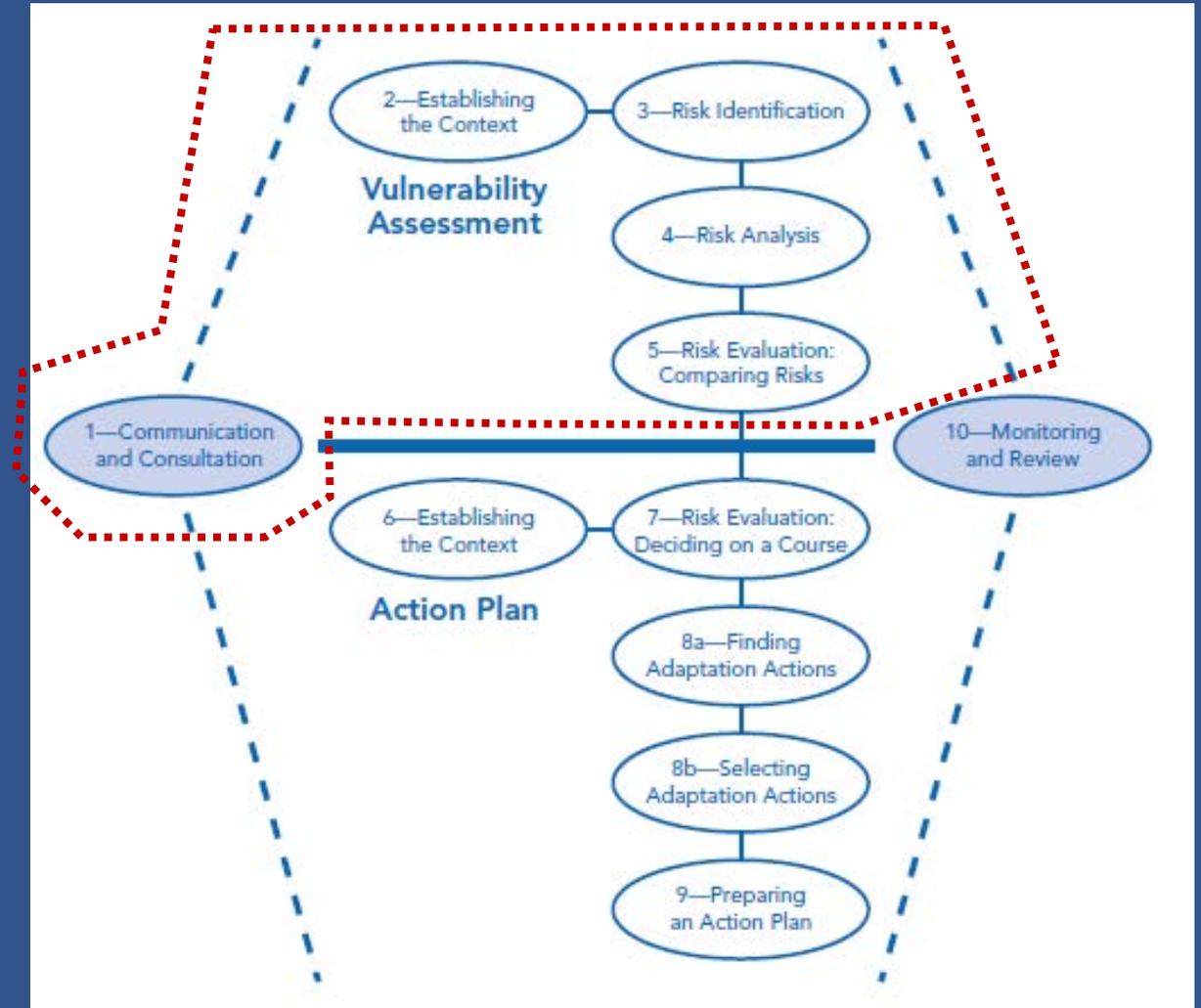
“Climate-ready” BRP

- Broad, risk-based assessment of goals and milestones
- Guidance using the EPA's workbook steps for developing risk-based adaptation plans
 - 1st Phase – Vulnerability Assessment (Current)
 - 2nd Phase – Action Plan (Future)
- Incorporate
 - Previous studies and resources
 - Targeted stakeholders / climate experts
 - Students



