

## **Comments On the Coastal and Ocean Resources Sector Outline**

Provided by Debbie Aseltine-Neilson, CA Department of Fish and Game

7/20/12

### **I. Coastal and Ocean Resources “Vulnerability”**

I concur with the comment during the July 12th call that vulnerability may not be the correct word for this title. Some of our resources are not just vulnerable, they are being impacted. On the other hand, “Future Climate Impacts” as used in the 2009 CA Climate Adaptation Strategy (2009 Strategy) implies that all impacts are in the future, and while it may be debatable whether that was the case in 2009, we certainly recognize that this is no longer the case...as noted earlier, some impacts are happening now. This title then needs to reflect this broader perspective and this broader perspective should then be reflected in our strategic approach...that we ultimately need strategies to deal with current impacts, strategies to model, monitor, and assess potential vulnerabilities, and strategies to prepare for expected future impacts.

I would hope that in the process of developing this sector’s chapter to fit within the page limitations, that the document can still present the range of issues that confront us in regard to climate change. The outline, and subsequent goals and strategies, seems to focus mostly on sea level rise and extreme events. While these issues are of concern (and have high political visibility), it is important that these do not overshadow other equally important issues that are or will be confronting us. Increased ocean acidification is noted in the outline, but increased warming of ocean waters (and the effects on coastal marine ecosystems), changes in current patterns (and resulting upwelling events), changes in plankton dynamics (e.g. harmful algal blooms), and increased areas of hypoxia along our ocean shelf are but a few additional issues. The current and future impacts of these factors are not as well known as for sea level rise and extreme events, and are easily relegated to a lower priority to those whose impacts can be more adequately described to the public.

The 2009 Strategy did provide a broad perspective of the issues. I would recommend that the 2012 Strategy use a similar organization of the issues as in the 2009 Strategy, or consider some of the organizational framework used in the National Fish, Plants, and Wildlife Climate Adaptation Strategy (see Table 1 of public review version)

II. Strategy 1c, Habitat Protection, in the 2009 Strategy called for the State to identify priority conservation areas and recommend lands that should be considered for acquisition and preservation. I am sure that several examples can be provided to highlight successes in this area. Certainly, the implementation of our statewide Marine Protected Areas network should be mentioned.

### **III. Coastal and Ocean Adaptation Goals and Strategies**

Comments on Coastal and Ocean Resources Sector Outline

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Prepared by Debbie Aseltine-Neilson, Department of Fish and Game

Prepared 7/20/12

As noted earlier, I am concerned that the vast majority of proposed strategies concentrate on sea level rise and extreme events. I would be willing to participate in a brainstorming session with other CO-CAT members (or other agency staff) to develop additional strategies that cover the other issues to a greater extent than is just provided under E. I've provided a few rough ideas in my comments below.

I agree with the concern expressed during the July 12<sup>th</sup> call that the protection of habitats and ecosystems that is present within the 2009 Strategy is missing from this outline. In addition, I believe that additional work needs to be done to identify and protect areas where these habitats or ecosystems may occur in the future in response to climate change. In addition, incorporation of climate change into management must take a more ecosystem-based approach.

For Goal E, I would suggest breaking this goal into two goals as follows:

(1) Support monitoring of biologic, chemical and physical processes that are important for coastal and ocean biodiversity and ecosystem functions

- Build and expand collaborations with groups involved in monitoring (e.g. California Current Acidification Network; Southern California Ocean Observing System and the Central California Ocean Observing System, Regional Data Framework Action Coordination Team)
  - Ocean temperature, currents (upwelling)
  - Ocean chemistry including ocean acidification
  - Hypoxia
  - HABs
- MPAs – monitoring .....

(2) Adaptively manage resources

- Incorporate climate change into management plans (e.g. SWAP)
- Synthesize information on impacts of climate change on fisheries and their associated ecosystems and integrate into management
- Build increased understanding of changing coastal sediment budget processes into regional sediment management
- Develop new tools for incorporating climate change into management (vulnerability assessments)

Might consider adding an outreach goal too to increase public awareness of changes in our estuaries and coastal waters due to climate change

IV. Related Planning....

I suggest that you separate the "MPA – monitoring for climate change impacts (OPC/Ocean Science Trust, DFG)" and "coordination on ocean acidification monitoring (OPC/Ocean Science Trust, DFG)" into separate items

Consider adding item on Regional Data Framework Action Coordination Team (see <http://www.westcoastoceans.org/index.cfm?content.display&pageID=153>)

V. Adaptation Research Needs in the Coastal and Ocean Resources Sector  
Should add the development of a marine vulnerability assessment (several efforts are currently being pursued through the NPLCC; it would be valuable to build on these efforts to develop assessments that cover our ocean environment).

Submitted by:  
Benjamin Grant  
SPUR  
July 9, 2012

**COASTAL AND OCEAN RESOURCES SECTOR – 2012 CLIMATE ADAPTATION STRATEGY**  
**JULY 5, 2012 SCOPING OUTLINE**

**(Please send comments by close of business on Friday, July 20th to [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov))**

The California Natural Resources Agency, working through the Climate Action Team (CAT), is developing the 2012 Climate Adaptation Strategy. This resource will outline proactive steps to take now to protect public health and safety, infrastructure and the economy, and California's unique natural environment in the face of climate change. The 2012 Climate Adaptation Strategy will include chapters on agriculture, biodiversity, forestry, land use and infrastructure, public health, transportation, energy, emergency preparedness, fresh water, and ocean and coastal resources but will also highlight various cross-cutting recommendations.

The [Coastal and Ocean Climate Adaptation Team \(CO-CAT\)](#), comprised of over 16 state agencies, is developing the coastal and ocean chapter of the 2012 Adaptation Strategy. This scoping outline is intended to identify and engage the public in a discussion of the issues that should be addressed in this chapter. We welcome your thoughts on whether we have identified the correct issues and your thoughts on how to approach these issues.

A draft of the full 2012 Climate Adaptation Strategy will be available for public comment in early fall, along with specific opportunities to comment on the coastal and ocean chapter. A final version is expected at the end of this year.

- I. **Coastal and Ocean Resources Vulnerability** (This section is intended to identify the major drivers of vulnerability from climate-induced impacts on coastal and ocean resources (i.e. infrastructure, communities, beaches/public recreation, wetlands, etc.)
  - A. sea-level rise and erosion
  - B. extreme events such as El Niño storms, atmospheric rivers
  - C. ocean acidification
  - D. other physical, chemical and biological changes
- II. **Highlights of Steps Taken to Date and Success Stories** (This section is intended to highlight some of the steps taken to date to adapt to climate impacts on coastal and ocean resources. In addition to commenting on the items below, we welcome the public to submit descriptions and photos of innovative adaption projects to [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov)).
  - A. CO-CAT and OPC Science Advisory Team developed guidance on sea-level rise and OPC adopted resolution to support the guidance and conducted outreach to over 45 state agencies, commissions and other governmental bodies.
  - B. Many state agencies (BCDC, State Lands Commission, Caltrans, Delta Conservancy) have developed sea-level rise guidance and policies and significant relevant state grant programs have incorporated SLR into funding decisions (e.g. Coastal Conservancy, Department of Water Resources, Strategic Growth Council).

**Comment [BG1]:** should this include historic and contemporary management practices? These affect coastal dynamics.

also -- changes to sediment dynamics as a discreet category?

- C. High-resolution elevation data (LiDAR) are available for nearly entire coastline to support detailed sea-level rise vulnerability assessments and thanks to partnership with NOAA Coastal Services Center, this data is being incorporated into interactive sea-level rise inundation viewer tool.
- D. Regional collaborations are assessing vulnerabilities and developing adaptation plans.

**III. Coastal and Ocean Adaptation Goals and Strategies** (This section is intended to identify the recommended strategies for adapting to coastal and ocean impacts of climate change. In many cases, the identified strategy is cross-sectoral and will be highlighted as such in the final report.)

A. Protect public health and reduce harm to coastal and bay communities from extreme events and sea-level rise.

1. sea-level rise hazard avoidance, sustainable development in low hazard areas
2. vulnerable populations
3. emergency preparedness for extreme events that are made worse or compounded by sea-level rise (*e.g.* increased flooding and erosion from storms and tsunamis, and levee failure and liquefaction from earthquakes)
4. improved forecasting and projections
5. wastewater treatment and stormwater management facilities
6. harmful algal blooms and exposure to water-borne pathogens
7. hazardous waste sites
8. hotspots for saltwater intrusion into water supplies

**Comment [BG2]:** a distinct set of issues and challenges apply in urban areas -- worth calling out I think

**Comment [BG3]:** as worded, these are not reading as strategies or goals -- needs a very clear sort throughout. What is this a list of? issues? hazards? goals? strategies? needs?

**Comment [BG4]:** harm to private property, public infrastructure, public open space resources

B. Improve understanding and protect public trust resources from sea-level rise impacts.

1. vulnerability of public trust resources such as public access, water supplies, navigation, wildlife, etc. and costs and benefits of adaptive management to address vulnerabilities.
2. education on how a changing shoreline (from erosion and inundation as the mean high tide line moves inland) affects private property boundaries and public trust lands
3. evaluation of possible changes to laws and policies to remove barriers to effective state actions

C. Support local, regional and state agencies and collaborations, tribes, land-owners and resource managers in addressing sea-level rise and extreme events.

1. updates to Local Coastal Programs (LCPs), General Plans, Local Hazard Mitigation Plans, and other land use documents that are key adaptation implementation tools
2. develop sample language for LCPs, General Plans, etc.
3. pilot projects on innovative adaptation approaches that reduce risk and achieve co-benefits (*e.g.* planned retreat, living shorelines)

4. regional sediment management
5. more data and education on socioeconomic impacts of different adaptation options
6. education on tools for addressing sea-level rise (e.g. transfer of development credits, rolling easements, setbacks, tax and fee incentives)
7. tidal wetlands and beaches –predicted changes, upland areas suitable for migration inland, actions to address sediment supply, innovative projects that enhance or restore functions and resiliency

**Comment [BG5]:** model language, codes, contracts?

D. Incorporate best available scientific understanding of sea-level rise and extreme events into decision-making.

1. coastal hazard maps that can be used in land use decisions and real estate transactions
2. accessibility of geospatial data (e.g. LiDAR) to improve vulnerability analyses
3. improved understanding of shoreline change
4. collaborations with insurance and investment partners
5. planning and decisions on infrastructure investments

E. Monitor and adaptively manage changes to biologic, chemical and physical processes that are important for coastal and ocean biodiversity and ecosystem functions.

1. ocean acidification – monitoring on both a spatial and temporal scale to help identify hotspots and target management actions
2. Marine Protected Areas – monitoring for changes to indicator species, to help inform adaptive management of MPAs
3. fisheries – synthesize information on impacts and integrate into management
4. sediment management – understand changing coastal sediment budgets and processes and conduct regional sediment management

IV. **Adaptation Research Needs in the Coastal and Ocean Resources Sector** (This section is intended to identify key research needs that will help the state of California and other entities to more effectively adapt to climate change impacts.)

- A. Monitor, document and distribute information on shoreline changes and impacts from storms (e.g., beach and cliff erosion) and revise methodologies for predicting shoreline evolution
- B. Updated methodology for flood frequency under changing climate
- C. Improved forecasting of extreme events such as atmospheric rivers (extreme precipitation)
- D. Co-location of land-based GPS and tidal gauge stations to improve monitoring of local relative sea- level

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- E. Improve monitoring and understanding of land elevation changes, such as subsidence and tectonic activity (*e.g.* Cascadian fault system)
- F. Development of consistent methods for monitoring ocean acidification
- G. Socioeconomic data (including quantification of ecosystem services) on impacts of different adaptation approaches (*e.g.* seawalls, managed retreat, artificial reefs, and no action/business as usual)
- H. Evaluation of innovative adaptation efforts (*e.g.* living shorelines) in reducing risk or vulnerability to climate-related hazards

**Comment [BG6]:** best practices in lifecycle costing and cost-benefit analysis for infrastructure -- how do we decide what measures are appropriate to protecting what components?

