prbo

PRBO Conservation Science

Climate Smart Conservation: Climate change and nature-based solutions for wildlife and people

NOAA Ocean Climate Summit

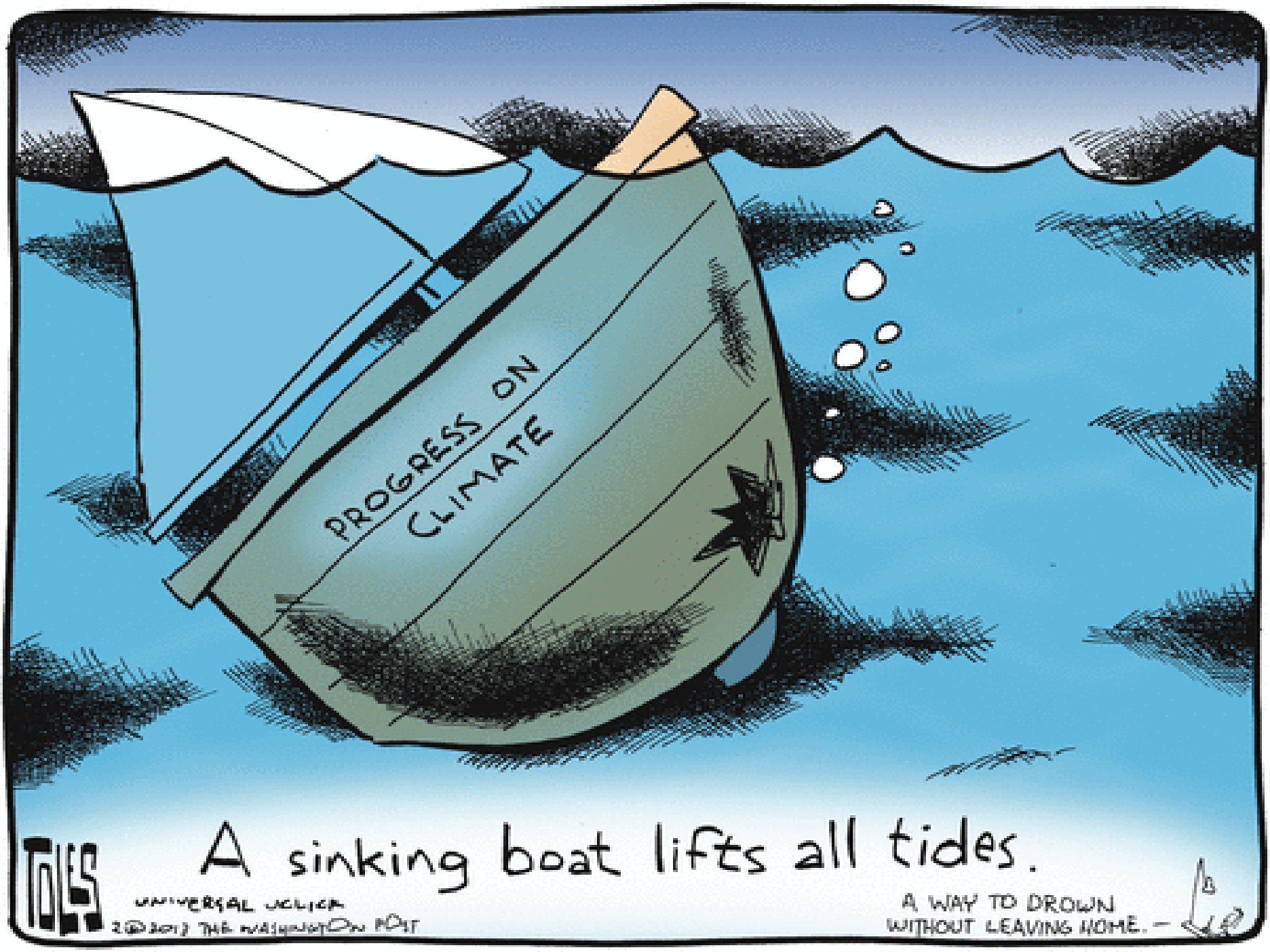
Ellie M. Cohen and PRBO Staff

February 20, 2013

ASSESSING THE IMPACT OF CLIMATE CHANGE...

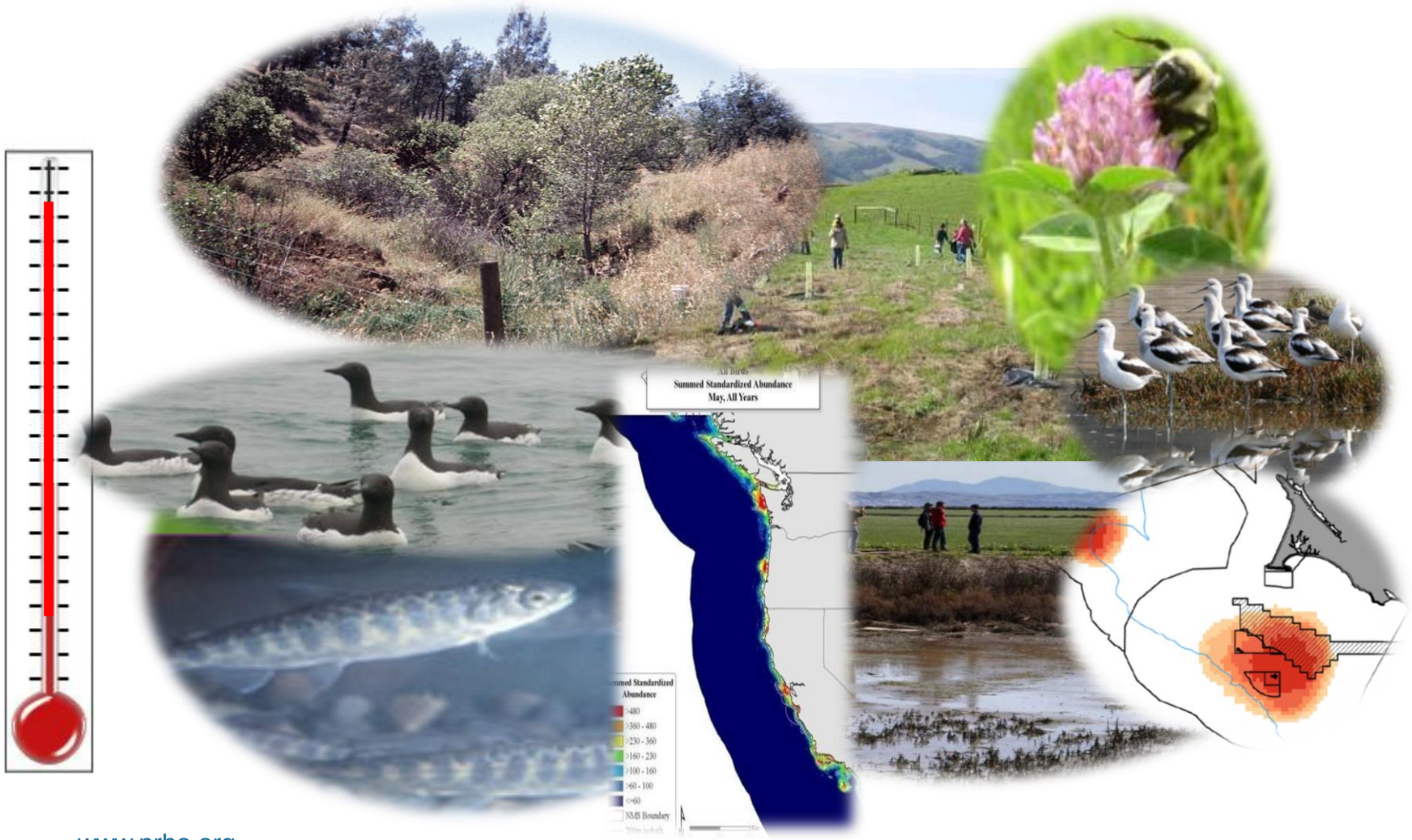
THE SCIENTISTS

THE POLITICIANS


PROGRESS ON CLIMATE
A sinking boat lifts all tides.
TOLES
UNIVERSAL UCLICK
©2013 THE WASHINGTON POST
A WAY TO DROWN WITHOUT LEAVING HOME.—
2-19-13