Vulnerability Assessment Process

- Communication and Consultation
- Establishing the Context
- Risk Identification
- Risk Analysis
- Risk Evaluation: Comparing Risks



Task 1 – Review and Communication of Existing Information

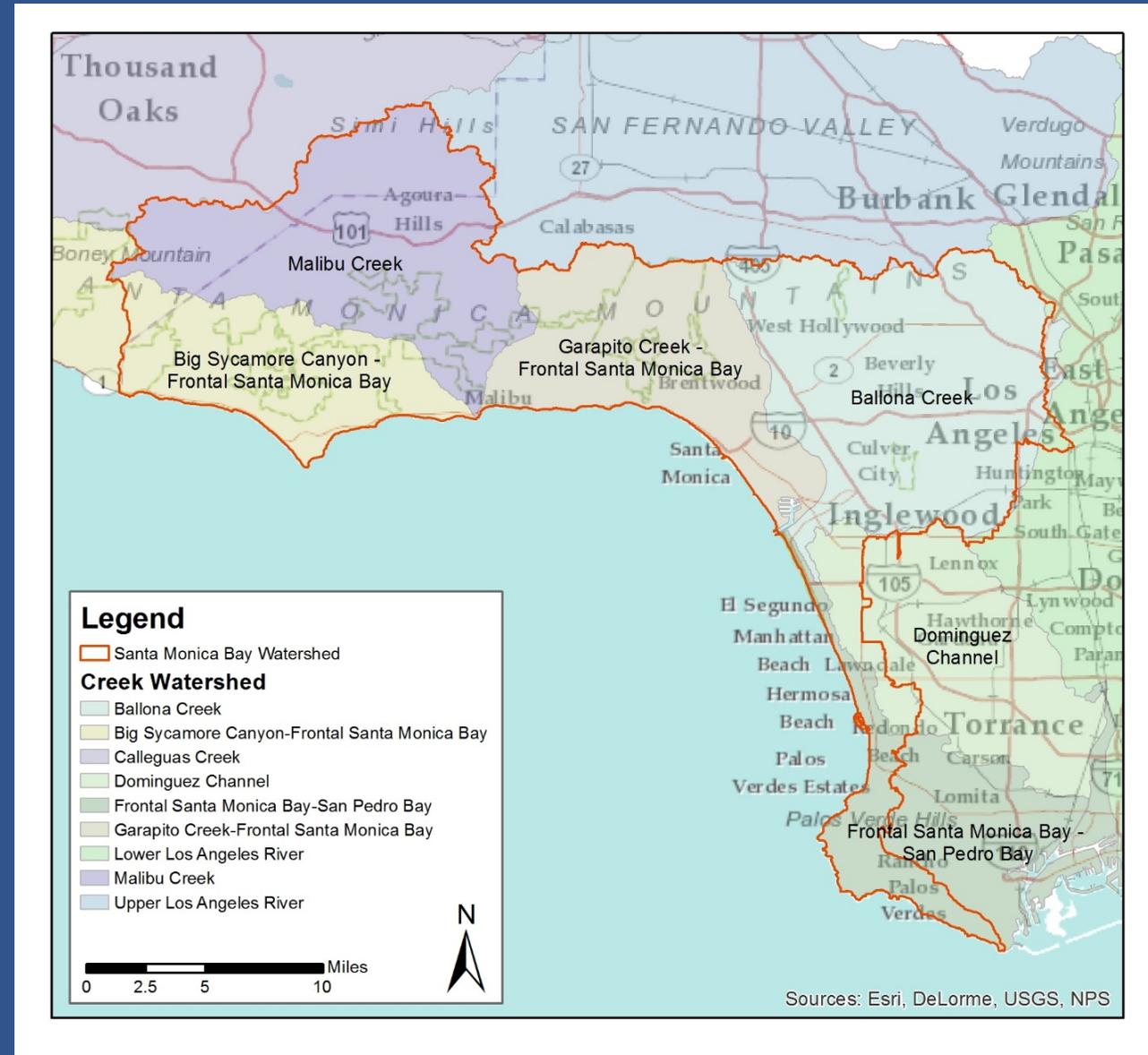
- UCLA Student Project
 - Developed an extensive inventory of Climate Change related tools that can be utilized towards identifying and evaluating risks
 - Small case study using the tools identified to conduct a vulnerability assessment on one BRP goal
 - Prioritized / ranked tools in inventory



