

Oceans and Coastal Resources and Ecosystems Sector Plan



AGRICULTURAL SECTOR PLAN



BIODIVERSITY AND HABITAT SECTOR PLAN



EMERGENCY MANAGEMENT SECTOR PLAN



ENERGY SECTOR PLAN



FORESTRY SECTOR PLAN



LAND USE AND COMMUNITY DEVELOPMENT SECTOR PLAN



OCEANS AND COASTAL RESOURCES AND ECOSYSTEMS SECTOR PLAN



PUBLIC HEALTH SECTOR PLAN



TRANSPORTATION SECTOR PLAN



WATER SECTOR PLAN

Oceans and Coastal Resources and Ecosystems Sector Plan



Introduction

California’s coastal agencies³⁷ have a long history of successfully protecting, maintaining, and enhancing the health of coastal and ocean areas by addressing issues such as pollution, unsustainable resource use, and rapid urban development. This work is crucial considering that California’s ocean and coast contribute \$39.1 billion annually to the state’s GDP. (National Ocean Economics Program (NOEP) 2014). Climate change stressors, including but not limited to, sea-level rise and changing ocean conditions, are likely to escalate longstanding challenges such as unsustainable resource use, which present new governance and management challenges. The obstacles do not come from a single stressor, but the cumulative impacts. For example, it is not only sea-level rise that causes concern, but it is the long-term sea-level rise coupled with extreme storms, high tides, and seasonal fluctuations (e.g. El Niño Southern Oscillation, Pacific Decadal Oscillation, etc.).

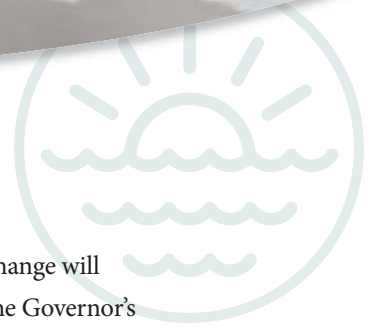
State coastal agencies are striving to meet all of these challenges and prepare for the uncertainties that each obstacle presents both individually and cumulatively. They are applying a climate change adaptation³⁸ lens to their planning and decision-making, testing and implementing actions to reduce the impacts of climate change on coastal ecosystems, communities, economies and infrastructure, and supporting local adaptation efforts.

Through these efforts, state coastal agencies have already taken important steps to implement the coastal and ocean recommendations in *Safeguarding California: Reducing Climate*

Risk [California Natural Resources Agency (CNRA) 2014]. However, in most cases, the implementation of adaptation measures will be a long-term, multi-phase, iterative process, rather than a near-term, discrete one. For instance, initial planning, including Local Coastal Program (LCP) updates, vulnerability assessments, and adaptation plans, rely on up-to-date applied research. These assessments and plans then inform detailed project planning, design, engineering, and permitting, which can take many years to complete before on-the-ground projects can be implemented. Thus, climate change adaptation is ongoing, and state agencies are taking into account the need for continuous adaptive management in the face of a

³⁷ State coastal agencies include: a) the coastal zone management agencies – the California Coastal Commission (regulatory agency), the San Francisco Bay Conservation and Development Commission (regulatory agency), and the State Coastal Conservancy (implements multi-benefit projects to protect and enhance coastal resources), b) agencies that own and/or manage coastal lands – the State Lands Commission and the Department of Parks and Recreation, and c) agencies with direct interests in coastal and ocean resources due to their mandates – the Ocean Protection Council (state adaptation lead for coastal and ocean ecosystems and resources).

³⁸ The National Climate Assessment (2014) defines adaptation as “actions to prepare for and adjust to new conditions, thereby reducing harm or taking advantage of new opportunities.”



changing climate. In some cases, new alternatives to actions recommended in *Safeguarding California* may emerge given continually improved information about climate, the role of humans in influencing it, and the effectiveness of various adaptation measures.

In this Implementation Plan, state coastal agencies have identified ways to reduce coastal and ocean climate change vulnerabilities and impacts using available capacity and resources and leveraging existing programs, projects, and forums. However, making further progress on adaptation requires a commitment to:

- **Allocate adequate funding and capacity** to improve the understanding of climate change vulnerabilities and impacts and to formulate, implement, and monitor adaptation measures that support the overarching goal of coastal and ocean health.
- **Coordinate and align efforts across agencies, levels, and sectors** to achieve a shared vision of coastal and ocean health.
- **Learn continuously** to inform the development and adjustment of flexible adaptation approaches that effectively and efficiently respond to changing conditions.
- **Leverage existing legal, policy, and institutional structures** to govern and manage coastal and ocean areas and resources for short- and long-term health.

While state coastal agencies have demonstrated their commitment to collaborating on climate

change adaptation, transformational change will also require continued support from the Governor's Office and the Legislature, commitments by local and regional entities, and efforts by other state agencies. This is especially true when it comes to fully implementing adaptation policies to address risks from sea-level rise, particularly in relation to infrastructure planning and investment and water quality management.

1.1 STATE COASTAL LEADERSHIP GROUP ON SEA-LEVEL RISE

This Implementation Plan for Ocean and Coastal Ecosystems and Resources was coordinated by the Ocean Protection Council (OPC) on behalf of the member agencies of the State Coastal Leadership Group on Sea-level Rise, with support from the California Ocean Science Trust (OST) and inputs from a broad range of state and non-state entities. The State Coastal Leadership Group, which is convened by the OPC, consists of senior management from the California Coastal Commission (CCC), Department of Parks and Recreation (DPR), OPC, State Coastal Conservancy (SCC), State Lands Commission (SLC), and San Francisco Bay Conservation and Development Commission (BCDC). The group's shared mission is to maintain the natural beauty, accessibility, economic power, ecological richness, and social diversity of the California coast by reducing risks from sea-level rise, storms, erosion, and other coastal climate change-related hazards by:

- Sharing information between member agencies to strengthen competencies, reduce redundancy, and increase synergy;



- Strengthening partnerships among member agencies to enable strategic, coordinated actions and provide leadership on coastal and ocean adaptation;
- Promoting dialogue on priority issues, such as those related to the Public Trust, to ensure that member agencies have a shared understanding that informs their interactions with other agencies, local governments, and tribes;
- Identifying needs and implementing actions to promote adaptation and resilience in coastal areas throughout the state; and
- Gauging collective progress and determining shared agency needs to present to the legislature and other relevant entities to inform policy and funding processes.

Photo by J. Sutton
Submission to the
2015 Amateur
Photography Contest
sponsored by Thank
You Ocean and CCC.
The photographer's
notes indicate that
it was taken during
a king tide on 3-1-
2014 in Half Moon
Bay in front of the
Miramar Restaurant.

Vulnerability Assessment³⁹: Changing Ocean and Coastal Conditions

California's ocean and coastal areas are currently subject to a range of climate change-related stressors that are expected to worsen over time. These include an increase or increases in ocean temperature, sea-level rise, extreme storm events, changes in storm patterns, and ocean acidification and hypoxia. In most cases, it will be the combined impacts of multiple stressors that will pose the greatest risks to coastal and ocean health. While research funded through California's Climate Change Assessments has improved the state's understanding of the potential impacts of individual climate change stressors, additional research is needed to understand their combined impacts.



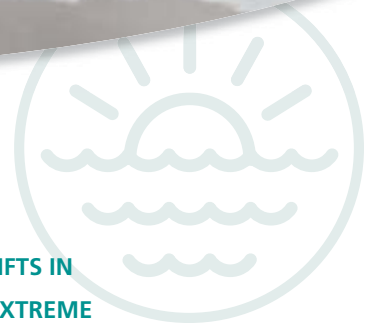
It is important to note that the extent and timing of the climate change-related vulnerabilities of coastal areas and the ocean will be site-specific and shaped by the degree to which assets

(e.g., communities, ecosystems, property, and infrastructure) are subject to stressors such as sea-level rise and storms⁴⁰ (exposure), the internal qualities that make them susceptible to these

³⁹ Unless otherwise noted, the information in this section is based on the coastal and ocean resources and ecosystems section of Safeguarding California.

⁴⁰ In its report, *Sea-level Rise for the Coasts of California, Oregon, and Washington: Past, Present and Future* (2012), the National Research Council notes that sea-level rise will vary regionally. The factors that contribute to these differences include local differences in water density, variations in sea levels due to winds, contributions from land-based ice, and vertical land motions along the coast.

⁴¹ For instance, intertidal habitats in North Central California that have been subject to pollution from agricultural and livestock wastes, wastewater, sewage outfalls, mining, and industrial wastes are likely to have low resilience to climate change (Hutto et al., 2015).



stressors⁴¹ (sensitivity), and the capacity to adjust and respond to these stressors (adaptive capacity). Thus, while Safeguarding California and other summaries of general vulnerabilities and impacts are useful starting points, identifying adaptation measures will require conducting thorough locally or resource specific vulnerability assessments that build upon work-to-date, such as BCDC's Adapting to Rising Tides Program.

A number of coastal jurisdictions have begun to assess climate change vulnerabilities⁴² to understand how valued assets could be affected by sea-level rise. The state has supported these efforts through the State Climate Change Assessments and grant programs, such as the OPC's LCP Sea-Level Rise Grants and Coastal Commission's LCP Local Assistance Grants. There are also several tools for conducting local vulnerability assessments, ranging from from the *California Adaptation Planning Guide* (California Emergency Management Agency and CNRA 2012), which describes a framework for assessing vulnerabilities and planning for adaptation, to data on and maps of sea-level rise vulnerabilities found on *Cal-Adapt* and Climate Central's *Surging Seas* websites.

The remainder of this section summarizes the vulnerabilities and impacts highlighted in *Safeguarding California* (CNRA 2014).

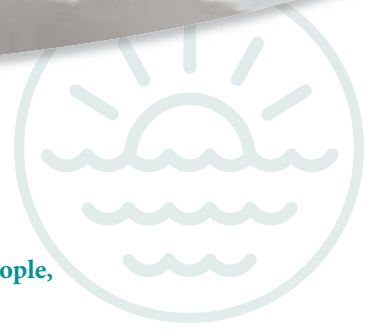
2.1 INCREASED TEMPERATURES, SHIFTS IN PRECIPITATION, AND CHANGES IN EXTREME EVENTS

Each of the past three decades has been warmer globally than during all previous decades on record (Hartmann et al. 2013), and average global temperature is estimated to increase by 0.54-1.26 °C for the period 2016-2035 relative to 1986-2005 (Kirtman et al. 2013). For every 1.8-degree increase in average global temperature, the volume of moisture that the atmosphere can hold increases by 7%. Increased levels of atmospheric moisture will raise levels and intensity of precipitation (Carey 2011). Rainfall patterns are also expected to change and vary regionally, with increased winter and spring rainfall in the northern U.S. and decreased rainfall in the Southwest, including California, particularly in the spring. Even as overall precipitation in the Southwest is projected to decrease, the number of heavy rainfall events is anticipated to increase (Walsh, et al. 2014).