- V. **Related Planning, Investment and Regulatory Processes** (This section identifies planning, investment and regulatory processes that may present an opportunity for integration of the above strategies. This section is meant to inform a discussion about cross-sectoral opportunities and will probably appear in the Appendix to the 2012 Climate Adaptation Strategy, not within the ocean and coastal chapter itself.)
- A. Updates to Local Coastal Programs (Coastal Commission, Coastal Conservancy, OPC, Strategic Growth Council) - state grant funding, coordination, review of amendments
  - B. Update to General Plan Guidelines (OPR)
  - C. SB 375 Sustainable Communities Strategies (CCLU-IN)
  - D. Funding pilot innovative and effective adaptation projects (Coastal Conservancy, SWRCB)
  - E. California Water Plan – especially role of desalination and recycled water (DWR)
  - F. Integrated Regional Water Management Plans (DWR)
  - G. Transportation vulnerability hot spot map (CalTrans)
  - H. SLR impacts on groundwater basins, desalination & wastewater (SWRCB.)
  - I. Integrated climate vulnerability screening (Department of Public Health)
  - J. Incorporation of SLR into applications related to state leases and grants (ports, marinas, harbors, etc. – State Lands Commission)
  - K. Regional habitat plans (*e.g.* Bay Area Baylands Goals Update, Our Coast Our Future – SF Bay Area, Southern California Wetland Recovery Project)
  - L. Regional Coastal/Bay Climate Planning Projects (*e.g.*, San Diego Climate Strategy, LA Regional Collaborative, Southern Monterey Bay Coastal Erosion Project, Adapting to Rising Tides/BCDC, One Bay Area Climate Strategy, Humboldt Bay Initiative, etc.)
  - M. State Wildlife Action Plan (DFG)
  - N. Marine Protected Areas -monitoring for climate change impacts, coordination on ocean acidification monitoring (OPC/Ocean Science Trust, DFG)
  - O. CA Coastal Mapping Program – elevation & habitat data & maps (OPC etc.)
  - P. Sea-level rise guidance (internal draft guidance document) (State Parks)

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- Q. Disclosure on risk from climate change impacts (Insurance Commissioner)
- R. Granted land trustees (ports and coastal cities, primarily) preparation for sea level rise action plans (State Coastal Commission).
- S. Incorporate climate data into basin and ocean plans (SWRCB)
- T. Areas of Conservation Emphasis mapping and modeling tool (ACE-II) (DFG)
- U. Natural Communities Conservation Planning Program (NCCP) and Habitat Conservation Plans (DFG, Coastal Conservancy)
- V. California State Multi-Hazard Mitigation Plan (CalEMA)
- W. Local Hazard Mitigation Plans (CalEMA)
- X. Sea level rise guidance document for use by transportation planners (Caltrans)
- Y. AB 162- Flood risk and local land use planning. (DWR, CVFPB)

**Comment [BG7]:** National Park Service  
General Management Plans

Army Corps Dredging activities, beach  
nourishment/beneficial reuse processes (section  
2037)

July 20, 2012

Cat Kuhlman  
Deputy Secretary for Oceans and Coastal Matters  
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**Re: Comments on the Coastal and Ocean Resources Sector – 2012 Climate Adaptation Strategy Scoping Outline**

Dear Deputy Secretary Kuhlman and members of the Coastal and Ocean Climate Action Team:

On behalf of the Center for Ocean Solutions (COS), thank you for the opportunity to review and comment on the Scoping Outline for the Coastal and Ocean Resources chapter of the 2012 Climate Adaptation Strategy. We commend the Coastal and Ocean Climate Action Team on progress made since the 2009 Strategy and look forward to working with you and your colleagues to further develop and implement the 2012 Strategy.

This effort is directly relevant to our work at COS, a collaboration among Stanford University's Woods Institute for the Environment and Hopkins Marine Station, the Monterey Bay Aquarium, and the Monterey Bay Aquarium Research Institute. Our mission is to solve the major problems facing the ocean and prepare leaders to take on these challenges. Coastal climate adaptation work is central to our organization's primary goals and objectives. The Center's priority efforts on this issue include (1) partnering with local, regional, state and federal decision-makers along California's coast to scope and implement effective adaptation actions, (2) researching and understanding climate-related impacts on the ocean and coastal communities, (3) coordinating and co-authoring the Coastal Issues chapter of the Southwest Climate Assessment and (4) developing decision-support tools for adaptation planning.

It is from this perspective that we provide the following brief comments on the Scoping Outline.

Section I

- A. This section highlights physical impacts from climate change rather than resource vulnerabilities. We therefore recommend refining the section title to reflect that objective. Our suggested title is, "Physical impacts from climate change."
- B. High rainfall can be associated with additional weather phenomena unrelated to atmospheric rivers. For this reason we recommend changing the term "atmospheric rivers" to "extreme precipitation events" in Section I.B. to account for this broadened scope.
- C. We recommend highlighting two additional impacts that affect ocean resource vulnerability:
  - a. Altered upwelling season: The impacts of changing wind patterns (resulting from climate change) can affect the timing, intensity and/or efficiency of coastal upwelling, a process that infuses the State's coastal ecosystems with nutrients. Altered ocean upwelling therefore has the potential to affect the foundation of oceanic food webs.

- b. Extreme hypoxic events: Climate change may have a role in the expansion of low oxygen zones in the ocean. While oxygen minimum zones are a natural occurrence in parts of the ocean, expansion beyond its normal boundaries can have numerous and complex ecological effects on ocean ecosystems.

### Section III.

- A. Within Section III.A., we recommend including the following two additional strategies as ways to protect public health and reduce harm to coastal and bay communities from extreme events and sea-level rise:
  - (1) Recognize, maintain and rehabilitate natural systems that provide the community with a variety of ecosystem services.
  - (2) Promote and apply financial incentives (e.g., real estate disclosures and insurance coverage standards that accurately incorporate climate change-related risk) to limit development in high-risk areas.
- B. As a part of Section III.C., we recommend incorporating the following two additional strategies to help stakeholders address sea-level rise and extreme events:
  - (1) Encourage and leverage the use of public-private partnerships.
  - (2) In addition to innovative projects that incorporate strategies such as planned retreat and living shorelines, provide a user-friendly clearinghouse of the suite of adaptation strategies and options that local, regional, state agencies and collaborations, tribes, land-owners and resource managers can use to address sea-level rise and extreme events.
- C. In Section III.E., we recommend monitoring the following two additional oceanographic conditions due to their importance to ocean biodiversity and ecosystem function:
  - (1) Altered upwelling seasons
  - (2) Extreme hypoxic events

### Section IV

Ocean acidification is due to increased atmospheric carbon dioxide,<sup>1</sup> but at the local level land-based pollution can also exacerbate the problem.<sup>2,3</sup> By understanding how land based practices influence local acidification, we can develop appropriate policy responses best suited to protect our coastal ecosystems.<sup>4</sup> Similarly, hypoxic events are likely due to a combination of climate change and human impacts. Oceanic conditions associated with climate change, such as warmer surface waters and increased stratification, raise the potential for a hypoxic event to occur and have been associated with the recent expansion of low dissolved oxygen waters and increased occurrences of hypoxic conditions along

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<sup>1</sup> Scott C. Doney et al., *Ocean Acidification: The Other CO<sub>2</sub> Problem*, 1 ANN. REV. MAR. SCI. 169 (2009).

<sup>2</sup> Richard A. Feely et al., *The Combined Effects of Ocean Acidification, Mixing, and Respiration on pH and Carbonate Saturation in an Urbanized Estuary*, 88 ESTUARINE, COASTAL & SHELF SCI. 442 (2010).

<sup>3</sup> Wei-Jun Cai et al., *Acidification of Subsurface Coastal Waters Enhanced by Eutrophication*, 4 NATURE GEOSCIENCE 766 (2011).

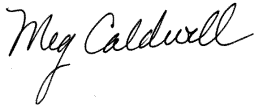
<sup>4</sup> Ryan P. Kelly & Margaret R. Caldwell, *Why Ocean Acidification Matters to California, and What California Can Do About It*, Center for Ocean Solutions (2012).

open coasts.<sup>5</sup> Under this condition, smaller eutrophication events resulting from land-based nutrient runoff will occur more frequently and lead to increased economic and ecological consequences.<sup>6,7</sup>

For these reasons, we recommend expanding Section IV.F. to include the following suggested language: “Development of systematic and consistent methods for monitoring ocean acidification and hypoxic events; and focused research to determine the relative importance of the different causes of these phenomena.” Incorporating these additional monitoring conditions can help the State better understand, prepare and respond to impacts from ongoing oceanographic changes resulting from climate change.<sup>8,9</sup>

Thank you for this opportunity to comment on the Draft Scoping Outline. Please do not hesitate to contact me with any questions or concerns regarding these recommendations. We will be happy to provide additional explanation and assistance and look forward to working with you to enhance the resilience of the State’s coastal and ocean resources.

Sincerely,

A handwritten signature in cursive script that reads "Meg Caldwell".

Meg Caldwell, JD  
Executive Director  
Center for Ocean Solutions  
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<sup>5</sup> Steven J. Bograd et al., *The Shoaling of the Hypoxic Boundary in the California Current*, 35 GEOPHYSICAL RES. LETTERS (2008).

<sup>6</sup> Robert Diaz & Rutger Rosenberg, *Introduction to Environmental and Economic Consequences of Hypoxia*, 27 WATER RESOURCES DEV. 71 (2011).

<sup>7</sup> Andreas F. Hofmann et al., *Hypoxia by Degrees: Establishing Definitions for a Changing Ocean*, 58 DEEP SEA RES I 1212 (2011).

<sup>8</sup> See Bograd, *supra* note 5.

<sup>9</sup> See Hoffman, *supra* note 7.

July 20, 2012

California Natural Resources Agency

Delivered electronically to: [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov)

Thank you for the opportunity to comment on the Coastal and Ocean Resources Sector – 2012 Climate Adaptation Strategy July 5 Scoping Outline. I hope you will find these useful, and please do not hesitate to get in touch if you would like to follow up in more detail.

Overall I think the outline raises many of the important considerations, with a few exceptions that probably fall into the “other” categories in some sections, such as “other physical, chemical and biological changes.” I urge you to flesh these out as early as you can in order that they be given proper treatment and emphasis in the final product. Some of these include changes in timing and strength of upwelling and resulting consequences to foodwebs, higher ocean temperatures, freshening, and changes to ocean chemistry beyond pH. Also, in order for the entire Strategy update to represent an integrated work and avoid siloing recommendations by sector, I believe there should be an introductory piece that discusses cross-sectoral implications and themes explicitly. Incorporating a set of “climate smart adaptation principles” across the entire document (i.e., not just within this chapter) will help address this. Some suggested climate smart principles are:

1. **Align Adaptation Strategies with Biodiversity and Ecosystem Function Goals:** Prioritize biodiversity and ecosystem function as a climate adaptation strategy that builds resiliency in ecological systems. Ensure that specific actions taken to address climate change impacts align with broad scale nature conservation goals and do not exacerbate climate-related vulnerabilities of ecosystems.
2. **Safeguard People and Wildlife:** 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, birds, other wildlife, plants and ecosystem services such as natural water storage and flow. Prioritize activities that provide co-benefits for people and nature—ecologically and economically.,.
3. **Plan for Climate Extremes and Variability:** Ensure that actions address the impacts of increasing climate extremes and variability in addition to the impacts of longer term average temperature increases..Choose strategies and actions that provide the greatest benefits across a range of possible future climate scenarios. Also consider the impact of ecological and human responses to climate change .
4. **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.
5. **Plan for Co-Objectives of Climate Mitigation and Adaption:** Develop a planning process that supports comprehensive climate response, aligning greenhouse gas mitigation strategies with adaptation actions. For instance, promote actions that help forests adapt to future climate

variability, and sustain biodiversity while also promoting their ability to sequester carbon and other ecosystem services such as water storage and flow,.