Name	Type	geographical scale	Agencies Involved	Topic
CropScape	Online	National	Space Administration, U.S. Department of Agriculture	National Agrimajor commodities and produce digital, crop-specific, categorized g
Soil Climate Analysis	Online	National	Agriculture - Natural Resources Conservation Service - National Watch	humidity, wind speed and direction, barometric pressure, snowwate
VegScape—Vegetation Condition Explorer	Online	National	Agricultural Statistics Service - George Mason University - Center fo	liture/cropland/vegetation condition/NDVI, VCI, RVCI, RMVCI, M
CalWeedMapper	Online	California	California Invasive Plant Council (Cal-IPC)	Biodiversity/Invasive species/invasive plant distribution
Modeling Bird Distribution Responses to Climate Change	Online	California	Point Blue Conservation Science	to climate change/temperature, precipitation, Vegetation, Soil perm
Biodiversity Information Serving Our Nation (Inventory)	Online	National	U.S. Geological Survey (USGS)	ies occurrence data, records of an organism at a particular time in
Data Basin (Inventory)	Online	National	Conservation Biology Institute	ersity/precipitation, invasive species distribution, biodiversity Conse
Environmental Sensitivity Index	Online	National	National Oceanic and Atmospheric Administration	ity/species distribution/Birds, fish, habitats, invertebrates, marine n
California Climate and Hydrology Change Graphs	Online	California	Climate Commons	ge, runoff, max/min month temperature, actual/potential evapotransp
Climate Inspector	Online	Global	National Center for Atmospheric Research	Climate change/Air Temperature change, Precipitation level
Climate Outlooks	Online	National	National Oceanic and Atmospheric Administration	Climate Prediction
ClimateData.us	Online	National	HabitatSeven	imate Change/air temperature change and forecast, precipitation lev
Climate Wizard	Online	National	The Nature Conservancy	e Change/Average air temperature change and forecast, precipitati
CMIP Climate Data Processing Tool	Excel	National	U.S. Department of Transportation	Change/min&max air temperature change and forecast, precipitati

Climate Change Tool Inventory

- Tools relevant to Santa Monica Bay Watershed and BRP goals
- 70 tools documented
 - Geospatial tools
 - Studies
 - Reports
 - Datasets
- Tools categorized and ranked

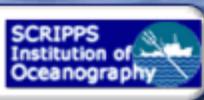


Climate Change Tool Inventory

- Tools categorized
 - Name
 - Type
 - Geographic scale
 - Agencies responsible
 - Aspects of climate change addressed
 - Topics of interest (climate change I & II)
 - Related BRP goal suggestion
 - Website/ reference
 - Temporal extent

California Swell Model Archive

- Online
- California
- UC David Bodega Marine Lab
- Wave
- Marine Habitats & Wildlife
- BRP Goal #9
- <http://cdip.ucsd.edu/>



Themes

Recent

Historic

Documents

Station ID

search

news | contact us | home

observed | **nowcast models** | forecast models

Nowcast Models

Regional Models

- Southern California
- Central Coast
- Monterey Bay
- Northern California

Local Models

- San Diego
- San Pedro Channel
- Santa Monica Basin
- Santa Barbara Channel
- Offshore Islands
- San Francisco

Wave Height Plots

- Southern California
- San Diego County
- Orange County
- Los Angeles County
- Ventura County
- Santa Barbara County