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Climate change is also expected to alter the frequency and severity of extreme events. In California, today's version of a 100-year storm

⁴² Additional information on local vulnerability assessments can be found at <http://www.georgetownclimate.org/adaptation/state-information/overview-of-californias-climate-change-preparations>.



(i.e. a storm that has a 1% chance of occurrence in a given year) could take place annually by the year 2050 (Moser, Ekstrom, and Franco 2012). If the maximum tide levels that were recorded during the major El Niño of 1982-83 were to recur by 2050 during an extreme storm on a 100 to 200-year return period, including ≤ 12 inches of rain plus a week of high creek and river flows, the combination would likely cause \$10.4 billion in damages from structural and material losses, as well as transportation delays and interrupted electricity (Bay Area Council Economic Institute 2015).

2.2 SEA-LEVEL RISE AND STORMS

Another consequence of global warming is sea-level rise. Figure 1 shows sea-level rise projections for the west coast of the U.S. from the National Research Council's (NRC) 2012 sea-level rise report.

Figure 1. Sea-level rise projections for the West Coast relative the year 2000

TIME PERIOD	NORTH OF CAPE MENDOCINO	SOUTH OF CAPE MENDOCINO
2000-2030	-4 to 23 cm (-0.13 to 0.75 ft)	4 to 30 cm (0.13 to 0.98 ft)
2000-2050	-3 to 48 cm (-0.1 to 1.57 ft)	12 to 61 cm (0.39 to 2.0 ft)
2000-2100	10 to 143 cm (0.3 to 4.69 ft)	42 to 167 cm (1.38 to 5.48 ft)

The differences in sea-level rise projections north and south of Cape Mendocino are due mainly to vertical land movement. North of Cape Mendocino, geologic forces are causing much of the land to uplift, resulting in a lower rise in sea level, relative to the land, than has been observed farther south.

2.2.1 Flooding and inundation of people, buildings, and infrastructure

Sea-level rise can increase flood risks in low-lying coastal areas and areas bordering rivers. A 5 ft increase in water levels due to sea-level rise, storms, and tides is estimated to affect 499,822 people, 644,143 acres, 209,737 homes, and \$105.2 billion of property value in coastal California areas (Climate Central 2014).

An increase of 5 ft in water levels would threaten a wide range of buildings (including 60 fire and emergency medical service stations, 3 hospitals, 57 medical facilities, and 126 schools) and infrastructure (including 2,634 miles of roads, 26 miles of railroads, 32 rail stations, 2 airports, and 17 power plants). Impacts on transportation operations and infrastructure such as sea- and airports, roads, passenger and cargo rail, and bridge supports, would affect critical emergency evacuation routes and impede the movement of economic goods.

The impacts on sea- and airports in particular will have important economic implications. For instance, the San Francisco Airport accounted for \$5.4 billion in business and 33,580 jobs in 2012. Inclusion of off-site activities that rely on air service (e.g. cargo deliveries, customer visits) increase the airport's economic contribution to \$31.2 billion and 153,000 jobs (Bay Area Council Economic Institute 2015). The San Francisco Airport is already vulnerable to floods; sea-level rise is anticipated to exacerbate future floods, placing the airport at greater risk.

As water levels increase by 5 ft, the number of sites listed by the U.S. Environmental Protection Agency (e.g. Superfund sites, brownfields, and hazardous waste sites) is expected to increase to 1,354 because the flooding or inundation of facilities or land containing hazardous materials can lead to polluted runoff containing fertilizers, sewage, and other toxic materials. These can contaminate drinking water supplies and ocean-based food sources. Many marine species suffer morbidity or mortality when polluted runoff causes algal blooms, because the algae tend to produce toxins and reduce oxygen levels in the water. Swimming in these polluted waters can cause impacts to public health, including earaches, sinus problems, gastrointestinal problems, fever, and rashes.

2.2.2 Flooding and inundation of groundwater resources

The combined impacts of sea-level rise and storms may worsen saltwater intrusion of groundwater caused by over-pumping, which already poses challenges in coastal aquifers in Central and Southern California, including in Pajaro and Salinas Valleys and Los Angeles and Orange Counties. For communities that use groundwater for all or a portion of their water supply, saltwater intrusion from sea-level rise is likely to decrease fresh water availability and force them to consider potentially costly alternatives such as surface water transfers. For farmers who irrigate with groundwater, unless they are able to access alternative sources of water at reasonable prices, they may no longer be able to cultivate their land (Heberger et al. 2009).

2.2.3 Flooding and inundation of wetlands

Wetlands, marshes, and other critical habitats will erode and face inundation. It is estimated that wetland habitats will require 150 square miles of open space for inland migration if they are to be maintained as sea levels rise by five feet (Heberger et al. 2009). Sea-level rise is also expected to convert some freshwater wetlands into salty tidal wetlands by altering the elevations of freshwater-saltwater interfaces. Modeling and efforts to monitor changes in marsh and water levels at the Elkhorn Slough National Estuarine Research Reserve indicate that sea-level rise is likely to cause extensive marsh loss. The update to the 1999 Baylands Ecosystem Habitat Goals, released in October 2015, offers new recommendations for promoting healthy baylands in light of climate changes that are projected to occur by 2100.

2.2.4 Erosion of sea cliffs, dunes, and beaches

California's beaches and recreational resources provide tremendous benefits to the state, including recreation and tourism revenues, habitat for commercial fish species, enhanced water quality, and increased quality of life. The tourism and recreation of California's ocean and coast has been calculated at roughly \$16.9 billion annually (NOEP 2014). Sea-level rise is expected to



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exacerbate the erosion of seacliffs, bluffs, and dunes along the coast and lead to the losses of public beaches and recreational resources. For every foot that sea level rises, 50-100 feet of beach width could be lost. Seawalls and other coastal armoring structures worsen the impacts of sea-level rise by hindering ecosystems' landward migration, which can reduce beach width and result in beach loss. The loss of beach could decrease public access, reduce recreational opportunities and affect local economies by disrupting the tourism and coastal dependent industries.

lowering of the pH and changing of the chemistry due to elevated levels of CO₂, and hypoxia, low dissolved oxygen water, (OAH) are often coupled stressors due to chemical, biological, and oceanographic processes and are unprecedented on the West Coast. (See Figure 3 for an overview of the processes driving these changes.)

Current research on OAH on the West Coast makes it clear that the oceans will change and while the suite of direct and indirect impacts of OAH are uncertain, they are expected to be

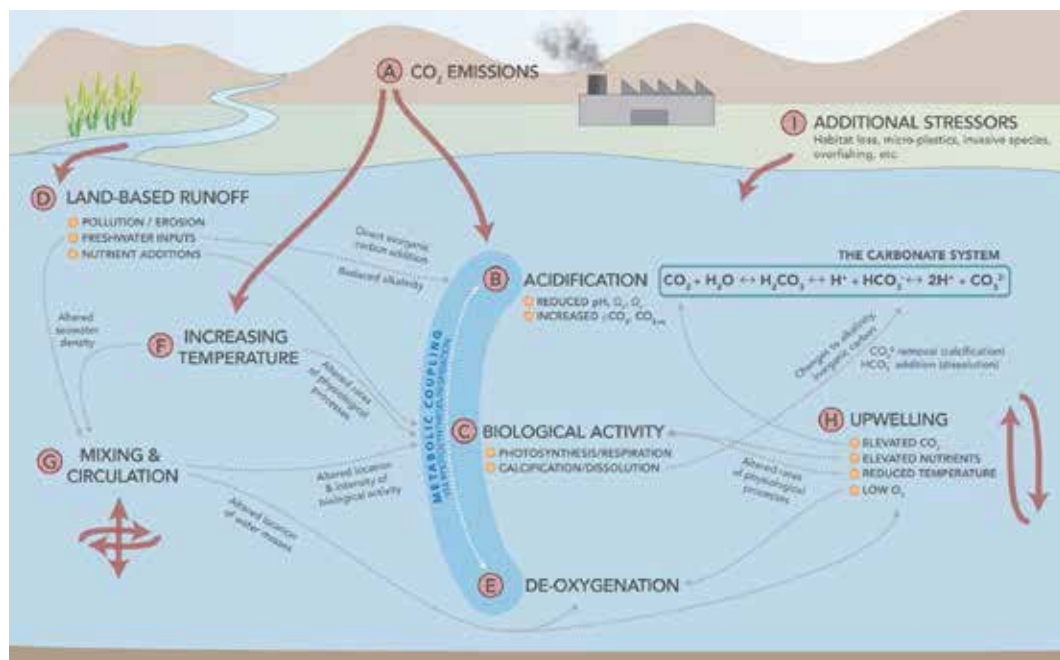
2.3 OCEAN ACIDIFICATION AND HYPOXIA

The ocean absorbs about a third of the carbon dioxide that is released into the atmosphere each year from the burning of fossil fuels and other human activities. As the CO₂ levels in the atmosphere increase, so do the levels in the ocean, changing the chemistry of the water and threatening marine ecosystems and coastal communities dependent on the health of the sea. Ocean acidification, this

Figure 3. Overview of the major driving processes (and associated linkages among them) in coastal oceans.

(A) Atmospheric CO₂-driven (B) acidification occurs against a backdrop of additional drivers of change in ocean conditions, including (D) land-based runoff, (E) deoxygenation, (F) warming, (G) mixing and circulation, (H) upwelling, and (I) other additional stressors. Processes can be accentuated in bodies of water with low circulation and mixing, for example tidal flushed bays and estuaries, as well as tidepools. source: West Coast OAH Science Panel product, "Multiple stressor considerations: ocean acidification in a deoxygenating ocean and warming climate"

Note: Location of processes relative to one another does not denote actual location in the water column.





profound. For example, ocean acidification may cause declining harvests and revenues from shellfish and their predators, with negative consequences for coastal communities, including food insecurity, and declining fisheries and aquaculture industries. Hypoxia can have profound effects on marine ecosystems leading to large-scale die-offs, local damage to fisheries, and over the long-term reduced biodiversity. While some areas of hypoxic waters – particularly in the deep ocean – are natural and important parts of marine ecosystems, climate change and other human activity may now expand hypoxic waters into areas closer to the ocean surface.

