

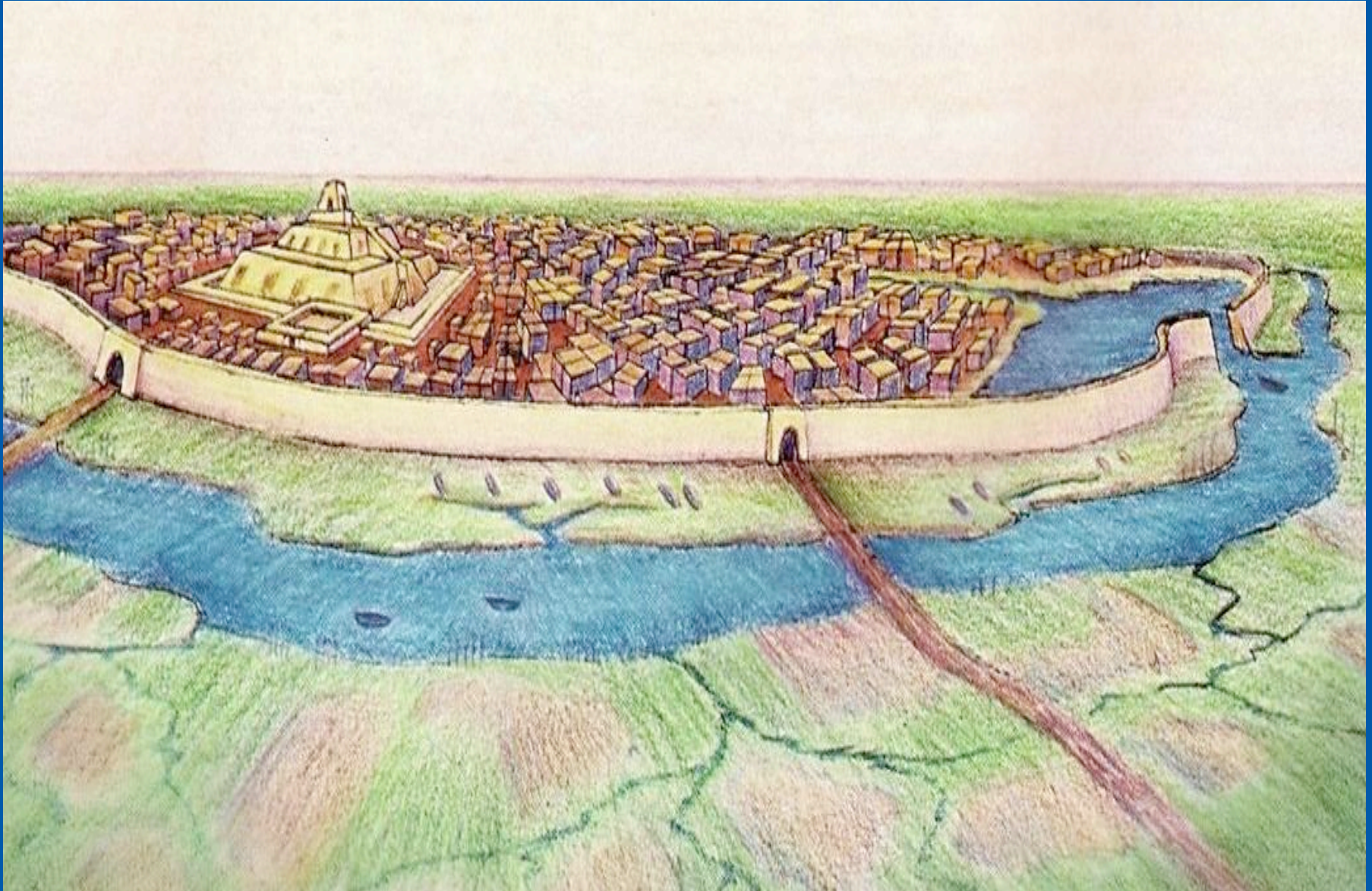
Climate-Smart Conservation: Nature-based solutions to secure our future

Ellie Cohen and Point Blue Staff
Bolin Community Lecture
January 28, 2014



Point Blue
Conservation
Science

Sumerians: 5000 BCE – 2,000 BCE



Artist's rendition of a Sumerian city-state surrounded by a wall; present day Iraq.

“The question is whether any civilization can wage relentless war on life without destroying itself, and without losing the right to be called civilized.”

— Rachel Carson

What will we do differently to avoid this fate?

Over the last 2-3 years....

Human population exceeded 7 billion *October 2012*

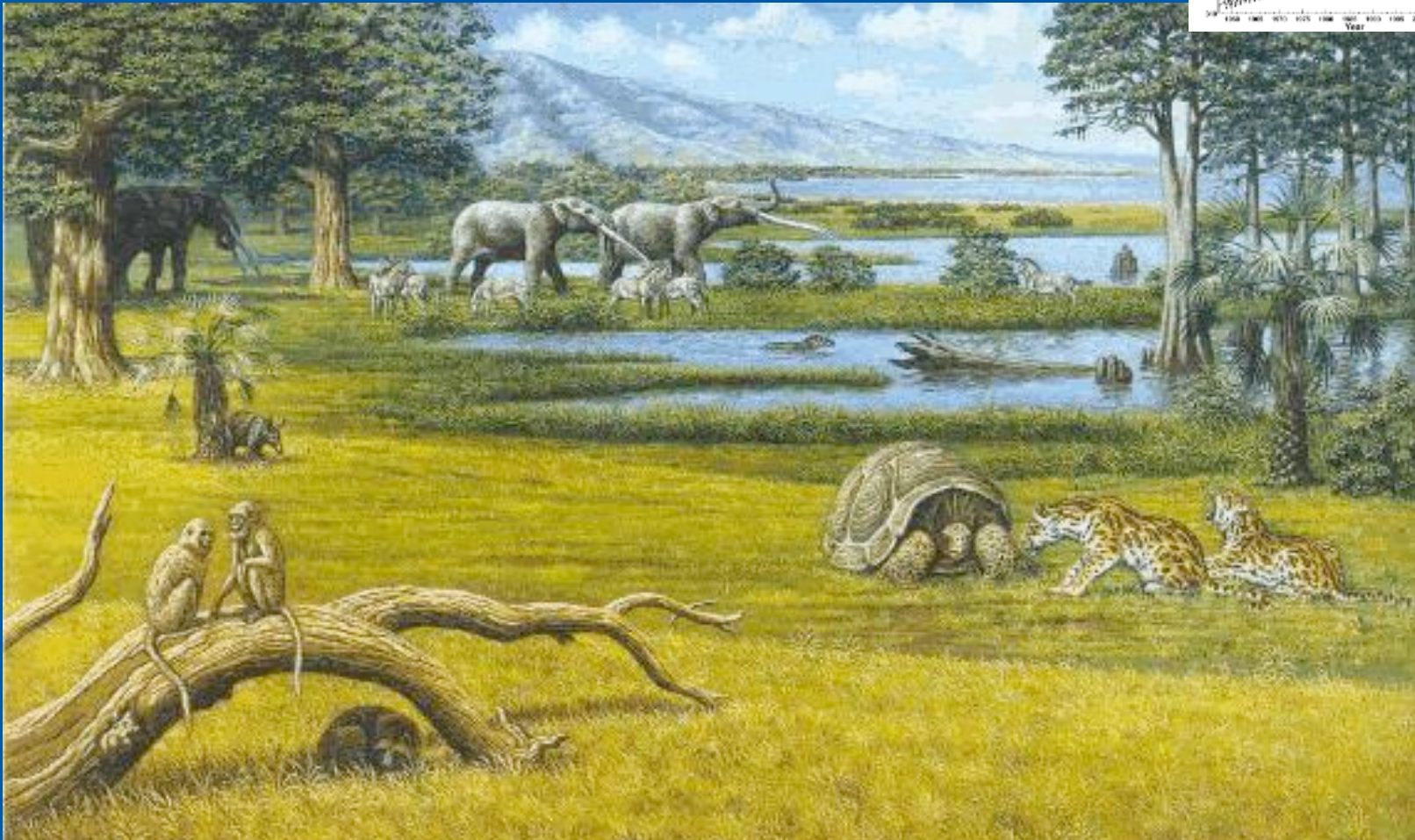
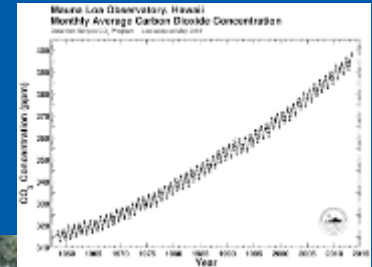


China Shandong Province Beach / AP Photo

~43% of Earth's surface converted to agricultural
& urban uses *June 2012*

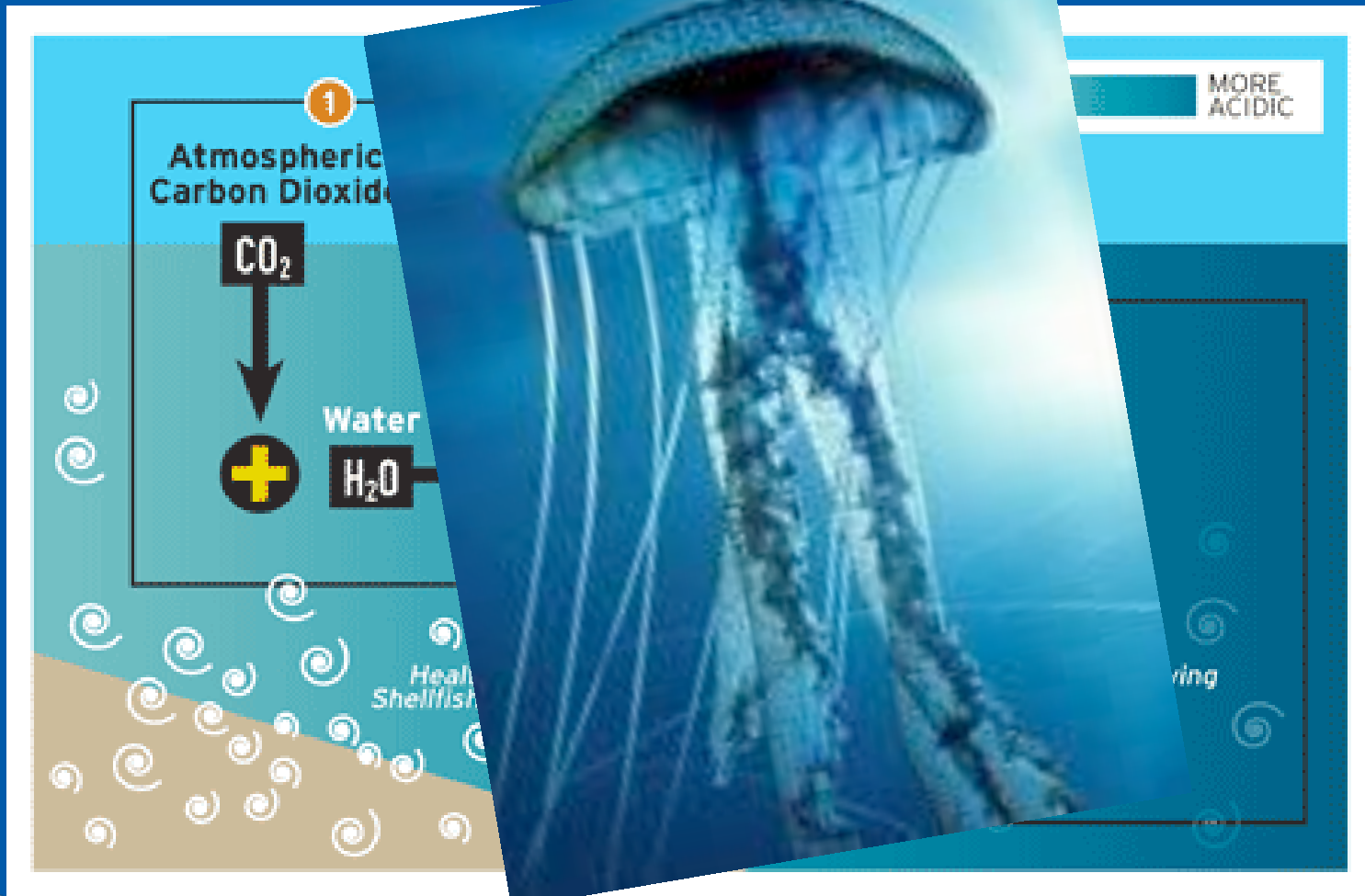


CO2 exceeded 400 ppm first time in human history- *May 9, 2013*



Pliocene ~2-5 million years ago was last time Earth had >400 ppm+ CO2:
Temperatures were 2-3 °C higher and global sea level 25m higher than today.