Sea & Swell Models

- San Diego Harbor
- San Pedro Channel
- LA - Long Beach

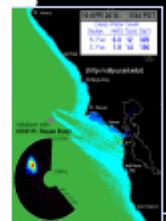
Descriptions/Help

FAQ/Model Info

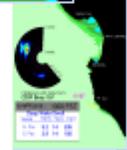
Model Archives

California Swell Models

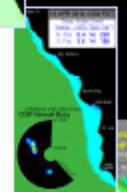
Regional:



Northern California

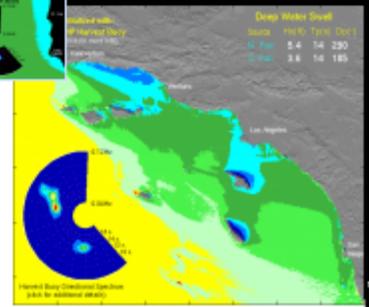


Monterey Bay



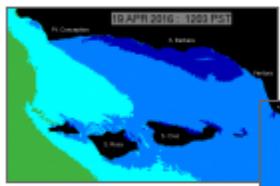
Central Coast

Southern California

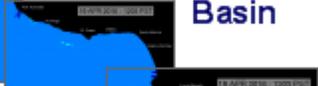


Local Swell Models:

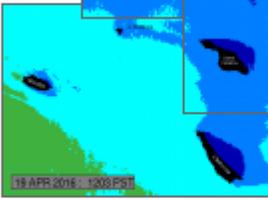
Santa Barbara Channel



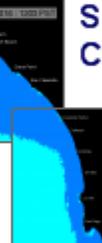
Santa Monica Basin



Offshore Islands

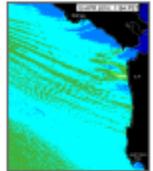


San Pedro Channel

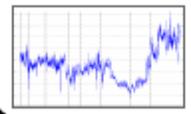


San Diego

San Francisco

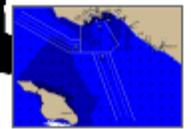


Wave Height Plots:



- Southern California
- San Diego County
- Orange County
- Los Angeles County
- Ventura County
- Santa Barbara County

Sea & Swell Models:



- San Diego Harbor
- San Pedro Channel
- Long Beach Harbor

Last update:
04/19/2016
12:54 PST

Climate Change Tool Inventory

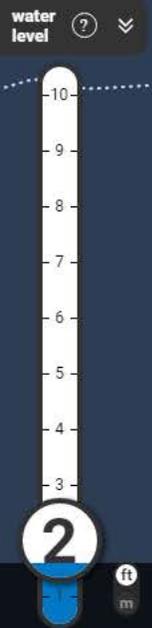
- Tools ranked – evaluated the effectiveness of tools based on 4 categories
 - Convenience (user-friendly?)
 - Relevance to BRP goals
 - Reliability of data source
 - Records up-to-date
- Each category ranked 1 to 5 (worst to best) integrated score for each tool by averaging all 4 rankings
- Data gaps identified

Surging Seas RISK ZONE MAP

Enter a global coastal place

With unchecked pollution, the median projection for when sea level rise reaches 2 ft at Santa Monica is 2090 (very likely range, 2070 - 2150).

