

Cal Poly Humboldt

## Digital Commons @ Cal Poly Humboldt

---

State & Federal Reports and Publications

Cal Poly Humboldt Sea Level Rise Initiative

---

5-2021

### California State Parks Sea Level Rise Adaptation Strategy

The California Department of Parks and Recreation

Follow this and additional works at: [https://digitalcommons.humboldt.edu/hsuslri\\_state](https://digitalcommons.humboldt.edu/hsuslri_state)

---



# SEA LEVEL RISE ADAPTATION STRATEGY

## **CALIFORNIA STATE PARKS**







## FOREWORD

### California State Parks Sea Level Rise Adaptation Strategy



COASTAL CALIFORNIA POPPY

The exceptional coastal state parks that provide public access to California's iconic coast are cherished destinations for Californians and visitors from around the world. Unfortunately, these coastal parks are not immune from the growing impacts of climate change. As landowner of nearly a quarter of the California shoreline, the California Department of Parks and Recreation (State Parks) is already seeing coastal flooding and erosion impacting coastal parks.

As sea levels continue to rise, these impacts are only expected to increase unless concerted action is taken to improve the resilience of the coast. In response to rising seas, an internal and multidisciplinary working group from State Parks developed this Sea Level Rise Adaptation Strategy (Strategy) to provide the framework and the decision support tools needed to improve the resilience of coastal units of the State Park System. The Strategy builds off the State of California's aligned policies to address sea level rise, including the Ocean Protection Council's Sea Level Rise Guidance, the State of California Sea Level Rise Principles, and other important studies, policies and guidance from Gavin Newsom and former administrations.

The Strategy lays out a comprehensive roadmap to build a rapid and agile response to sea level rise. Some of the actions identified in the Strategy are already being implemented, while others will be prioritized over the upcoming years, pending funding availability, partnerships, and additional organizational capacity. Lessons learned in real time, new emerging science, and any new policies and guidance will be incorporated along the way to build an evolving and iterative response to sea level rise. State Parks leadership recognizes that implementation of the Strategy will be a costly initiative that will require funding over several decades. As such, the department welcomes creative partnerships and public engagement to help make sea level rise adaptation goals a reality.