Ocean 30% more acidic since 1800s; fastest rate in 300 million years



Arctic ice— *Earth's air conditioner*— lowest extent, volume ever recorded *Sept 2012*

September 16, 2012



↑ Record breaking extremes: heat, drought, storms
Hurricane Sandy 1 ft SLR + Superstorm= 17 ft surge Oct 2012

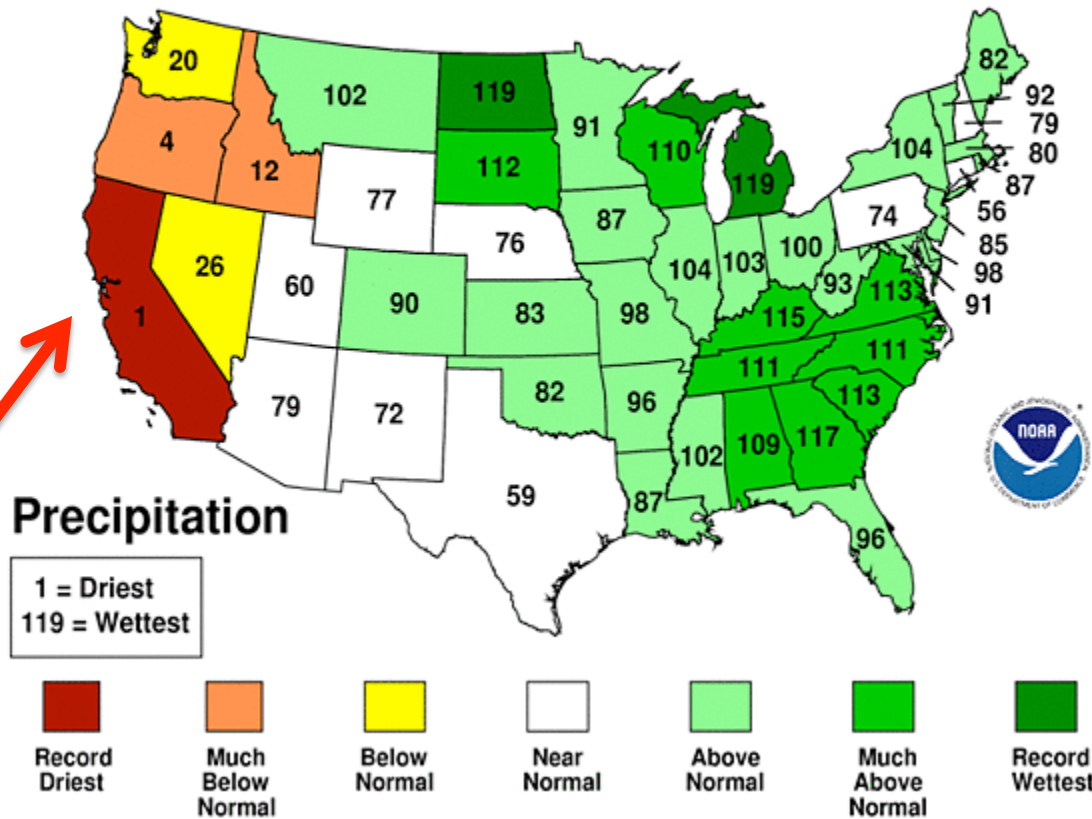


(AP Photo/Mike Groll) AT SEA: A roller coaster mangled by Hurricane Sandy in Seaside Heights, N.J. Oct 31, 2012

California: 2013 driest year on record

January-December 2013 Statewide Ranks

National Climatic Data Center/NESDIS/NOAA



US Drought Monitor
<http://droughtmonitor.unl.edu/>



Severe to Extreme Drought Continues

Yosemite Rim Fire: 3rd largest in CA recorded history

Aug 17 – Oct 24, 2013

www.npr.org/blogs/thetwo-way/2013/08/26/215697233/fire-tracker-online-tool-to-monitor-blaze-near-yosemite Elias Funez /MCT /Landov





Impending tipping point for the future of life on our planet?

- Population growth
- Destruction of natural ecosystems
- Climate change

**Barnosky et al NATURE June 2012
Natl Academy of Sciences,
Abrupt Climate Change Dec 2013**

Image Cheng (Lily) Li.

We are totally reliant on nature

Ecosystem Services or Nature's Benefits

- Freshwater, clean air
- Food, fisheries
- Wood, fiber, fuel

- Climate
- Flood
- Disease
- Water quality

- Recreational
- Educational
- Spiritual

Globally nature's benefits = est. ~2x
global GNP (~\$72 trillion in 2012)



**TOO MUCH
TOO LITTLE WATER**

To sustain life as we know it, we must implement Climate-Smart Conservation

- Directly addresses impacts of climate change (GHG emissions) with habitat loss, pollution and other environmental threats.
- Sustains ecosystem services for wildlife and people through nature-based solutions.



Climate-Smart Conservation Key Principles

1. **Focus on future** conditions, not past; plan ahead to reduce risks
2. Design actions in **watershed/ecosystem context** across multiple scales in time and space
3. Employ **flexible, adaptive approaches** for timely response to continual change
4. **Prioritize actions for multiple benefits** to nature *and* people → nature-based, 'green' solutions
5. **Collaborate & communicate across sectors** for timely, long term solutions

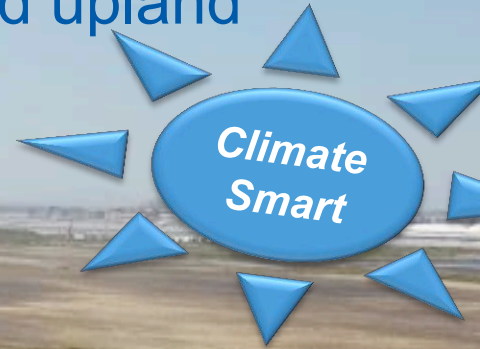
1. FOCUS ON FUTURE CONDITIONS including extremes —‘stop trying to prevent ecological change’



↑ **FIRE:** implement mechanical thinning, prescribed burns + allow some high severity fires = fire resilience, habitat mosaic, improved water cycle and ecological health

↑ FLOODING, STORM SURGES, SLR

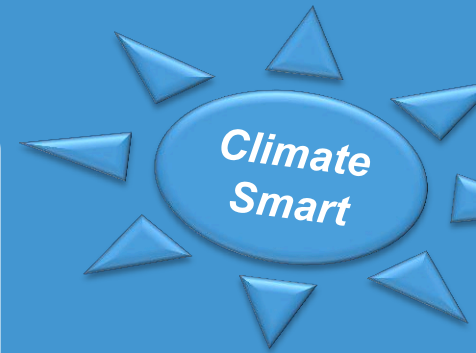
- Restore tidal wetlands, riparian habitat
- Protect remaining undeveloped shoreline and upland transition zone



Historic Bay tidal marsh, Newark's "Area 4," is one of the largest areas of restorable, undeveloped baylands in the South Bay (Photo by Margaret Lewis) Save the Bay

2. DESIGN ACTIONS IN WATERSHED, ECOSYSTEM & BIOSPHERE CONTEXT — focus on ecosystem processes for multiple benefits, not single species or benefit