Get more data



Scenario: **Unchecked pollution** Event: **Sea level rise**

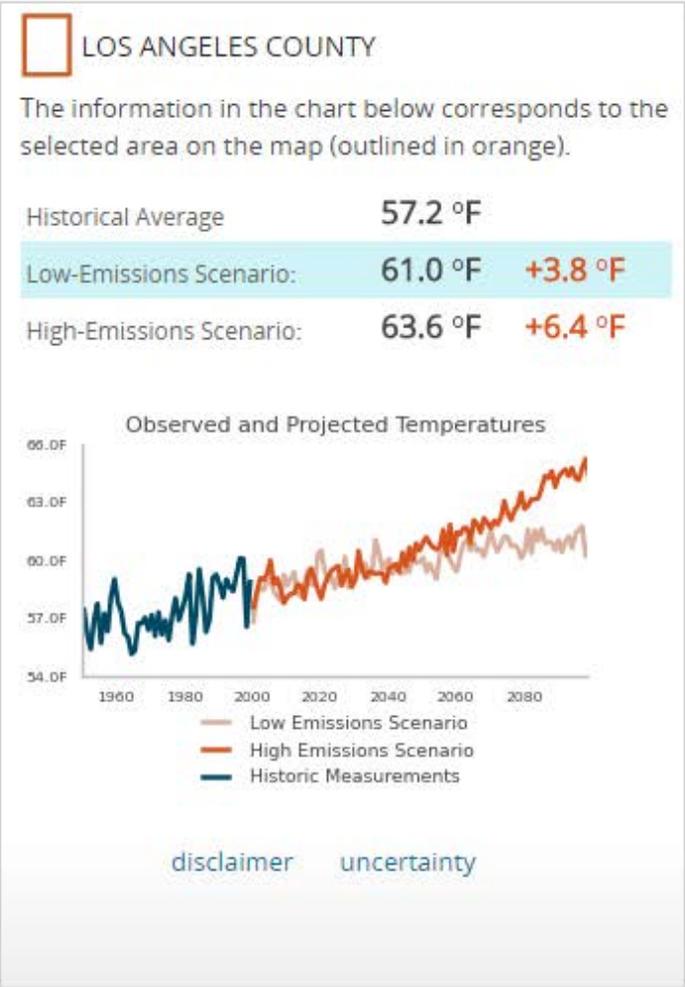
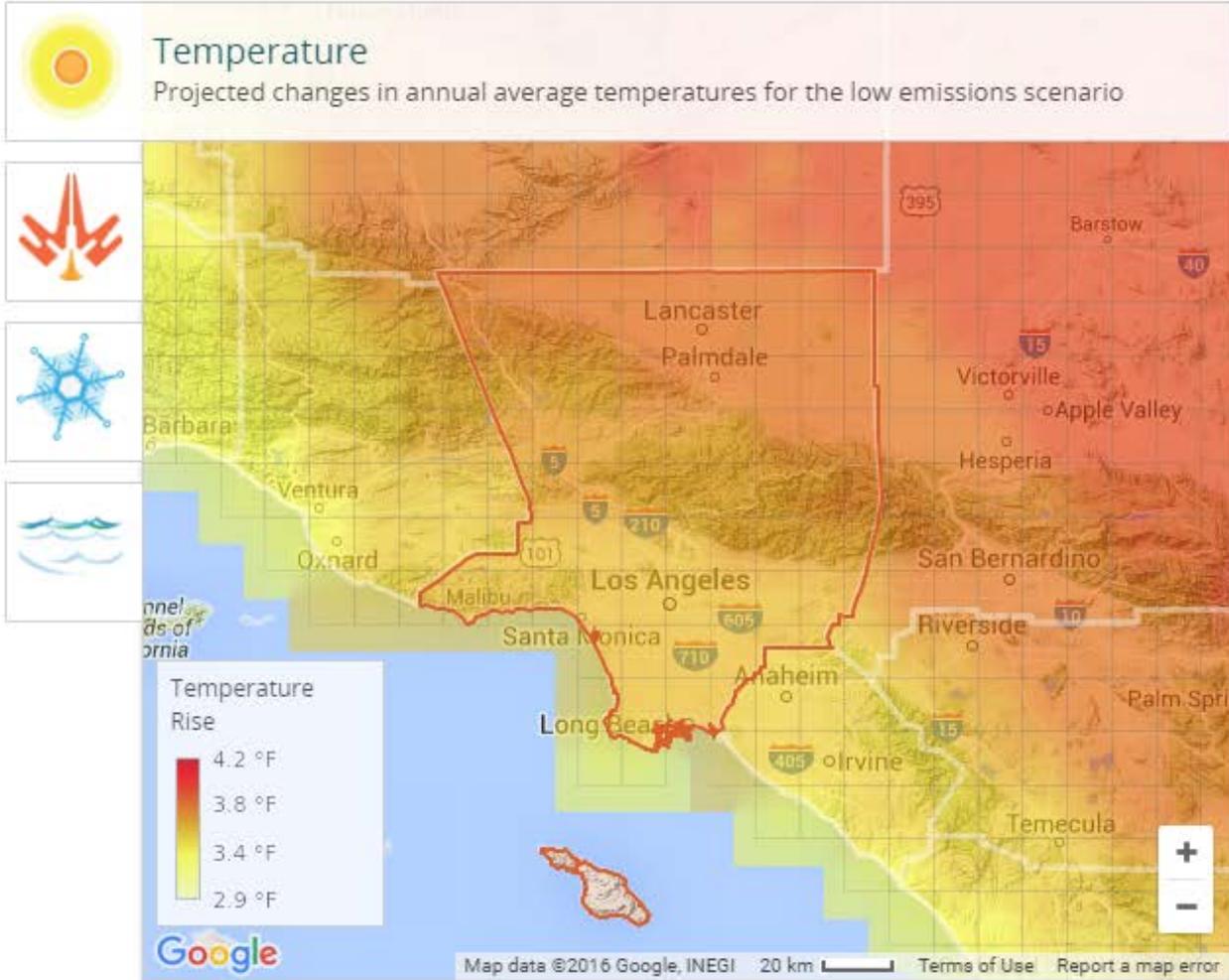
Markers show when sea level rise reaches 2 ft