PRBO Conservation Science

GOOD NEWS: We can reduce climate change impacts and provide more time for wildlife and people to adapt



www.prbo.org

PRBO Conservation Science

To Prevent Total Climate Chaos-

Must engage in mitigation *and* adaptation simultaneously

- **Mitigation**: reduce greenhouse gas emissions (GHG) and enhance carbon sinks

- **Adaptation**: actions to reduce the risks of, and adapt to, climate change impacts on the human and **natural environment**

‘Mitadaption’ ….

Climate Smart

Climate Smart Conservation

http://www.seedsdream.org/Volunteering.html

Definition:

Conservation strategies and actions that specifically address impacts of climate change in concert with other threats.

Climate smart conservation promotes nature-based solutions for wildlife and people that:

- Reduce GHG emissions and enhance ecosystem services;
- Reduce climate change impacts and enhance ability to adapt; and,
- Sustain vibrant, diverse ecosystems.

Adapted from National Wildlife Federation's Climate Smart Conservation Adaptation Principles 2011

Climate Smart Conservation Principles

Principles for Designing and Implementing Climate Smart Actions

Resources Legacy Fund Expert Panel
Guiding Principles for Ecosystem Adaptation
October 2012

1. Conserve the variety of ecological settings that will support California's biodiversity and ecosystems as they shift in response to the changing climate.
2. Conserve and restore landscape linkages and connectivity areas that will allow diverse species to move to new locations and will enhance their persistence.
3. Set priorities for watershed protection and management that will yield conservation and societal benefits as water flows become more variable and potentially decline.
4. Adjust flows below dams and protect coldwater habitats to support native species and aquatic ecosystems.
5. Develop and implement strategies that will ensure the persistence of coastal ecosystems as sea level rises.
6. Manage ecosystems for resilience in the face of extreme events.
7. Align adaptation and mitigation strategies to optimize the co-benefits for people and for ecosystems
8. Use best available scientific information and technical know-how to make informed decisions now in an adaptive management framework
9. Manage for the future.

Excerpted from the forthcoming report soon to be posted online at http://www.resourceslegacyfund.org.

Resources Legacy Fund. 2012. *Ecosystem Adaptation to Climate Change in California: Nine Guiding Principles.* Resources Legacy Fund, Sacramento, California, 32 pp.

http://tbc3.org/wp-content/uploads/CA-Guiding-Principles-RLF-2012.pdf

National Wildlife Federation
Climate Change Adaptation Principles
June 2011

1. Actions Linked to Climate Impacts. Conservation strategies and actions are designed specifically to address the impact of climate change in concert with existing threats; actions are supported by an explicit scientific rationale.

2. Forward-Looking Goals. Conservation goals focus on future, rather than past, climatic and ecological conditions; strategies take a long view (decades to centuries) but account for near-term conservation challenges and needed transition strategies.

3. Broader Landscape Context. On-the-ground actions are designed in the context of broader geographic scales to account for likely shifts in species distributions, to sustain ecological processes, and to promote collaboration.

4. Robust in an Uncertain Future. Strategies and actions provide benefit across a range of possible future conditions to account for uncertainties in future climatic conditions, and in ecological and human responses to climate shifts.

5. Agile and Informed Management. Conservation planning and resource management is capable of continuous learning and dynamic adjustment to accommodate uncertainty, take advantage of new knowledge, and cope with rapid shifts in climatic, ecological, and socio-economic conditions.

6. Minimizes Carbon Footprint. Strategies and projects minimize energy use and greenhouse gas emissions, and sustain the natural ability of ecosystems to cycle and sequester carbon and other greenhouse gases.

7. Climate Influence on Project Success. Considers how foreseeable climate impacts may compromise project success; generally avoids investing in efforts likely to be undermined by climate-related changes unless part of an intentional strategy.

8. Safeguards People and Wildlife. Strategies and actions enhance the capacity of ecosystems to protect human communities from climate change impacts in ways that also sustain and benefit fish, wildlife, and plants.

oids Maladaptation. Actions taken to address climate change impacts man communities or natural systems do not exacerbate other climate-d vulnerabilities or undermine conservation goals and broader stem sustainability.

http://www.nwf.org/Global-Warming/Climate-Smart-Conservation/Adaptation-Principles.aspx

California Climate Adaptation Strategy
DRAFT Climate Smart Principles for State Agencies
July 2012 (to be finalized in 2013)

1. Make Climate Appropriate Decisions in Project Evaluation: Consider the potential effects of climate change on existing and proposed projects to evaluate project merit. Avoid investing in projects that are likely to be undermined by climate-related changes.

2. Plan for Co-Objectives of Climate Mitigation and Adaptation: Develop a planning process that supports comprehensive climate response, aligning greenhouse gas mitigation strategies with adaptation actions.

3. Develop Goals for Forward-Looking and Progressive Time-Scales: Focus conservation goals on future climatic and ecological conditions rather than those of the past. Develop strategies for near-term and long-term timescales.

4. Design Actions from a Landscape, Ecosystem, and Watershed Perspective: Design actions in the context of broader geographic scales and regional contexts to account for likely shifts in species distributions and other ecological changes. Promote collaboration among various stakeholders to develop multi-scale and large-scale actions.

5. Use Adaptive Management: Employ an adaptive management decision making framework that is flexible and responsive to changes in climate, ecology and economics.

6. Prioritize Actions: Prioritize actions based on their risks and benefits, as well as the likelihood that they will reduce the vulnerability of built and natural environments.

- **a. No Risk Actions:** Prioritize actions that have high probability of producing beneficial adaptation outcomes.
- **b. High Vulnerability Actions:** Prioritize actions that improve the capacity of highly vulnerable ecosystems to adapt to climate change impacts.
- **c. Multi-benefit Actions:** Prioritize actions that produce the greatest combination of benefits under a range of possible future climate scenarios.

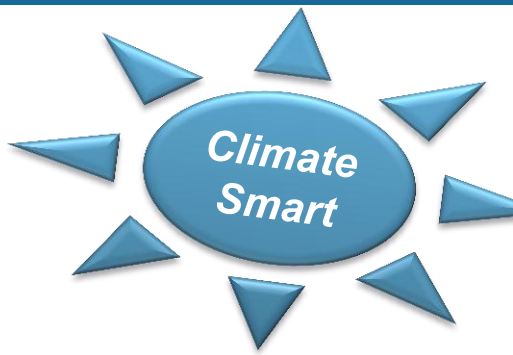
7. Align Adaptation Strategies with Overall Biodiversity Goals: Prioritize biodiversity as a climate adaptation strategy that builds resiliency in ecological systems.