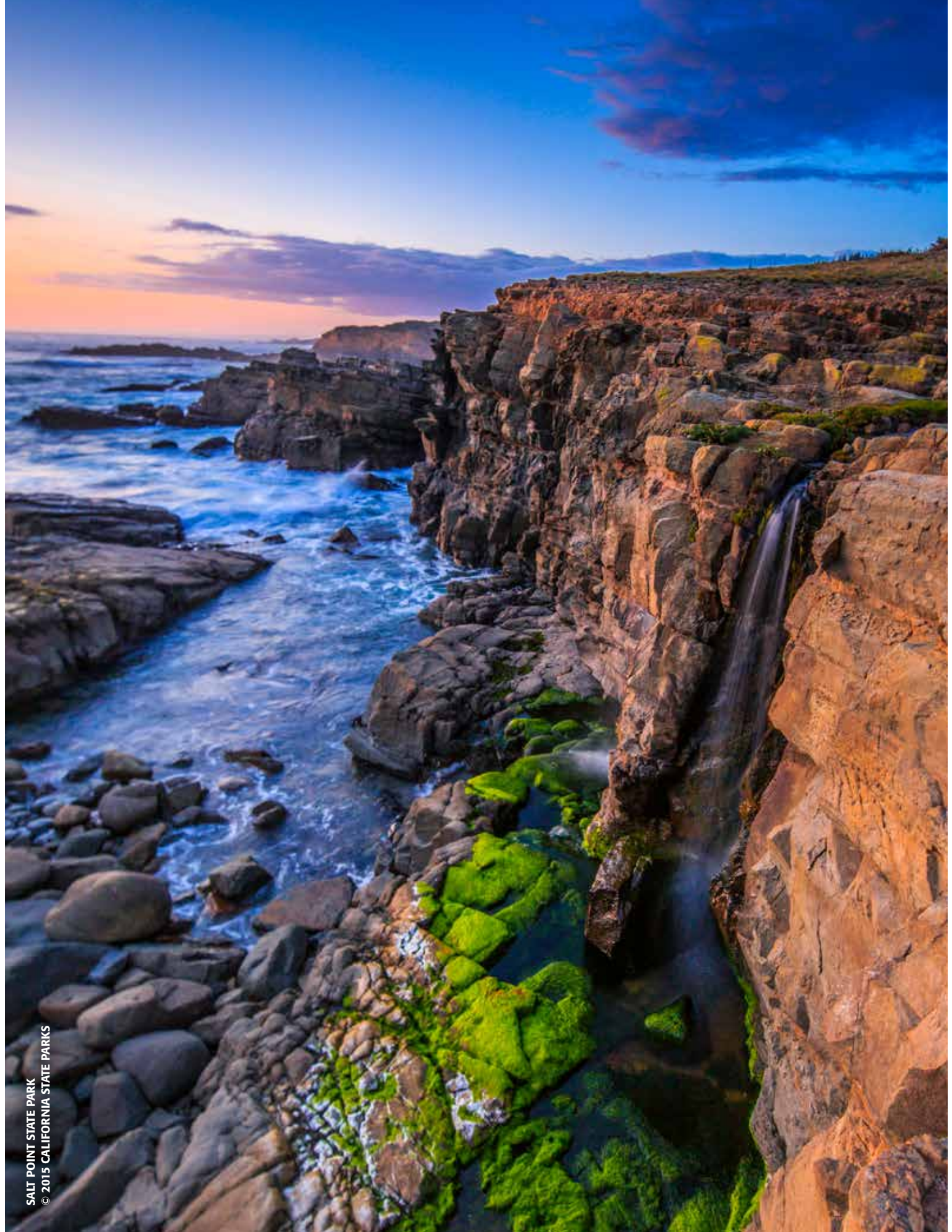
State Parks' role on the coast is to provide access and recreational opportunities while protecting the invaluable natural and cultural resources that have inspired Californians for decades. The department also embraces the responsibility to hold these lands in trust for future generations, and the opportunity to be a leader on sea level rise resilience in California. It is our resolve to protect California's treasures and ensure continuing, equitable access to the coast. We cannot do this alone and hope you will support us on this journey.

Sincerely,

A handwritten signature in blue ink that reads "Armando Quintero". The signature is fluid and cursive.

Armando Quintero  
Director, California Department of Parks and Recreation





## CONTENTS

### **4 INTRODUCTION**

- 4 The Coast and California State Parks
- 4 Sea Level Rise
- 5 California's Aligned Response to Sea Level Rise
- 7 State Parks' Response: A New Strategy

### **9 STRATEGIC DIRECTION**

- 9 Guiding Principles
- 14 Tools to Support Projects and Plans

### **16 ADAPTIVE MANAGEMENT**

### **17 CONCLUSION**



CALIFORNIA SEA LION



# INTRODUCTION



GRAY WHALE COVE STATE BEACH  
© 2010 CALIFORNIA STATE PARKS

## CALIFORNIA'S COAST

California's coast is commonly viewed as one of the most scenic destinations in the world. Comprised of sprawling sandy beaches, rugged rocky shores, towering earthen cliffs, and dynamic estuaries and lagoons, California's coastline boasts a diverse set of landscapes and habitats. These varied habitats sustain extraordinary biological diversity, including numerous threatened and endangered species. California's unique cultural history is also preserved in coastal landmarks, including areas of tribal significance, shipwrecks, Spanish-era missions, and historical centers for immigration and civil rights. The cultural landscape of California's coast is central to the identity of many Californians and can provide insight into local knowledge, skills, and technologies. The California coast is also a source of outstanding recreational opportunity. For some the coast is a place to find adventure, and for others it is a place for solitude, inspiration, and wonderment. Regardless of what the coast represents, to most it is an irreplaceable resource that should be managed for the benefit of present and future generations.