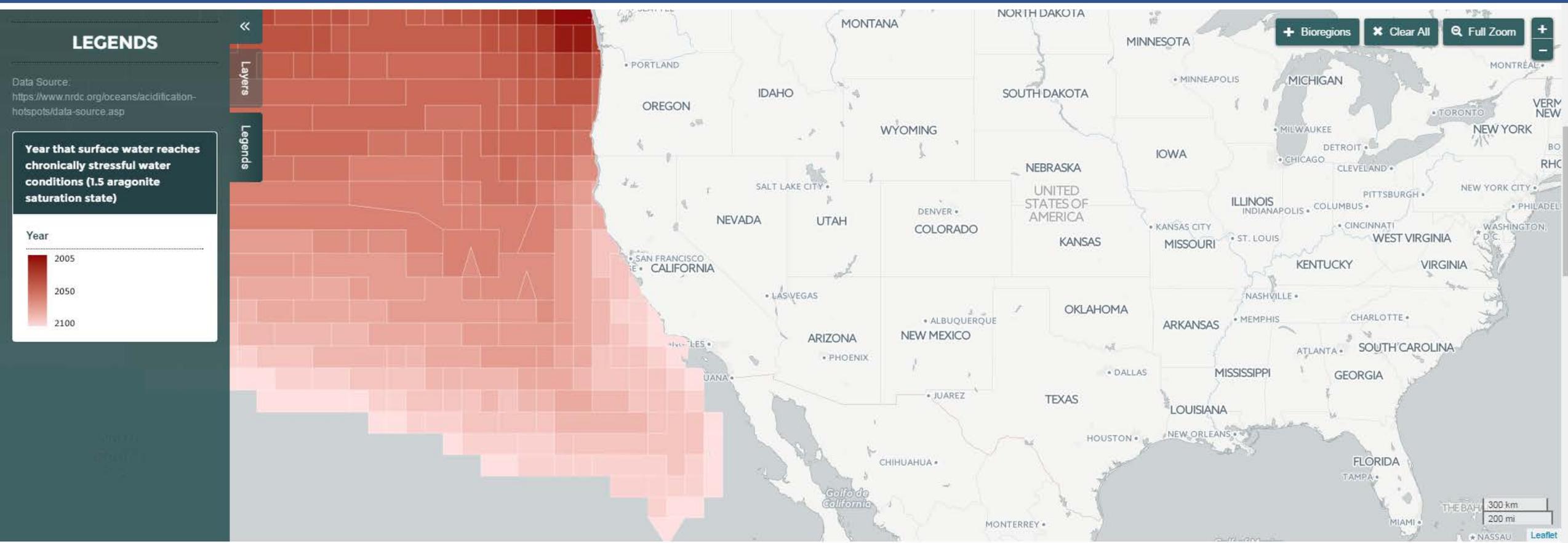
- See projections
- Legend
- Social vulnerability
- Population
- Ethnicity
- Income
- Property
- Landmarks