8. Safeguard People, Wildlife and the Economy: Employ strategies that enhance the capacity of human communities to adapt to extreme, climate change driven events by implementing nature-based solutions that also benefit fish, wildlife, and plants. Prioritize activities that provide co-benefits for people, wildlife, and the economy.

9. Plan for Climate Variability: Ensure that actions address the impacts of increasing climate variability in addition to the impacts of temperature change.

https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=48381
https://nrm.dfg.ca.gov/documents/ContextDocs.aspx?cat=ClimateTaskForce

Climate Smart Conservation
Key Principles



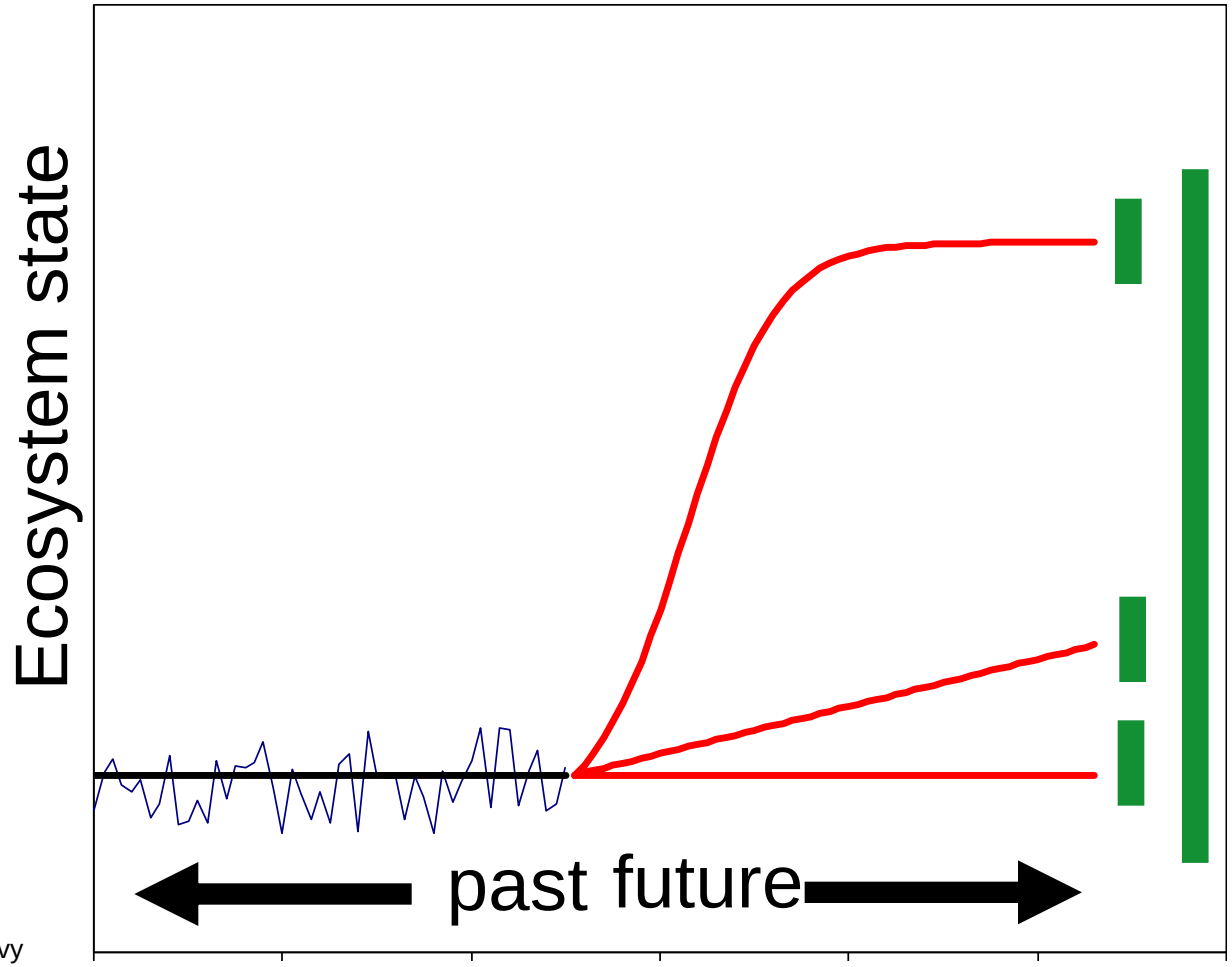
1. Future focus
2. Ecosystem/watershed/landscape context
3. Flexible and adaptive
4. Prioritize actions
5. Collaborate & communicate across sectors

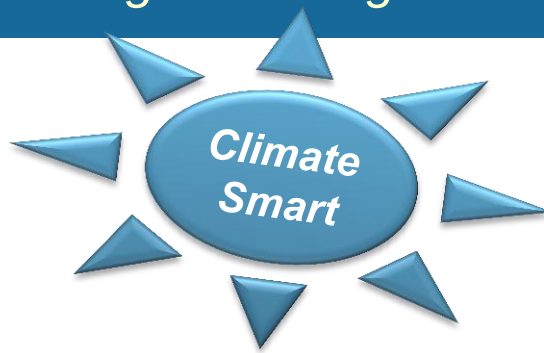
Adapted from: Draft Principles for CA Resources Agency Adaptation Update 2012; NWF Climate Smart Conservation Adaptation Principles 2011; CSIRO's Climate change impacts on Australia's biodiversity conservation & protected areas, Sept 2012 Update

PRBO Conservation Science

1. FOCUS ON FUTURE CONDITIONS including extremes, not past--- '*stop trying to prevent ecological change*' …

.