## The Coast and California State Parks

State Parks manages land in trust for the people of California.<sup>1</sup> Nearly one quarter of the California coastline is managed by State Parks — with 111 oceanfront park units and an additional 17 park units within the coastal zone, totaling 128 coastal units.<sup>2</sup> State Parks' coastal units provide coastal access and recreational opportunities to more than 50 million people each year.<sup>3</sup> Coastal park units protect some of the state's most valued natural and cultural resources while providing world-renowned opportunities for high-quality outdoor recreation. They offer more than 5,700 campsites; 1,700 picnic sites; 550 restrooms; and 300 parking lots that provide access for visitors from California and all over the world.<sup>4</sup>

As the manager of significant coastal resources, State Parks has an obligation and an opportunity to provide leadership in coastal land management over the coming decades. The department will maintain a broad, forward-thinking perspective that considers multiple viewpoints, while preparing for the inevitable impacts of coming centuries of sea level rise currently predicted by scientific models.

## Sea Level Rise

Warming seas and rapidly melting ice sheets are causing sea levels to rise. In 2017, the California Ocean Protection Council's Science Advisory Team synthesized the state of sea level rise science in its "Rising Seas in California: An Update on Sea-level Rise Science" report. According to the report, the current rate of global sea level rise has accelerated to approximately 3.4 mm per year — twice the rate of the 20th century and greater than any rate over the past thousand years. By the year 2100, California is projected to experience 1 to 7 feet of sea level rise, depending on future rates of global emissions. Within the same period, melting ice off the West Antarctic ice sheet could cause extreme sea levels along the California coast — a high of 10 feet or more of potential sea level rise.

Sea level rise threatens to alter the character of the coastline as habitats and infrastructure become inundated or forced to squeeze between rising seas and existing development. While long-term sea levels will certainly have a substantial impact on our coast, episodic processes such as El Niño Southern Oscillation, king tides, seasonal cycles, and winter storms already cause significant social, environmental, and economic impacts. Presently, much of California's infrastructure that supports its coastal economy, including coastal park units, lies within mere feet of high tide.

<sup>1</sup> Title 14, California Code of Regulations, Section 15386

<sup>2</sup> Coastal zone, defined as the regulatory boundaries of the California Coastal Commission and Bay Conservation and Development Commission

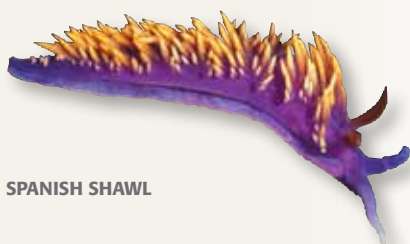
<sup>3</sup> California Department of Parks and Recreation. 2019. California State Park System Statistical Report: 2016/17 Fiscal Year

<sup>4</sup> California Department of Parks and Recreation; California State Coastal Conservancy. 2017. Draft Report: Sea Level Rise Assessment for Existing Facilities.



## CALIFORNIA'S CLIMATE ADAPTATION STRATEGY

Building on California's previous climate adaptation strategies, the "Safeguarding California Plan: 2018 Update" provides a road map of actions the state government should take to address the impacts of climate change presently and into the future. The Plan describes a series of ongoing actions and next steps required to achieve the state's climate change goals — organized by recommended actions across 11 sector-specific policy areas. Several chapters (Ocean and Coast, Parks, Recreation, and California Culture, Emergency Management, and Biodiversity and Habitat) contain actions on how State Parks can address accelerating sea level rise.



SPANISH SHAWL

Projections indicate that 600,000 people and \$150 billion (2010 dollars) in California coastal property may be affected by sea level rise by the end of the century.<sup>5</sup> For State Parks, preliminary modeling indicates 5 feet of sea level rise and a 100-year storm would result in the inundation of 593 structures, 150 acres of parking lots, 93 campgrounds and day-use areas, and 65 miles of access roads<sup>6</sup> — without considering underground infrastructure, bluff erosion, and archaeological losses. Sea level rise may be disastrous to California and coastal park units if no further action is taken to plan, prepare, and respond to this emerging threat.