LOCAL CLIMATE SNAPSHOTS

Los Angeles County, CA

Use Metric Units Use County Average

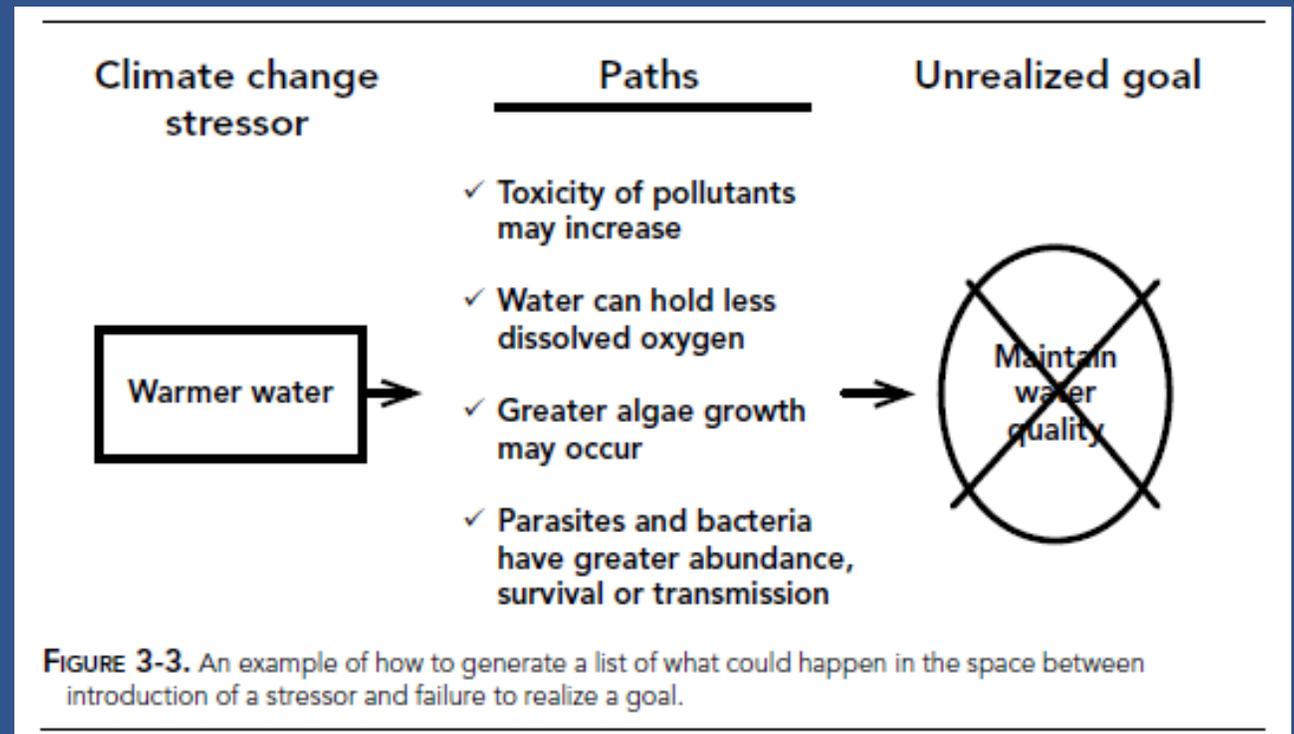




NRDC – Ocean Acidification Hotspots

Task 2 – Risk Identification

- Objective: to create a broad list of climate change risks that might affect the organization's ability to achieve its goals and milestones
- Considered 7 types of climate change stressors in evaluating goals and milestones:
 - Warmer summers (overall climate)
 - Warmer winters (overall climate)
 - Warmer water
 - Increasing drought
 - Increasing storminess
 - Sea level rise
 - Ocean acidification