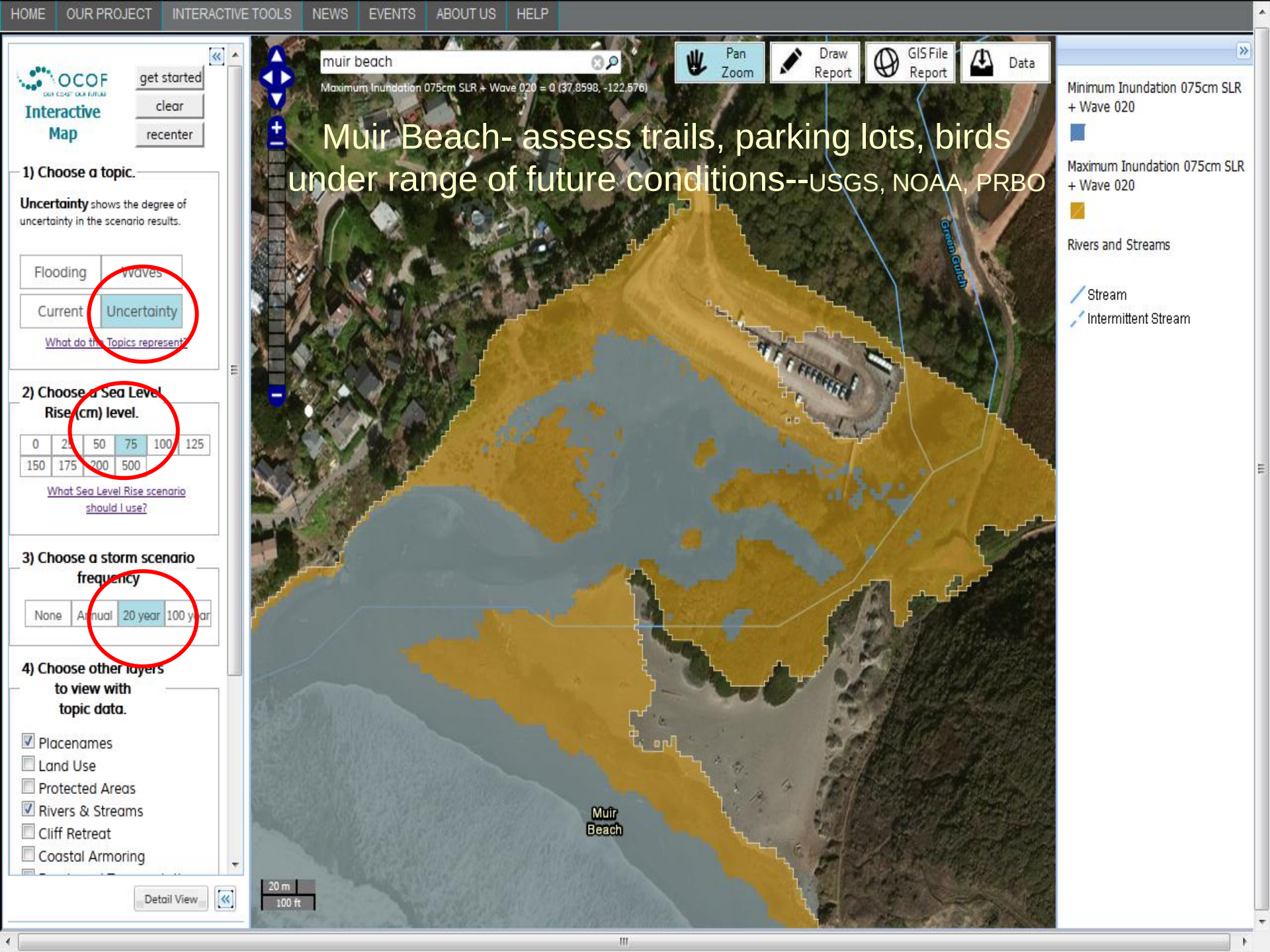
-- Model projections and design management actions across multiple scenarios to address uncertainty in near- & long-term

- Storm surges
- Extreme heat
- Flooding
- Warmer SST
- Increased salinity…

-- Protect 'climate space' diversity to buffer against extremes

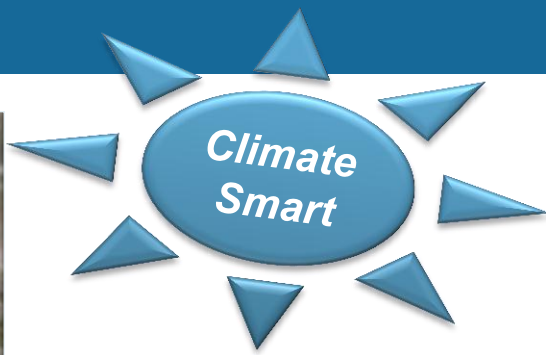
Nat Seavy

www.prbo.org


HOME
OUR PROJECT
INTERACTIVE TOOLS
NEWS
EVENTS
ABOUT US
HELP
OCOF
Interactive Map
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)
Pan Zoom
Draw Report
GIS File Report
Data
Muir Beach- assess trails, parking lots, birds under range of future conditions--USGS, NOAA, PRBO
Green Gulch
Muir Beach
20 m
100 ft
Minimum Inundation 075cm SLR + Wave 020
Maximum Inundation 075cm SLR + Wave 020
Rivers and Streams
Stream
Intermittent Stream

Example: Cool nest boxes

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



For Cassin's Auklets:

- protect from extreme heat events during breeding season

Example: Innovative tidal wetland restoration –capture more sediment, grow faster to meet rising tides

Climate Smart

Sonoma Land Trust

State of California Coastal Conservancy

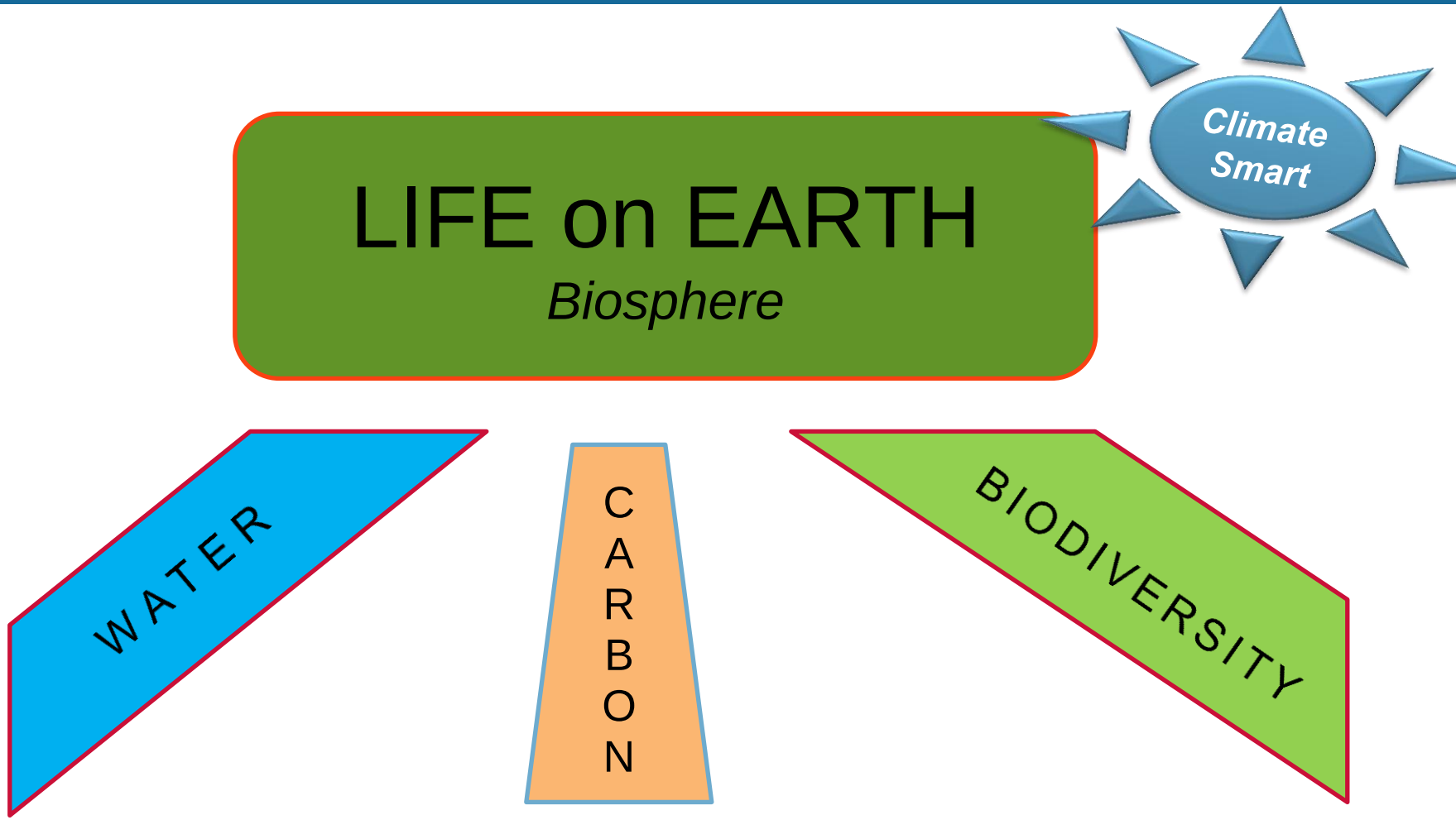
Sonoma Baylands, San Pablo Bay:

- Constructing hundreds of small islands to address *lack of sediment*:
  - create wind breaks
  - filter out sediment from incoming tide
- Benefits ecosystem and human infrastructure

http://www.sonomalandtrust.org./ ; *John Burgess / Santa Rosa Press Democrat:* Sears Point Ranch Restoration Site
http://www.pressdemocrat.com/article/20120216/ARTICLES/120219645/1042/opinion?p=2&tc=pg&tc=ar

2. DESIGN ACTIONS IN ECOSYSTEM CONTEXT

reduce other stressors and manage for multiple benefits



Example: Guide new ocean zoning practices

Common Murre

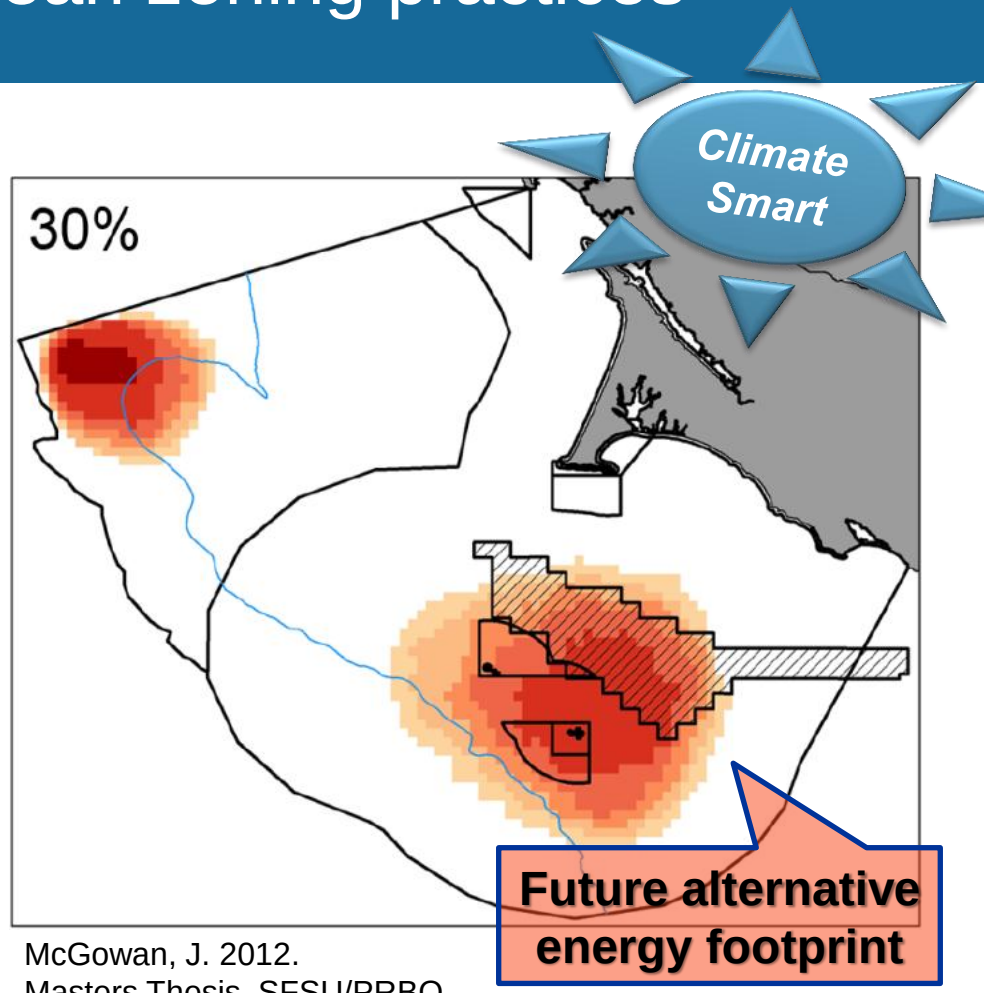
Cassin's Auklet

Rhinoceros Auklet

Brandt's Cormorant

Western Gull

Gray Whales?



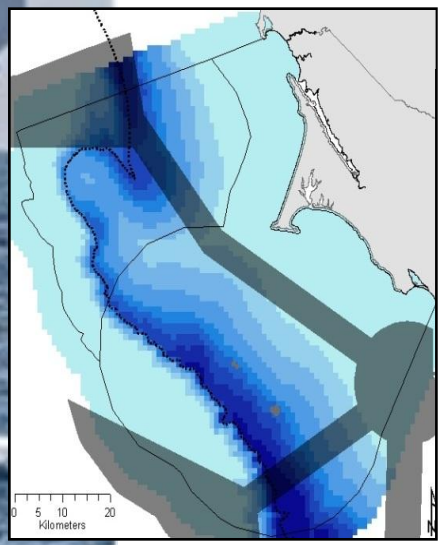
McGowan, J. 2012.
Masters Thesis, SFSU/PRBO

Findings:

- key seabird habitat outside state Marine Protected Areas (MPAs)
- threats from shipping, oil spills and energy development remain.