## California's Aligned Response to Sea Level Rise

Since 2006, California has been recognized as a global leader on climate change mitigation,<sup>7</sup> as successive Governors worked with Legislative leaders to craft and implement measures to curb greenhouse gas emissions. Knowing the state's mitigation efforts, coupled with others' efforts around the world, would slow but not stop long-term climate impacts, California leaders called for a statewide, coordinated strategy to guide California's adaptation actions. Through a Climate Adaptation Strategy that is currently in its second edition, California is equipped to demonstrate bold leadership on climate change adaptation.<sup>8</sup> During the Gavin Newsom Administration, the State of California has continued its leadership in sea level rise adaptation and other climate change policies and mitigation. Others, including the Legislative Analyst's Office, have described the threat of extensive and expensive sea level rise impacts facing California. In two recent reports, the LAO has stressed the importance of early planning to provide opportunities to test new approaches and to reduce the dramatically higher costs of delayed, extreme responses to sea level rise.<sup>9, 10</sup>

In late 2020, state agencies with coastal and bay climate resilience<sup>11</sup> responsibilities adopted a set of principles to further inform California's adaptation actions in response to sea level rise. (see box on page 6) As part of these principles, state agencies, including State Parks, committed to the goal of preparing for 3.5 feet of sea level rise by the year 2050. These principles will also align state actions on sea level rise adaptation, enhancing the climate resiliency of our coastal ecosystems and communities. Consistent and efficient decision-making stemming from aligned state actions will allow time to test and leverage needed solutions, and prevent unforeseen impacts to California's coast.

<sup>5</sup> Barnard, P.L., Erikson, L.H., Foxgrover, A.C., Finzi Hart, J.A., Limber, P., O'Neil, A.C., van Ormondt, M., Wood, N., Hayden, M.K., and J.M. Jones. 2019. Dynamic flood modeling essential to assess the coastal impacts of climate change. Scientific reports, 9:4309.

<sup>6</sup> California Department of Parks and Recreation; California State Coastal Conservancy. 2017. Draft Report: Sea Level Rise Assessment for Existing Facilities.

<sup>7</sup> Climate change mitigation is the action of reducing the severity of the causes of climate change.

<sup>8</sup> Climate change adaptation is the action of reducing vulnerability to the impacts of climate change.

<sup>9</sup> Petek, G., 2019. Preparing for Rising Seas: How the State Can Help Support Local Coastal Adaptation Efforts.

<sup>10</sup> Petek, G., 2020. What Threat Does Sea-Level Rise Pose to California?

<sup>11</sup> Climate resilience is the capacity to recover quickly from the impacts of climate change.



In late 2020, Governor Gavin Newsom issued executive orders on climate change adaptation and mitigation. The two orders respectively outlined ambitious passenger vehicle emission targets<sup>12</sup> and set goals to conserve 30% of state land and coastal waters by 2030 to build climate resilience and promote biodiversity conservation.<sup>13</sup>

Governor Newsom signed legislation in September 2020 requiring the development and update of a California Climate Change Assessment every five years.<sup>14</sup> The assessment will identify how climate change affects California’s natural systems, the potential fiscal and economic impacts of those effects, and examples of best practices for planning.



LEAST TERN

**CALIFORNIA’S SEA LEVEL RISE PRINCIPLES**

In 2020 Secretary Wade Crowfoot (California Natural Resources Agency) and Secretary Jared Blumenfeld (California Environmental Protection Agency) convened a group of 17 state agencies to co-develop and endorse the following set of Sea Level Rise Principles for use in planning, policy setting, project development, and decision-making. State Parks participated in the development of the principles and fully endorses their implementation:

- 1 DEVELOP AND UTILIZE BEST AVAILABLE SCIENCE.
- 2 BUILD COASTAL RESILIENCE PARTNERSHIPS.
- 3 IMPROVE COASTAL RESILIENCE COMMUNICATIONS.
- 4 SUPPORT LOCAL LEADERSHIP AND ADDRESS LOCAL CONDITIONS.
- 5 STRENGTHEN ALIGNMENT AROUND COASTAL RESILIENCE.
- 6 IMPLEMENT AND LEARN FROM COASTAL RESILIENCE PROJECTS.
- 7 INTEGRATE AND PRIORITIZE EQUITY AND SOCIAL JUSTICE.