In addition to the widely-documented impacts of OAH on shell-building, calcifying organisms, changes to ocean chemistry may have consequences for marine organisms' physiology, reproduction, growth, population dynamics, overall ecosystem structure, and biodiversity. When OAH is coupled with other changing ocean conditions, such as temperature, the combination could cause complex and wide-ranging impacts that could exacerbate or mitigate the effects of OAH. Although the scale and magnitude of OAH remains uncertain, laboratory studies, mesocosm studies, and ocean environments with naturally acidified water (such as volcanic carbon dioxide seeps) (Hall-Spencer et al. 2008) can help us begin to plan for and manage for future scenarios and ecosystem impacts. Changing ocean conditions on the West Coast and beyond require a coordinated strategy and investment across boundaries. This includes coordinating monitoring,

data dissemination and interpretation as well as assessing policy and management options. Given the importance of West Coast fisheries, it will be particularly important to understand how changing ocean conditions may affect fishery resources and management strategies in the future. Further vulnerability and risk assessments are needed to understand better the socioeconomic implications of OAH for organisms and ecosystems and the level of risk posed to different communities.⁴³

A driving force in strengthening our collective knowledge of this west coast-wide challenge has been the West Coast Ocean Acidification and Hypoxia Science Panel, a collaboration of 20 scientists from leading institutions across California, Oregon, Washington and British Columbia. Convened by the California Ocean Science Trust in 2013 at the request of the OPC, the Panel is addressing these issues at a coast-wide scale by building a new body of scientific knowledge to inform decision-makers at multiple levels of government. The Panel's products and recommendations for next steps in research and management have and will continue to inform local and regional efforts, and serve as a unifying framework to drive collaboration and policy action. As the Panel concludes its work, and releases its final recommendations in the spring of 2016, the OPC will continue advancing the conversation in multiple decision-making venues based on the salient scientific findings and recommendations of the Panel.

⁴³ Mathis et al. 2015 analyzes the risks posed by ocean acidification to the shellfish, salmon, and other finfish sectors in Alaska and the communities that rely on these sectors for their economic well-being.



Current Actions to Prepare for Climate Change Impacts

State coastal agencies have undertaken important steps to address the vulnerabilities and impacts summarized in the previous section and to implement the four categories of ocean and coastal recommendations identified in *Safeguarding California*:

- Improve management practices for coastal and ocean ecosystems and resources, and increase capacity to withstand and recover from climate impacts;
- Better understand evolving trends that may impact ocean and coastal ecosystems and resources;
- Better understand climate impacts on ocean and coastal ecosystems and resources; and
- Share information and educate.

These categories were identified as priority areas in which action was needed to facilitate progress on adaptation. State coastal agencies' adaptation efforts encompass the full cycle of adaptation planning from assessing vulnerabilities to identifying, evaluating, implementing, and monitoring adaptation measures. These agencies have focused on providing policy leadership on issues such as those related to the Public Trust, developing guidance to assist state agencies and local and regional planners understand and respond to climate change impacts, assessing the vulnerabilities of communities and ecosystems, and implementing adaptation measures. This section presents highlights of the adaptation efforts led by state coastal agencies; additional details can be found in Appendix C.

3.1 IMPROVE MANAGEMENT PRACTICES FOR COASTAL AND OCEAN ECOSYSTEMS AND RESOURCES, AND INCREASE CAPACITY TO WITHSTAND AND RECOVER FROM CLIMATE IMPACTS

Safeguarding California provides several broad recommendations for improving management practices to address the coastal and ocean climate change vulnerabilities and impacts highlighted in the previous section. State coastal agencies have responded with agency-specific initiatives and cross-agency efforts through mechanisms such as the State Coastal Leadership Group on Sea-level Rise and the California Collaborative on Coastal Resilience.

The State Coastal Leadership Group on Sea-level Rise has served as a forum for member agencies to discuss topics of shared relevance pertaining to adapting to sea-level rise, including

The State Coastal Leadership Group on Sea-level Rise has served as a forum for member agencies to discuss topics of shared relevance pertaining to adapting to sea-level rise, take stock of adaptation activities to date, and identify potential cross-agency adaptation priorities.



the review of adaptation activities to date, and identification of potential cross-agency adaptation priorities. For instance, the SLC is leading ongoing discussions about the Public Trust Doctrine and the implications of changing boundaries between public and private lands due to sea-level rise. Also the OPC is leveraging the State Coastal Leadership Group to inventory existing sea-level rise preparedness actions, as per California Assembly Bill (AB) 2516, with the intention of facilitating using lessons learned to inform state and local adaptation efforts. As part of this effort, the OPC is developing online resources, including a database of sea-level rise information and a catalogue of funding opportunities related to sea-level rise and other coastal climate hazards.

Established in 2014, the *California Collaborative on Coastal Resilience* is a multi-agency initiative to provide coastal communities with effective and efficient state support in becoming resilient to sea-level rise. Comprised of the CCC, OPC, SCC, and SLC, the agencies seek to understand resilience planning needs at the regional level and improve collaboration to support local communities. Efforts to date have focused on a pilot study in the low-lying Humboldt Bay region, where sea-level rise poses an imminent threat. As a multi-agency initiative, the Collaborative is gaining insight into the opportunities and mechanisms by which state coastal agencies can cooperate on sea-level rise adaptation activities locally, regionally, and statewide.

As a means to promote *hazard avoidance for new development*, DPR has adopted a coastal erosion



policy to discourage development, including new permanent structures, facilities, and structural protection, in sites subject to wave erosion, seacliff retreat, and other impacts. To *study and support cost-effective green infrastructure to reduce flood risk and stormwater runoff and maximize co-benefits*, the SCC has been implementing the South Bay Salt Pond Restoration Project, a 15,000-acre wetlands restoration project that will build multi-benefit flood protection for Silicon Valley. The California Department of Fish and Wildlife (DFW) is also supporting a number of projects to restore or enhance wetlands and salt marshes through the Wetland Restoration for Greenhouse Gas Reduction Grant program.

In terms of *supporting pilot projects for innovative shoreline management techniques*, the SCC has been working with the City of Ventura to implement one of the first managed retreat projects in California at the popular surfing beach of Surfers Point. The project addresses the severe erosion (up to 60 feet inland in some areas) that

March 2015
California
Collaborative on
Coastal Resilience's
Humboldt Bay Pilot
Workshop



was damaging the beach and dune habitat as well as a bike path and parking lot by removing existing improvements and relocating them inland to allow for retreat and continued public access even with anticipated sea-level rise. The project restored and enhanced the shoreline's ecological structure and function, including widening the sandy beach, restoring the sand dune habitat, and improving water quality. In addition, BCDC has recommended regional and local adaptation measures to reduce the vulnerabilities of multiple asset categories in the San Francisco Bay Area through its Adapting to Rising Tides Program. The OPC and SCC also anticipate supporting relevant pilot activities with Proposition 1 funds. They have incorporated sea-level rise into their Proposition 1 guidelines and expect to make infrastructure investments with these funds.

Development of the State Sediment Master Plan and sediment management activities continues with key state and federal agencies meeting regularly to discuss upcoming sediment projects and provide support for and technical review of regional sediment management plans. The BCDC is also assessing changing sediment dynamics in the San Francisco Bay and potential management options.

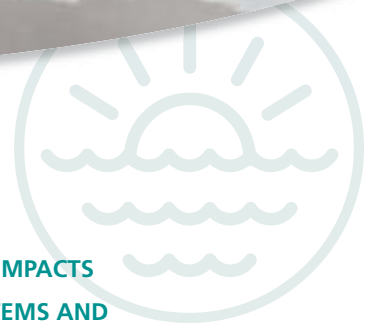
State coastal agencies have also provided guidance and financial resources to assist local governments *address climate impacts*. For example, the CCC developed and adopted the Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits

(2015), which presents a framework for local planners and decision-makers to integrate sea-level rise into LCPs and coastal development permits. Furthermore, the CCC and OPC have provided funding for updating LCPs with sea-level rise considerations through the LCP Planning Assistance Grant Program and the LCP Sea-level Rise Grant Program, respectively. The two agencies are coordinating these grant programs on an ongoing basis through an interagency agreement.

In addition, the CCC, through its LCP planning and regulatory program, has facilitated the implementation of numerous sea-level rise adaptation projects that protect coastal resources while increasing the capacity to withstand and recover from sea-level rise impacts. For example, the CCC approved a project to relocate inland three miles of coastal Highway One at Piedras Blancas in San Luis Obispo County; the project is anticipated to protect this portion of Highway One from erosion for 100 years. The realigned highway eliminates the need for damaging shoreline armoring in the future and creates space for DPR to implement

a new section of the California Coastal Trail for the public to enjoy this beautiful part of the California coast. The CCC also recently approved a multi-modal transportation and resource management plan for the 27-mile

The CCC developed and adopted the Sea-level Rise Policy Guidance (2015), which presents a framework for local planners and decision-makers to integrate sea-level rise into LCPs.



North Coast Corridor in San Diego. The project will allow for enhanced transportation and coastal resource protection, and includes planning for pedestrian and bicycle access, as well as wetland restoration at six coastal lagoons and the incorporation of sea-level rise considerations.

3.2 BETTER UNDERSTAND EVOLVING TRENDS THAT MAY IMPACT OCEAN AND COASTAL ECOSYSTEMS AND RESOURCES

Effectively responding to the impacts of climate change in coastal and ocean areas necessitates anticipating emerging issues. *Safeguarding California* draws attention to *improving understanding of the potential impacts and opportunities of offshore renewable energy development and supporting federal flood insurance reform* as two trends that could be important to promoting healthy coastal zones and oceans.

The SLC is conducting forward-thinking research and facilitating the advancement of offshore renewable energy; through its participation in the Marine Renewable Energy Working Group, which is comprised of relevant state agencies. The OPC, CCC, and SCC have been working with the Federal Emergency Management Agency to influence flood hazard mitigation policy and identify priority needs and actions to reduce flood risk in California's coastal counties. While shifts in national, international, and technological factors can be unpredictable, California's coastal agencies are actively tracking and responding to evolving trends that may affect their work.