6. **Develop Goals for Forward-Looking and Progressive Time-Scales:** Focus conservation and other goals on future climatic and ecological conditions rather than those of the past. Develop strategies for near-term and long-term timescales, including decades and centuries into the future.
7. **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.
8. **Employ Adaptive Management:** Employ an adaptive management decision making framework that is flexible and responsive to changes in climate, ecology and economics. Make management decisions based on continuous learning, monitoring, and evaluation. Develop, test and revise metrics to report regularly on what is working, what is not, and implement changes as needed based on that. Employ the latest in climate science, projections and scenario approaches to guide implementation and the adaptive management cycle.
9. **Prioritize Actions:** Prioritize actions based on their risks and benefits including the likelihood that they will reduce risks to the of built and natural environments.
  - a. **No Risk Actions:** Prioritize actions that have high probability of producing beneficial adaptation outcomes and little or no-risk of failure to implement successfully .
  - b. **High Vulnerability Actions:** Prioritize actions that improve the capacity of highly vulnerable ecosystems to adapt to climate change impacts. Prioritize strategies that utilize a precautionary approach to reducing risk and increased future costs. **Multi-benefit Actions:** Prioritize actions that produce the greatest combination of benefits under a range of possible future climate scenarios.

#### **Some Specific Comments by section:**

Section I (major drivers of vulnerability): consider including changes in upwelling and effect on food web, salinity changes (freshening) (would fit under “other physical, chemical, and biological changes”).

Potential examples of a “success story:”

- **Our Coast – Our Future:** Climate change will increase sea levels, erosion, and flooding in many regions of the San Francisco Bay Area. To protect communities and ecosystems, managers and planners need locally relevant tools that help them understand vulnerabilities and plan for action. Our Coast—Our Future ([www.prbo.org/ocof](http://www.prbo.org/ocof)) provides Bay Area natural resource managers, local governments and others with science-based decision-support tools to help understand, visualize, and anticipate local coastal climate change impacts based on the highest resolution elevation data available. OCOF is a collaboration of the Bay Area Ecosystem Climate Change Consortium, NOAA,

National Park Service, USGS, San Francisco Bay National Estuarine Research Reserve, Gulf of the Farallones National Marine Sanctuaries, and PRBO Conservation Science.

- PRBO Conservation Science and partners assessed the impacts of sea-level rise and suspended sediment availability on San Francisco Bay's tidal marshes and bird community from 2010 to 2100. Results are available via an online decision support tool ([www.prbo.org/sfbayslr](http://www.prbo.org/sfbayslr)). The tool helps users to identify areas and populations both vulnerable and resilient to future sea-level rise, and to make informed decisions about adaptation planning, restoration potential, and land acquisition to ensure maximum benefits for wildlife and human communities.
- PRBO Conservation Science, in partnership with the US Fish and Wildlife Service Farallon National Wildlife Refuge, assessed microclimate differences between natural and artificial seabird breeding habitat and implemented changes to nest boxes to reduce impacts of extreme temperatures on Cassin's auklets on Southeast Farallon Island. Cassin's Auklets are krill-eating specialists and indicators of return rates of Central California's commercially-valuable salmon as well as indicators of environmental change in coastal California. Artificial nest boxes are crucial to effective seabird restoration because they create additional habitat to help restore a threatened populations while also facilitating monitoring of individuals. However, increasing extreme temperature events caused mortality and heat stress on birds using this artificial habitat in 2008 and 2009, during extreme high air temperature events. New nest box design is being implemented that reduces temperatures to more closely mimic the protection to extreme heat provided by natural nesting boroughs on the island.
- Led by the California State Coastal Conservancy and the Bay Area Ecosystems Climate Change Consortium in partnership with the San Francisco Bay Joint Venture (USFWS), the project is engaging diverse stakeholders to provide a climate change technical update to the Baylands Ecosystem Habitat Goals Report (Report) to advance adaptation. The Report provided common goals for protecting and restoring over 100,000 acres of wetland habitat in the bay over the past 13 years. As of November 2010, more than 40,000 acres of tidal wetlands have been acquired for restoration by private, local, state, and federal partners. Through this climate change technical update process, scores of scientists, policymakers and other stakeholders in the 9 county region are being engaged to reassess, update and prioritize wetland conservation goals for long term ecological and economic benefits. The goals include conservation of tidal habitat and dependent wildlife including commercial fisheries as well as advancing the use of nature-based solutions for human communities in the face of increasing sea levels, more frequent flooding and other extreme climate events in the SF Bay area.

Section III A - should include the concept of nature-based solutions to flood protection – e.g., identify and prioritize for restoration/enhancement tidal marshes or dune systems that serve as natural, resilient, and biodiversity-supporting protection to human populations/infrastructure.

Section III E – consider adding salinity, timing and strength of upwelling, use of seabirds as indicators of ocean foodweb health (e.g., timing and success of breeding, diet composition datasets from Farallones?)

Again, thank you for the opportunity to comment at this stage of the development of the chapter, and I look forward to working with you on the rest of your process –

Regards,

Grant

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July 20, 2012

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**Re: Comments on 2012 Climate Adaptation Strategy Scoping Outline- Coastal and Ocean Chapter**

Dear Secretary Kuhlman,

On behalf of Heal the Bay, a non-profit environmental organization with over 13,000 members dedicated to making the Santa Monica Bay and Southern California coastal waters and watersheds safe and healthy for people and local ecosystems, we welcome the opportunity to submit these comments on the Scoping Outline of the Coastal and Ocean Chapter of the 2012 Climate Adaptation Strategy ("2012 CAS"). The implementation of adaptation strategies to protect California's ocean and coastal resources and waterways is of the utmost importance to our organization and members.

We are supportive of California's leadership in creating the 2009 Climate Adaptation Strategy ("2009 CAS") and look forward to seeing how this 2012 revision relates to the 2009 CAS. However, we encourage the Agency to clarify how the new 2012 document relates to the 2009 CAS, and how each document will influence the state policy.

We acknowledge that the CAS 2012 is in an outline format right now, but we recommend that a few additional elements be specified under the drivers of vulnerability in the next version of the 2012 document.

**Section I. Coastal and Ocean Resources Vulnerability**

- *Part B. Extreme Events:* Specify heavy stormwater run-off and storm surge.
- *Part D. Physical, chemical and biological changes:* Include changing currents, upwelling, and coastal water temperature changes.

**Section III. Coastal and Ocean Adaptation Goals and Strategies**

- *Part B. Improving Understanding and Protecting Public Trust Resources:* We urge the Agency to strengthen the 2012 CAS to emphasize protection of natural resources. The 2009 CAS contains explicit language that identifies "Avoid[ing] Future Hazards and Protect[ing] Critical Habitat" as a priority action. The 2012 CAS should further strengthen this conservation/protection approach and provide guidance on how the State will ensure opportunities for protection and restoration of critical habitats, as well as how the State will prevent increased risks to people, wildlife and infrastructure. We also recommend that the 2012 CAS support opportunities for tidal wetland restoration, migration, or buffer zones. The strategy should encourage projects that protect critical habitats, fish, wildlife and other aquatic organisms, restore tidal wetlands and related habitats, manage sediment for marsh accretion and natural flood protection, and maintain upland buffer areas around tidal wetlands.



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Santa Monica CA 90401

ph 310 451 1550  
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info@healthebay.org  
www.healthebay.org

- **Part E. Monitoring and Adaptive Management:**
  - **Bullet 1- Ocean Acidification:** We look forward to seeing a commitment to understanding ocean acidification and ocean temperature increases, and support for ecologically sound adaptation strategies and research. In addition to its negative impacts on calcifying organisms, recent studies show that ocean acidification also threatens key non-calcifying organisms, such as kelp forests. Rising temperatures and increased acidity together can stimulate the growth of turf-forming algae, which can then outcompete kelp forests.<sup>1</sup> Kelp forests are a high value habitat in California, and we encourage these potential impacts to be included in the 2012 CAS, as well as recommendations for monitoring and adaptation.
  - **Bullet 2- Marine Protected Areas (“MPAs”):** We recommend including an overview of the science behind marine protected areas (especially no-take reserves) in the discussion of why they are a beneficial climate change adaptation strategy. With a reduction of anthropogenic stressors in MPAs, these areas may be more resilient to the effects of changing currents, temperature, and acidity changes.
  - **New Bullet- Sea surface temperature changes:** Include an additional bullet on sea surface temperature changes.
  - **New Bullet- Current changes:** Include an additional bullet on current changes.

## **Section V. Related Planning, Investment and Regulatory Processes**

- **New Bullet:** Plan for climate change impacts on storm intensity and stormwater runoff in municipal stormwater permits, and possible other permits (SWRCB)

-----

In implementing the climate change adaptation strategies for ocean and coastal resources, steps should be taken to identify and evaluate trade-offs, cost-benefits, and minimize conflict. We recommend that local planners quantify the value of resources at the local and regional level, including environmental services, as this economic information will be essential in decision-making regarding preferred adaptation strategies and options. Thank you for your leadership in preparing the APG, and for the opportunity to comment. Please contact us if you have any questions.

Sincerely,

Dana Roeber Murray, MESM  
Marine & Coastal Scientist

Sarah Abramson Sikich, MESM  
Coastal Resources Director

---

<sup>1</sup> Gretchen E. Hofmann et al. (2010). The direct effects of increasing CO<sub>2</sub> and temperature on non-calcifying organisms: increasing the potential for phase shifts in kelp forests. *Annual Review of Ecology, Evolution, and Systematics*. Vol. 41: 127-147

Submitted By: Kelly Higgason  
NOAA  
July 12, 2012

**COASTAL AND OCEAN RESOURCES SECTOR – 2012 CLIMATE ADAPTATION STRATEGY**  
**JULY 5, 2012 SCOPING OUTLINE**

(Please send comments by close of business on Friday, July 20th to [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov))

The California Natural Resources Agency, working through the Climate Action Team (CAT), is developing the 2012 Climate Adaptation Strategy. This resource will outline proactive steps to take now to protect public health and safety, infrastructure and the economy, and California's unique natural environment in the face of climate change. The 2012 Climate Adaptation Strategy will include chapters on agriculture, biodiversity, forestry, land use and infrastructure, public health, transportation, energy, emergency preparedness, fresh water, and ocean and coastal resources but will also highlight various cross-cutting recommendations.

The [Coastal and Ocean Climate Adaptation Team \(CO-CAT\)](#), comprised of over 16 state agencies, is developing the coastal and ocean chapter of the 2012 Adaptation Strategy. This scoping outline is intended to identify and engage the public in a discussion of the issues that should be addressed in this chapter. We welcome your thoughts on whether we have identified the correct issues and your thoughts on how to approach these issues.

A draft of the full 2012 Climate Adaptation Strategy will be available for public comment in early fall, along with specific opportunities to comment on the coastal and ocean chapter. A final version is expected at the end of this year.

- I. **Coastal and Ocean Resources Vulnerability** (This section is intended to identify the major drivers of vulnerability from climate-induced impacts on coastal and ocean resources (i.e. infrastructure, communities, beaches/public recreation, wetlands, etc.)
  - A. sea-level rise and erosion
  - B. extreme events such as El Niño storms, atmospheric rivers
  - C. ocean acidification
  - D. other physical, chemical and biological changes
- II. **Highlights of Steps Taken to Date and Success Stories** (This section is intended to highlight some of the steps taken to date to adapt to climate impacts on coastal and ocean resources. In addition to commenting on the items below, we welcome the public to submit descriptions and photos of innovative adaption projects to [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov)).
  - A. CO-CAT and OPC Science Advisory Team developed guidance on sea-level rise and OPC adopted resolution to support the guidance and conducted outreach to over 45 state agencies, commissions and other governmental bodies.
  - B. Many state agencies (BCDC, State Lands Commission, Caltrans, Delta Conservancy) have developed sea-level rise guidance and policies and significant relevant state grant programs have incorporated SLR into funding decisions (e.g. Coastal Conservancy, Department of Water Resources, Strategic Growth Council).