LIFE on EARTH
Biosphere



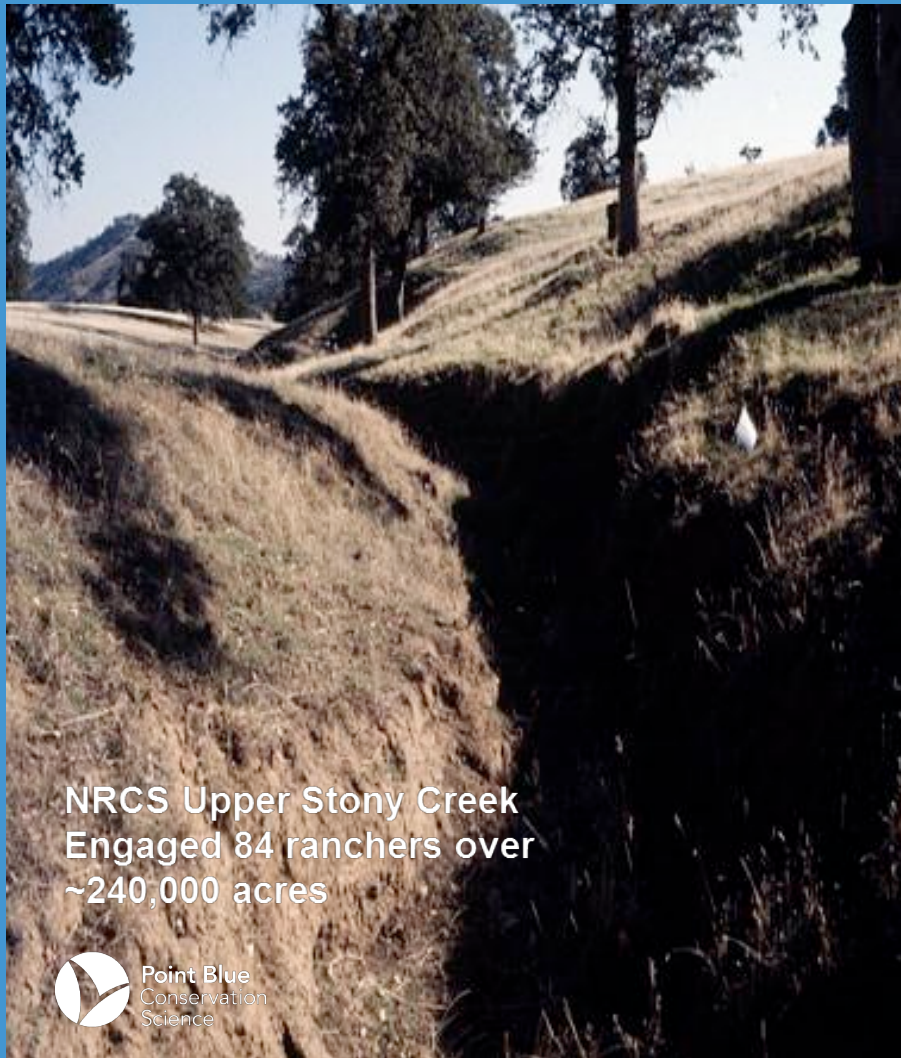
WATER

C
A
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B
O
N

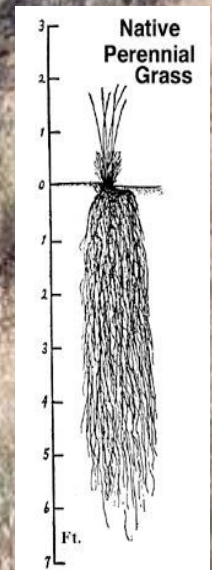
BIODIVERSITY

“Re-water” Rangelands: >30% of Bay Area

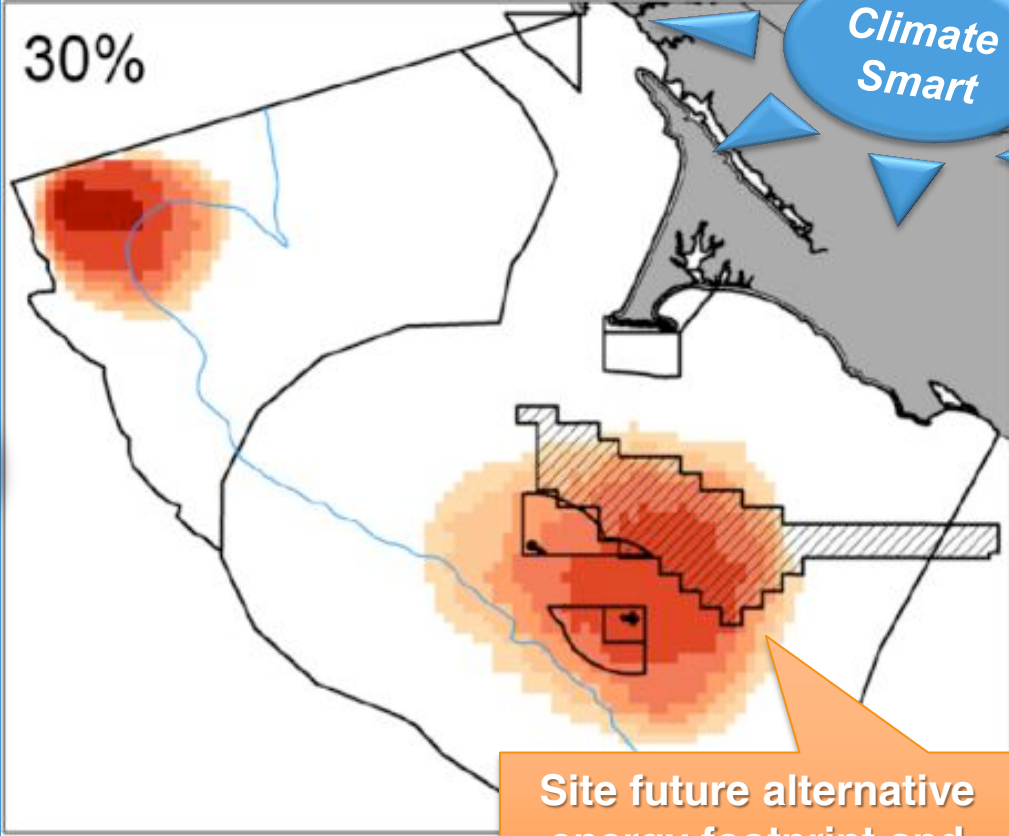
- Eco-friendly grazing, other practices on 1m acres = 2+ Hetch Hetchy’s of water stored
- Increase water flow, carbon storage, biodiversity– and bottom lines



Point Blue
Conservation
Science



Develop new ocean and Bay zoning practices to protect food web hotspots- *give marine wildlife, fisheries more time to adapt*



Climate Smart

Site future alternative energy footprint and design shipping lanes to avoid key feeding areas

McGowan, J. 2012. Point Blue/SFSU

Reduce whale strikes- GOFNMS

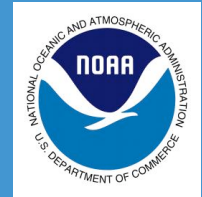
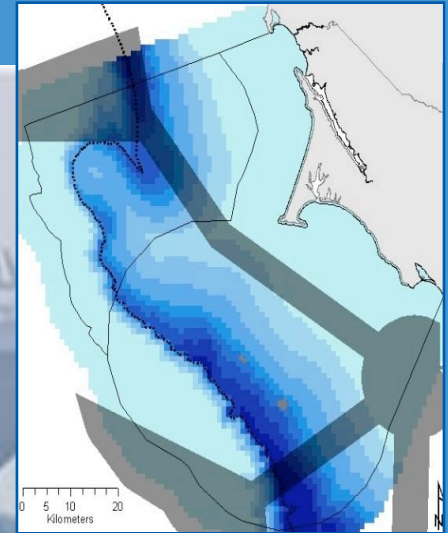


Photo: John Calambokidis



Findings: support new shipping lanes – they reduce vessel traffic within Sanctuaries and high-use humpback whale habitat by ~70%.

'Cool' Nest Boxes— Farallon Islands NWR

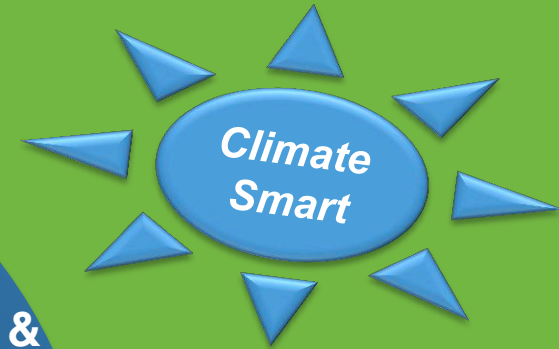
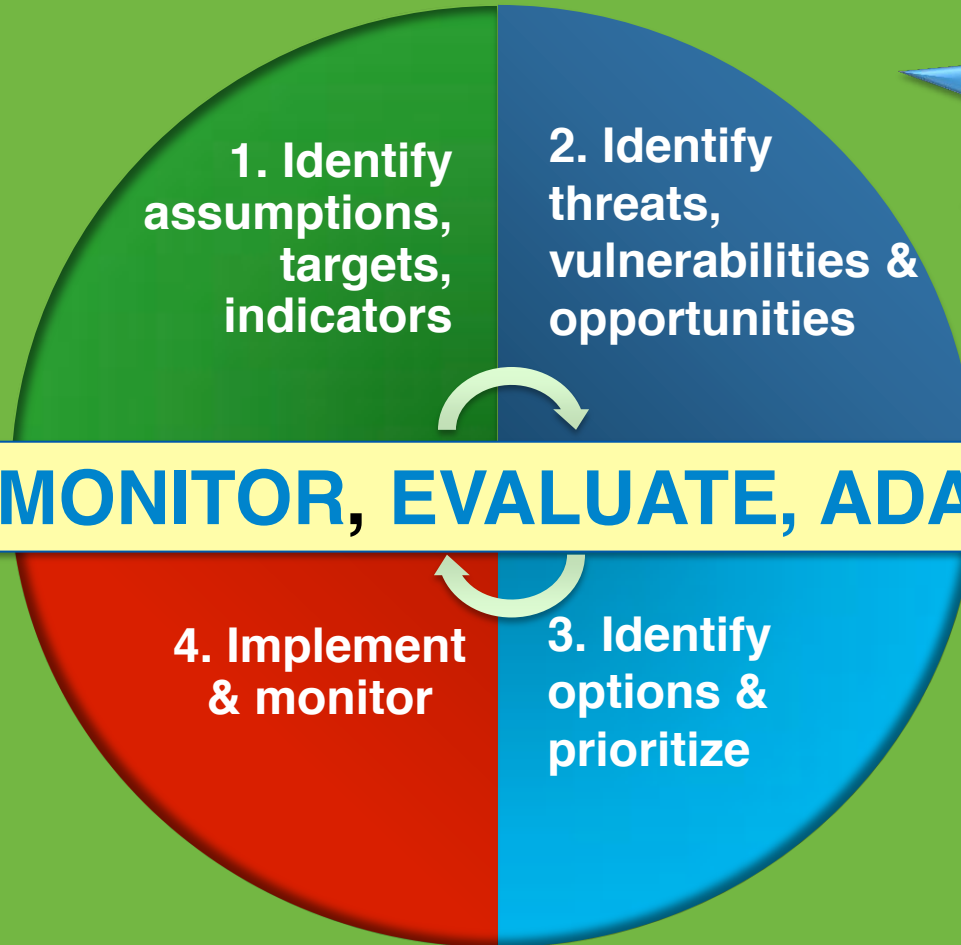


For Cassin's Auklets:

- protect from extreme heat events during breeding season

Max. temp. on Farallones increased by ~3.6 degrees C (6.5 °F) since 1971

3. FLEXIBLE, ADAPTIVE APPROACHES— monitor multiple indicators of ecosystem function- (or plans, policies...)



South Bay Salt Pond Restoration Project: Adaptive & Flexible Management

Climate Smart

APPENDIX 3. Adaptive Management Summary Table (Continued)

CATEGORY/ PO	RESTORATION TARGET	MONITORING PARAMETER (METHOD)	SPATIAL SCALE FOR MONITORING RESULTS	EXPECTED TIME FRAME FOR DECISION-MAKING	MANAGEMENT TRIGGER	APPLIED STUDIES	POTENTIAL MANAGEMENT ACTION
Vector Control Project Objective 5	<ul style="list-style-type: none"> The need for mosquito control does not exceed NEPA/CEQA baseline as determined by the Vector Control agencies 	<ul style="list-style-type: none"> Presence/absence of mosquitoes in former salt ponds Number of acres of breeding mosquitoes Number of larvae/dip in potential breeding habitat Number of acres within the 	Focal areas that may support mosquito sources throughout the South Bay	Ongoing	<ul style="list-style-type: none"> Detection of breeding mosquitoes in a former salt pond Detectable increase in monitoring parameters (relative to NEPA/CEQA baseline), particularly in areas with human activity 		<ul style="list-style-type: none"> Adjust design to enhance drainage or tidal flushing, control vegetation in ponded areas, and/or facilitate access (for control) to marsh ponds Increase level of vector control
Clapper R. Project Objective				<p>erly decades for high-quality marsh development (10-year targets)</p> <p>onitoring not expected to see substantial results until 10 years after cordgrass establishment in 300 acres or more (10-year targets)</p>			
Salt Marsh Harvest Mice Project Objective 1A	<ul style="list-style-type: none"> Meet recovery plan criteria for salt marsh harvest mouse habitat within the SBSP Restoration Project Area 	Salt marsh harvest mouse tidal	Entire South Bay	Likely decades for high-quality	See triggers for <i>Sediment</i>	<ul style="list-style-type: none"> How do salt marsh harvest 	<ul style="list-style-type: none"> Reconsider movement up staircase See <i>Vegetation Establishment</i> above Adjust phasing and design; for example, add or enhance upland transition habitat within and between restored marshes Reconsider movement up staircase

Includes:

- Explicit restoration targets
- Monitoring strategies
- Time-frame for decision making
- Triggers for altering actions
- New research that might be needed
- Potential management actions