PINK SAND VERBENA



HEARST SAN SIMEON STATE PARK  
© 2013 CALIFORNIA STATE PARKS

<sup>12</sup> Executive Order N-79-20 signed on September 23, 2020  
<sup>13</sup> Executive Order N-82-20 signed on October 7, 2020  
<sup>14</sup> Senate Bill 1320 (Stern) signed on September 24, 2020

## State Parks' Response: A New Strategy

With nearly one half of the State Park System in the coastal zone, State Parks recognizes sea level rise as a threat to resources, public access, and the ability to carry out its mission. Many coastal units are already experiencing the impacts of flooding and erosion and all are at increasing risk. In recent years, State Parks has adopted requirements that new projects consider the impacts of sea level rise, and has implemented a small number of adaptation projects. These efforts laid the groundwork for building coastal resilience.

While these existing policies have encouraged consideration of sea level rise impacts in projects and planning, a more comprehensive approach that includes lessons learned and rapidly evolving science and policy is essential to respond to sea level rise. Consistent with its mission, State Parks has developed this Strategy to prepare for and respond to sea level rise. The Strategy seeks to efficiently integrate sea level rise into existing operational processes and to better equip State Parks staff to preserve resources and access within coastal park units. As a result of implementing this Strategy, State Parks will be able to continue to provide high-quality recreational opportunities for the people of California and its visitors.



**BEACH MORNING GLORY**  
© LEAH GARDNER



### STATE PARKS' MISSION

To provide for the health, inspiration and education of the people of California by helping preserve the state's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation.





SAN ONOFRE STATE BEACH

## STRATEGIC DIRECTION

State Parks aims to address the challenge of rising seas using a proactive approach consistent with existing operational procedures and aligned with the latest statewide policy and science. This approach uses principles to guide all of State Parks' future endeavors related to sea level rise; these principles are cross-functional and serve to align actions internally. The approach also promotes increased integration of multidisciplinary objectives during project and plan development, as well as the development of decision support tools to assist staff in building best practices into future operations at coastal park units.

### Guiding Principles

At the core of this Strategy is a series of six principles designed to guide State Parks' response to sea level rise. All activities within state parks that are impacted by – or serve to adapt to – sea level rise should align with these principles. Each principle is listed below followed by a description of how it will be implemented.



#### PRINCIPLE 1

**State Parks will integrate sea level rise adaptation into coastal projects, plans, and funding decisions.**

Projects and plans are two primary pathways to carrying out work in state park units. To ensure that sea level rise is integrated into these processes, State Parks will adopt updated internal decision-making policies that set requirements for incorporating sea level rise into projects and plans at coastal park units. Projects with an identified nexus to sea level rise will be prioritized, and plans at coastal units will be updated or developed to address sea level rise, erosion, and coastal flooding. Projects and plans will be informed by statewide sea level rise policies and approaches, as well as by the latest emerging science. Sea level rise vulnerability assessments will need to be completed to inform these decisions, as well as adaptive management approaches.



DUNGENESS CRAB



## BUILDING COASTAL RESILIENCE

In response to sea level rise, erosion, and flooding, State Parks has invested in resilience projects and planning documents prior to the development of this Strategy. Below are a few examples of projects and plans at coastal park units that have contributed to coastal resilience of the overall State Park System.



### SAN ONOFRE STATE BEACH

#### *Building managed retreat into project planning.*

San Onofre State Beach has faced severe ongoing shoreline erosion, jeopardizing the park's shorefront amenities. In response to these challenges, State Parks proposed a long-term hazard management plan to adaptively manage the unit over time. The plan preserves public access as long as possible, while planning for eventual retreat and new public access in the future.



### CARDIFF STATE BEACH

#### *Testing innovative shoreline stabilization techniques.*

Cardiff State Beach is backed by Highway 101, which has been flooded and damaged on numerous occasions by extreme wave events and high tides. Through a collaborative effort, a living shoreline was constructed and revegetated to protect the highway. Now that the project is complete, monitoring will measure the performance of the living shoreline as a protective barrier for the highway and to evaluate the ecosystem health of the newly created dune habitat.