**Comment [KH1]:** What does D. refer to?  
other potential driver of vulnerability:  
ADD:  
E. precipitation variability (drier dry years,  
wetter wet)

Submitted By: Kelly Higgason  
NOAA  
July 12, 2012

C. High-resolution elevation data (LiDAR) are available for nearly entire coastline to support detailed sea-level rise vulnerability assessments and thanks to partnership with NOAA Coastal Services Center, this data is being incorporated into interactive sea-level rise inundation viewer tool.

D. Regional collaborations are assessing vulnerabilities and developing adaptation plans.

**Comment [KH2]:** High resolution local (SF Bay Area) tool is also being developed and will be complete for north-central CA coast this fall/winter. The beta version is currently in production, but accessible online, and the informational website will soon be getting a new look.

[www.prbo.org/ocof](http://www.prbo.org/ocof)

**III. Coastal and Ocean Adaptation Goals and Strategies** (This section is intended to identify the recommended strategies for adapting to coastal and ocean impacts of climate change. In many cases, the identified strategy is cross-sectoral and will be highlighted as such in the final report.)

A. Protect public health and reduce harm to coastal and bay communities from extreme events and sea-level rise.

1. sea-level rise hazard avoidance, sustainable development in low hazard areas
2. vulnerable populations
3. emergency preparedness for extreme events that are made worse or compounded by sea-level rise (*e.g.* increased flooding and erosion from storms and tsunamis, and levee failure and liquefaction from earthquakes)
4. improved forecasting and projections
5. wastewater treatment and stormwater management facilities
6. harmful algal blooms and exposure to water-borne pathogens
7. hazardous waste sites
8. hotspots for saltwater intrusion into water supplies

B. Improve understanding and protect public trust resources from sea-level rise impacts.

1. vulnerability of public trust resources such as public access, water supplies, navigation, wildlife, etc. and costs and benefits of adaptive management to address vulnerabilities.
2. education on how a changing shoreline (from erosion and inundation as the mean high tide line moves inland) affects private property boundaries and public trust lands
3. evaluation of possible changes to laws and policies to remove barriers to effective state actions

C. Support local, regional and state agencies and collaborations, tribes, land-owners and resource managers in addressing sea-level rise and extreme events.

1. updates to Local Coastal Programs (LCPs), General Plans, Local Hazard Mitigation Plans, and other land use documents that are key adaptation implementation tools
2. develop sample language for LCPs, General Plans, etc.
3. pilot projects on innovative adaptation approaches that reduce risk and achieve co-benefits (*e.g.* planned retreat, living shorelines)

4. regional sediment management
5. more data and education on socioeconomic impacts of different adaptation options
6. education on tools for addressing sea-level rise (e.g. transfer of development credits, rolling easements, setbacks, tax and fee incentives)
7. tidal wetlands and beaches –predicted changes, upland areas suitable for migration inland, actions to address sediment supply, innovative projects that enhance or restore functions and resiliency

D. Incorporate best available scientific understanding of sea-level rise and extreme events into decision-making.

1. coastal hazard maps that can be used in land use decisions and real estate transactions
2. accessibility of geospatial data (e.g. LiDAR) to improve vulnerability analyses
3. improved understanding of shoreline change
4. collaborations with insurance and investment partners
5. planning and decisions on infrastructure investments

E. Monitor and adaptively manage changes to biological, chemical and physical processes that are important for coastal and ocean biodiversity and ecosystem functions.

1. ocean acidification – monitoring on both a spatial and temporal scale to help identify hotspots and target management actions
2. Marine Protected Areas – monitoring for changes to indicator species, to help inform adaptive management of MPAs
3. fisheries – synthesize information on impacts and integrate into management
4. sediment management – understand changing coastal sediment budgets and processes and conduct regional sediment management

IV. **Adaptation Research Needs in the Coastal and Ocean Resources Sector** (This section is intended to identify key research needs that will help the state of California and other entities to more effectively adapt to climate change impacts.)

- A. Monitor, document and distribute information on shoreline changes and impacts from storms (e.g., beach and cliff erosion) and revise methodologies for predicting shoreline evolution
- B. Updated methodology for flood frequency under changing climate
- C. Improved forecasting of extreme events such as atmospheric rivers (extreme precipitation)
- D. Co-location of land-based GPS and tidal gauge stations to improve monitoring of local relative sea-level

- E. Improve monitoring and understanding of land elevation changes, such as subsidence and tectonic activity (*e.g.* Cascadian fault system)
- F. Development of consistent methods for monitoring ocean acidification
- G. Socioeconomic data (including quantification of ecosystem services) on impacts of different adaptation approaches (*e.g.* seawalls, managed retreat, artificial reefs, and no action/business as usual)
- H. Evaluation of innovative adaptation efforts (*e.g.* living shorelines) in reducing risk or vulnerability to climate-related hazards

V. **Related Planning, Investment and Regulatory Processes** (This section identifies planning, investment and regulatory processes that may present an opportunity for integration of the above strategies. This section is meant to inform a discussion about cross-sectoral opportunities and will probably appear in the Appendix to the 2012 Climate Adaptation Strategy, not within the ocean and coastal chapter itself.)

- A. Updates to Local Coastal Programs (Coastal Commission, Coastal Conservancy, OPC, Strategic Growth Council) - state grant funding, coordination, review of amendments
- B. Update to General Plan Guidelines (OPR)
- C. SB 375 Sustainable Communities Strategies (CCLU-IN)
- D. Funding pilot innovative and effective adaptation projects (Coastal Conservancy, SWRCB)
- E. California Water Plan – especially role of desalination and recycled water (DWR)
- F. Integrated Regional Water Management Plans (DWR)
- G. Transportation vulnerability hot spot map (CalTrans)
- H. SLR impacts on groundwater basins, desalination & wastewater (SWRCB.)
- I. Integrated climate vulnerability screening (Department of Public Health)
- J. Incorporation of SLR into applications related to state leases and grants (ports, marinas, harbors, etc. – State Lands Commission)
- K. **Regional habitat plans** (*e.g.* Bay Area Baylands Goals Update, Our Coast Our Future – SF Bay Area, Southern California Wetland Recovery Project)
- L. Regional Coastal/Bay Climate Planning Projects (*e.g.*, San Diego Climate Strategy, LA Regional Collaborative, Southern Monterey Bay Coastal Erosion Project, Adapting to Rising Tides/BCDC, One Bay Area Climate Strategy, Humboldt Bay Initiative, etc.)
- M. State Wildlife Action Plan (DFG)
- N. Marine Protected Areas -monitoring for climate change impacts, coordination on ocean acidification monitoring (OPC/Ocean Science Trust, DFG)
- O. CA Coastal Mapping Program – elevation & habitat data & maps (OPC etc.)
- P. Sea-level rise guidance (internal draft guidance document) (State Parks)

**Comment [KH3]:** OCOF would not actually fall under a regional habitat plan, it is instead a science-based, decision support tool that provides the data/information/visualizations for managers and planners to use for their various SLR planning needs. Maybe a new category could be added for the tools available to aid in the planning, investment, and regulatory processes. An index of tools of this sort can be found under the May 2012 workshop "Tools for SLR Planning" at <http://data.prbo.org/apps/ocof/index.php?page=resources>

Submitted By: Kelly Higgason

NOAA

July 12, 2012

- Q. Disclosure on risk from climate change impacts (Insurance Commissioner)
- R. Granted land trustees (ports and coastal cities, primarily) preparation for sea level rise action plans (State Coastal Commission).
- S. Incorporate climate data into basin and ocean plans (SWRCB)
- T. Areas of Conservation Emphasis mapping and modeling tool (ACE-II) (DFG)
- U. Natural Communities Conservation Planning Program (NCCP) and Habitat Conservation Plans (DFG, Coastal Conservancy)
- V. California State Multi-Hazard Mitigation Plan (CalEMA)
- W. Local Hazard Mitigation Plans (CalEMA)
- X. Sea level rise guidance document for use by transportation planners (Caltrans)
- Y. AB 162- Flood risk and local land use planning. (DWR, CVFPB)



July 17, 2012

Catherine Kuhlman  
Deputy Secretary for Ocean and Coastal Matters  
California Resources Agency  
1416 Ninth Street, Suite 1311  
Sacramento, CA 95814

RE: 2012 California Climate Adaptation Strategy Scoping Outline

Dear Secretary Kuhlman:

Thank you for inviting our comments on the **Scoping Outline of the Coastal and Ocean Chapter of the 2012 Climate Adaptation Strategy**. Save The Bay is the oldest and largest organization working to protect and restore San Francisco Bay, with more than 30,000 supporters throughout the region. We appreciate the State of California's leadership in producing the 2009 Climate Adaptation Strategy, and the initial steps that have been taken to implement portions of that strategy. A primary purpose of the 2012 Strategy should be to underscore areas where additional implementation is a high priority, and provide clear guidance to achieve significant progress in those areas. We have the following suggestions:

### **Clarify Roles of 2009 and 2012 documents**

The overall Strategy, and the Coastal and Ocean Chapter, should be clear on the relationship between the contents of the 2012 document and the contents of the 2009 document. The 2012 document has been variously described as an "update," a report on progress since 2009, and a new strategy. It is important to clarify whether the new document replaces or augments the previous document, and whether goals and strategies in the 2009 document are no longer State policy unless they are explicit in the 2012 document.

### **Acknowledge Multiple Approaches are Necessary**

The 2012 Strategy should acknowledge explicitly that there are several categories of approaches the State must take, including establishing mandates and requirements, to achieve adaptation goals:

1. Change state laws, regulations, agency practices and priorities to advance adaptation at all levels

2. Encourage state and local agencies, municipalities and other entities to take priority actions to adapt to climate change; provide tools, share information and best practices; promote collaboration; encourage changes in local planning and ordinances
3. Spend existing and future state funds to support local actions that are consistent with the Adaptation Strategy, and withhold funds from actions that are inconsistent or hinder adaptation.
4. Encourage changes in federal laws, regulations, and programs that help advance adaptation.

### **Emphasize Protection of Resources Explicitly**

Section III.B. in the draft outline should emphasize protection of resources to reduce harm, parallel to III.A's emphasis on protecting public health, i.e.:

B. Protect priority habitats, wildlife, and other public trust resources from extreme events and sea-level rise.

The 2009 Climate Adaptation Strategy Ocean and Coastal Resources section contains explicit language identifying “**Avoid Future Hazards and Protect Critical Habitat**” as a priority near-term action. **The 2012 Strategy should further strengthen this** “First Do No Harm” approach and should emphasize how the state will ensure opportunities for protection and restoration of critical habitats are preserved, and how the State will prevent increased risks to people, wildlife and infrastructure.

Toward this end, the 2012 strategy should aim to prohibit projects that would place development in undeveloped areas already containing critical habitat, and those containing opportunities for tidal wetland restoration, migration, or buffer zones. The strategy should encourage projects that protect critical habitats, fish, wildlife and other aquatic organisms, restore tidal wetlands and related habitats, manage sediment for marsh accretion and natural flood protection, and maintain upland buffer areas around tidal wetlands.