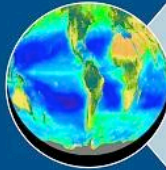
Indicators: Key to Adaptive Management

Ocean Climate Indicators for the North-Central CA Coast

Gulf of the Farallones
National Marine Sanctuary
Advisory Council



Biological Ocean Climate Indicators



Primary Productivity (Rate and Biomass of Primary Producers)

Indicates:

- Health of lowest trophic levels of food web
- Potential for harmful algal blooms

Examples:

- Chlorophyll Biomass
- Phytoplankton Assemblages



Abundance, Biomass, and/or Phenology of Mid-Trophic Level Species

Indicates:

- Health of middle trophic levels of food web

Examples:

- Mole Crabs
- California Mussels
- Gooseneck Barnacles
- Ochre Sea Stars
- Blue & Gopher Rockfish
- Copepods



Spatial Extent of Habitat-Forming Organisms

Indicates:

- Changes in habitat availability

Examples:

- Surfgrass
- Mussel Beds
- Bull Kelp
- Eelgrass
- Corals



Seabird Phenology, Productivity, and/or Diet:

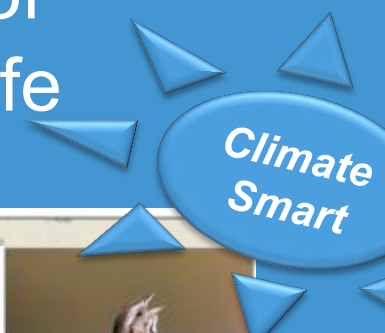
Indicates:

- Year-round picture of health of high trophic levels of food web
- Impacts of changes in primary productivity
- Potential for mismatches in species phenology

Examples:

- Brandt's Cormorant
- Cassin's Auklet
- Common Murre

4. PRIORITIZE ACTIONS— across range of future scenarios for multiple benefits to wildlife and people

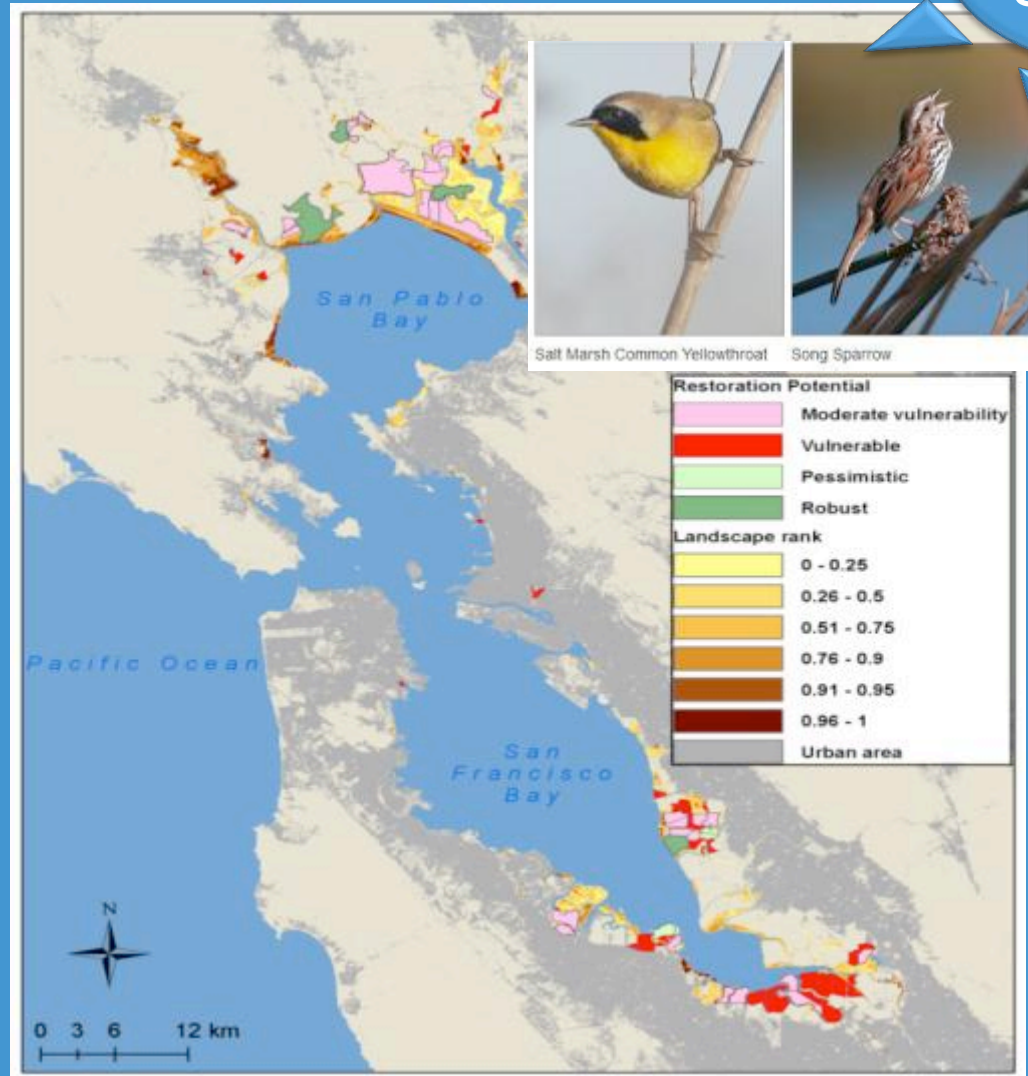


SF Bay Future Tidal Marsh Tool

restorations ranked :

- high/low sea level rise
- high/low sediment
- multiple timeframes (2010, -30, -50, -70, -90, 2110)
- Tidal marsh birds & vegetation

<http://data.prbo.org/apps/sfbslr/>

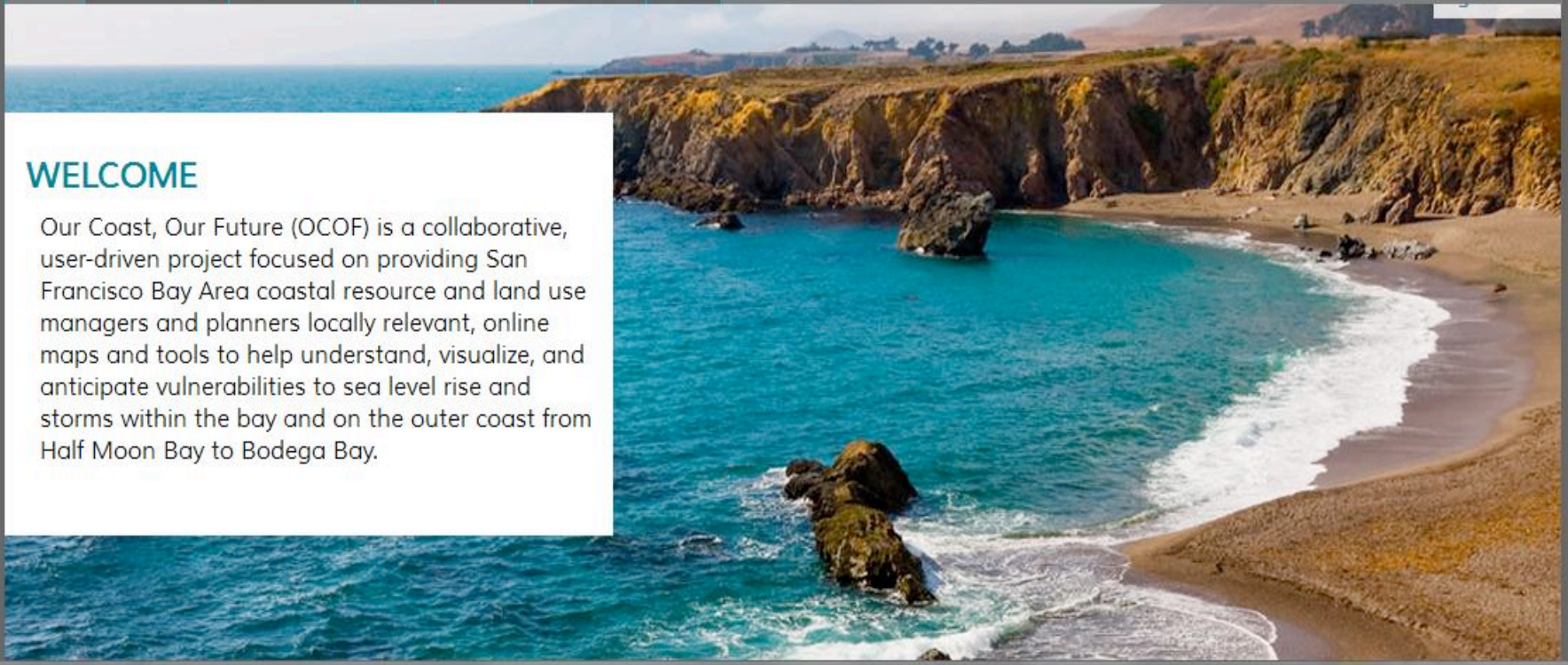




- HOME
- GET STARTED
- FLOOD MAP
- NEWS
- EVENTS
- ABOUT US
- HELP

WELCOME

Our Coast, Our Future (OCOF) is a collaborative, user-driven project focused on providing San Francisco Bay Area coastal resource and land use managers and planners locally relevant, online maps and tools to help understand, visualize, and anticipate vulnerabilities to sea level rise and storms within the bay and on the outer coast from Half Moon Bay to Bodega Bay.





 get started

 clear

 recenter

1) Choose a topic.

Uncertainty shows the degree of uncertainty in the scenario results.

Flooding

 Waves

 Current

 Uncertainty

[What do the Topics represent?](#)

2) Choose a Sea Level Rise (cm) level.

0	25	50	75	100	125
150	175	200	500		

[What Sea Level Rise scenario should I use?](#)

3) Choose a storm scenario frequency

None

 Annual

 20 year

 100 year

4) Choose other layers to view with topic data.