Task 2 – Risk Identification

BRP objective 9.2 – protect and manage rocky intertidal habitat

Climate Change Risks							
Milestone	Warmer summers	Warmer winters	Warmer water	Increasing drought	Increasing storminess	Sea level rise	Ocean acidification
9.2a. Conduct a pilot project to test three different methods of intertidal protection by 2015.	<ul style="list-style-type: none"> Animals engaged in partnerships with obligate algal symbionts at risk if temperatures alter relationship between partner Temperature-driven species redistribution Changing phenology may have large implications for fish and wildlife production because trophic coupling of important species in the food chain may be disrupted 	<ul style="list-style-type: none"> Parasite population growth rates may increase Animals engaged in partnerships with obligate algal symbionts at risk if temperatures alter relationship between partner Temperature-driven species redistribution Changing phenology may have large implications for fish and wildlife production because trophic coupling of important species in the food chain may be disrupted 	<ul style="list-style-type: none"> Species ranges may shift poleward Altered species composition and abundance of marine fauna Parasite population growth rates may increase Animals engaged in partnerships with obligate algal symbionts at risk if temperatures alter relationship between partners 		<ul style="list-style-type: none"> Potential damage from storm surge and increased wave action 	<ul style="list-style-type: none"> Intertidal habitats that do not accrete or migrate landward proportionally to relative sea level rise are susceptible to inundation 	<ul style="list-style-type: none"> Decrease in pH will affect all calcifying organisms

Task 2 – Risk Identification

BRP objective 2.4 – reduce pollution from commercial and recreational boating activities

	Climate Change Risks							
Milestone	Warmer summers	Warmer winters	Warmer water	Increasing drought	Increasing storminess	Sea level rise	Ocean acidification	
2.4a. Continue to support alternative boat sewage management strategies such as require mobile pumpout services as part of standard lease agreements, institute marina wide mobile pumpout program, install stationary pumpout facilities, etc.	<ul style="list-style-type: none"> Recreational boating density may increase 	<ul style="list-style-type: none"> Recreational boating density may increase 	<ul style="list-style-type: none"> Recreational boating density may increase Discharges of sewage may have a greater effect on water quality, more bacteria consuming more oxygen in a higher water temperature may lead to more cases of hypoxic or anoxic water. In this case we may change to a more active role in supporting proper sewage management strategies. 		<ul style="list-style-type: none"> Boating activities may be limited Increase in the severity of storms may effect the infrastructure (stationary pumpout facilities and mobile pumpout boats) needed for proper sewage management. Increase in the frequency of storms may delay infrastructure repairs. 	<ul style="list-style-type: none"> Pump out stations may have to be strategically placed Sea level rise may effect the infrastructure (stationary pumpout facilities and mobile pumpout boats) needed for proper sewage management. 		

Task 3 – Risk Analysis and Prioritization (next step)

- Characterize risks
- Consequence – Likelihood (C/P) Matrix
- Product will be a decision making tool
 - 1) A broad, risk-based assessment of climate change vulnerability for the BRP
 - 2) Agreement among management and key stakeholders about how the climate change risks will affect the organization

Likelihood (probability) of occurrence	High	1. Warmer water may stress immobile biota 2. Warmer water may lead to changes in drinking water treatment processes n. _____	1. Warmer water may hold less dissolved oxygen 2. Sea level rise may cause bulkheads, sea walls and revetments to become more widely adopted n. _____	1. Shoreline erosion from sea level rise may lead to loss of beaches, wetlands and salt marshes 2. Combined sewer overflows may increase from more intense precipitation n. _____
	Medium	1. Increased wildfires from warmer summers may lead to soil erosion 2. Warmer winters may lead species that once migrated through to stop and stay n. _____	1. Parasites and bacteria may have greater abundance, survival or transmission due to warmer water 2. Warmer summers may drive greater water demand n. _____	1. More frequent drought may diminish freshwater flow in streams 2. More intense precipitation may cause more flooding n. _____
	Low	1. Warmer water may lead open seasons and fish to be misaligned 2. Warmer winters may lead to more freeze/thaw cycles that impact water infrastructure n. _____	1. Warmer water may lead jellyfish to be more common 2. Ocean acidification may cause the recreational shellfish harvest to be lost n. _____	1. Contaminated sites may flood from sea level rise 2. Warmer water may promote invasive species n. _____
		Low	Medium	High
Consequence of impact				

Color key: Green Yellow Red

Questions?