### **Accelerate Tidal Marsh Restoration**

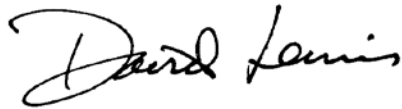
The 2012 Strategy also should more explicitly encourage tidal marsh restoration in areas vulnerable to impacts from sea level rise, especially those where development has not yet occurred and where tidal marsh restoration is possible. The priority for undeveloped shoreline areas should be protection for restoration of habitat, prohibition of development that precludes restoration, and completion of actual habitat restoration. This approach is consistent with “no regrets” planning in the face of climate change, and can increase the likelihood of success on the ambitious guidance principle the 2009 Strategy proposed:

We note that existing coastal habitat restoration plans endorsed by the state, including the *California Wildlife Action Plan* (2007) and the *Baylands Ecosystem*

*Habitat Goals* (1999), also identify tidal marsh restoration as a priority. In San Francisco Bay, for example, regional plans identify opportunities to increase tidal marsh from 40,000 acres to 100,000 acres, and much of that 60,000 acre difference is subject to impacts from sea level rise. Because restored tidal marsh stands the best chance of adjusting to projected changes in sea level, adaptation and resilience are advanced by accelerating new tidal marsh restoration and preserving existing tidal marsh wherever possible, and by preventing development on restorable shoreline parcels where development has not already occurred.

Thank you very much for considering our suggestions. We appreciate the opportunity to assist in strengthening this crucial state adaptation strategy.

Sincerely,

A handwritten signature in black ink that reads "David Lewis". The signature is written in a cursive, flowing style with a large initial "D".

David Lewis  
Executive Director

**From:** [landandclam@gmail.com](mailto:landandclam@gmail.com) on behalf of [Nell Langford](#)  
**To:** [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov)  
**Subject:** comment  
**Date:** Friday, July 20, 2012 5:12:21 PM  
**Attachments:** [Storm Old Ramp 2-1.jpg](#)  
[storm\\_old\\_ramp\\_1-6.jpg](#)  
[Cal-Adapt -- Exploring California's Climate Change Research.pdf](#)  
[FW Sea Level Rise projections re ODSVRA PSB.pdf](#)  
[Sea-Level Rise KeyPoints-1.pdf](#)

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California Department of Resources

July 20, 2012

Thank you for the opportunity to comment on Sea Level Rise Strategies.

Safe Beach Now spoke during public comment on "Spotlight on Science: Extreme Events" at the Ocean Protection Council Meeting on December 16, 2011 in Sacramento.

We share the concerns for increasing coastal vulnerability due to a changing climate. We addressed the threats posed by California State Parks, OHV division. When the old wooden ramp was destroyed by high tides and waves, State Parks bulldozed a ditch used as a sand ramp for vehicles which makes the area even more vulnerable. See attached pictures. The area can be seen in the attached map.

In addition, instead of addressing the sea level rise issue, which it knows exists (see attached) State Parks is bulldozing the foredunes to assure ingress and egress for vehicles to the Oceano Dunes State Vehicular Recreation Area.

Please see our documentary "No Way in and No Way Out" at [safebeachanddunes.org](http://safebeachanddunes.org). The last scene is how the dug-out ramp looks at high tide in the winter.

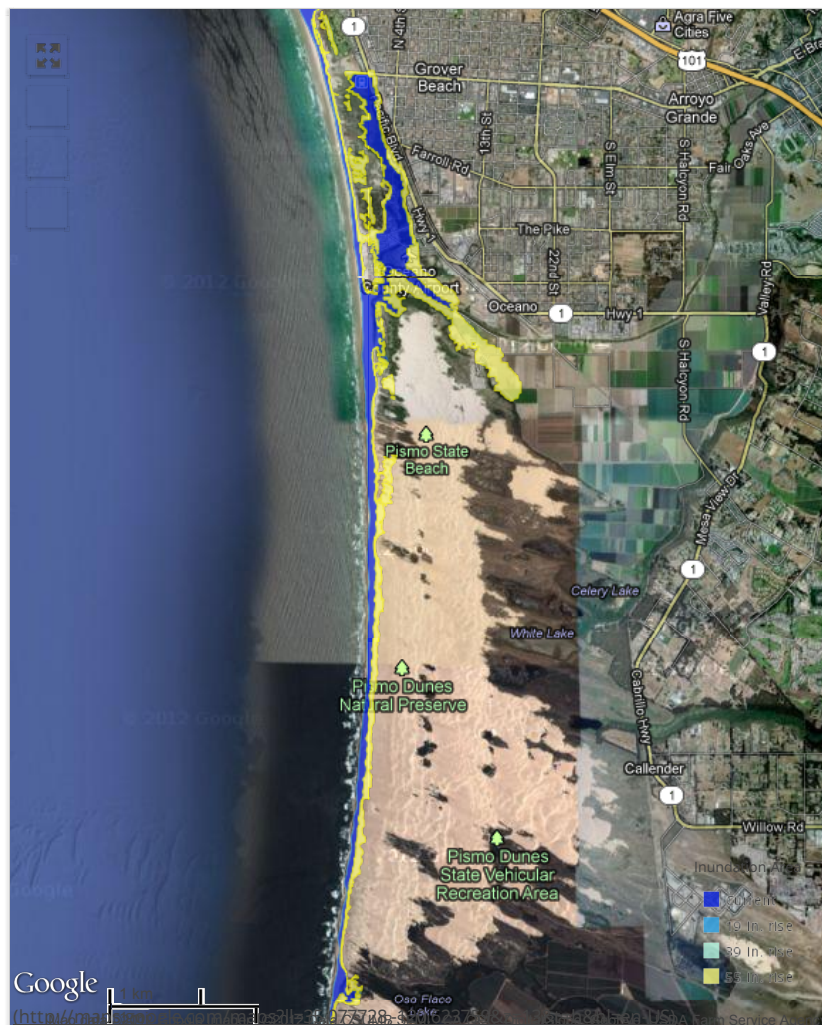
Regards,

Nell Langford  
member Safe Beach Now  
P.O. Box 27  
Pismo Beach, CA 93448  
[805 773 4771](tel:8057734771)



Attachement - Comment from Nell Langford  
Friday, July 20th, 2012

## SEA LEVEL RISE: THREATENED AREAS MAP



## Sea Level Rise

Global models indicate that California may see up to a 55 inch (140 cm) rise in sea level within this century given expected rise in temperatures around the world. The following map tool displays areas that may be in threat of inundation during an extreme flood event (100 year flood()).

These data were developed by scientists from the [USGS](http://cascade.wr.usgs.gov/sealevelrise/)(<http://cascade.wr.usgs.gov/sealevelrise/>) (Bay Area) and [Pacific Institute](http://www.pacinst.org/reports/sea_level_rise/)([http://www.pacinst.org/reports/sea\\_level\\_rise/](http://www.pacinst.org/reports/sea_level_rise/)) (Coast). Blue color indicates areas already in threat today, while the lighter shades are area projected to also be in threat given the expected sea level rise.

These maps do not currently take into account protective structures, such as levees. New maps are currently being developed by researchers to include these structures.

More up to date information on the the State's response to sea level rise may be found at the [Coastal and Ocean Climate Action Team](http://www.opc.ca.gov/2010/07/coastal-and-ocean-climate-action-team-co-cat/)(<http://www.opc.ca.gov/2010/07/coastal-and-ocean-climate-action-team-co-cat/>).



## TAKE A TOUR

Climate data provided by:



(<http://www.pacinst.org/>)

Pacific Institute(<http://www.pacinst.org/>)

Data Set Contributed: *Pacific Institute Coastal Data*

These data include areas inundated by 100-year unimpeded Pacific coastal flooding under baseline (year 2000) conditions for the California Coastline, as well as areas inundated by 100-year unimpeded Pacific coastal flooding under a scenario() of 1.4-meter (55-inch) sea-level rise. These data are available for download([http://www.pacinst.org/reports/sea\\_level\\_rise/data/index.htm](http://www.pacinst.org/reports/sea_level_rise/data/index.htm)) via the Pacific Institute.



(<http://cascade.wr.usgs.gov/sealevelrise>)

U.S. GEOLOGICAL SURVEY (USGS)

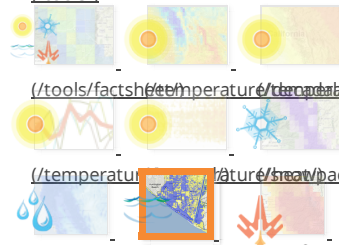
Sea Level Rise(<http://cascade.wr.usgs.gov/sealevelrise>)

Data Set Contributed: *Bay Area Inundation*

These layers represent areas around San Francisco Bay at risk of inundation, and correspond to varying amounts of long-term sea level rise (varying over decades) in conjunction with various return levels corresponding to shorter-term variability (hours to years). Most of these areas are currently behind levees or other protective structures, and would only be inundated if those structures were to fail. These data are described in detail in the reference: Knowles, Noah. 2010. Potential Inundation Due to Rising Sea Levels in the San Francisco Bay Region. San Francisco Estuary and Watershed Science, 8:1. Available at <https://escholarship.org/uc/item/83838>

## CLIMATE TOOLS

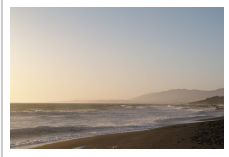
(/tools/)



(/precip/decade/level/) (/fire/)

SEA LEVEL RISE: THREATENED AREAS  
MAP

## Related Stories



### [Shrinking Beaches\(/blog/2011/apr/13/shrinking-beaches/\)](#)

2011 April 13

Many of California's beaches may shrink in the future because of rising seas and increased erosion from winter storms. Currently, many beaches are protected from erosion through manmade sand replenishment (or "nourishment") programs, which bring in sand from outside sources to replace the diminishing supply of natural sand. In fact, many of the wide sandy beaches in southern California around Santa Monica, Venice, and Newport Beach were created and are maintained entirely by sand nourishment programs. As sea levels rise, increasing volumes of replacement sand will be needed to maintain current beach width and quality. California beach nourishment programs currently cost millions of dollars each year. As global warming continues, the costs of beach nourishment programs will rise, and in some regions beach replenishment may no longer be viable.



### [Climate Change and Transportation\(/blog/2011/apr/12/climate-change-and-transportation/\)](#)

2011 April 12

California's economy, including foreign and domestic trade, relies heavily upon its transportation infrastructure. The state's important role in the world economy makes its transport systems vital to people inside and outside its borders.

<a href="#">Resources(/blog/landing/)</a>	<a href="#">Climate Tools(/tools/)</a>	<a href="#">Data Access(/data/)</a>	<a href="#">Community(/community/)</a>	<a href="#">Contributors(/data/contributors/)</a>
<a href="#">About Cal-Adapt(/page/about-caladapt/)</a>	<a href="#">Local Snapshot(/tools/factsheet/)</a>	<a href="#">Raster Downloads(/data/download-raster/)</a>	<a href="#">Feedback(/page/feedback/)</a>	<a href="#">California Energy Commission(/data/contributors/#19)</a>
<a href="#">Collaborators(/data/contributors/)</a>	<a href="#">Temperature(/temperature/)</a>	<a href="#">Tabular Downloads(/data/tabular/)</a>	<a href="#">Ask a Climate Expert(/page/ask-a-scientist/)</a>	<a href="#">California Natural Resources Agency(/data/contributors/#20)</a>
<a href="#">Publications(/publications/)</a>	<a href="#">Snowpack(/snowpack/decadal/)</a>	<a href="#">Data Sources(/data/sources/)</a>	<a href="#">Historic Photo Hunt(/page/photo-hunt/)</a>	<a href="#">Public Interest Energy Research Program (PIER)(/data/contributors/#21)</a>
<a href="#">Announcements(/blog/categories/announcements/)</a>	<a href="#">Precipitation(/precip/decadal/)</a>	<a href="#">Understanding Climate Data(/blog/categories/understanding-climate-change/)</a>		<a href="#">Google.org(/data/contributors/#9)</a>
<a href="#">Glossary(/site/glossary/)</a>	<a href="#">Sea Level Rise(/sealevel/)</a>			<a href="#">Pacific Institute(/data/contributors/#10)</a>
<a href="#">Links(/page/links/)</a>	<a href="#">Wildfire(/fire/)</a>			<a href="#">Santa Clara University(/data/contributors/#8)</a>
<a href="#">Contact Us(/page/contacts/)</a>				<a href="#">Scripps Institution of Oceanography(/data/contributors/#12)</a>
<a href="#">FAQs(/site/faqs/)</a>				<a href="#">UC Berkeley(/data/contributors/#11)</a>
<a href="#">Climate Articles(/blog/categories/climate-stories/)</a>				<a href="#">UC Merced(/data/contributors/#6)</a>
				<a href="#">U.S. Geological Survey (USGS)(/data/contributors/#5)</a>

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State of California, Edmund G. Brown Jr., Governor

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Attachement - Comment from Nell Langford  
Friday, July 20th, 2012

**From:** [Bedrossian, Trinda](#)  
**To:** [Wanish, Barbara](#)  
**Subject:** FW: Sea Level Rise projections re ODSVRA/PSB  
**Date:** Monday, August 15, 2011 11:00:13 AM

---

FYI...See current map data that Rick sent at end of the bottom e-mail...Thanks for your future help. I'll talk with you late this week regarding what other info you may need to put this together...Trinda

---

**From:** LeFlore, Rick [mailto:[rlefl@parks.ca.gov](mailto:rlefl@parks.ca.gov)]  
**Sent:** Monday, August 15, 2011 10:38 AM  
**To:** Bedrossian, Trinda  
**Subject:** RE: Sea Level Rise projections re ODSVRA/PSB

Perfect – absolutely what I'm looking for, along w/the park overlays as noted, would also like to have a hard copy map I can use internally that wouldn't show the confidential cultural sites . Can you get something back to me by Fri, 9/9? Be sure final products are in "final draft" form as I would include this as part of my working group "in progress" tasking.