3.3 BETTER UNDERSTAND CLIMATE IMPACTS ON OCEAN AND COASTAL ECOSYSTEMS AND RESOURCES

California has a long history of drawing on the scientific community to inform coastal and ocean policy, planning, and management. The structures that have been put in place, including the State's Climate Change Assessments, the Climate Action Team (CAT) Research Working Group's Research Plan, and the West Coast OAH Science Panel, have facilitated an improved understanding of climate change vulnerabilities and impacts as well as possible adaptation measures. However, more work still needs to be done. *Safeguarding California* calls out three priorities to enhance this understanding: *further vulnerability assessments and cost analyses, continued modeling, and continued support and investment in monitoring.*

Effective adaptation requires understanding climate change vulnerabilities and impacts at appropriate scales, and state coastal agencies are implementing a number of programs that provide technical and financial support for regional and local *vulnerability assessments* and cost analyses. For instance, in addition to evaluating the vulnerabilities of different asset

While shifts in national, international, and technological factors can be unpredictable, California's coastal agencies are actively tracking and responding to evolving trends that may impact their work.



categories under its Adapting to Rising Tides Program, BCDC is examining the social, equity, governance, environmental, and economic risks and ramifications of these vulnerabilities in the San Francisco Bay Area. The CCC is providing technical and financial support for 22 local vulnerability assessments through its LCP Grant and LCP Planning Programs, and is reviewing and compiling vulnerability assessments of urban and rural areas statewide to identify priority areas for adaptation planning. Through its Climate Ready Program, the SCC supports vulnerability assessments in a number of coastal counties and cities including Humboldt Bay, Marin County, San Mateo County, Benicia, Monterey, Santa Barbara, Ventura, Los Angeles, and San Diego. These local and regional vulnerability assessments result from collaborative efforts across sectors and jurisdictions. For instance, in Humboldt Bay, the Adaptation Planning Working Group (a locally organized effort) has brought together state coastal agencies, the DFW, the California Department of Transportation, and a number of local and federal government entities.

To assess the coastal and ocean vulnerabilities resulting from a changing climate, it is necessary to factor in information about future climate conditions at relevant scales, and climate change models provide credible estimates of future conditions. Important state efforts related to *modeling* include the SCC's support for development of the Coastal Storm Modeling System (CoSMoS) for California, which provides meter-scale predictions of storm-related coastal flooding, erosion, and cliff failures to inform

adaptation planning. Other modeling efforts help to explain how different factors contribute to processes that are related to climate change. One example is a joint UCLA/University of Washington/Southern California Coastal Water Research Project (SCCWRP)/National Oceanic and Atmospheric Administration (NOAA) model that was initially funded by the OPC and examines the role of nutrient pollution on ocean acidification and hypoxia in the California Current System (which stretches from British Columbia to Baja California). NOAA recently provided additional funding to support this activity.

Vulnerability assessments and modeling require data and information that enable an understanding of changes over time, and *monitoring* of California's extensive network of marine protected areas presents a unique opportunity to track how climate change is affecting ocean resources and how these resources respond to different adaptation measures. The OPC currently works with a broad range of partners to support monitoring of the state's marine protected areas. It is collaborating with the DFW, Fish and Game Commission, and OST to create a comprehensive long-term monitoring strategy to aid in better managing the protected areas for climate resilience. Other monitoring activities undertaken by the State in coastal and ocean areas include long-term data gathering, monitoring, and modeling by the DPR's Division of Boating and Waterways.

California is also providing leadership on monitoring in a wider context through the West Coast OAH Science Panel and the Pacific Coast



Collaborative (PCC) in coordination with the federal Interagency Working Group on Ocean Acidification (IWG-OA). The PCC, which also involves policy leadership in Washington, Oregon, and British Columbia, will implement a coast-wide and integrated monitoring program that links biological and chemical data collection based on the recommendations of the West Coast OAH Panel. This effort leverages various state and federal efforts to understand the magnitude of OAH and, through improved alignment and prioritization, will enhance the impact of the OAH activities funded by different entities. The PCC is working with NOAA, the U.S. Environmental Protection Agency, and the IWG-OA to understand the extent of the resources that state and federal agencies have used to monitor, model, and study OAH along the West Coast. These efforts, which build on the scientific grounding of the Panel and other efforts, ensure that we are exercising comprehensive research and monitoring in order to take appropriate management and regulatory action to combat OAH.

3.4 SHARE INFORMATION AND EDUCATE

Safeguarding California prioritizes outreach to raise awareness and improve understanding of the impacts of climate stressors on valuable coastal and ocean resources. Awareness and capacity building efforts throughout the state are wide-ranging and numerous. Specifically, *Safeguarding California* highlights *investing in risk communication efforts, developing sustainability modeling tools for fishery managers, and improving maps and tools and providing training to incorporate climate science*

into planning, operations, and management for assets at risk from sea-level rise.

To help state agencies *incorporate sea-level rise science into their planning and decision-making*, the OPC, in collaboration with the Coastal and Ocean Resources Working Group for the CAT, developed the *State Sea-level Rise Guidance Document* (2013). State coastal agencies have also developed guidance to inform agency-specific work. For instance, the DPR has developed guidance for assessing new and current projects in consideration of projected sea-level rise; the document also includes descriptions of relevant tools and resources. In relation to its draft *Sea Level Rise Policy Guidance* for LCPs and Coastal Development Permit applicants, the CCC carried out more than 30 outreach meetings and presentations and 6 webinars for local governments and other stakeholders. With its document now adopted, the CCC is continuing to conduct outreach and provide training to staff and local governments, and is planning additional next steps to facilitate sea-level rise planning and adaptation statewide.

State coastal agencies have complementary outreach activities targeting other state agencies and their partners with *risk communication efforts* to raise public awareness of coastal and ocean adaptation issues. For instance, through the California King Tides Initiative several state (SCC, CCC, and OPC) and federal agencies and non-profit organizations, has been using photographs to educate the public about sea-level rise.



In regard to *fisheries management*, the OPC and OST are working with the OPC Science Advisory Team and DFW to produce information that will improve state management of fisheries in the face of climate change.

In partnership with the NOAA Office of National Marine Sanctuaries, OPC coordinates the Thank

You Ocean campaign, which seeks to educate the public about ocean conservation issues and informs on actions to help protect California’s coast and oceans. Through a variety of social media platforms, Thank You Ocean reaches a broad segment of California residents and shares information about climate change and other threats.

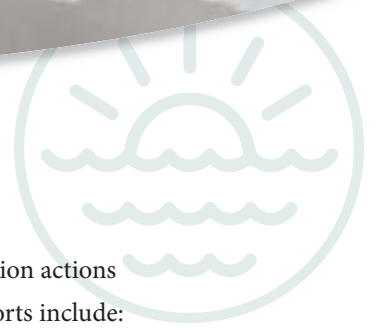
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Next Steps

State agencies have demonstrated a commitment to protect, restore, and enhance coastal and ocean ecosystems and resources in the face of a changing climate and have effectively leveraged existing resources to promote coastal and ocean adaptation throughout the state. However, much of this work has been limited by agency resource constraints. To make significant progress on implementing climate change adaptation measures, additional funding and staff resources are needed to allow these agencies to broaden their capacities to support adaptation in a strategic, coordinated manner. Providing staff devoted to climate change work will allow for specialized and rapidly-emerging knowledge to be effectively incorporated into adaptation planning and implementation.

Successful adaptation will also require deepening current efforts to coordinate and collaborate across agencies, sectors, and levels of government, as well as continued engagement with disadvantaged communities that lack adequate resources to prepare for, respond to, and recover from climate change impacts. State coastal agencies will continue to leverage mechanisms such as the State Coastal Leadership Group on Sea-Level Rise, the Coastal and Ocean Working Group of the Climate Action Team, the West Coast OAH Panel, the California Collaborative on Coastal Resilience, and the California Coastal Sediment Management Workgroup to further adaptation

in ways that promote a shared vision of coastal and ocean health in the near- and long-term, in specific locales and broader geographies. State coastal agencies will also continue to seek out adaptive, flexible responses to climate change that are informed by sound science, and refine these approaches based on collective learning.

State coastal agencies have already begun to respond to the recommendations provided in *Safeguarding California*. Nonetheless, efforts are still nascent for: understanding the impacts and opportunities presented by offshore renewable energy development, supporting reform of the



Federal Flood Insurance Program, developing sustainability modeling tools for fishery managers, and communicating public health risks.

Appendix D lists the activities state coastal agencies have identified to further progress on implementing the recommendations in *Safeguarding California*. Their planned adaptation efforts include:

- Taking on climate change adaptation by updating policies, regulations, and guidance, to reflect new information as needed; promoting broad coastal and ocean health priorities by factoring in all climate change considerations (including sea-level rise, ocean acidification, and hypoxia) into regulatory and land use decision-making, planning, and investments, including those related to infrastructure; and reviewing the most recent science; specifically on sea-level rise to inform updates of the State Sea-level Rise Guidance Document (2013);
- Expanding support for regional and local sea-level rise adaptation, including vulnerability assessments, selection and implementation of adaptation measures, and monitoring;
- Testing innovative shoreline management techniques, cost-effective green infrastructure options, and existing techniques such as setbacks and transfers-of-development-rights; and
- Developing research and monitoring tools to improve resilience of ecosystems and coastal communities.

State coastal agencies' priority adaptation actions to support the planned adaptation efforts include:

- Supporting full implementation of state adaptation policies, such as Governor's Executive Order B-30-15, through agency-specific and cross-agency actions.
- Implementing AB2516 via surveys by OPC twice a year until January 1, 2018 to assess sea-level rise planning progress throughout the state. As part of this process, the OPC will provide an online database of sea-level rise planning information from state agencies, ports, airports and utilities, as per AB 2516.
- Improving state coastal agency websites to provide information on coastal and ocean climate change impacts and adaptation resources
- Conducting crucial research through the Fourth Climate Change Assessment to improve modeling, vulnerability assessments, and natural infrastructure adaptation measures for responding to sea-level rise and OAH by 2017.
- Increasing public awareness and community engagement in preparing for climate risks by conducting training and outreach on use of the CCC's Sea Level Rise Policy Guidance by December 2016, and on an ongoing basis.
- Developing an approach for integrating scientific advances into state sea-level rise guidance by December 2016.
- Updating the Southern California Wetlands Recovery Project Regional Strategy to consider climate change by autumn 2017.



- Releasing a vulnerability assessment for Contra Costa County under the Adapting to Rising Tides program by June 30, 2017, as part of BCDC’s and SCC’s work supporting county-level adaptation efforts.

agencies will build on their adaptation efforts to date to continue to address the coastal and ocean impacts of sea-level rise, storms, OAH, and other climate change stressors, and to support progress from vulnerability assessments and adaptation planning to implementation throughout the state.