### PIGEON POINT LIGHT STATION STATE HISTORIC PARK

#### *Planning for future bluff erosion at a historical site.*

Finalized in June 2017, the general plan for Pigeon Point Light Station State Historic Park identifies sea level rise as a key issue for management of the park unit into the future. The general plan discusses how sea level rise will cause accelerated erosion along the bluffs and beach areas and incorporated these projections into detailed site planning, retreat and new public access in the future.



### WILDER RANCH STATE PARK

#### *Stabilizing cultural resources using native plantings.*

At Wilder Ranch State Park, a large shell mound from ancestral California Native Americans dating back nearly 7,200 years has cultural importance and is a critical resource to better understand previous climate regimes. The site was experiencing increased erosion on its seaward side due to more exposure and public visitation. In collaboration with the Amah Mutsun Tribe and archaeological researchers, the site was stabilized and native vegetation was reestablished.



SAND DOLLAR

## BUILDING COASTAL RESILIENCE (Continued)



### MACKERRICHER STATE PARK

#### *Removing derelict infrastructure and restoring habitats.*

A haul road built in the 1940s originally provided a direct route across the dune system at MacKerricher State Park from nearby timberlands to the mills. State Parks removed the haul road to improve the natural functioning of the dune system, restore flow to two coastal creeks, expand habitats for listed plants and bird species, and improve coastal resilience.



### POINT LOBOS STATE NATURAL RESERVE

#### *Educating visitors about impacts and solutions.*

State Parks uses interpretive panels to engage and educate visitors at park units. At Point Lobos State Natural Reserve, an interpretive panel explains how climate change and sea level rise are affecting parks in unprecedented ways and describes actions State Parks is taking to reduce its impacts. Many interpretive panels can be found throughout the State Park System, including similar panels on climate change issues.



### CARPINTERIA STATE BEACH

#### *Retreating and redesigning infrastructure.*

A coastal dune trail at Carpinteria State Beach was affected by sea level rise and erosion, and was often covered with shifting sands. The original trail was moved inland to reduce further damage to the trail and to increase the pathway's resilience to sea level rise. The new boardwalk was also elevated to allow natural dune formation processes to continue without interference from the trail, further increasing the site's resilience to sea level rise.



### MALIBU LAGOON STATE BEACH

#### *Using soft armoring to protect cultural resources.*

The Adamson House Estate and ethnohistoric Chumash village of Humaliwo, both located at the mouth of Malibu Creek, are threatened by coastal wave erosion and Malibu Lagoon breaching. This combination of forces resulted in the displacement of a historic beach changing room structure and erosion of archaeological deposits in April 2019. A soft approach is being designed to place natural cobble armoring in front of the cultural resources to stabilize these resources.



SEA STAR





## PRINCIPLE 2

**State Parks will translate best available science into practicable, long-term solutions.**

Sea level rise science is continually evolving as the atmospheric and oceanographic processes that contribute to sea level rise become better understood, projections are updated, and potential impacts become clearer. State Parks will contribute to science by continuing to fund research related to sea level rise, erosion, and coastal flooding. Literature reviews on sea level rise science will also be conducted to inform State Parks' management and operational decisions. In alignment with other state agencies and partners, State Parks staff will translate and integrate science into management solutions, such as innovative designs for coastal infrastructure, novel restoration techniques for natural and cultural resources, and the development of adaptation pathways.



**WESTERN SNOWY PLOVER**  
© SANDRINE BIZIAUX-SCHERSON



## PRINCIPLE 3

**State Parks will work collaboratively with local, state, and federal agencies; nonprofit partners; community organizations; and California Native American Tribes to create and sustain an aligned response to sea level rise.**

There are many sharing the California coastline with State Parks, including other state agencies, organizations, businesses, homeowners, visitors to the coast, and more. Consistent with its mission and principles, State Parks will work to align its local responses to sea level rise with its neighbors and partners. Collaboration will involve the department's participation in statewide efforts, as well as developing and leveraging coastal partnerships to align local responses where possible. State Parks will look for opportunities to participate in regional and ecosystem-level restoration projects to conserve at-risk resources and promote resilience. The department will also work together with California Native American Tribes to inform cultural and natural resource management and better restore and manage resilient landscapes affected by sea level rise.