Placenames

 Land Use

 Protected Areas

 Rivers & Streams

 Cliff Retreat

 Coastal Armoring

Detail View

muir beach

 Maximum Inundation 075cm SLR + Wave 020 = 0 (37.8598, -122.576)

Muir Beach- how best to implement "managed retreat?" --assess trails, parking lots, birds under range of future conditions




Minimum Inundation 075cm SLR + Wave 020

 Maximum Inundation 075cm SLR + Wave 020

Rivers and Streams

 Stream

 Intermittent Stream

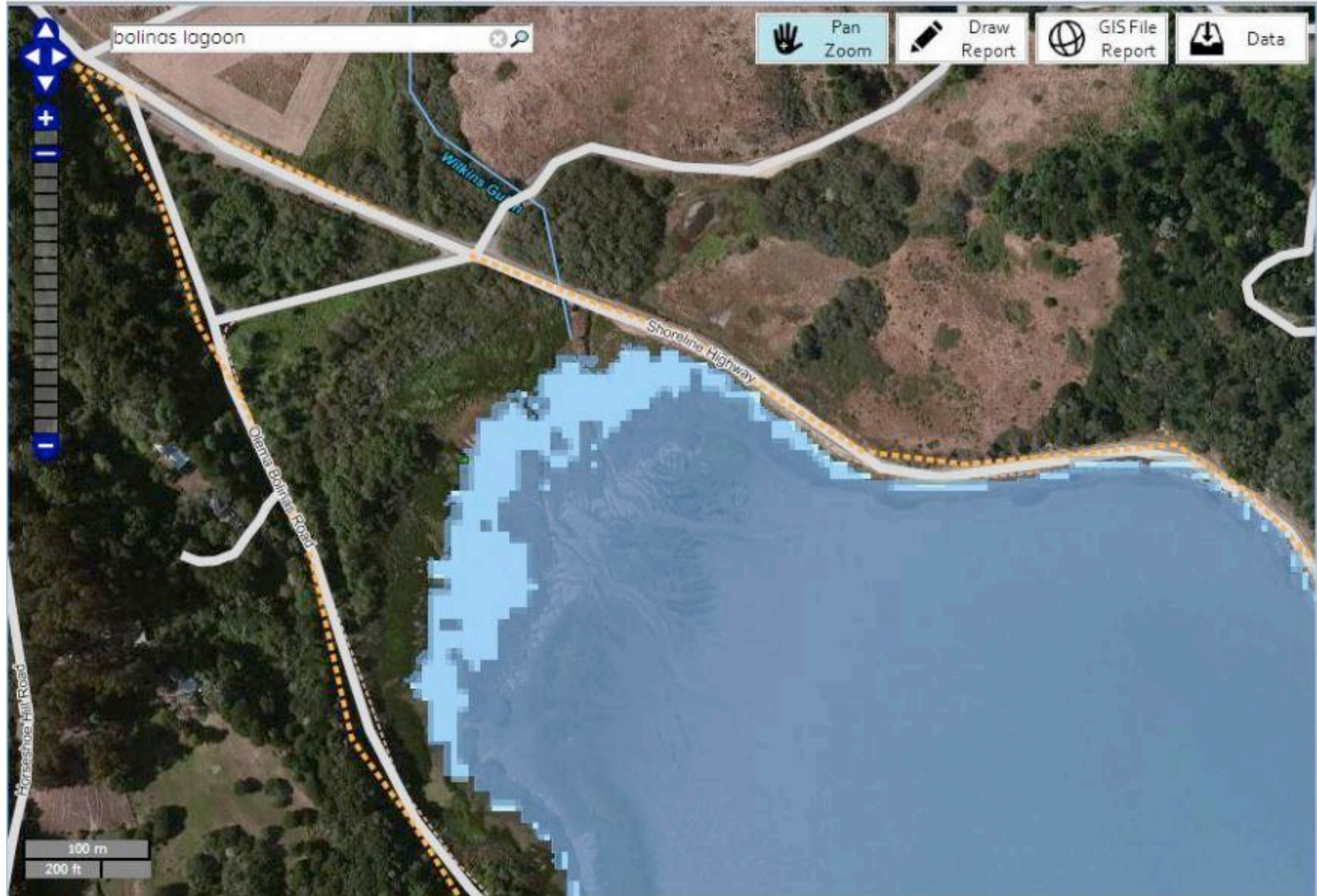