Through these planned activities, state coastal

Monitoring and Evaluation

Effective monitoring and evaluation can help state coastal agencies understand the impacts of their adaptation investments and refine their strategies to promote ocean and coastal health. The climate change indicators compiled by the Office of Environmental Health Hazard Assessment (OEHHA) (2013) serve as a useful foundation for assessing climate changes in coastal and ocean contexts and their effects on physical and biological systems. Figure 4 summarizes those OEHHA indicators.

Figure 4. OEHHA indicators relevant to coastal and ocean areas

CLIMATE CHANGE DRIVERS	CHANGES IN CLIMATE	IMPACTS ON PHYSICAL SYSTEMS	IMPACTS ON BIOLOGICAL SYSTEMS
<ul style="list-style-type: none"> • Greenhouse gas emissions • Atmospheric greenhouse gas concentrations 	<ul style="list-style-type: none"> • Annual air temperature • Extreme heat events • Precipitation 	<ul style="list-style-type: none"> • Sea-level rise • Coastal ocean temperature • Chemical composition (including ocean acidification) • Changes in storm systems 	<ul style="list-style-type: none"> • Human heat-related mortality and morbidity • Sacramento fall run Chinook salmon abundance • Cassin’s auklet populations • Shearwater and auklet populations off Southern California • Sea lion pup mortality and coastal strandings • Ocean acidification: <ul style="list-style-type: none"> • Decreased calcification of shelled organisms • Reduced sensory function in fish • Increased photosynthetic rates in carbon-fixing organisms



The OEHHA indicators complement those used by state coastal agencies to evaluate their activities. For instance, the SCC has developed a set of draft indicators to gauge the impacts of the local vulnerability assessment and adaptation planning efforts supported by their Climate Ready Program Grants. Although the SCC metrics are largely focused on process, they also include outcome indicators, such as the degree of economic risk reduction achieved by adaptation (see Appendix E).

While OEHHA indicators, such as the effects of ocean acidification on marine organisms, are helpful for gauging broad impacts, there is a need to develop focused metrics (e.g., the impacts of ocean acidification on oysters), including those that capture the socio-economic implications of climate change (e.g., the impacts of ocean acidification on oyster industry revenues), to inform coastal and ocean management and decision-making. Additionally, given the numerous demands on coastal agencies' resources, it will be necessary to identify metrics that target priority coastal and ocean management issues and to formulate monitoring and evaluation frameworks that can be implemented easily.

With additional funding and position support, state coastal agencies would be able to:

- Identify key questions and issues, including agencies' overlapping concerns;
- Review existing indicators in the ecological, human health, economic, social, infrastructural, and disaster risk-reduction literature to identify and compile indicators to measure successful adaptation and resilience;
- Agree upon cross-agency indicators to understand baseline vulnerabilities and resilience, evaluate state planning initiatives, such as LCPs and general plans, and gauge and demonstrate the progress of state-supported projects; and
- Improve linkages between ecosystem protection and community resilience.



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Ocean and Coastal Ecosystems and Resources

APPENDIX A. ACRONYMS

AB	Assembly Bill
BCDC	San Francisco Bay Conservation and Development Commission
CCC	California Coastal Commission
CNRA	California Natural Resources Agency
CAT	Climate Action Team
DFW	Department of Fish and Wildlife
DPR	Department of Parks and Recreation
LCP	Local Coastal Program
NOAA	National Oceanic and Atmospheric Administration
OEHHA	Office of Environmental Health Hazard Assessment
OPC	Ocean Protection Council
OST	Ocean Science Trust
PCC	Pacific Coast Collaborative
SCC	State Coastal Conservancy
SLC	State Lands Commission

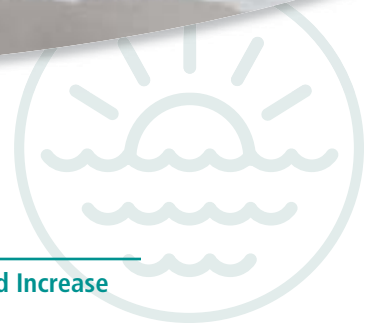


APPENDIX C.

STATE COASTAL AGENCIES' CURRENT ACTIONS TO PREPARE FOR CLIMATE CHANGE IMPACTS, ORGANIZED BY THE RECOMMENDATION CATEGORIES IN SAFEGUARDING CALIFORNIA

1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts

AGENCY	ACTIONS
BCDC	<ul style="list-style-type: none"> • Adapting to Rising Tides Program: Assesses the vulnerability of multiple asset categories, and evaluates the risks and consequences to society, equity, governance, environment, and economy posed by the vulnerabilities. The working group includes cities, counties, and regional, state, and federal agencies and organizations. Adaptation measures will be recommended to address vulnerabilities • Head of the Tide Project: Includes development of a guidance document to assist San Francisco Bay Area regional planners, flood managers, and local governments to understand the vulnerabilities that flood control channels and Bay tributaries face due to sea-level rise and potential measures to improve resilience • Policies for a Rising Bay Project: Supports assessment of the Bay fill policies in relation to rising sea levels. • Bay Plan Climate Policies: Adopted to inform review of BCDC permit applications in light of sea-level rise. • Regional Sediment Management activities: Assess changing Bay sediment dynamics and potential management measures.
CCC	<ul style="list-style-type: none"> • LCP Local Assistance Grant Program: Provides funding to support LCP updates that specifically address issues related to climate change such as sea-level rise and facilitate local adaptation. • LCP updates: Implement adaptation planning and build resilient communities, including addressing sea-level rise and associated coastal hazards. • Coastal Development Permits: Address sea-level rise where applicable to ensure resilience for the life of the development. • Sea Level Rise Policy Guidance: Provides an overview of the best available science on sea-level rise for California and recommends a methodology for addressing it in CCC planning and regulatory actions. The final document was adopted unanimously by the CCC on August 12, 2015. • Beach Valuation Study: Explores new methods to assess the true costs of shoreline armoring to the public in order to support mitigation of the adverse impacts of hard armoring to recreation, public access, and beach ecology. NOAA-funded Project of Special Merit.



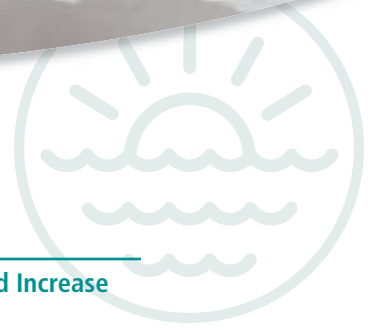
1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – CONTINUED

AGENCY	ACTIONS
DPR	<ul style="list-style-type: none"> • Coastal erosion policy: Discourages development (including permanent new structures, facilities, and structural protection) in sites that are subject to impacts such as wave erosion and seacliff retreat. New projects must also consider the projected impacts of sea-level rise. Additionally, parks managers follow coastal development permit guidelines for hazard avoidance, when applicable. • Coastal restoration projects: Many focus on enhancing natural dune structure and movement. Also, projects such as invasive species removal or the removal/modification of structural barriers are consistent with an integrated ecosystem approach to reducing climate impacts.
OPC	<ul style="list-style-type: none"> • LCP Sea-level Rise Grant Program: Provides funding to support incorporation of sea-level rise considerations into LCP updates through modeling, vulnerability assessments, adaptation planning, or policy development. • AB 2516: Create the Sea-level Rise Planning Database to help assess the implementation of key state policies, provide information on sea-level rise planning activities to facilitate coordination and collaboration, and understand the factors contributing to successful adaptation. As part of this effort, the OPC is also developing a catalogue of funding opportunities to support adaptation to sea-level rise and other coastal climate change hazards.
SCC	<p>The SCC is currently implementing dozens of projects that support improved management practices and capacity building. Specifically, SCC’s projects seek to encourage innovative design of new structures/infrastructure in areas vulnerable to sea-level rise, support pilot projects for innovative shoreline management, study and invest in cost-effective green infrastructure, support and continue progress toward a more integrated ecosystem approach, and continue development of the State Sediment Master Plan and sediment management.</p> <ul style="list-style-type: none"> • South Bay Salt Pond Restoration Project: Develop and implement a comprehensive plan to build multi-benefit flood protection for the Silicon Valley in conjunction with a 15,000-acre green infrastructure wetland restoration project. (Over 3,000 acres to date.) • Dozens of estuarine wetland restoration projects and habitat restoration projects: Increase coastal resilience and promote reuse of sediment. • Living Shorelines projects in the City of Arcata, San Francisco Bay and Upper Newport Bay • Managed retreat projects in the City of Ventura and San Francisco • CoSMoS: Support development of this sophisticated climate change planning tool with improved technical capacity for California.
SLC	<ul style="list-style-type: none"> • Incorporating sea-level rise into the SLC’s decision-making: Consider how to reduce the potential for adverse sea-level rise impacts to the resources and values protected by the Public Trust Doctrine, including impacts to public access, and the potential for hazard creation via damaged structures and/or inundation of facilities. Decisions incorporate management practices such as acquisition of rolling easements and boundary determinations to protect the landward migration of the public-private property boundary. • Marine oil terminals: The SLC requires that marine oil terminals consider sea-level rise projections over the remaining lives of the terminals



1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – CONTINUED

AGENCY	ACTIONS
Cross-agency	<ul style="list-style-type: none"> • State Coastal Leadership Group on Sea-level Rise: <ul style="list-style-type: none"> o Select Committee Hearing on Sea-level Rise – Raised awareness of capacity issues and the need for continued and improved funding. Recommended climate change adaptation be addressed through support for agency actions, rather than additional/new legislative mandates, as tools exist within current agency authorities. o Public Trust Doctrine – Initiated discussion to describe a vision for maintaining public trust and access as sea levels rise. • California Collaborative on Coastal Resilience: A multi-agency initiative (CCC, SCC, SLC, and OPC) to develop an approach to support coastal communities effectively and efficiently to strengthen sea-level rise resilience. A pilot project in Humboldt Bay has included an analysis of local resilience planning needs and a stakeholder workshop, and support for the community is currently being organized. In addition, the effort is enhancing interagency collaboration, and the pilot is informing development of a transferable model for statewide application. • Coastal Sediment Management Workgroup: Hold regular meetings of the CCC, BCDC, SCC, DFW, DPR, CNRA, SLC, State Water Resources Control Board, U.S. Army Corps of Engineers, U.S. Geological Survey, U.S. Environmental Protection Agency, National Park Service, California Marine Affairs and Navigation Conference, and California Coastal Coalition to discuss upcoming sediment projects and provide support for and technical review of regional sediment management plans. • Coastal and Ocean Resources Working Group for the CAT: Member agencies are discussing means to address future climate change risks even as they respond to the immediate challenges posed by El Niño and needed emergency response. • CCC and SLC collaboration to address the protection of Public Trust resources: Assess the impacts of sea-level rise, shoreline armoring, and other hazard mitigation measures on sovereign lands as well as adjacent uplands that may become inundated due to sea-level rise. The agencies are seeking NOAA funding to support these efforts. • OPC and CCC coordination of their respective grant programs funding local planning efforts: Developed a joint grant application and announcement for the second rounds of grant funding, and together reviewed the applications and developed recommendations. Through an interagency agreement, CCC staff administer the OPC LCP Sea-level Rise Grant Program. This coordination helps to streamline the grant execution process, simplify reporting and invoicing requirements for local governments, save the state money, and increase the success of the projects through early and on-going communication between the local governments and CCC staff on development of projects supporting applications for LCPs or LCP updates under the Coastal Act.