Example: Reduce whale strikes

Climate Smart

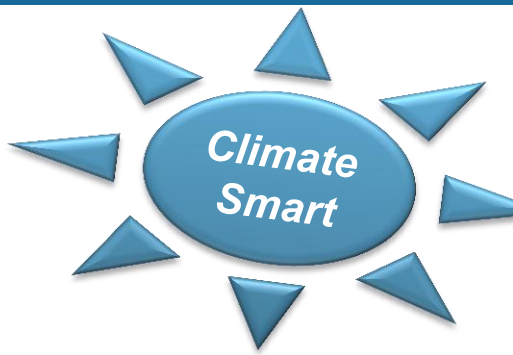


Future vessel traffic footprint

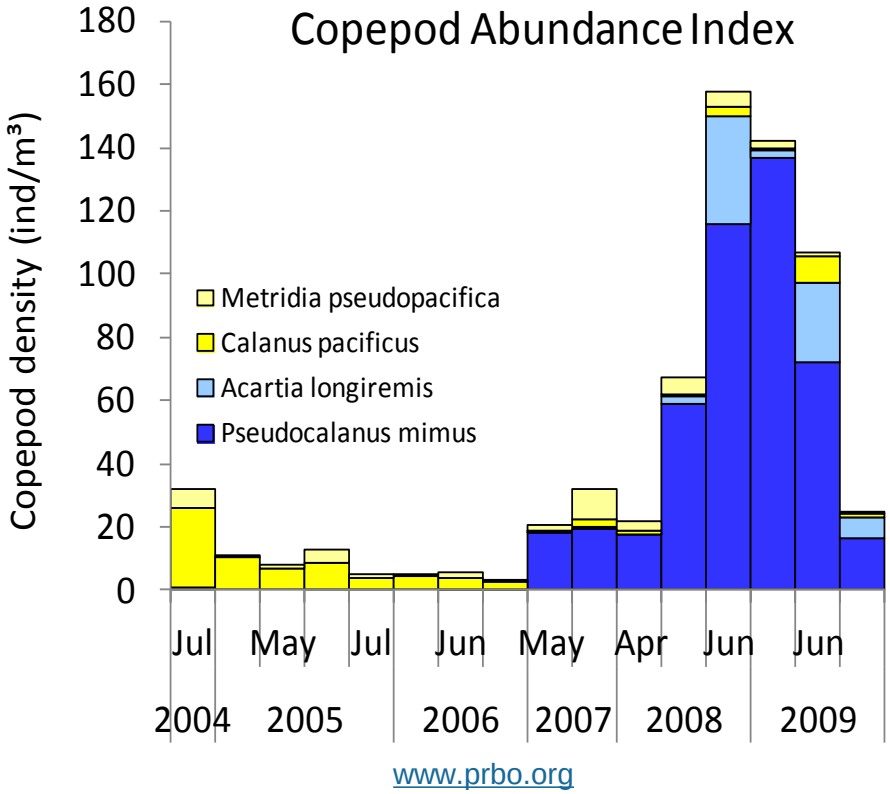
Findings: support new shipping lanes – they reduce vessel traffic within Sanctuaries and high-use humpback whale habitat by about 70%.

Dransfield, A. 2012. Masters Thesis, SFSU/PRBO

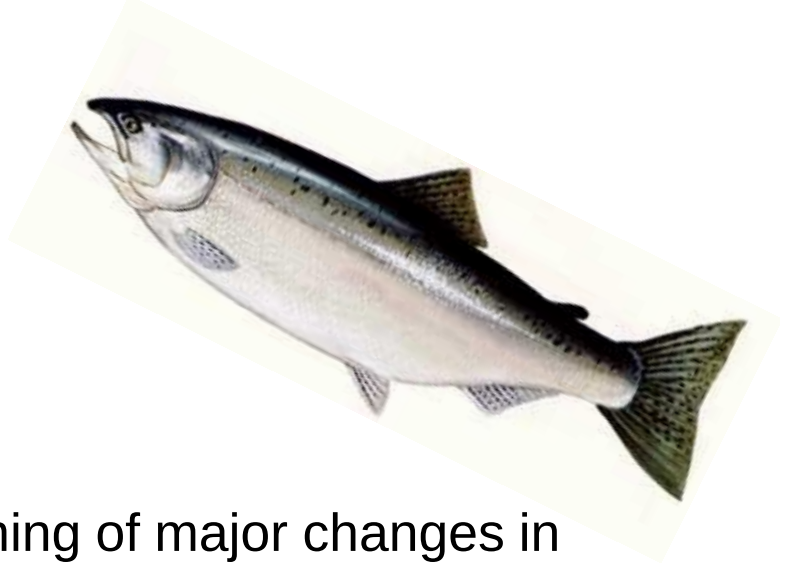
3. EMPLOY FLEXIBLE, ADAPTIVE APPROACHES



Example: Develop ocean health indicators to provide early warning; change management actions



www.prbo.org



Copepods –give a one-year advance warning of major changes in oceans conditions, help forecast salmon in WA-OR.

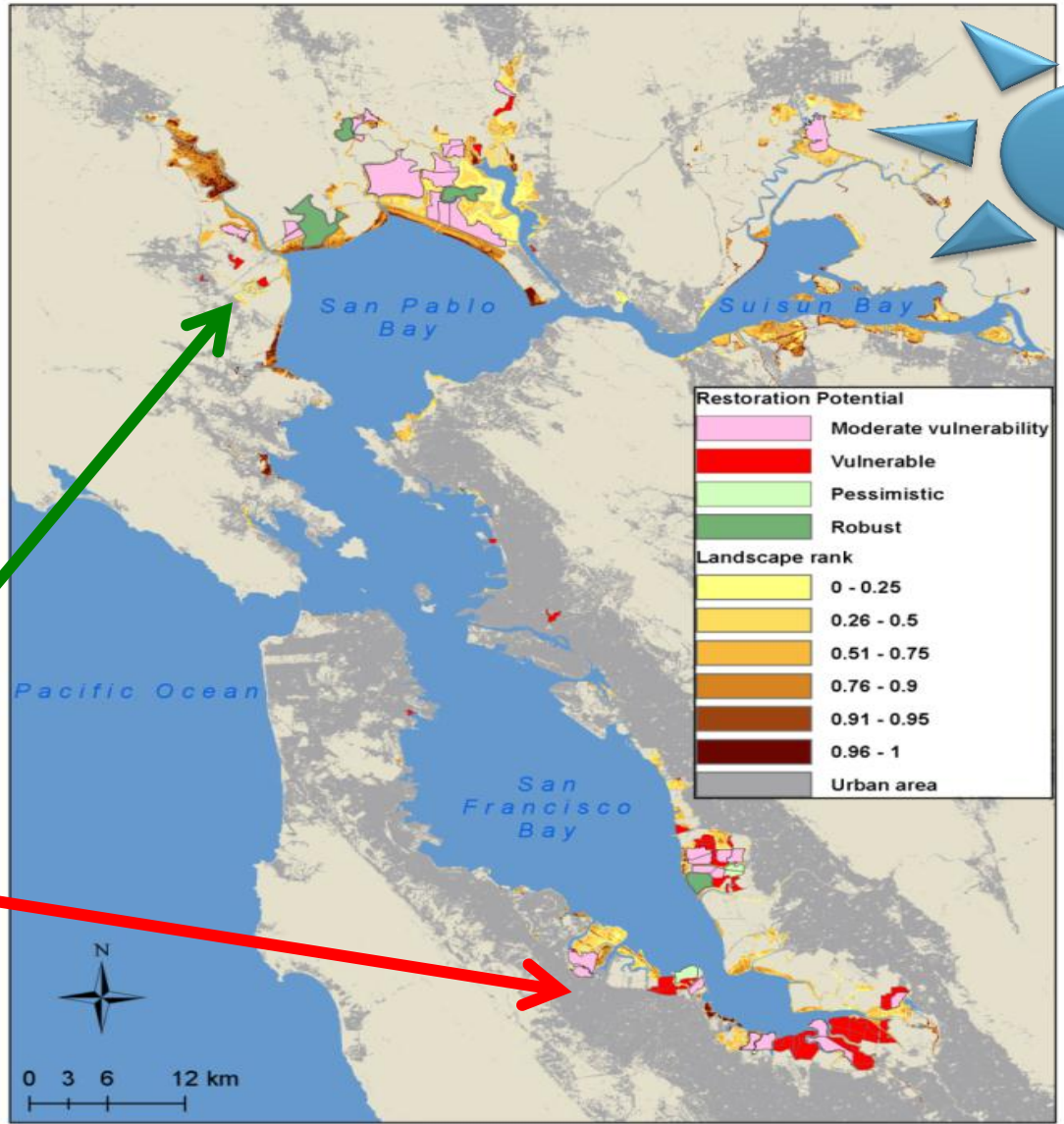
Fontana, R. 2013. PhD Thesis, UC Davis/PRBO