 OCOF

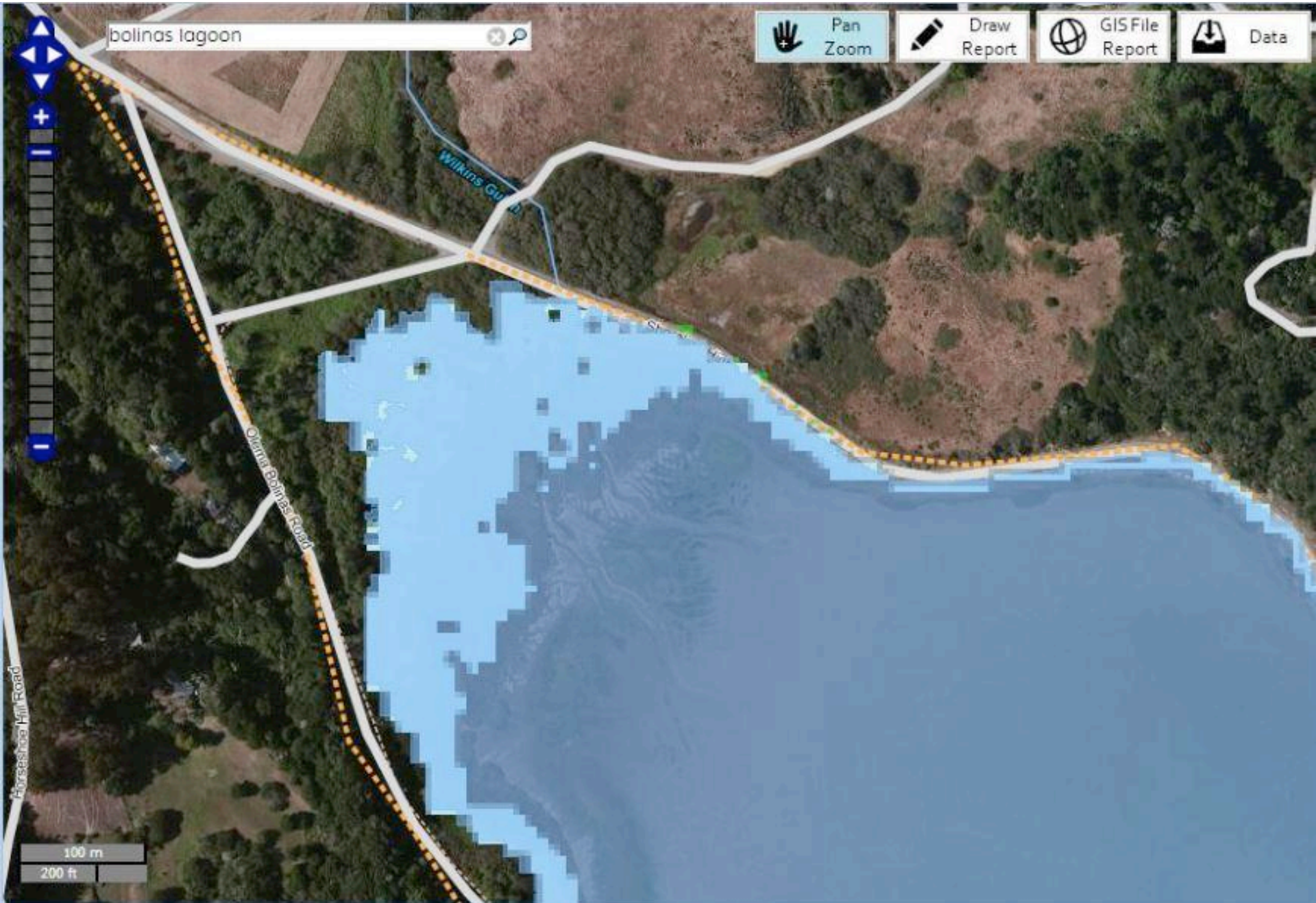
OUR COAST OUR FUTURE

- Partners:
- NOAA
 - USGS
 - POINT BLUE
 - NPS

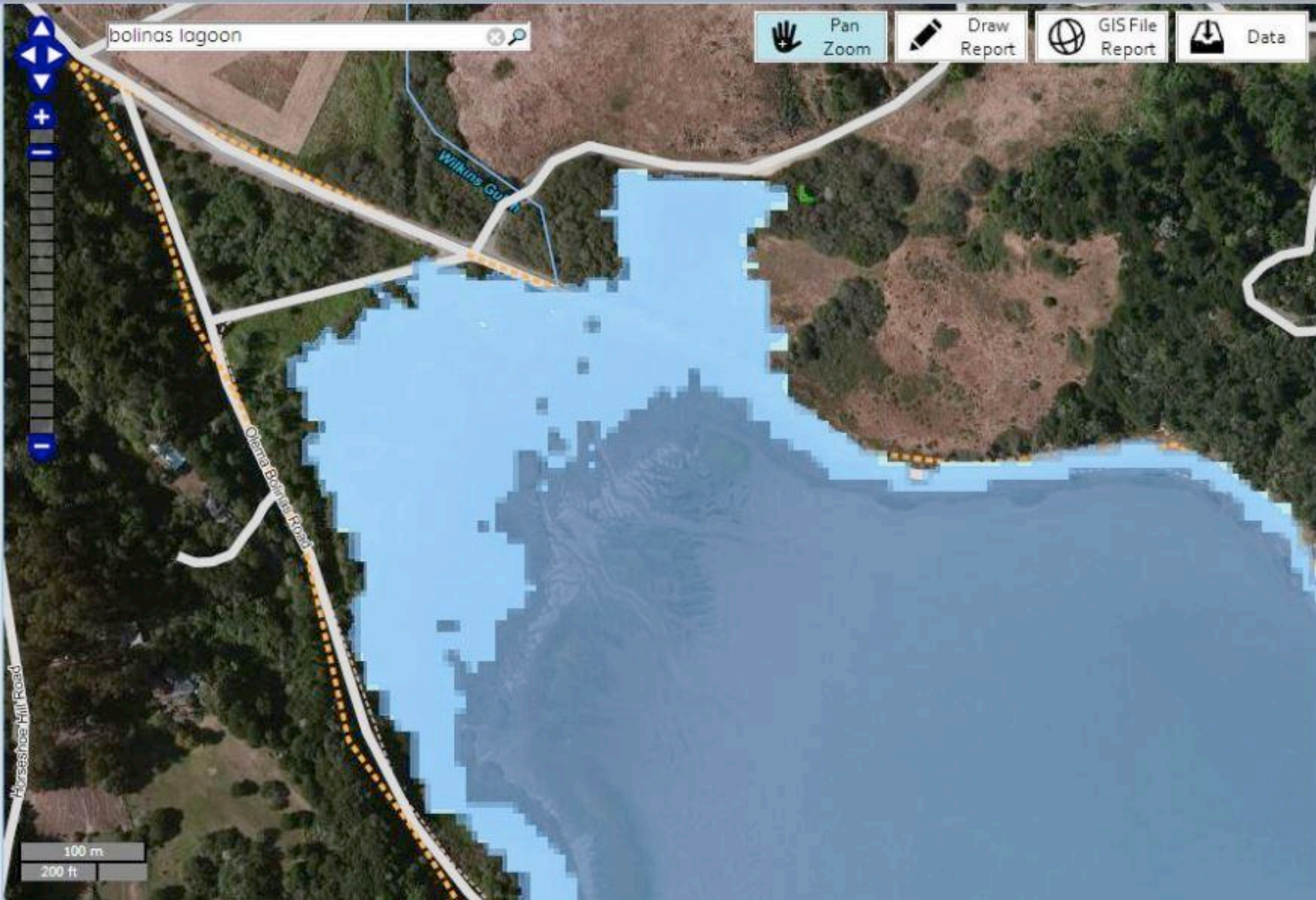
Will be available for SF Bay soon



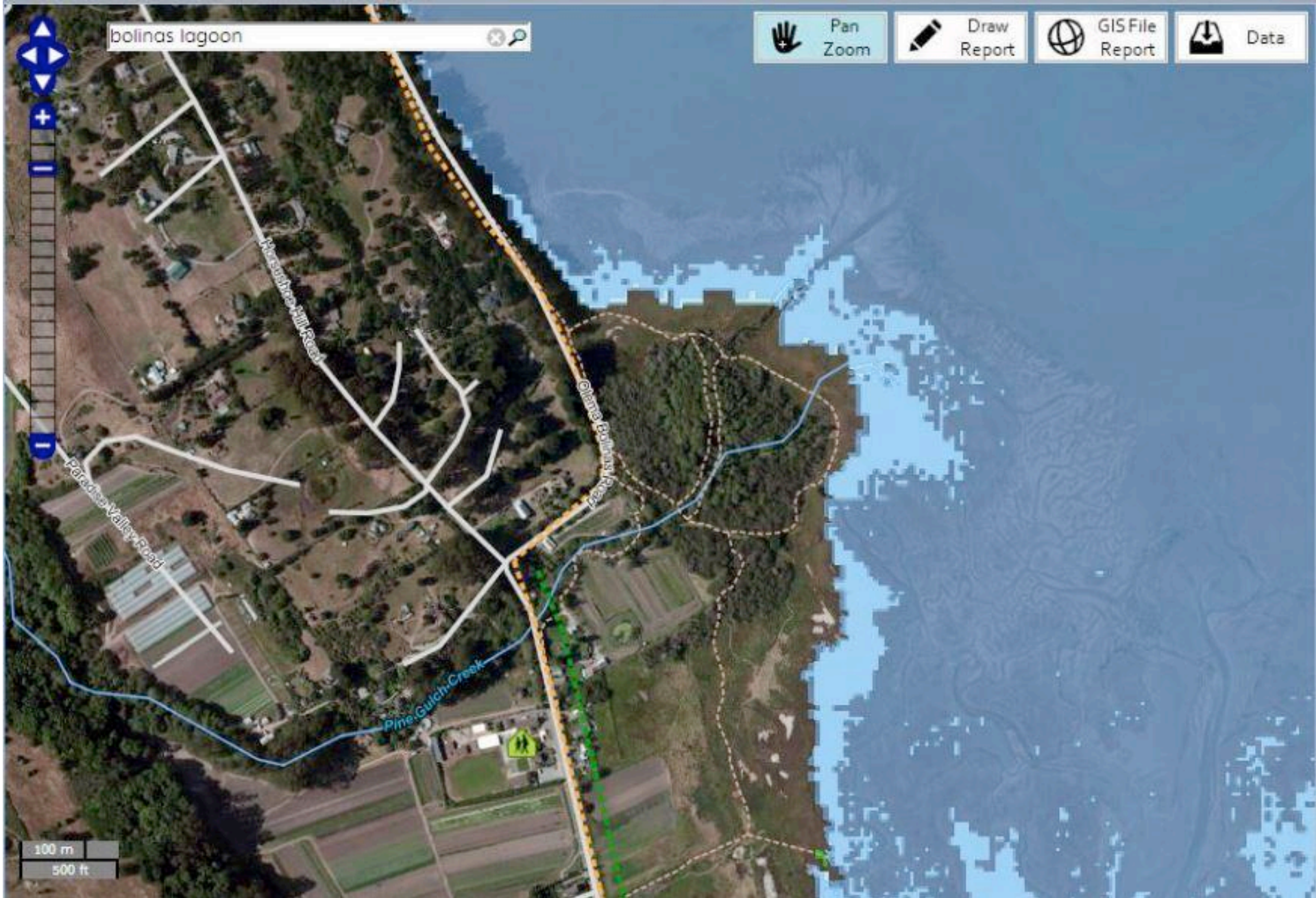
The Northern Bolinas Y: SLR 0cm; No Storm



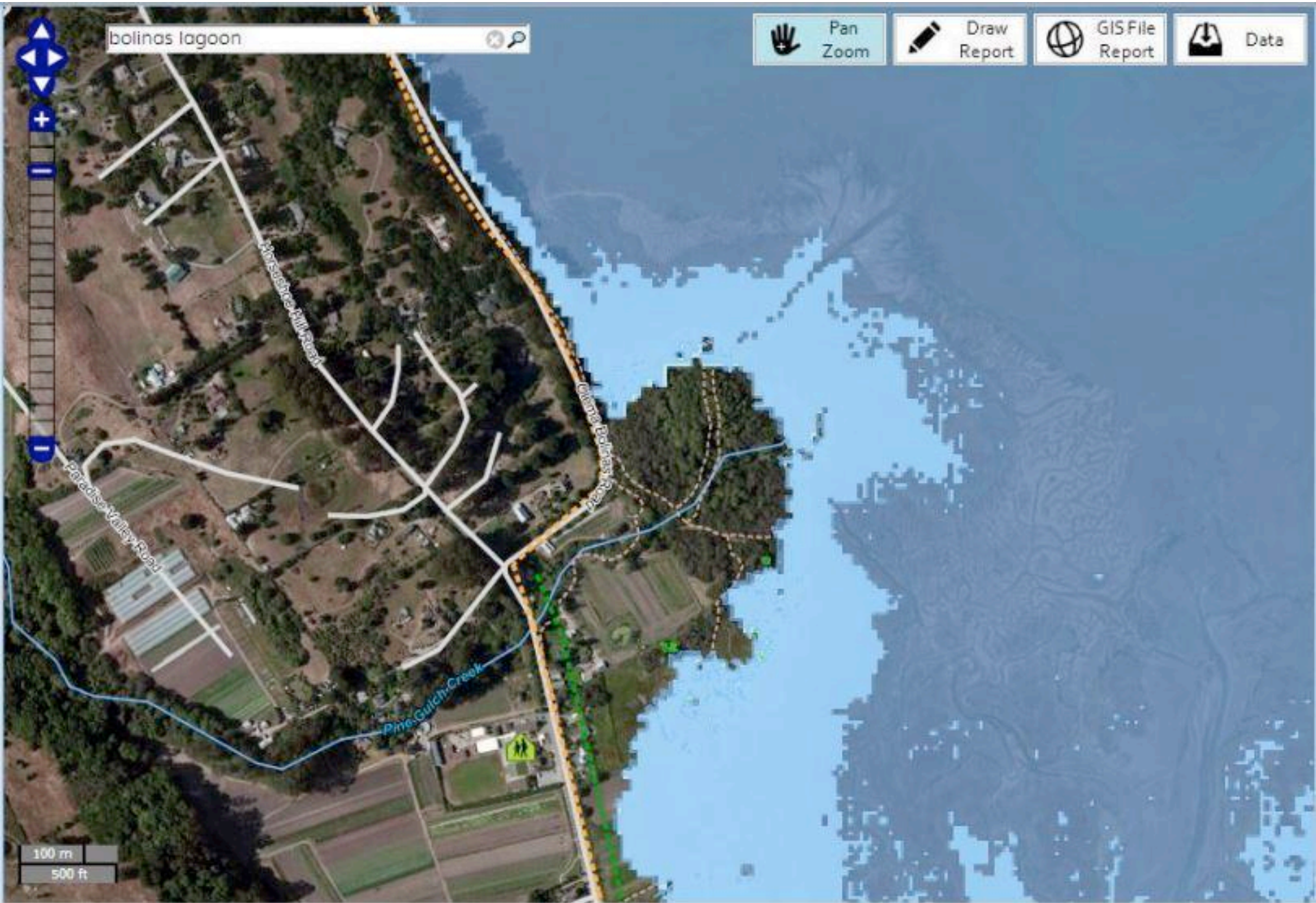
The Northern Bolinas Y: SLR 25cm; Annual Storm



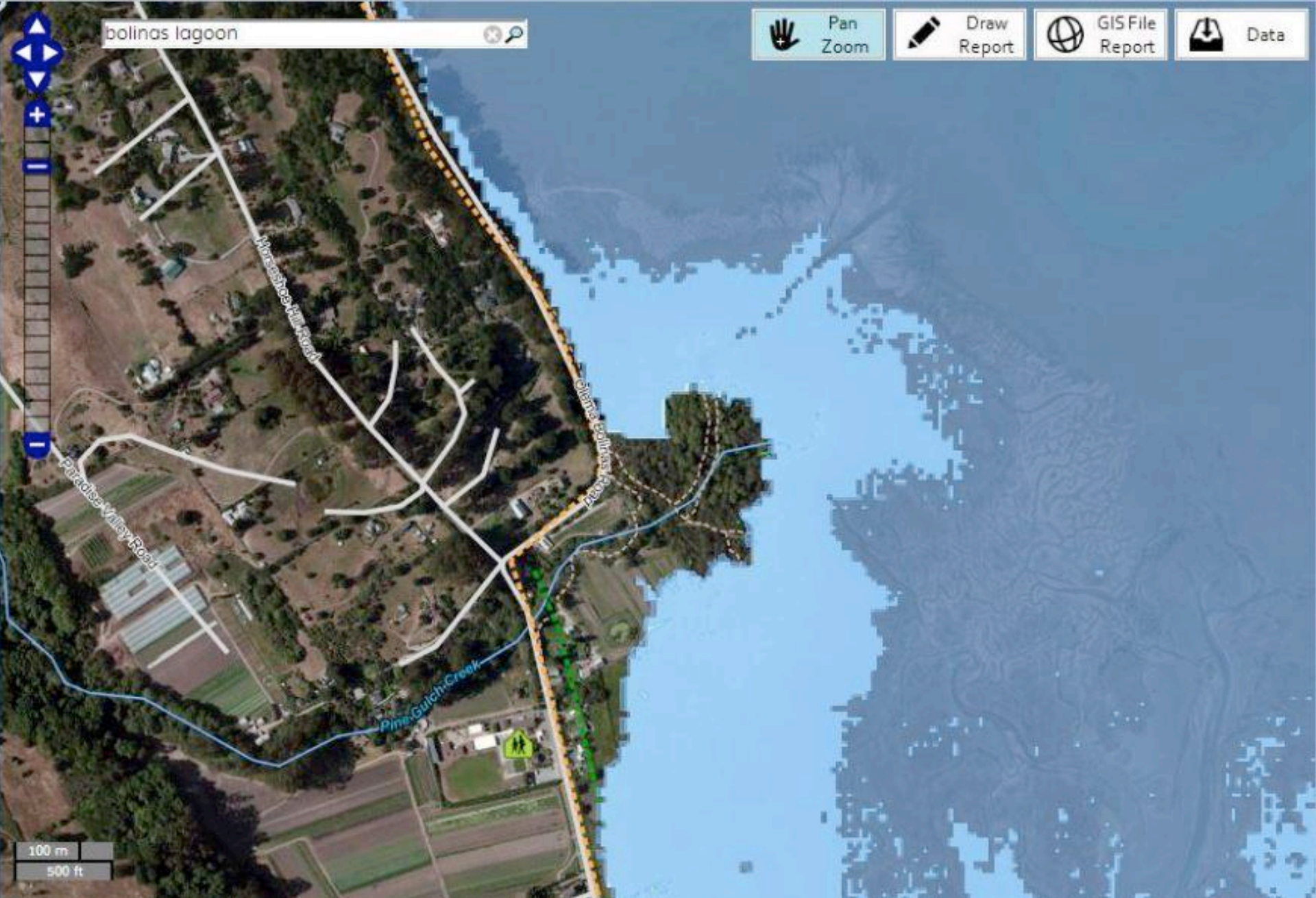
The Northern Bolinas Y: SLR 50cm; 20yr Storm