1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – CONTINUED

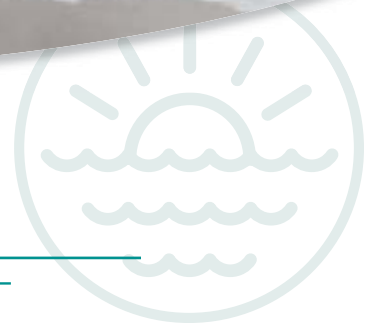
AGENCY	ACTIONS
Cross-agency (continued)	<ul style="list-style-type: none"> Sea-Level Rise and Floodplain Management Focus Group: Body of floodplain managers and coastal decision-makers that was convened to guide and shape the outputs of the NOAA sea-level rise and floodplain management project. Members of the Focus Group will help to link project efforts to their broader communities, promoting partnerships, strengthening the network of institutions focused on addressing coastal vulnerability and climate adaptation, and helping to distribute and share the project's products. Members include the CCC, SCC, California Office of Emergency Services, Department of Water Resources, Governor's Office of Planning and Research (OPR), OST, Federal Emergency Management Agency, NOAA, as well as representatives from the counties of Los Angeles, Marin, and Santa Cruz and the cities of Chula Vista and San Francisco.

2. Better Understand Evolving Trends that May Impact Ocean and Coastal Ecosystems and Resources

AGENCY	ACTIONS
OPC	Comment letter on President Obama's Executive Order on Federal Emergency Management Agency flood standards.
SCC	Federal Emergency Management Agency Flood Risk Reduction – Local Project Identification: Identify priority needs and actions related to flood risk reduction in coastal counties from San Francisco to San Diego.
SLC	Offshore renewable energy: Research and facilitate the advancement of offshore renewable energy, including through participation in the Marine Renewable Energy Working Group.

3. Better Understand Climate Impacts on Ocean and Coastal Ecosystems and Resources

AGENCY	ACTIONS
BCDC	<ul style="list-style-type: none"> Adapting to Rising Tides. Head of Tides Project. Innovative Wetlands Adaptation Techniques Project: Assessed wetlands value for flood control and vulnerability to rising sea levels.
CCC	<ul style="list-style-type: none"> LCP Grant Program: Supports projects that include sea-level rise vulnerability assessments and subsequent adaptation planning through LCPs.
DPR	<ul style="list-style-type: none"> Division of Boating and Waterways: Undertakes long-term data gathering, monitoring, and modeling, as well as applied research. Coastal site surveys: Collaborates with the Society for California Archaeology to address climate change and sea-level rise.
OPC	<ul style="list-style-type: none"> LCP Sea-level Rise Grant Program.

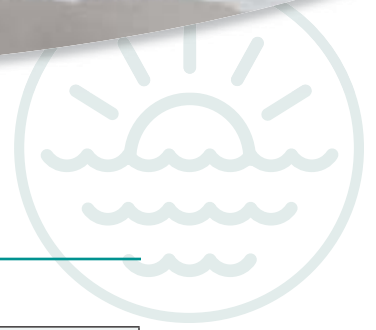


3. Better Understand Climate Impacts on Ocean and Coastal Ecosystems and Resources – CONTINUED

SCC	<ul style="list-style-type: none"> • Vulnerability assessments: Provides support in many coastal communities through the Climate Ready program, including Humboldt Bay, Marin County, San Mateo County, City of Benicia, Monterey, Santa Barbara, Ventura, Los Angeles, and San Diego. • Economic impact analyses: Provides support in Monterey. • CoSMoS: Support and work toward best modeling.
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4. Share Information and Educate

AGENCY	ACTIONS
BCDC	<ul style="list-style-type: none"> • Policies for a Rising Bay Project. • Adapting to Rising Tides: Advise local governments on adaptation planning, including through a Help Desk. • Head of Tides Project.
CCC	<ul style="list-style-type: none"> • Outreach and education related to the Sea Level Rise Policy Guidance: 30-plus outreach meetings/presentations and six webinars for local government and other stakeholders on the draft Sea-level Rise Guidance. Outreach and training materials are currently being developed for the recently adopted document, with activities to begin before the end of 2016. • Overhaul of Climate Change website: In-progress with initial focus on sea-level rise. Additional material will provide information on extreme weather events and ocean acidification issues as well as greenhouse gas emissions.
DPR	<ul style="list-style-type: none"> • Developed a guidance document for evaluating new and current projects in consideration of projected sea-level rise, describing several tools and resources for undertaking this evaluation.
OPC	<ul style="list-style-type: none"> • <i>Making Waves: Communicating Ocean-Climate Impacts and Solutions</i>: Funded by OPC. Describes challenges and potential solutions for these challenges to better communicate the impacts of climate change on oceans. • “Successful Adaptation to Coastal Climate Change” Workshop: Held in February 2015, the workshop brought together representatives of state coastal agencies, CNRA, and the California Environmental Protection Agency to identify the cornerstones of a vision for coastal adaptation in 2050.
SCC	<ul style="list-style-type: none"> • Surviving the Storm Report: Helped develop a comprehensive report on the economic impacts of storms and sea-level rise in the San Francisco Bay Area, in partnership with the Bay Area Council. • CoSMoS: Support community outreach related to the CoSMoS model to build local capacity. • Baylands Ecosystem Habitat Goals Science Update: To be released in October 2016.
SLC	<ul style="list-style-type: none"> • Facilitating AB 691 (Chapter 592, Statutes of 2013) compliance: Requires local legislative grantees (e.g. ports and local jurisdictions that manage state-owned public trust lands) to address the impacts of sea-level rise on granted public trust lands. • Sea-level rise vulnerability tools webpage.



4. Share Information and Educate – CONTINUED

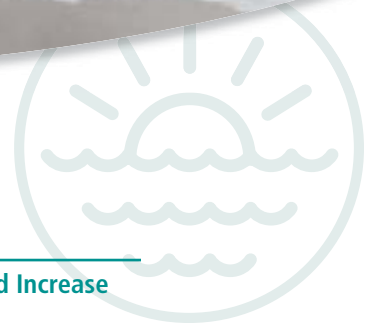
Cross-agency	<ul style="list-style-type: none"> • California Collaborative on Coastal Resilience: Public workshop in Humboldt Bay included approximately 100 participants from a number of sectors; reports based on workshop results are currently being drafted. • State Coastal Leadership Group on Sea-level Rise • Coastal Sediment Management Workgroup
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APPENDIX D.

STATE COASTAL AGENCIES' NEXT STEPS, ORGANIZED BY THE RECOMMENDATION CATEGORIES IN SAFEGUARDING CALIFORNIA

1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts

AGENCY	ACTIONS
BCDC	<ul style="list-style-type: none"> • Update BCDC's policies and regulations: As needed, to reflect new information and understanding regarding adaptation and to increase effectiveness of BCDC's programs. • Adapting to Rising Tides: Expand the program to the nine Bay Area counties. • Provide support through regulatory and planning work.
CCC	<ul style="list-style-type: none"> • CCC 2013-2018 Strategic Plan: Continue to develop policy guidance for addressing impacts of climate change, assess coastal resource vulnerabilities to guide development of priority coastal adaptation planning strategies, and reduce greenhouse gas emissions through support of smart growth, other mitigation measures, and public education. • LCP Local Assistance Grant program: Make an additional \$3 million in funds (in addition to the \$2 million already awarded) available to local governments to support LCP updates and sea-level rise vulnerability assessments. • <i>Sea Level Rise Policy Guidance</i>: Conduct ongoing outreach and coordination with partners to provide information and guidance through workshops, presentations to local governments, and educational materials. • NOAA-funded Project of Special Merit: CCC staff to develop policy guidance and model ordinance language for resilient shoreline residential developments in hazardous areas affected by sea-level rise. • Technical support for local adaptation: CCC staff to continue to work with local partners on vulnerability assessments as well as policy and ordinance development for adaptation. • Provide support through ongoing regulatory and planning work.



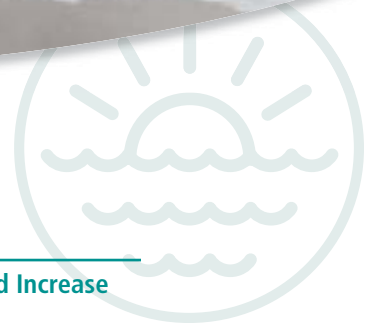
1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – C O N T I N U E D

AGENCY	ACTIONS
DPR	<ul style="list-style-type: none"> • Implement and improve upon policy and guidance: For evaluating potential impacts from sea-level rise related flooding or inundation on proposed projects. • Training: Consider and better anticipate increased emergency services related to climate-induced stressors in future training. • Restoration projects: Expand implementation of restoration projects in coastal park units. Collaborate on innovative shoreline management opportunities. • Sediment-related projects: Continue to undertake planning for and support projects that restore natural sources of sediment. Engage on additional coastal sediment management issues through Division of Boating and Waterways.
OPC	<ul style="list-style-type: none"> • <i>AB 2516: Track development actions.</i> • Shared vision of ocean and coastal health: With the OST, continue to bring together managers, scientists, tribal representatives and other groups to build a shared vision for ocean and coastal health and successful adaptation by addressing questions such as: <i>How will we know if our management actions are resulting in healthy ocean and coastal areas? What are concrete actions that agencies and researchers can take to reduce the impacts of OAH? How can we increase the climate resilience of our fisheries? How can we determine if we are successfully adapting to sea-level rise? How can we use marine protected areas as living laboratories to understand changing ocean conditions and to offer refuges from stressors?</i> • Further strengthen institutional partnerships: Enhance partnerships to cross boundaries and leverage resources through initiatives such as the State Coastal Leadership on Sea-level Rise, West Coast OAH Panel, Marine Protected Area Collaboratives and Partnership Plan, West Coast Governor’s Alliance on Ocean Health, and the emerging West Coast Ocean Partnership. • Convene groups to discuss priority issues: Identify lead agencies on cross-cutting issues, based on agency mandates, scientific information needed to support decision-making, and ways in which the state’s MPAs can be used to promote ocean and coastal health in the face of climate change.
SCC	<ul style="list-style-type: none"> • Continue to implement dozens of projects that support better management practices and capacity building. Areas of focus will continue to include promoting innovative design of new structure/infrastructure in areas vulnerable to sea-level rise, supporting pilot projects for innovative shoreline management, studying and investing in cost-effective green infrastructure, furthering progress toward a more integrated ecosystem approach, and continuing to develop the State Sediment Master Plan and sediment management. With Proposition 1 funding, the SCC expects to do more work on saltwater intrusion into groundwater.