Greatly appreciate it – Rick.

---

**From:** Bedrossian, Trinda [mailto:[Trinda.Bedrossian@conservation.ca.gov](mailto:Trinda.Bedrossian@conservation.ca.gov)]  
**Sent:** Monday, August 15, 2011 10:29 AM  
**To:** LeFlore, Rick  
**Subject:** RE: Sea Level Rise projections re ODSVRA/PSB

Rick: I think we can provide a better 3 meter DEM map, possibly showing four categories: 100 year storm event; 55" predicted sea level rise; combo of 100 year storm and 55" rise; and rise due to predicted tsunami events. Would this be helpful? If so, what is your deadline? I am trying to finish up projects for MacKerricher State Park and Ocotillo Wells before the end of the month, but could get our GIS folks started on the Pismo data sometime this week.....Trinda

Trinda L. Bedrossian, PG, CEG, CPESC  
Senior Engineering Geologist, Specialist  
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**From:** LeFlore, Rick [mailto:[rlefl@parks.ca.gov](mailto:rlefl@parks.ca.gov)]  
**Sent:** Friday, August 12, 2011 2:18 PM  
**To:** Bedrossian, Trinda  
**Subject:** Sea Level Rise projections re ODSVRA/PSB

Attachement - Comment from Nell Langford  
Friday, July 20th, 2012

Hi Trinda: I'm part of a State Parks ad hoc working group looking "informally" at potential sea level rise scenarios as they may present themselves at State Parks' coastal units. Pasted below is a link to a cal-adapt website that lets you see predicted sea rise levels at defined intervals. As you can see, it's pretty gross in scale – leading to my question to you: Can you (ie, CGS) perform a more detailed GIS overlay analysis that would take these predicted levels and overlay them on topo for ODSVRA and PSB that can give us a better tool to discuss potential management issues? Something including cultural resource sites would be valuable, as well as developed facilities. First blush look shows significant impact at our ability to access ODSVRA from the two current beach ramps; definitely would make us think longer term in terms of changes that may be needed to enable more inland access points.

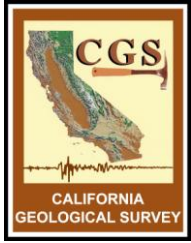
Not looking at this point for an in depth analysis, but at least a generation of readable overlay maps would be a good discussion starting point.

With inclusion of known archeological sites, this would be considered a confidential document, which is for the better at this point, anyway. OHMVRD archeologist Kelly Long can provide related GIS info.

Please advise your thoughts and any questions on this.

Many thanks and hope you've had a good summer so far – Rick.

<http://cal-adapt.org/sealevel/?units=imperial&lat=35.0989&lng=-120.6124&zoomLevel=13&gridID=9q4pmwyjc7tx>



# DEPARTMENT OF CONSERVATION

## CALIFORNIA GEOLOGICAL SURVEY

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To: Rick LeFlore, State Park Superintendent IV  
California State Parks  
Off-Highway Motor Vehicle Recreation Division  
1725 23<sup>rd</sup> Street, Suite 200  
Sacramento, CA 95816

From: Trinda L. Bedrossian, CEG 1064  
Senior Engineering Geologist  
California Geological Survey  
801 K Street, Suite 1324  
Sacramento, CA 95814

Date: September 9, 2011

Subject: Comments regarding "Impacts of Sea-Level Rise on the California Coast", Pismo Beach State Park and Oceano Dunes State Vehicular Recreation Area

Per your request, the California Geological Survey (CGS) prepared several draft GIS maps of the Pismo Beach State Park and Oceano Dunes State Vehicular Recreation Area (SVRA) using data from the California Climate Change Center (CCCC) report entitled: "Impacts of Sea-Level Rise on the California Coast" (Heberger and others, 2009). This data shows projected boundaries of an estimated 1.4 meter (m) increase in sea level, along with the 100 year storm event. For planning purposes, CGS also added the boundaries of potential tsunami inundation in the Pismo Beach State Park and Oceano Dunes SVRA areas managed by California State Parks (CSP) as projected by the California Emergency Management Agency, CGS, and the University of Southern California (State of California, 2009).

In reviewing the 2009 CCCC report, CGS notes the following:

1. Pages xi and 1: CCCC states that sea-level has risen 8 inches along the California coast within the past 100 years. Scientific reports (e.g., Science News, 2007) indicate the current world-wide sea-level rise is 3 millimeters per year (mm/yr) or about 1 foot (11.8 inches) in 100 years. The lower than average rate of sea-level rise in California may be related to the 1 mm/yr (0.04 inches/yr or 4 inches in 100 years) average tectonic uplift along the California coast (see below).
2. Pages xi and 1: CCCC predicts sea-level will rise 1.4 m in the next century. This is 55 inches (4.6 feet) or more than 460% increase in sea-level rise in the next 100 years. This means sea-level would increase an average of 0.55 inches or 14 mm/yr, as compared to the historic 3 mm/yr. No data is presented to explain how these estimates were developed, whether they are predicted to occur in a linear or non-linear manner, what the predicted ranges in variation may be, or what level of increase has actually occurred in

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Protecting lives and property from earthquakes and landslides; Ensuring safe mining and oil and gas drilling;  
Conserving California's farmland; and Saving energy and resources through recycling.*

Attachement - Comment from Nell Langford  
Friday, July 20th, 2012

the Pismo Beach area since 2000 (i.e., at the predicted rate, sea-level should have risen 154 mm or 6.1 inches since 2000). All of this information is necessary to develop a reasonable planning scenario.

3. Pages 1 (footnote) and 6: CCCC states that the numbers do not consider ice melt from Greenland and Antarctic ice sheets so potential sea-level increase could be higher. The melting of extensive land based ice and snow occurred 120,000 years ago during the last interglacial period (Sangamon). Temperatures and CO<sub>2</sub> levels were similar to current conditions, and sea level was 20 feet (6.1 m) higher than today. There is no data presented in the CCCC report to document the likelihood that a comparable level of ice and snow melt, including accelerated melting of the Greenland and Antarctic ice sheets, will occur within the next 100 years so that planning implications can be considered.
4. Page 6 (Figure 1): CCCC notes a shift in sea-level data from the San Francisco area following the 1906 earthquake, thereby "disrupting consistent measurements". Shifts in sea-level data along the California coast are intricately interwoven with tectonic activity along the San Andreas Fault and other faults in the western part of the state. Numerous studies of fault displacement and uplift resulting in marine terraces indicate that uplift rates vary between 0.1 and 2 mm/yr along the California coast (Hapke and others, 2006; Norris and Webb, 1990; Olson, 2007; Page, Thompson, and Coleman, 1998). Higher rates of uplift also occur locally following major earthquakes. As a result, there are distinct variations in mean sea level along the California coast. For example, Hapke and others (2006) cite total sea-level rise for Crescent City as - 0.48 mm/yr; San Francisco as +2.13 mm/yr; Los Angeles as + 0.84 mm/yr; and San Diego as + 2.15 mm/yr. It is not clear what baseline was used in the CCCC report sea-level rise projections or if variations in tectonic uplift along the California coast or the average tectonic uplift rate of 1 mm/yr (Page, Thompson, and Coleman, 1998) were considered.

**Recommendations:** The Shell Beach-Pismo area is one of five principal areas of tectonic uplift and terrace development in California (Norris and Webb, 1990). For this reason, prior to establishing planning parameters for addressing sea-level rise in the next 100 years:

1. The baseline data and methodology used for projecting the 1.4 m sea-level rise in the CCCC report should be clearly understood. This would require a more thorough explanation of the baseline information, analytical methodology, and assumptions used in the CCCC report. Such data should include the range of mean sea-level being used as a baseline, the year(s) the data was collected, and locations from which the sea-level and CO<sub>2</sub> baseline information were collected. In other words, what data was used as a reference for establishing the 1.4 m sea-level increase?
2. Implications of the assumptions should also be explained (e.g., why certain scenarios were selected for the San Francisco Bay area, but not along other portions of the coast; what is expected to happen if the melting of the Greenland and Antarctic ice sheets occurs, etc.).
3. Data more specific to the area are needed to verify that local sea-level rise projections take into consideration the tectonics of the Pismo area, i.e., the San Andreas Fault, other faults in western San Luis Obispo County, and the Hosgri Fault offshore (Olson, 2007).
4. Sea-level monitoring data from the Pismo Beach area is needed to establish current baseline information and track variations in the 100-year projections that may be useful to future planning.

5. A better understanding of the precision and accuracy of available topographic data is needed to ensure that information provided in the CCCC report is accurate enough for planning purposes.

**References:**

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Cc: William R. Short, California Geological Survey, Supervising Engineering Geologist

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July 19, 2012

California Natural Resources Agency

Delivered electronically to: [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov)

**Re: 2012 Climate Adaptation Strategy**

Thank you for the opportunity to review the draft outline for the coast and ocean resources sector chapter for the 2012 Climate Adaptation Strategy. Ocean Conservancy has worked to help protect California's coast and ocean for more than two decades. A healthy ocean and coast are not only inherently valuable to California, but also vital to our state's future economic well-being. With threats to the global ocean on the rise, California's long history of leadership on ocean protection makes us well suited to respond to the important challenge of climate change. The draft 2012 Climate Adaptation Strategy is an important step forward, and we write now to offer recommendations for improving and strengthening the Strategy.

While we are pleased that the outline has generally identified the main issues that should be considered under the state's climate adaption policy, we believe that the report's emphasis on sea level rise unintentionally minimizes the two other significant ways in which climate change will affect our coasts and oceans: ocean acidification and altered oceanographic conditions. In addition, the outline fails to develop goals and strategies focused on these identifiable threats, instead focusing largely on institutional processes (e.g. improve understanding, support agencies, and incorporate science into decision making).

In summary, our comments address the following key recommendations:

- Develop goals and objectives around core impacts of climate change
- Identify all activities, strategies and tactics under each core impact
- Emphasize the key role of natural systems in each core climate impact

Specifically, we recommend that the core of the report (i.e. sections III and IV) be restructured as described below.