Pine Gulch Creek Delta: SLR 0cm; No Storm



Pine Gulch Creek Delta: SLR 25cm; Annual Storm

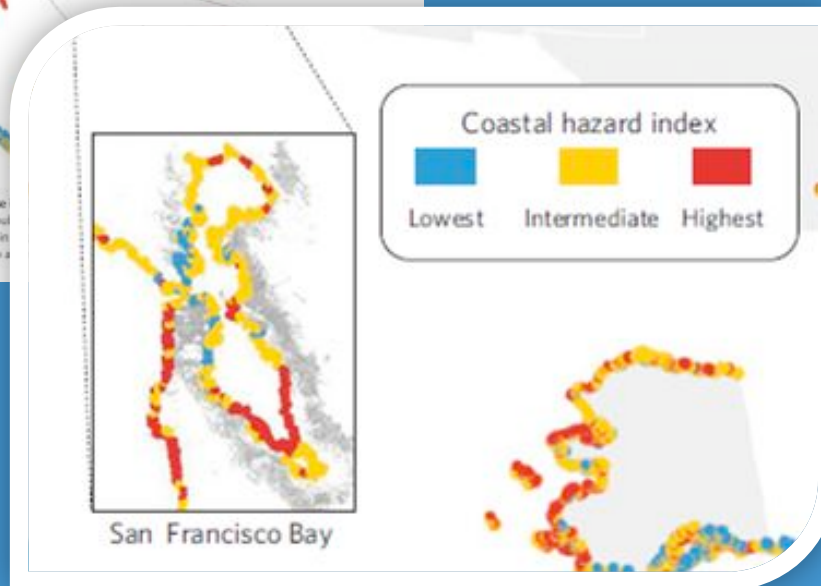
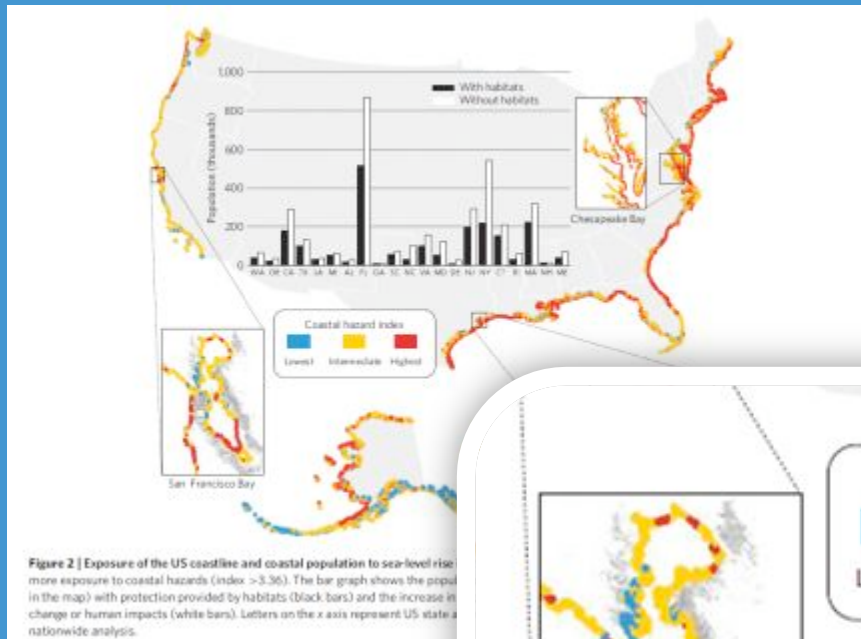


Pine Gulch Creek Delta: SLR 50cm; 20yr Storm

PRIORITIZE NATURAL OR GREEN “INFRASTRUCTURE” OVER ENGINEERED



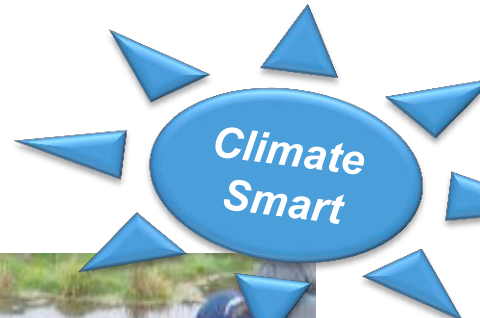
Coastal habitats
reduce risk to
people & property
by 50%



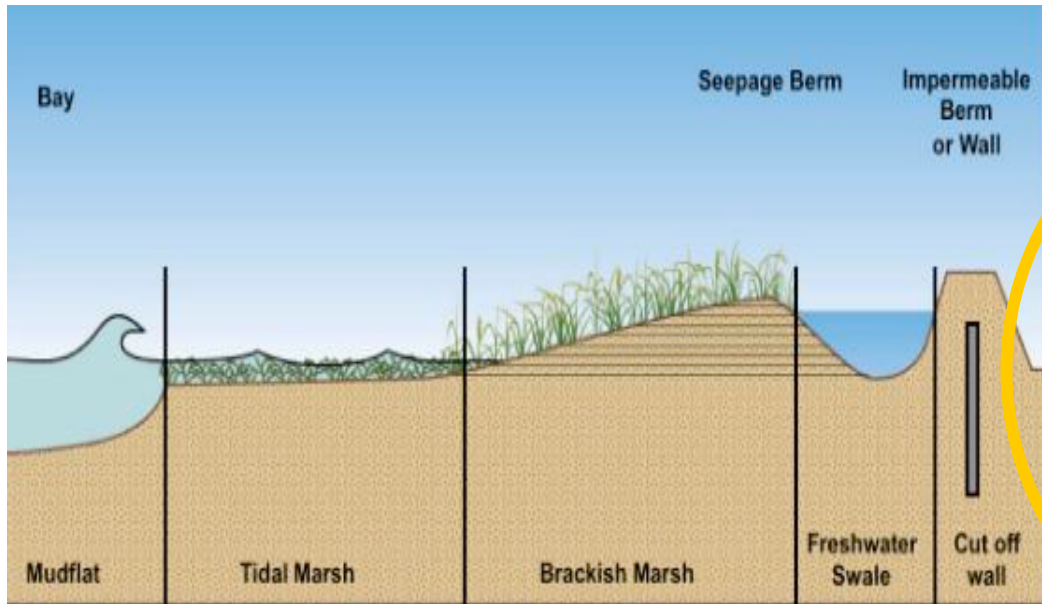
5. COLLABORATE & COMMUNICATE ACROSS SECTORS— *accelerate effective problem solving, share information openly, engage local communities – especially youth!*

Private Land
50% of CA

Public Land
50%



Engineers, ecologists, policymakers and community working together for multiple benefits



Tidal marshes combined with earthen levees
can reduce costs by almost 50%
The Horizontal Levees



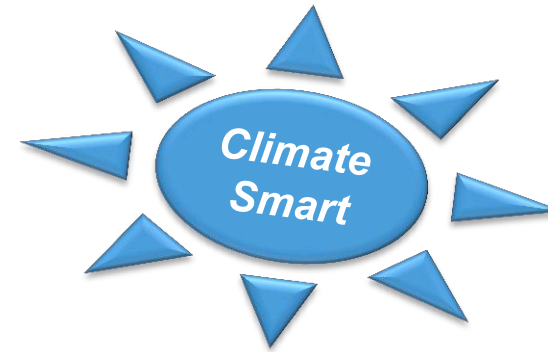
Ecological Engineering

- Disaster risk reduction
- Hard/soft engineering
- Ecosystem-based adaptation



Bay Area Ecosystems Climate Change Consortium

BAECCC www.baeccc.org



Bringing together scientists, natural resource managers and planners to sustain nature's benefits in the face of accelerating climate change



Scenario Planning



To bring together
diverse stakeholders
A collaborative
planning tool to
address climate
change in an uncertain
future



Moore, Sara S.; E. Seavy, Nathaniel; Gerhart, Matt. **Scenario Planning for Climate Change Adaptation—A Guidance for Resource Managers**. Point Blue Conservation Science & California Coastal Conservancy 2013.

6. Apply the 10% Rule Every Day



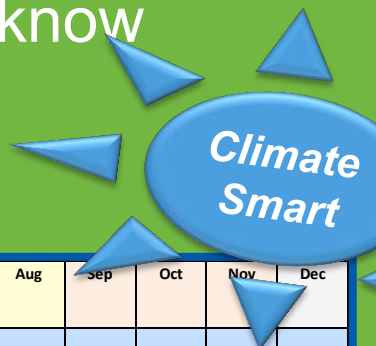
T = Test &

E = Experiment

N = Now

Climate Smart Ecological Restoration Pallet

--Test and Experiment based on what you already know



Common Name	Tolerates full or partial sun	Tolerates clay soil	Tolerates wet conditions	Tolerates dry conditions	Evergreen	Fire Adapted	Wildlife fruit source	Wildlife Nectar source	Wildlife Seed Source	Insectary Plant
Sticky manzanita	1		0	1	1	1	1	1		1
common manzanita	1	1	0	1	1	1	1	1		1
Bearberry	1	1	0	1						
Marin manzanita	1		0	1						
CA Sagebrush	1	1	0	1						
Salt Marsh Baccharis	1	1	1	1						
coyote brush	1	1	1	1						
spice bush	1	1	1	1						
Ceanothus	1			1						
blue blossom	1		0	1						
Mountain Mahogany	1	1	0	1						
Creek dogwood	1	1	1	0						
hazelnut	1	1	1	0						
Hawthorne	1	1	1	1						
Western leatherwood	1	1	1	0						
fremontia/ flannelbush	1	1	0	1						
Toyon	1	1	0	1						
Creambush	1	1	1	1						
Pitcher Sage	1		0	1						
twinberry	1	1	1	0						
coffeeberry	1	1	1	1						
reberry buckthorn	1		0	1						
Gooseberry	1	1	1	1						
Straggly Gooseberry		1	1	0						
pink current	1	1	1	0						
CA Rose	1	1	1	1						
wood rose	0	1		1						
ground rose	1		0	1						
thimbleberry	0	1	1	0						
CA blackberry	1	1	1	1						
blue elderberry	1	1	1	1						
snowberry	1	1	1	1						
Poison Oak	1	1	1	1	0		1	1	0	0
CA grape	1	1	1	1	0		1	1	0	1

Common Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sticky manzanita	1	1	1	1								
common manzanita	1		1	1	1						1	1
Bearberry			1	1	1	1						
Marin manzanita												
CA Sagebrush								1	1	1	1	1
Salt Marsh Baccharis							1	1	1	1		
coyote brush	1							1	1	1	1	1
spice bush				1	1	1	1	1				
Ceanothus			1	1	1							
blue blossom			1	1	1	1	1	1	1	1		
Mountain Mahogany			1	1	1							
Creek dogwood					1	1	1					
hazelnut	1	1	1	1				1	1	1		
Hawthorne				1	1							
Western leatherwood	1	1	1									
fremontia/ flannelbush					1	1	1					
Toyon						1	1			1	1	1
Creambush					1	1	1	1		1	1	
Pitcher Sage												
twinberry			1	1	1	1	1	1	1			
coffeeberry				1	1	1	1	1	1	1		
reberry buckthorn			1	1								
Gooseberry		1	1									
Straggly Gooseberry			1	1	1							
pink current			1	1		1	1	1				
CA Rose					1	1	1	1	1	1	1	1
wood rose					1	1	1	1	1	1	1	1
ground rose												
thimbleberry			1	1	1	1	1					
CA blackberry			1	1	1	1	1					
blue elderberry					1	1	1	1				
snowberry					1	1	1		1	1		
Poison Oak												
CA grape												

Must Make Policies Climate-Smart

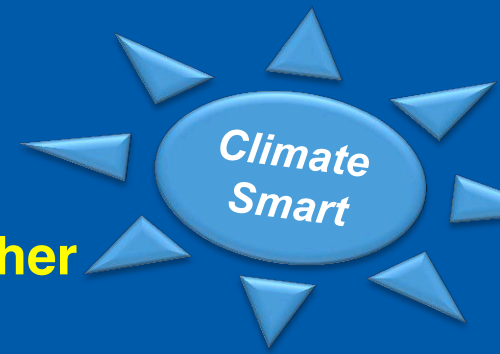
1. Identify, address regulatory and policy barriers to testing new climate-smart approaches
2. Develop regional climate-smart policy framework
3. Help public agencies embrace climate-smart principles to guide ecological and societal resilience

No more 'business as usual'

- Stop greenhouse gas pollution
- Transition to clean, efficient energy – and efficient water-use- economy, and
- Make protecting nature's benefits an equal priority.