1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – C O N T I N U E D

AGENCY	ACTIONS
SLC	<ul style="list-style-type: none"> • Improve SLC capacity to address sea-level rise: Expand the policy development, agency coordination, and outreach activities of the SLC Sea-level Rise Program. Explore new initiatives to address implementation gaps related to activities necessary to protect and enhance the public’s rights under the Public Trust Doctrine and associated Public Trust resources, avoid hazards, and anticipate/reduce climate-related emergencies on SLC land. New staff is needed in the legal, boundary, and science classifications in order to accomplish SLC resiliency goals and would help SLC address the legal implications involved in boundary changes between sovereign land and private upland, boundary dispute resolution, and updated leasing policies that incorporate climate change and sea-level rise adaptation. • Concrete implementation steps: Include addressing the increased incidences of coastal armoring to protect private property and participating in innovative solutions that consider both private and public property interests, as well as ecosystem protection (including the use of living shorelines and other green infrastructure); continuing to incorporate sea-level rise into staff’s analysis and recommendations (e.g., alternatives to reduce impacts) for new development projects; working with lessees to adapt existing and future facilities/structures to account for sea-level rise and increased storm events; and developing lease terms to protect the state from hazard liability associated with sea-level rise and increased storm events.
Cross-agency	<ul style="list-style-type: none"> • Strengthen existing coastal and ocean policy and legislation to promote adaptation and resilience: <ul style="list-style-type: none"> o Starting with prior efforts to do so, review existing legislation and policy pertinent to coastal and ocean areas to identify the components that support adaptation actions such as managed retreat and rolling easements, and the components that hinder it. In addition to considering coastal and ocean-specific legislation and policy, examine potential conflicts with legislation such as the federal Clean Water and Endangered Species Acts. o Upon completion of the review, convene a legal and policy clinic involving federal and state agencies, local governments, engineers, lawyers, and ecologists who can: <ul style="list-style-type: none"> • Contribute to a conversation about how to reinterpret/modify the existing legislative and policy framework to promote resilience; • Identify concrete policy and legislative opportunities to support improved capacity to address adaptation issues, integrate climate into relevant decision-making, and discourage maladaptation; and • Recommend options to create new funding mechanisms. o Evaluate the recommendations provided by the expert group, and look for opportunities to implement them, where appropriate, to strengthen adaptation and resilience. • Develop and distribute a California Environmental Quality Act checklist that facilitates application of state policy and technical guidance on sea-level rise.



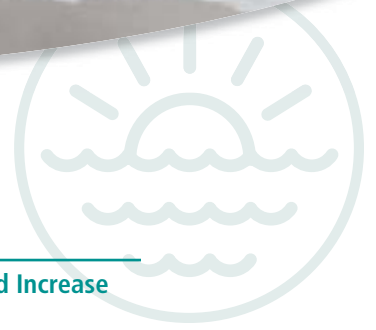
1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – CONTINUED

AGENCY	ACTIONS
Cross-agency (continued)	<ul style="list-style-type: none"> • Prioritize non-armoring solutions to erosion, storm events, and sea-level rise, including natural protective infrastructure, where feasible and appropriate, in existing and new development: <ul style="list-style-type: none"> o <i>Limit armoring</i> <ul style="list-style-type: none"> • Resolve conflicts in Coastal Act sections 30235 and 30253 to limit the availability of armoring. • Strengthen the SLC’s and CCC’s enforcement authorities and capacities to address unlawful armoring structures. • Clearly define a legitimate “sudden unexpected emergency,” limit the availability of emergency seawall permits to these instances, and improve mechanisms to force removal of emergency armoring structures in the absence of longer-term authorization. o <i>Prioritize non-armoring solutions</i> <ul style="list-style-type: none"> • Prepare a technical analysis (e.g., environmental and cost analysis), specifications, and guidance, for non-armoring approaches and their applicability to different shoreline types for use by project proponents in planning and designing projects. Convene regulators and identify options for streamlining permits for designs that meet regulatory criteria while promoting broader state coastal and ocean adaptation goals. • Provide funding to implementing agencies such as the SCC to incentivize construction of on-the-ground non-armoring solutions. • Ensure that public funding and government decision-making prioritize non-armoring solutions and do not increase the vulnerability of infrastructure or property. • Draft a clear, consistent statement on the State’s approach to protect and enhance the public’s rights under the Public Trust Doctrine as it relates to impacts from sea-level rise: The CCC and SLC, in collaboration with the other member agencies of the State Coastal Leadership Group on Sea-level Rise, to develop language clearly articulating the State’s approach to protect and enhance the public’s rights under the Public Trust Doctrine as it relates sea-level rise impacts. Share the language with other regulatory trustees, legislative trustee entities (e.g. ports), and state agencies so that they can insert it into their projects, programs, and grant documents, as appropriate. • Continue to allocate grant funding for disadvantaged coastal communities: Continue to provide funding to disadvantaged coastal communities through programs such as the Climate Ready and LCP grants. Use criteria from the U.S. Census Bureau’s American Community Survey or from the California Environmental Protection Agency’s Communities Environmental Health Screening Tool to determine qualifying disadvantaged communities. • Include adaptation co-benefits as a consideration for projects funded by cap-and-trade money: Work with the California Air Resources Board to define adaptation co-benefits, and develop criteria to promote consideration of defined adaptation co-benefits into projects supported by cap-and-trade funding.



1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – CONTINUED

AGENCY	ACTIONS
Cross-agency (continued)	<ul style="list-style-type: none"> • Integrate scientific advances into state planning and decision-making: The OPC, with the OST, to develop and implement a broader process for incorporating advances in climate change science into updates of the State’s sea-level rise guidance, based on an assessment of state agencies’ and local governments’ use of the existing guidance. Work with the Technical Advisory Group established by the OPR to identify opportunities to inform the development of guidance for other climate change variables and support implementation of Executive Order B-30-15. • Promote the integration of natural resource and community issues: Apply the technical analysis, specifications, and guidance developed for non-armoring approaches to plan and design pilot projects that support integration of the natural and built environments in adaptation planning (e.g., restoring wetlands’ functions also to strengthen their capacity to buffer against climate change). Use the results of the pilot projects (e.g., integrating the update to the Baylands Ecosystem Habitat Goals with regional and local land use planning efforts) and case studies to illustrate where, when, and how to integrate natural resource and community issues. • Complete and update the State’s regional sediment management plans: Draft coordinated regional sediment plans to provide for sediment to increase resilience of coastal habitats, such as reconnecting sediments from watersheds to feed downstream wetlands and littoral systems, and facilitating the effective use of dredged material from navigation projects in tidelands restoration. • Develop state agency adaptation plans to support a shared vision of coastal and ocean health: Based on vulnerability assessments, create agency-specific adaptation plans to identify actions that can be taken to address aspects of agencies’ programs that are vulnerable to climate change stressors and to build adaptive capacity. Include description of actions to incorporate climate policies such as Executive Order B-30-15 into all relevant agency decision-making. • Obtain funding to support critical work planning for the impacts of sea-level rise and climate change: Identify agency priorities, needed actions to build agency capacity, including allocating staff time to coordinate on adaptation and resilience issues, and required funding. Make the case to the legislature for funding, and apply for federal grants for related projects. • Integrate adaptation considerations into agencies’ funding guidelines, project selection criteria, and review processes: Develop a shared understanding across state coastal agencies of metrics and prioritized adaptation measures that support broader goals for coastal and ocean health. Identify key state agency funding decisions (e.g., Water Board, Department of Water Resources’ Integrated Regional Water Management program, Department of Transportation) in which sea-level rise considerations are not fully integrated, and work with the relevant agencies to incorporate state policy and technical guidance on sea-level rise and other climate impacts.



1. Improve Management Practices for Coastal and Ocean Ecosystems and Resources, and Increase Capacity to Withstand and Recover from Climate Impacts – C O N T I N U E D

AGENCY	ACTIONS
Cross-agency (continued)	<ul style="list-style-type: none"> • Strengthen local planning mechanisms to require science-based planning for sea-level rise and implementation of established plans in ways that protect public access and natural resources: <ul style="list-style-type: none"> o Ensure that local governments, including port districts, have access to planning and implementation funds. o Reinforce the CCC’s adopted Sea Level Rise Policy Guidance. o Support the adoption of standardized erosion rate and setback distance calculations to address changes anticipated to result from sea-level rise. o Prepare regional adaptation strategies, where appropriate, to integrate adaptation planning across jurisdictions, using a collaborative approach involving local, regional, and state entities. o Identify critical areas of habitat at risk along the coast and areas needed to allow them to migrate as seas rise. Prioritize funding to acquire and preserve them. • Reduce coastal flooding: Provide funding to implement “no regrets” projects that will reduce the impacts of flooding associated with future sea-level rise. • Develop steady funding to pay for sea-level rise adaptation by the state. • Pursue non-armoring responses to sea-level rise and related hazards for public-owned lands: Include options such as relocating public development (e.g., buildings, parking areas, roadways, utilities), rather than spending taxpayer money to temporarily protect structures in hazardous areas. • Apply an equity lens to coastal and ocean climate change adaptation activities: Develop guidelines to help state agencies and localities evaluate the impacts of adaptation to ensure that disadvantaged communities do not disproportionately bear the costs of adaptation. • Build adaptation knowledge base: Develop criteria for tracking projects (in different types of locales and ecosystems, under different timeframes, for different types of actions) and summarize lessons learned to start to develop a collective body of knowledge. This will allow for a targeted use of limited resources to capture lessons learned.