**Develop goals and objectives around core impacts of climate**

Climate change will manifest as three key drivers of environmental change in California's coast and ocean. First, sea level rise poses a clear and present danger to coastal infrastructure and the communities and economies upon which they depend as well as threatening coastal ecosystems. While the outline has identified a range of activities to prepare for sea level rise, the overarching state

goal is not clear. Ocean Conservancy believes an emphasis on living shorelines and planned retreat, combined with protection of vital infrastructure, should be the state's central adaptation goal and this should be clearly stated in the outline. This provides a clear goal around which the suite of state activities can be focused and their success measured.

Ocean acidification (OA) is the second core driver of change in California's oceans, coasts and estuaries. The change in ocean chemistry (i.e. pH) that accompanies the ongoing increase in carbon dioxide in our atmosphere (and resulting dissolution in ocean water) threaten a range of ocean species, the food webs in which they are embedded, and the industries upon which they depend. All organisms that form calcium carbonate shells (e.g. clams, mussels, oysters, etc) are sensitive to ocean pH. Evidence is rapidly mounting of a diversity of other ways that OA is affecting the biology and ecology of a range of other species as well. OA is distinct from sea level rise and other climate-driven changes in oceanography (see below) and thus deserves special recognition in the outline and in the ensuring states adaptation plans. The state's goal should be to better understand the scale of OA, evaluate the ecological and economic risks of OA, and identify local and regional management options to confront the threat. While OA is identified in the outline, it is buried under Section II E.1, and clearly warrants separation as a unique phenomenon.

The third major driver of climate change in California's coasts and ocean will be a suite of changes in oceanographic conditions. These will manifest as:

- elevated ocean temperatures;
- reduced levels of dissolved oxygen;
- altered timing and intensity of wind-driven upwelling events; and
- altered patterns of precipitation with concomitant changes in freshwater river flow and changes in estuarine and coastal circulation patterns.

These drivers are most likely to influence the state's valuable commercial and recreational fisheries. California's adaptation goal should be to evaluate how these changes will affect commercially and recreationally important species and proactively incorporate this information into fishery management plans and other management structures at both the state and federal level to enhance resilience of these species and their associated fisheries in the face of changing oceanographic conditions. Failure to adequately plan for these changes may result in declines to important fisheries as existing management may not be adequate in the face of changing ocean conditions.

### **Identify all activities, strategies and tactics under each core impact**

Under each of the core drivers identified above, the outline should identify all of the strategies, tactics, and activities in support of the adaptation goal(s). At present, different activities are spread throughout each of the report's five main sections, making it nearly impossible to see the state's collective response to any key issue. At a minimum, we envision that each section would specifically address how the following actions would address the specific driver:

- Research and monitoring needs;
- Decision-making tools;
- Changes to local coastal plans;

- Integration of regulatory processes and bodies;
- Public education; and
- Value and role of natural systems in confronting climate change.

Using such a structure will provide a “one stop shop” for the range of strategies and regulatory processes needed to adapt to that particular threat.

### **Emphasize the key role of natural systems in each core climate impact**

The important role that natural ecosystems play in confronting climate change is currently underemphasized in the draft outline. We recommend that a separate section at the beginning of the coastal and ocean resources sector highlight the importance of natural systems. Secondly, we recommend that specific values and roles of natural systems and specific regulatory strategies be clearly identified so that conservation is a key outcome for each key driver.

Natural systems are critical components to confront all three key environmental drivers:

- **Sea level rise:** Seagrasses, wetlands, salt marshes, and coastal kelp forests can all protect against extreme weather events and associated flooding. By sequestering carbon, they can also play an important complimentary role to adaptation, by mitigating carbon dioxide emissions.
- **Ocean acidification:** Upland terrestrial habitat, salt marshes, and seagrasses can all uptake nutrients that are responsible for local drivers of ocean acidification. These communities can especially ameliorate the role of agricultural runoff in exacerbating coastal acidification. Healthy shellfish beds also uptake nutrients as well as directly buffer pH via their calcium carbonate shells.
- **Oceanographic changes:** As the California ocean changes around us, management measures that provide a buffer or contribute to the resilience of natural systems, will become increasingly import. One important example is marine protected areas (MPAs) - including fully protected marine reserves. Ocean Conservancy has been a long-time supporter of the state’s implementation of the Marine Life Protection Act. Over time, California’s MPAs will increase the abundance, size, and genetic diversity of marine communities, providing additional resilience in the face of changing oceanographic conditions. Conserved coastal wetlands and other coastal ecosystems may play a similar buffer role for their respective biological communities. In addition, marine reserves are a critical research laboratory, allowing a more refined understanding of how climate change and ocean acidification influence species and communities in the absence of the confounding factor of fishing.

California’s new marine protected areas should be identified as an important component of the state’s strategy to adapt to climate change and ocean acidification. Sufficient funding for management and enforcement of the MPAs will be necessary for the state’s new network to meet its own biodiversity goals and to ensure these areas provide an important hedge against climate change.

We strongly encourage the Natural Resources Agency ensure that the outline and final report highlight the critical role of marine reserves – and other conserved natural ecosystems – in meeting the substantial climate adaptation challenges that await us in the not-too-distant future.

Thank you for providing us the opportunity to review the draft outline. We look forward to working with you to ensure the full draft of the 2012 Climate Adaptation Strategy meets the needs of all Californians.

Sincerely,

A handwritten signature in black ink that reads "Kaitilin Gaffney". The signature is written in a cursive, flowing style.

Kaitilin Gaffney  
Pacific Program Director

A handwritten signature in black ink that reads "George H. Leonard". The signature is written in a cursive, flowing style.

George H. Leonard  
Director of Strategic Initiatives

## **Comment on July 5, 2012 Scoping Outline CAT Climate Adaptation Strategy**

First and foremost thank you for the opportunity to comment on the Draft 2012 CAT Climate Change Strategy.

In order to take proactive steps in addressing Climate Change in California's coastal and inland areas, some of the serious obstacles in the administrative and enforcement sectors must be taken into account. An agency that I believe should be included with the 16 state agencies that make up CO-CAT is the California State Attorney General's Office. The Attorney General's Office must have authority to investigate personnel that are in positions of Public Trust and not be blindly obligated to represent violators whose actions have compromised that trust. In addition, the lack of any meaningful whistleblower protection policy for individuals employed in the public sector stifles the ability for state oversight agencies to take proper action concerning conditions that compromise public health and safety.

In order for the California Ocean Protection Council (OPC) to effectively protect our coastal waters, authority must be given regarding ocean easements. These include the Once-Through Cooling (OTC) easements and their associated outfalls along with other dedicated ocean outfall easements, for example, Wastewater Treatment Plant outfalls. By working collaboratively with other state and federal agencies and in support of the United Nations Law of the Sea Convention, the state agencies that comprise CO-CAT and the associated Tribal entities have an unprecedented opportunity to benefit from the latest developments regarding this international milestone. Upon ratification, California is set to have the largest economic potential in the United States via the Exclusive Economic Zone (EEZ) and the associated territorial waters as defined by UNCLOS. The issues and concerns regarding coastal ocean easements are critical, especially Wastewater Treatment Plant outfall easements which continually have been overburden due to the revolving door policy and cavalier actions by regulatory agencies regarding adherence to the Clean Water Act and the issuance of waivers. A clear example of this abuse could be seen in the way the Central Coast Regional Water Quality Control Boards (CCRWQCB) has for decades allowed Morro Bay / Cayucos Sanitary District Wastewater Treatment Plant (MB/CSD WWTP) to operate with a 301(h) waiver. The need to eliminate partially treated sewage from being deposited into our coastline could not be overstated.

Another area of environmental concern is the piggy-backing of Desalination Plants to OTC inlets. First and foremost when addressing OTC inlets and omitting discussion regarding the associated outfall, can be compared to cooking one sided hotcakes or studying water by fragmenting the discussion into an analysis of hydrogen and oxygen. This is an area where the OPC-SAT team could weigh in on regarding the environmental risks involved in using ocean easements for drinking water production and the associated carbon footprint from energy consumption. At the American Society of Mechanical Engineers (ASME) 1<sup>st</sup> Water Quality, Drought, Human Health & Engineering Conference that was held in the Desert Research Institute, Las Vegas, Nevada in October 2006, several researchers presented technologies that showed promise in the ability to

efficiently, economically and environmentally produce drinking water from desalination process.

The need for infrastructure investment in California has become a major issue of public concern. Recently the University of Davis in California released a report regarding nitrate contamination in California's groundwater and drinking water aquifers. The report primarily focused on agriculture use of organic and synthetic fertilizers and excess nitrates in groundwater. Although the report did look at nitrate contamination in groundwater from wastewater plants (WWTP) and septic systems, due to the fact that wastewater data is not digitalized in the state, the report could not accurately estimate the effects human related nitrate contamination. In earthquake prone California, sewer collection and conveyance systems are susceptible to liquefaction damage. The amount of sewage that is exfiltrating from the sewer collections infrastructure and never reaching the WWTP is significant. The need to address this issue in a synchronous and collaborative manner is paramount. With California being the most populous state the effects of a dilapidated sewer collection and conveyance system is critical to our public health.

The challenges that lie ahead for the citizens of California, CO-CAT and the WCGA are great. Proactive and tangible progress in adapting to climate change must be in a form that address not only environmental and public health issues but must transcend into the social-economic benefits of sustainable job creation.

Our faith does not lie in the agencies that we create, but is rooted in events that are validated by the beneficial uses to be enjoyed by our grandchildren and generations yet to come.

Richard E.T.Sadowski



July 19, 2012

The Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT)  
Ocean Protection Council  
1330 Broadway, 13th Floor  
Oakland, CA 94612

Dear Workgroup Members:

Sierra Club California supports the Ocean Protection Council's (OPC) ongoing efforts to address climate change impacts and California's adaptation needs. We believe that the Draft 2012 Climate Adaptation Strategy Coastal and Ocean Resources Sector Scoping Document is a good start. However the 2012 update can do more to build on the previous Climate Adaptation Strategy and identify specific policy recommendations to increase resiliency along our coast.

The following are three recommended additions to the current list of goals, strategies and planning, investment, and regulatory processes.

1. The Climate Adaptation Strategy (CAS) should prioritize educating developers and permitting agencies about the risks of building in vulnerable coastal areas. Not only does such poor siting affect the building, it can also reduce natural buffers to extreme weather events, thus putting existing properties in danger. Using the wealth of information already available, the state can help ensure that local permitting agencies and builders have the most up-to-date information about sea-level rise impacts, increasing erosion rates, extreme events, and natural buffers before they make the decision to develop in a vulnerable area. These educational materials, which could be called "Before You Build" and "Before You Permit", would spell out the numerous risks associated with building in coastal areas and flood plains, as well as identify important risk aversion services provided by open space buffer zones.
2. While the current Scoping Outline calls out the Climate Risk Disclosure Survey circulated by the California Department of Insurance (DOI) as a potential cross-sector opportunity, we believe that there are additional opportunities for integration with the DOI. Following the release of the Survey, the DOI should draw greater attention to climate adaptation and risks by convening a public meeting of insurance industry representatives to address climate change impacts in California and how the insurance industry can and should respond. In the last Climate Disclosure Survey from 2010, CERES found that, "Of the 88 insurance companies surveyed, only 11 reported having formal climate change policies." Clearly action is needed to bring this number up and ensure that the insurance industry is acting in a way that is responsible given known



climate vulnerabilities. The event would provide an opportunity for DOI to work proactively with scientists and the insurance industry to strategize how to avoid disasters and ensure that policies are not inadvertently incentivizing new development in particularly vulnerable places.

3. The State should examine options for ensuring that the risk for new development and re-development in flood-prone areas is born by the developer, rather than the state or federal government. Reducing the state's liability and exposure to climate impacts should be an explicit goal of the CAS and the CO-CAT should include options for partnering with the DOI to do so. One option might be to require that as part of the planning process for any new or re-development in vulnerable areas, builders would have to provide proof that they will be able to take on the risk associated with the site for the expected life of the development. That is, new development should include a plan for the life of the building that outlines how owners will insure the building, or otherwise manage their risk.