PRBO Conservation Science

4. PRIORITIZE ACTIONS

--across multiple scenarios for greatest benefits to wildlife & people

Tidal Marsh & SLR
Restoration Ranked
(high/low SLR; high/low sediment; multiple timeframes (2010, -30, -50, -70, -90, 2110)
http://data.prbo.org/apps/sfbslr/



Climate Smart

Green: Highest quality bird tidal marsh habitat across all scenarios; **low adaptation management needs**

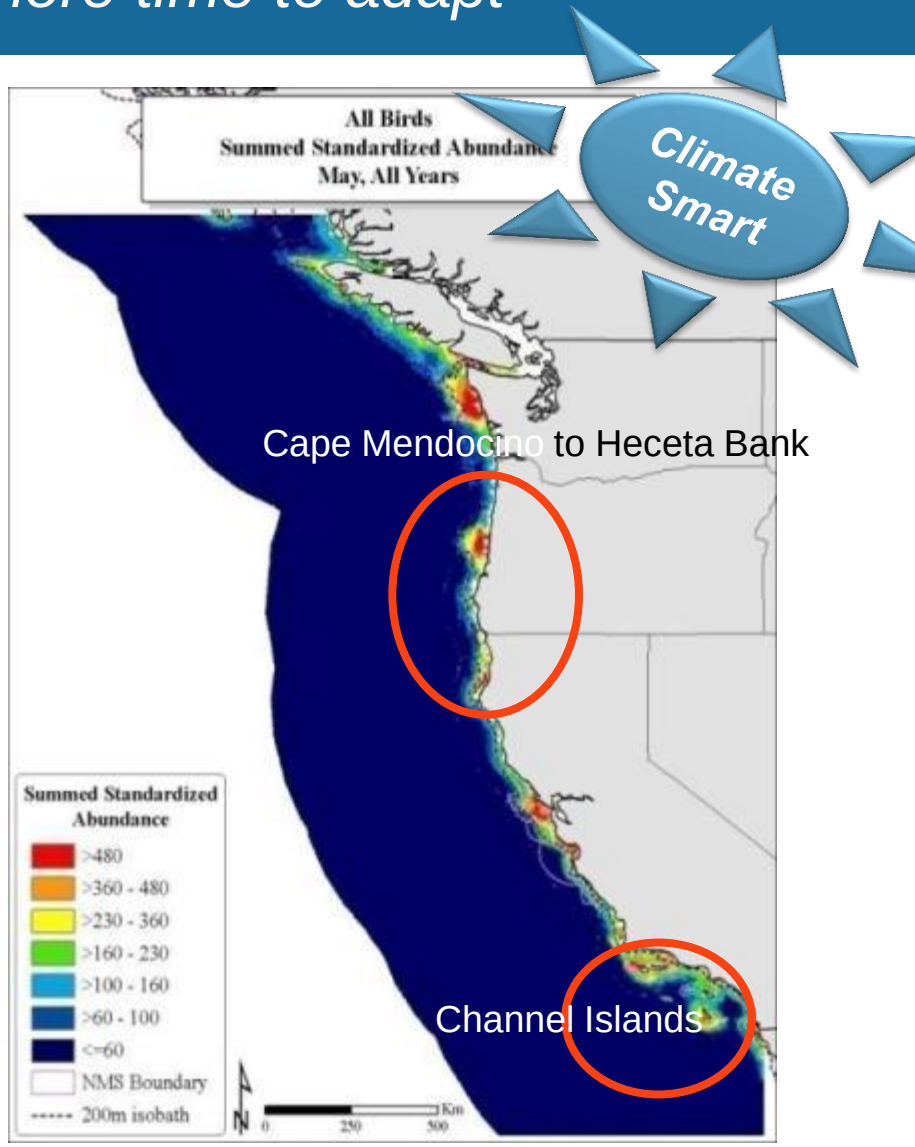
Red: Lowest quality; **significant adaptation management needs**

www.prbo.org Veloz et al

Example: ID & Prioritize Food Web Hotspots for Protection– *give marine wildlife, fisheries more time to adapt*

- Guiding where to establish and/or expand marine protected zones, types of protection

- Prioritizing entire CA Current, National Marine Sanctuaries and state MPAs



Where the wild things are: predicting hotspots of seabird aggregations in the California Current System.
Nur et al Ecological Applications 2011 www.prbo.org

PRBO Conservation Science

5. COLLABORATE & COMMUNICATE ACROSS SECTORS

Climate Smart

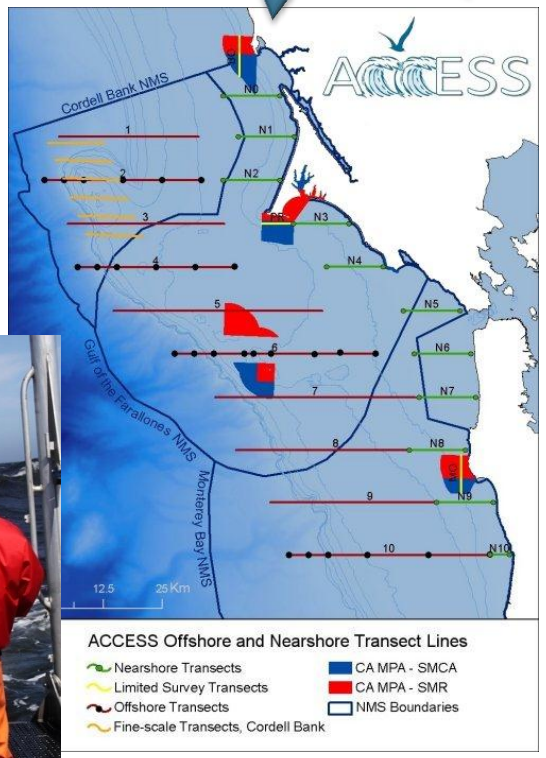
Applied California Current Ecosystem Studies (ACCESS)

www.accessoceans.org

Conducting collaborative ocean research to inform resource managers, policy makers and conservation partners.

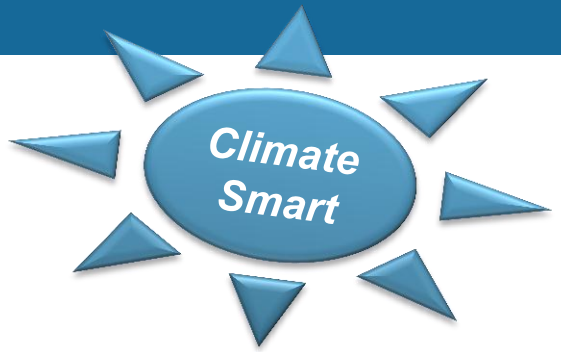
Founders:

Members:



PRBO Conservation Science

Bay Area Ecosystems Climate Change Consortium



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

BAECCC www.baeccc.org

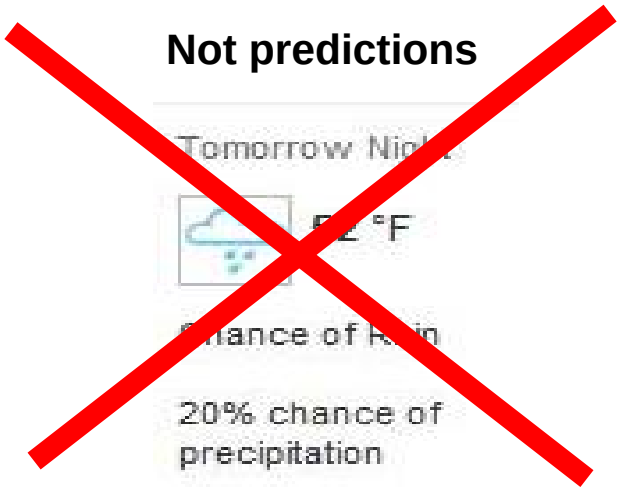
EXAMPLE: Climate Smart Planning

Scenario planning:

a collaborative planning tool for addressing climate change in an uncertain future

Adapted from: http://www.jiscinfonet.ac.uk/tools/scenario-planning/index_html

Scenario Planning



- Assumes future will be very different
- Encourages collaborative “out-of-the-box” thinking amongst diverse stakeholders
- Develops a range of plausible futures (worst to best case)
- Gets past paralysis from not having certainty in projections
- Guides what we need to do now to address the range of future scenarios

From Sara S. Moore, *Getting from Climate Projections to Decisions: a Marin Case Study* April 1,2011 NBWA and Futures of Wild Marin; Also- http://www.jiscinfonet.ac.uk/tools/scenario-planning/index_html

DELTA 2050: internal strategic planning

Scenario Planning Process:
1. Scoping
2. Trend analysis
3. **Build Scenarios**
4. **Generate Options**
5. Test Options
6. Action Plan

Fewer levees: Managed habitat retreat, restoration

Pickleweed Pastures

Less fresh water in Delta

OPTIONS (sampling):

- **Optimization modeling for multiple benefits – biodiversity, water, fisheries, agriculture**
- **Restoration innovations – how best to breach levees to maximize benefits**
- **Levee innovations– how maintain and promote ecosystem function**
- **Improve water use efficiency – flooded fields for agriculture, birds**

More fresh water in Delta

Peripheral Realities

Go with the Flow

More levees: Fortify levees to hold back the sea

www.prbo.org; Adapted from: Sara Moore, Preparing for Climate Change with Case Studies: Futures of Wild Marin; and http://www.jiscinfonet.ac.uk/tools/scenario-planning/index_html

TEST AND EXPERIMENT– You can do it building 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	1	1	1	1		1
Marin manzanita	1		0							
CA Sagebrush	1	1	0							
Salt Marsh Baccharis	1	1	1							
coyote brush	1	1	1							
spice bush	1	1	1							
Ceanothus	1									
blue blossom	1		0							
Mountain Mahogany	1	1	0							
Creek dogwood	1	1	1							
hazelnut	1	1	1							
Hawthorne	1	1	1							
Western leatherwood	1	1	1							
fremontia/ flannelbush	1	1	0							
Toyon	1	1	0							
Creambush	1	1	1							
Pitcher Sage	1		0							
twinberry	1	1	1							
coffeeberry	1	1	1							
reberry buckthorn	1		0							
Gooseberry	1	1	1							
Straggly Gooseberry		1	1							
pink current	1	1	1							
CA Rose	1	1	1							
wood rose	0	1								
ground rose	1		0							
thimbleberry	0	1	1							
CA blackberry	1	1	1							
blue elderberry	1	1	1							
snowberry	1	1	1							
Poison Oak	1	1	1							
CA grape	1	1	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	
wood rose					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			1	1			1					

6. Apply the 10% Rule Every Day

Climate Smart

T = Test &

E = Experiment

N = Now

How address the challenges of accelerating climate change on top of other stressors?

No More “Business as Usual”

CLIMATE SMART:

Reverse greenhouse gas emissions, enhance ability of wildlife and people to adapt and, make ecosystem conservation an equal priority *now*

IN SUMMARY:

Climate change is happening now and accelerating

We must practice Climate Smart Conservation daily:

to reduce/reverse GHG emissions, promote adaptation, and sustain ecosystem benefits for wildlife and people

Key Principles:

1. Focus actions on future conditions, not past
2. Design actions in ecosystem/watershed context
3. Employ flexible, adaptive approaches for timely response to continual change
4. Prioritize actions across multiple scenarios for greatest benefits to wildlife and people
5. Collaborate & communicate across sectors for timely, long term solutions; convey science *and* hope!
6. **Follow the TEN% Rule: Test and Experiment 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


GLOBAL ATMOSPHERIC
CARBON LEVELS
2026
US Climate Secretary:
CO2 rates level off!
2026
From *Climate: A Crisis Averted*

Northern Anchovies, California Coast
http://kipevansphotography.photoshelter.com/image/I0000Dq6ZBT03E4k

Major investments in nature-based solutions pay off

Water flows despite drought and snow-pack loss

August, 2040

Green infrastructure protects NYC from latest superstorm

October, 2045

From *Climate: A Crisis Averted*


Because of our climate smart actions today, healthy ecosystems, on land and at sea will continue to sustain wildlife & our communities for decades to come….

Additional Resources … ecohen@prbo.org

- Climate Smart Conservation, National Wildlife Federation
- CDFG Climate College: www.dfg.ca.gov/Climate_and_Energy/Climate_Change/Climate_College
- Adaptation 101, Jennie Hoffman, EcoAdapt
- Some Thoughts on Landscape and Seascape Conservation Approaches, Roger Griffis, NOAA Fisheries Service

- Cooler Smarter: Practical Steps for Low-Carbon Living. Union of Concerned Scientists
- skepticalscience.com Explaining climate change science & rebutting misinformation
- realclimate.org Climate science from climate scientists
- climatechangecommunication.org Center for Climate Communication
- Climate Change: Lines of Evidence-National Research Council and the National Academy of Sciences videos

- http://blogs.kqed.org/climatewatch/ climate-related science and policy issues, with a specific focus on California
- WEEKLY Climate Change and Ecosystem Updates: sign up for the www.baeccc.org list serve- receive webinar announcements, weekly biodiversity and climate change news updates, and more

- www.merchantsofdoubt.org/ how handful of scientists obscured truth from tobacco smoke to global warming

PRBO Conservation Science

THANK YOU!

Anonymous (2)
Audubon California
Bay Area Ecosystems Climate Change Consortium
S.D. Bechtel, Jr. Foundation
Bernice Barbour Foundation
Bureau of Reclamation
Bureau of Land Management
California Coastal Conservancy
California Department of Fish and Game
California Department of Water Resources
California Bay Delta Authority
California Landscape Conservation Cooperative
Central Valley Joint Venture
Faucett Family Foundation
Richard Grand Foundation
Marin Community Foundation
Giles Mead Foundation
Moore Family Foundation
Gordon and Betty Moore Foundation
David and Lucile Packard Foundation
National Park Service
National Science Foundation
NOAA National Marine Sanctuaries
Natural Resource Conservation Service
Resources Legacy Fund Foundation
San Francisco Foundation
San Francisco Bay Joint Venture
San Francisco State University
The Nature Conservancy
University of California
U.S. Fish and Wildlife Service
USDA Forest Service
USDA Natural Resources Conservation Service
US Geological Survey
and PRBO Board, Members and Staff