2. Better Understand Evolving Trends that May Impact Ocean and Coastal Ecosystems and Resources

AGENCY	ACTIONS
SCC	<ul style="list-style-type: none"> • Work with the Federal Emergency Management Agency and local partners to collect beach profile data and high-water mark data in the winter storm season.
SLC	<ul style="list-style-type: none"> • Expand the Marine Renewable Energy Working Group by supporting the addition of federal staff (Bureau of Ocean Energy Management) via a formal Task Force request, which would help fulfill the recommendation related to the <i>Impacts and Opportunities of Renewable Energy Development in Safeguarding California</i>.



3. Better Understand Climate Impacts on Ocean and Coastal Ecosystems and Resources

AGENCY	ACTIONS
BCDC	<ul style="list-style-type: none"> • Adapting to Rising Tides: Nine County Assessment. • 50th Anniversary Celebration.
DPR	<ul style="list-style-type: none"> • Study on the vulnerability of DPR’s coastal resources: Initiate an examination of DPR’s natural and cultural resources’ projected exposure to sea-level rise-related flooding and inundation. This study will be a crucial step towards developing a departmental strategy for addressing sea-level rise impacts.
OPC	<ul style="list-style-type: none"> • Create an approach for integrating scientific advances into state planning and decision-making: <ul style="list-style-type: none"> o Develop process and criteria for updating sea-level rise guidance and for integrating scientific advances on sea-level rise into planning and decision-making. o Develop and implement outreach, communications, and capacity-building strategy, based on the results of a needs assessment, to facilitate use of the revised guidance by state agencies and their partners and to communicate the updating process. Produce and disseminate materials. o Convene a working group for the OPC Science Advisory Team and relevant state agencies to discuss state priorities for future sea-level rise research. The working group will meet annually to set priorities.
SCC	<ul style="list-style-type: none"> • Southern California Wetlands Recovery Project Regional Strategy: Lead update of the Regional Strategy to consider climate change. • Coastal wetlands: Identify vulnerability of coastal wetlands and priority upland transition sites. • California Coastal and Estuarine Land Conservation Program Plan: Update to address climate impacts. Continue to support vulnerability assessments and economic analyses in coastal communities around the state and San Francisco Bay Area.
SLC	<ul style="list-style-type: none"> • Identification and mapping of coastal infrastructure and vulnerable sites: Identify and map existing infrastructure and impediments to coastal access. Identify historically contaminated sites or current industrial sites that could be vulnerable to inundation and develop response plans. • Additional staff: Needed to assist local trustees of granted lands in assessing the impacts of sea-level rise on their granted public trust lands, as required by AB 691. • Capacity to analyze potential sea-level rise impacts: Improve capacity to use integrated spatial tools for planning, risk management analysis, and internal and external communication/education. • Interactive sea-level rise mapping and analysis platform: Participate in developing a platform that can be shared across agencies, applicants, grantees, and others, and which would contribute to all four of the broad <i>Safeguarding California</i> Ocean and Coastal Ecosystems and Resources recommendations.



3. Better Understand Climate Impacts on Ocean and Coastal Ecosystems and Resources – CONTINUED

AGENCY	ACTIONS
Cross-agency	<ul style="list-style-type: none"> • Conduct “quick and dirty” assessments to evaluate vulnerability of agencies’ coastal assets: Using available tools and resources, conduct preliminary assessments of the vulnerability of agencies’ coastal infrastructure assets to storms and sea-level rise. The results of the preliminary assessments can be used to determine where additional detailed vulnerability and risk assessments are needed to inform further action. Where detailed assessments are deemed unnecessary due to limited exposure and/or sensitivity to climate risks, develop monitoring plans for the assets. For high-risk assets, detailed assessments are to be used to identify appropriate adaptation actions. Where relevant, link to disaster risk-reduction efforts. • Assess vulnerability of future coastal public access to rising sea levels: Conduct a vulnerability assessment of coastal public access to increasing sea levels in 2025, 2050, and 2100. The goal is to have a shared understanding of what may be compromised or lost due to sea-level rise and to identify actions that need to be taken to maintain and/or improve public access. Ensure that all projects that include public access provide for its resilience to increasing sea levels. Prepare regional strategies that assess and plan for resilience of public access to rising sea levels.

4. Share Information and Educate

AGENCY	ACTIONS
BCDC	<ul style="list-style-type: none"> • Adapting to Rising Tides: Nine County Assessment and Help Desk. • 50th Anniversary Celebration.
CCC	<ul style="list-style-type: none"> • Develop culturally and linguistically relevant educational materials for diverse populations (e.g., vulnerable communities, school-age children, business, and labor): Use best practices in climate change education to promote an understanding of the risks associated with climate change.
SCC	<ul style="list-style-type: none"> • Southern California Wetlands Recovery Project Regional Strategy: Update to consider climate change. • Baylands Ecosystem Habitat Goals Update: Communicate findings and recommendations to stakeholders and decision makers • Vulnerability assessments and economic analyses: Continue to support sharing of results with stakeholders around the state. • Beach profile information: Support data collection at selected locations.



4. Share Information and Educate – C O N T I N U E D

AGENCY	ACTIONS
Cross-agency	<ul style="list-style-type: none"> <p>• Support existing staff and technical expertise, and provide additional staff resources within the coastal zone management program to build durable capacity: Provide funding to maintain highly trained and experienced staff at the state coastal agencies to continue to provide on-the-ground support, and serve as regional specialists on advisory committees. Provide additional staff to state coastal agencies, as needed, to work with project/permit applicants, grant recipients, and local governments to increase their capacity for adaptation planning, such as through the Help Desk that BCDC’s ART program provides for local governments.</p> <p>• Create a framework for thinking through trade-offs involved in adaptation decisions: Develop and disseminate an actionable, flexible framework to help state agencies consider trade-offs involved in adaptation decisions to inform selection and prioritization of adaptations.</p> <p>• Compile and collaboratively identify and implement management actions to respond to climate change in coastal and marine areas, including parks, reserves, and protected areas: Bring together state coastal agencies (e.g., OPC, SCC, and DPR) to identify pilot projects and implement green solutions at State Parks and other protected areas. Based on results of pilot projects and other implementation efforts, identify criteria to help planners and managers evaluate and prioritize adaptation measures.</p> <p>• Fund the development of guidelines to inform regional and local use of sea-level rise data and information – Support preparation of guidelines to help regional and local planners and decision-makers navigate the differences between available sea-level rise guidance and downscaling products, understand the general impacts predicted by these products, and appropriately frame requests to technical experts to ensure receipt of needed inputs.</p> <p>• Improve state agency websites to incorporate the latest recommendations on climate communications.</p> <p>• Improve the availability of relevant data, guidance, and technical resources related to armoring.</p> <ul style="list-style-type: none"> o Compile comprehensive statewide data and information regarding the use, locations, and consequences of armoring. o Support the development of legal guidance that helps state and local entities comply with constitutional requirements and avoid “takings” liability when they promote non-armoring responses to sea-level rise and related coastal hazards. o Support consistent statewide monitoring of armoring impacts. o Support the development of standard methodologies for calculating impacts and identifying mitigation measures that account for the full value of impacts caused by armoring, including impacts to neighboring properties. o Support pilot projects that demonstrate the feasibility and value of non-armoring solutions at the community scale.



APPENDIX E. DRAFT SCC INDICATORS FOR PLANNING PROJECTS – VULNERABILITY ASSESSMENT AND ADAPTATION PLANNING

INDICATORS: PLANNING PROJECTS - VULNERABILITY ASSESSMENTS		
Logic Level	Result (goal, outcome, output)	Indicators
Goal: SCC Strategic Plan	Strategic Plan, Goal 7: Resilience of coastal communities and ecosystems to the impacts of climate change enhanced	Objective 7A: (Whether or not) Significant climate-related threats, management challenges, and priority technical assistance needed (to maintain resilient coastal communities and natural resources) identified.
		Objective 7B: (Whether or not) Vulnerability assessments conducted and adaptation plans and strategies developed (that address threats to coastal communities and public infrastructure in ways that protect natural resources and provide maximum public benefits).
		Objective 7C: (Whether or not) Vulnerability assessments of uplands and waterways conducted, and adaptation plans developed, (that address impacts to natural resources, biodiversity, and critical habitat).
		Objective 7F: (Whether or not) Projects that reduce GHG emissions (by increasing carbon sequestration or supporting land uses that reduce energy consumption including vehicle miles traveled) implemented.
Goal: SCC Strategic Plan	Strategic Plan, Goal 1: Develop the California Coastal Trail as a major recreational amenity, tourist attraction, and alternative transportation system	Objective 1F: Improve [planning for] accessibility for people with disabilities [and disadvantaged communities].
Goal: SCC Strategic Plan	Strategic Plan, Goal 9: Expand environmental education efforts to improve public understanding, use, and stewardship of coastal resources	Objective 7F [Plan to] Implement projects that reduce greenhouse gases by increasing carbon sequestration, or by supporting land uses that reduce energy consumption including vehicle miles traveled.
Outcome	Follow-up action taken	Whether or not follow-up action taken, and descriptive details of what that follow-up action was.
Outcome	Economic risk reduction achieved	# (Amount) in \$ of the portion of the economy that was/will be at risk, but is now/will be protected, by this project.



APPENDIX E. DRAFT SCC INDICATORS FOR PLANNING PROJECTS – VULNERABILITY ASSESSMENT AND ADAPTATION PLANNING – CONTINUED

INDICATORS: PLANNING PROJECTS - VULNERABILITY ASSESSMENTS		
Logic Level	Result (goal, outcome, output)	Indicators
Output	Key issues addressed	# of key issues addressed through project. Key issues include: Agriculture, Greenhouse gas reduction/mitigation, sea-level rise, wildlife corridors, carbon sequestration, green infrastructure (e.g. living shorelines), saltwater intrusion, fire intensity, restoration, water recharge, sediment management, protection of land, protection of open space, conservation/restoration/enhancement of habitats, trail development, invasive species management, riparian protection/enhancement/restoration, and adaptive management.
Output	Key decision-makers participated and informed	# of key decision-makers participating and informed (through project)
Output	Community members reached	# of people reached through project, disaggregated by age (children vs. adults) and income (advantaged vs. disadvantaged communities)
Output	Data is accessible to the public	Whether or not data made available
Output	Facilities constructed	# of facilities constructed
Output	Educational seminars held	# of educational seminars held
Output	Sites addressed	# of sites addressed through project
Output	Greenhouse gas strategies developed	Whether or not greenhouse gas reduction strategies developed
Output	Vulnerability assessments completed	Whether or not vulnerability assessments completed
Output	Adaptation plans/ strategies developed	Whether or not adaptation plans/strategies developed



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