There are important ways that the insurance industry can contribute to California's climate change resilience. We believe by adding these sections, California will add important new tools to reduce our vulnerability to climate change.

Thank you for your consideration.

Sincerely,

Amanda Wallner  
Organizer, California Coast Resilient Habitats Campaign  
Sierra Club California

Suzie Moser  
July 12, 2012  
California Sea Grant

I want to underline and submit in writing again the importance of using key concepts correctly, a) to avoid confusing the public, which already barely understands the whole vulnerability/risk/adaptation lingo, b) to remain consistent with the 2009 document (which was drawing on the extant literature); and c) because you look like you're out of touch with the science literature on this topic (NOT a good idea).

I agree this should be handled at the front end of the report, in an overview/definitional chapter. In terms of how to make this accessible to non-experts - well, apparently we haven't been successful with you all, but it's not that difficult - I do it all the time with people I engage with - and should be handled consistently across chapters. That is the heavy lift on your part to educate everyone accordingly.

I offer my help in reviewing that discussion. More generally, I think there has been absolutely NO progress in communicating adaptation meaningfully to the public (no one in the public knows about your strategy!) and there should be a re-commitment to that. You will lose the fight if you don't make that a very high, meaningful priority for all adaptation efforts in the state.

As for highlighting innovative adaptation options - you may find some but more importantly you should reflect what we found in the report Rising to the Challenge

([http://www.usc.edu/org/seagrant/research/climateadaptsurvey/SurveyReport\\_FINAL\\_OnlinePDF.pdf](http://www.usc.edu/org/seagrant/research/climateadaptsurvey/SurveyReport_FINAL_OnlinePDF.pdf)) - i.e. the state of adaptation planning to date, and on the barriers and needs to progress further.

Delivered electronically to: [coastalclimate@resources.ca.gov](mailto:coastalclimate@resources.ca.gov)

July 20, 2012

**Re: Comments on the Scoping Outline of the Coastal and Ocean Chapter of the 2012 Climate Adaptation Strategy**

To the Members of the Coastal and Ocean Climate Adaptation Team:

Thank you for the opportunity to provide comments on the Scoping Outline of the Coastal and Ocean Chapter of the 2012 Climate Adaptation Strategy ('12 CAS). We are pleased to see that California is committed to addressing climate adaptation issues comprehensively, and that its approach to these issues will be adaptive. The 2009 California Adaptation Strategy ('09 CAS) was a foundational document that was a model for many other states throughout the U.S.; the effort to keep it up-to-date should also provide a model for others to follow as our knowledge and understanding of climate change impacts advances.

The Nature Conservancy's mission is to conserve the lands and waters on which all life depends. TNC's Board of Directors, which sees climate change as the single largest threat to our mission, is implementing a comprehensive program to address climate change in California, the United States, and around the world. We have several general comments on the approach and content of the scoping outline, as well as a number of specific comments on individual sections. Our general comments follow:

- (1) It is important that good recommendations in the '09 CAS continue to be the policy of the state. We recommend that the '12 CAS incorporate the '09 CAS by reference and clearly describe any changes to the recommendations and cross cutting strategies in the '09 CAS.
- (2) This concern is underscored by efforts to limit the length of the Ocean and Coastal Chapter of the '12 CAS. We have learned a great deal in the years between the '09 CAS and the '12 CAS – both about the issue of climate change adaptation, and about the processes by which adaptation can be accomplished. This update will be most valuable if it reflects these advances in a comprehensive way, and as such we recommend that the drafters should not set arbitrary length limitations on the various sections. This certainly does not mean that the '12 CAS should revisit every item that appears in the '09 CAS; again, policies that have not evolved or changed should be simply incorporated by reference.
- (3) The level of attention and focus on protection of natural resources remains critically important to the state, but as currently articulated, the scoping outline is weak on this issue. We strongly caution against weakening the '09 CAS with respect to the needs of natural resources in a changing climate, and their role in providing protection and other beneficial services to human communities. We provide more detail on how coverage of natural resource issues can be improved in the detailed comments below.
- (4) We encourage this chapter and the '12 CAS in general to highlight extreme events as both indicators and consequences of climate change. These events are the best (and possibly only) way to really connect climate change to the daily lives of people, and are – consequently – the best means of promoting meaningful climate response and building support for policies to reduce

emissions of greenhouse gas, the source of the problem. For many extreme events – including floods and El Nino events – nature should be an important part of the solution, and the '12 CAS should promote the evaluation of these strategies and prioritization of them within state and local planning documents. This important role for nature-based solutions, or “green infrastructure” is a strategy that connects with many of the other sectors in the '12 CAS and should be recommended as a cross cutting strategy.

- (5) TNC supports promoting the comprehensive coordination between the '12 CAS and appropriate plans of other state and local agencies. In particular, the connection between the priorities articulated in the Ocean and Coastal Chapter and the priorities of the California State Hazard Mitigation Planning activities of CalEMA is critical. Hazard Mitigation Planning at both the local and state levels is a common sense context for the translation of policy principles into on-the-ground adaptation action. CalEMA, together with its local analogues, has experience with doing this that other state and local agencies should capitalize on.

Our comments on specific sections of the scoping outline follow:

**Section 1: Vulnerability.** It is important to briefly review the drivers of vulnerability; however, it is equally important to describe which vulnerabilities are “direct” – e.g., the impact of ocean acidification on bivalve shell formation – and which are “indirect,” or “synergistic.” For example, sea level rise is not a driver of vulnerability by itself. In many places along California’s coast, sea level rise will occur without any appreciable impact on community or natural assets. The vulnerability arises, instead, from the combined effects of sea level rise and risky land use practices. The siting of communities or infrastructure close to the shore not only puts those assets at risk, but also creates the risk of coastal habitats being squeezed out of existence between development and the rising sea. Explaining how climate factors and land use choices work together to create vulnerability is both more accurate and creates a better understanding of the tools and strategies available for effective climate adaptation.

**Section 2: Progress to date.** The State of California has done an exemplary job of promoting climate change adaptation at the state level. Accordingly, the '12 CAS should highlight our successes in this regard. However, this is also an opportunity for some candid reflection on what obstacles we’ve faced in accomplishing the goals of the '09 CAS. Are we lacking specific enabling conditions? Is there a need for additional legislation? Is there a need for more money? Are we having trouble supporting local governments in a productive way? We encourage you to include a section summarizing the obstacles to our ability to accomplish adaptation in a meaningful way, and suggesting ways of overcoming them.

We also encourage you to highlight exceptional non-governmental projects that are advancing ocean and coastal climate adaptation throughout the state. TNC’s Coastal Resilience Ventura project is a stakeholder-driven effort to advance social, economic and environmental solutions to climate change and coastal hazards that are both effective and cost efficient. Coastal Resilience Ventura works through science, decision-support tools and policy, with stakeholders advising on every aspect of this work:

- a. *Science* - advancements in our understanding of the impacts of sea level rise have already been made and even integrated into policy. We are building on this foundation by incorporating geomorphological processes like erosion and accretion into projections of sea level rise, and aggregating coastal and river flooding effects, thereby creating even more accurate projections of potential future conditions.
- b. *Decision-Support Tools* - Currently, decision-makers rely on static maps of individual assets or impacts. We are developing an interactive web mapping application that empowers decision-makers to simultaneously examine land use practices and natural resource values, along with the potential changes under sea level rise and flooding scenarios that they design themselves. Our tools also let decision-makers analyze the potential ecological, social and economic consequences of a range of management approaches.

- c. *Policy* - Typically, decision-makers don't have complete information about economic, social and ecological vulnerability when tackling climate change. As a consequence, they are not equipped to reduce these impacts simultaneously. Coastal Resilience Ventura is designed to provide that information and recommend approaches that work for all sectors.

We would be happy to provide additional information regarding Coastal Resilience Ventura if you are interested.

**Section 3: Goals and Strategies.** In general the natural resource protection strategies should be strengthened. Subsection B, "Improve Understanding and Protect Public Trust Resources from Sea Level Rise Impacts," is a natural home for natural resource protection strategies, but none are clearly evident from the scoping outline. In contrast, the '09 CAS is fairly strong in this regard. For example, Strategy 1: Establish State Policy to Avoid Future Hazards and Protect Critical Habitat ('09 CAS at 73) prioritizes directing development away from hazard areas and priority conservation areas. There is nothing similarly strong in the '12 CAS scoping outline, and you should either reiterate this policy preference from the '09 CAS or incorporate it by reference. We encourage you to take a hard look at the '09 CAS and explicitly reaffirm the state's commitment to ensuring the viability of coastal natural resources in the face of sea level rise.

The goals and strategies section lacks any specific reference to agriculture. We recognize that there will be a separate chapter specifically dealing with agriculture, but nevertheless suggest that certain links between ocean and coastal strategies and agricultural strategies be established here. Coastal agriculture will experience sea level rise and saline intrusion impacts in ways that set it apart from inland agricultural operations, and the strategies used to confront these impacts will need to be coordinated with those targeted toward other coastal land uses and coastal natural resources.

We support Subsection C, "Support local, regional and state agencies and collaborations, tribes, landowners and resource managers in addressing sea level rise and extreme events." This is an important responsibility for the State, since much of the on-the-ground adaptation activity will occur at local and regional levels. Local governments are empowered to adopt land-use policies that promote prudent setbacks from the coast and preserve natural protective features such as dunes and wetlands could really improve the climate resilience of coastal communities. California should seek ways to support local governments as they take these actions, and should develop a clear paradigm for effectively providing this support. This recommendation obviously goes beyond the Coastal and Ocean section; all chapters of the '12 CAS should reflect a clear common understanding of what the state's role vis-à-vis local adaptation efforts is.

Subsection E, "Monitor and adaptively manage changes to biologic, chemical and physical processes that are important for coastal and ocean biodiversity and ecosystem functions," should specifically include ecosystem changes, such as wetland migration. The ability – or, in many cases, inability – of coastal wetlands to adjust to changes in sea level will be a key determinant in exposure of coastal communities to coastal hazards. In other words, wetland migration will need to be monitored and accommodated to the greatest possible extent if our coastal communities are to retain the benefits they derive from these natural resources into the future.

**Section 4: Adaptation Research Needs.** In addition to the research subjects listed in the scoping outline, we recommend identifying evaluation of the combined impacts of multiple climate factors as a key research need. For example, in California's estuarine areas, projections of the combined impacts of sea level rise and river flooding will be critical if nearby communities are to plan for their future. Similarly, agriculture will be impacted by both sea level rise and saline intrusion, and these climate factors will work together to determine where productive farming can feasibly occur in the future. TNC's Coastal Resilience Ventura project is modeling some of these combined impacts for coastal Ventura County, but other areas of California's coast will need similar information.

**Section 5: Related Planning Efforts.** We are pleased to see the intent to coordinate the '12 CAS with other planning activities related to climate change adaptation. However, we caution against simply listing the processes in an appendix; the issue of coordination of agency priorities is a critical one and merely creating a catalogue of planning efforts does not advance the concept of cross-sectoral coordination. Instead, we suggest taking this opportunity to identify specific opportunities for inter-agency collaboration, and where such opportunities are lacking, we suggest proposing strategies for filling those gaps. Further, it would be helpful to identify what kind of planning effort each represents, both in terms of level of government (local, state, regional or federal), and what outcomes are expected (policy principles, project prioritization, permit guidance, etc.). Doing this can be an effective first step at linking or coordinating efforts that have similar objectives.

Once again, TNC commends you for undertaking this update to the California Adaptation Strategy, and thank you for the opportunity to provide these comments. Please feel free to contact me if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Sarah G. Newkirk". The signature is fluid and cursive, with the first name "Sarah" being more prominent.

Sarah G. Newkirk  
Coastal Project Director