IN SUMMARY:



Climate change is accelerating and exacerbating other environmental change

To sustain nature's health and secure our future on Earth, we must practice climate-smart conservation daily:

1. **Focus on future**
2. Design actions in **ecosystem context**
3. Employ **flexible, adaptive approaches**
4. **Prioritize actions for greatest benefits**
5. **Collaborate & communicate across sectors**
6. Follow the TEN% Rule: **Test and Experiment Now!**

WE HAVE CHOICES



Beach

What will each of us start doing differently tomorrow?



We can make a difference if we act now!

Coming up next on

FUTUREFLIX

THE MOVIES OF TOMORROW, TODAY!

YOU ORDERED

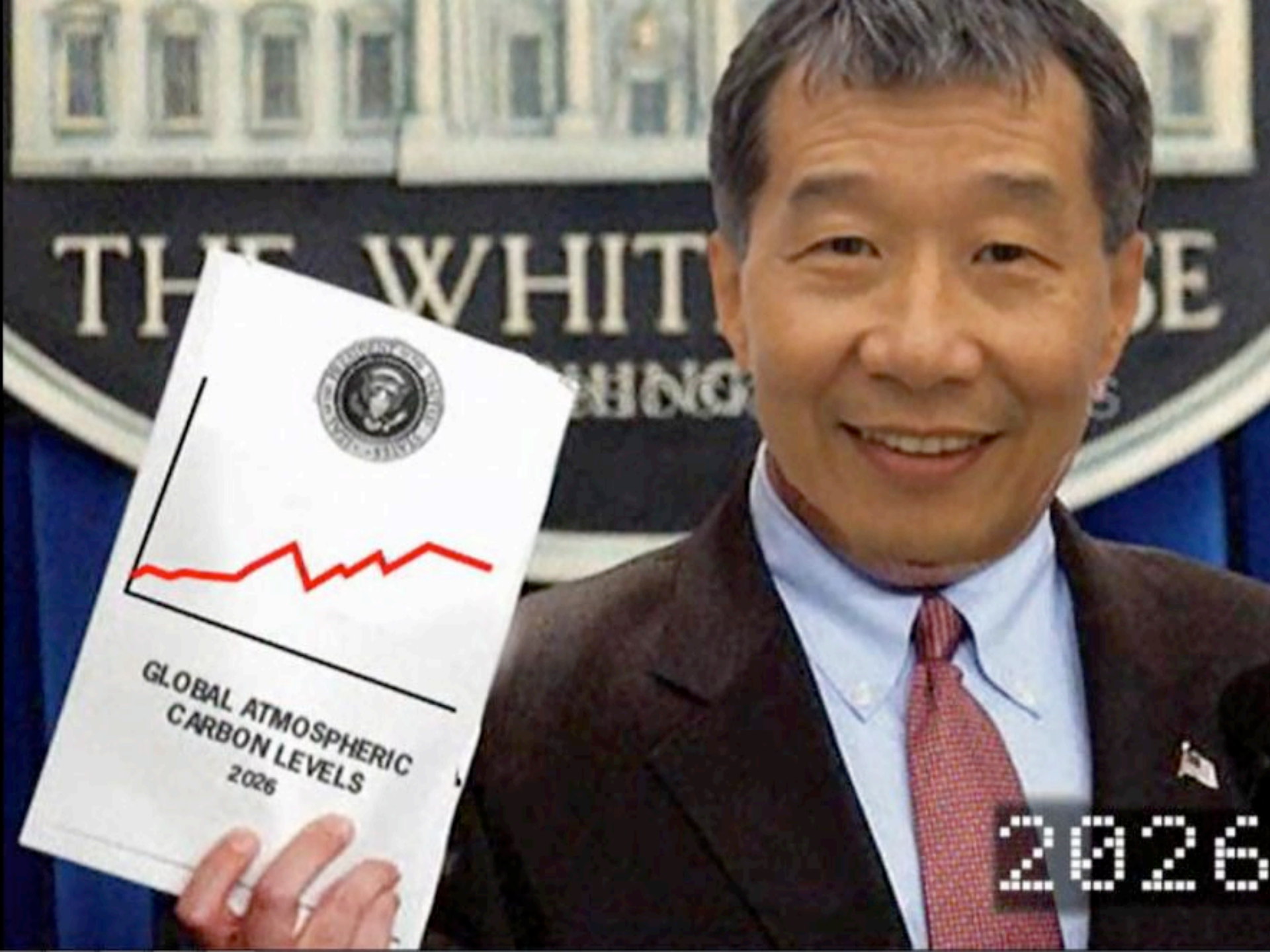
Title: **Climate: A Crisis Averted** © 2055

Synopsis: A riveting documentary on how human beings overcame the greatest challenge the species ever faced.

Director: Ken Burns III | USA | Running Time: 4min 04 sec

00:01





THE WHITE HOUSE
OFFICE OF THE DIRECTOR OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY



GLOBAL ATMOSPHERIC
CARBON LEVELS
2026

2026



**Major Investments in Nature-
Based Solutions Pay Off!**

Water flows despite drought and snow-pack loss

August, 2030



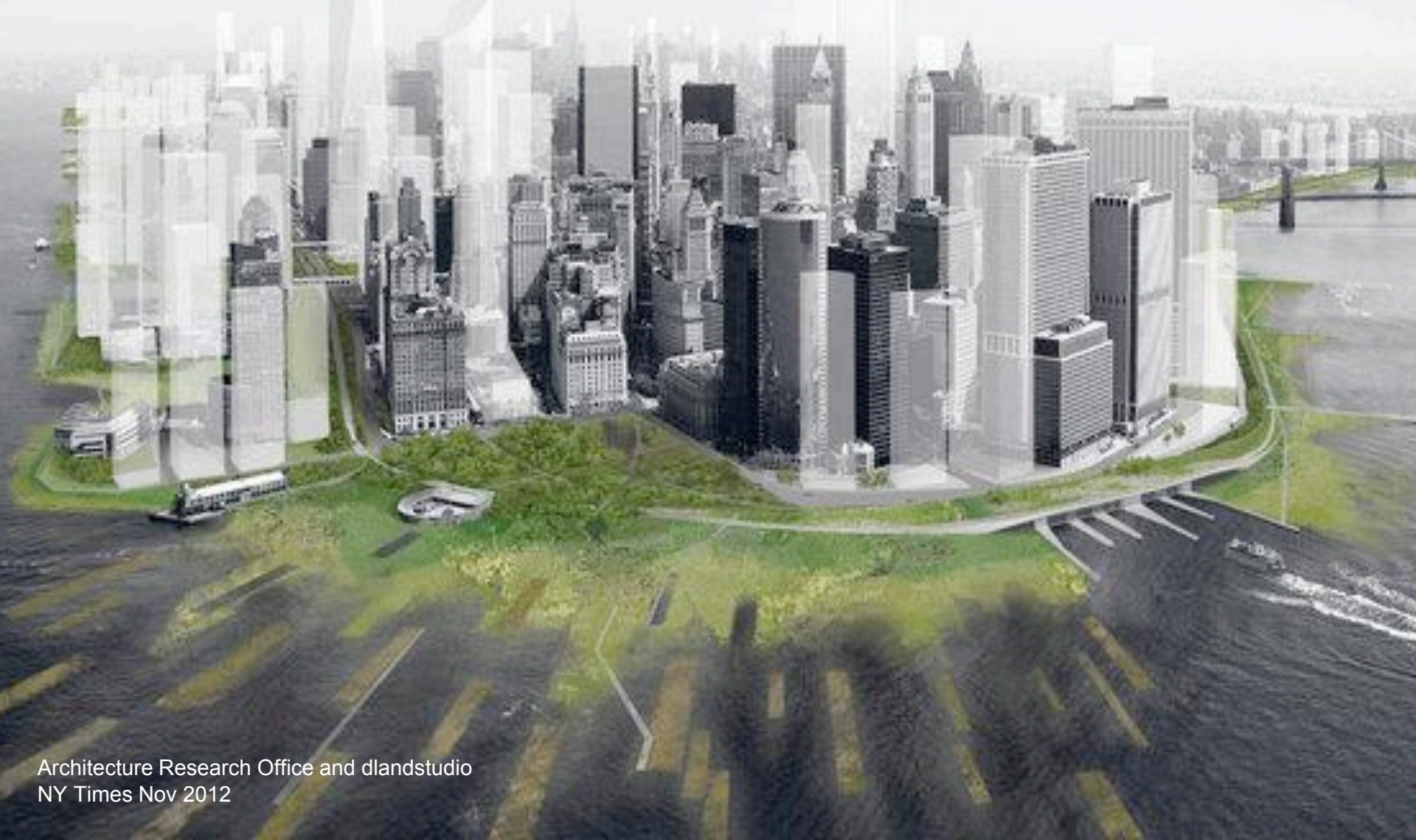
Bay Tidal Marshes Thriving

Regional Policies to Manage Dirt, Protect Cities from Rising Seas and Store Carbon Celebrated

October, 2033

Green Infrastructure Protects NYC from Latest Superstorm

Following Lead of SF Bay Area Cities October, 2045






Visionary Habitat Restoration, Elevated Infrastructure Sustain a Thriving Bolinas

October, 2050

40-Story Urban Farms -Towering Success

Bay Area raises all food it consumes July, 2108





Because of our climate-smart conservation actions today, healthy ecosystems will sustain thriving wildlife & human communities for decades to come, on land and at sea,

What will each of us do differently?

Additional Resources ... ecohen@pointblue.org



- **NOAA Gulf of Farallones National Marine Sanctuary Ocean Climate Initiative**
- <http://farallones.noaa.gov/manage/climate/climate.html>
- **Bay Area Ecosystems Climate Change Consortium** www.baecccc.org
- **Weekly Climate Change and Ecosystem Updates:** sign up for the www.baecccc.org or www.californialcc.org list serve- receive webinar announcements, weekly biodiversity and climate change news updates, and more
- **California Climate Commons** <http://climate.calcommons.org/article/climate-smart-conservation>
- **Climate Smart Conservation, National Wildlife Federation** www.nwf.org/What-We-Do/Energy-and-Climate/Climate-Smart-Conservation.aspx
- skepticalscience.com Explaining climate change science & rebutting misinformation
- realclimate.org Climate science from climate scientists
- www.merchantsofdoubt.org/ --how handful of scientists obscured truth from tobacco smoke to global warming

Thank you partners, funders, members and staff!!





Point Blue

Conservation science for a healthy planet.