## PRINCIPLE 4

**State Parks will work to balance the need for coastal access while protecting recreational, natural, and cultural resources in a holistic response to sea level rise.**

As described earlier, State Parks' mission involves protecting California's natural and cultural resources, while also providing opportunity for high-quality outdoor recreation. The department will work to find balance between these often-competing aspects of the State Parks mission and support continued access to the California coastline. Planning should also include consideration of strategic acquisitions that protect coastal lands and promote resilient natural processes. As coastal park units are impacted by sea level rise, State Parks will assess and plan for continued public access, which could also include the relocation, retrofit, or removal of current

access points and recreational areas to support future access to the coast. Sea level rise, erosion, and coastal flooding will be evaluated prior to the placement of new visitor-serving facilities, as well as the maintenance of existing facilities. Nature-based green infrastructure that conserves natural processes, resilient infrastructure that accommodates sea level rise, and managed retreat — where necessary — will generally be preferred alternatives to hard armoring in the long-term management of coastal park units.



#### **PRINCIPLE 5**

**State Parks will align its approach with Coastal Act provisions to improve the coastal permitting and compliance process.**

State Parks manages resources and infrastructure along the coast that are subject to the provisions of the Coastal Act, as well as permitting and compliance processes. Coastal park units are within the jurisdictions of either of two coastal regulatory agencies: the California Coastal Commission and the Bay Conservation and Development Commission, and must also operate within county jurisdictions where there are approved local coastal plans. State Parks will participate in interagency working groups with these and other allied agencies to improve the coastal permitting and compliance process to more effectively respond to sea level rise through planning efforts and project implementation. State Parks will update internal policies and develop sea level rise support tools that will assist managers in the coastal zone to incorporate best practices into permit applications.



#### **PRINCIPLE 6**

**State Parks will increase public awareness and understanding of sea level rise through education and engagement with visitors.**

With more than 50 million visitors to coastal park units each year, State Parks has a tremendous opportunity to educate and engage with the public about sea level rise, erosion, and coastal flooding. The department will engage its visitors through efforts such as community and regional events, community-based restoration projects, community science projects, and mentorship programs for students and young adults to gain experience in multiple aspects of sea level rise adaptation and management. Multilingual interpretive and educational materials on sea level rise will also be critical for adaptation efforts in coastal park units. State Parks policy updates will reflect the need for interpretation and education component in all projects related to sea level rise.



LONG BILLED CURLEW

## Tools to Support Projects and Plans

Managers will apply the sea level rise principles outlined in this Strategy as they develop plans and implement projects in coastal park units. Projects are activities undertaken at park units beyond annual scheduled maintenance that serve to address major needs for park infrastructure, resources, and visitor access. Example projects could range from restoration of historic dune habitats to the building of a new visitor center. Planning documents are road maps for future development decisions at park units; they are generally long-term and address topical

management objectives (e.g., road and trail management) or park development and management at a comprehensive yet general level (e.g., park general plans). Through the updated policies and procedures recommended by this Strategy, State Parks will be able to prioritize projects and plans that stress sea level rise adaptation.

As used in this Strategy, “tools” are models, systems, guidelines and other resources that support decision-making. Because of State Parks’ decentralized systems and large number of staff who develop

and manage projects, such widely accessible guidelines provide essential references or templates that can be tailored to local, site-specific conditions. These tools will build sea level rise into existing project and plan development processes within State Parks, and department staff will be able to use the tools to make informed decisions throughout the development process. Tools identified to support sea level rise response work – all of which require development or update – are identified below.

### SEA LEVEL RISE DECISION SUPPORT TOOLS

The following tools have been identified as needed to support sea level rise adaptation work by State Parks. These tools do not yet exist and require development or update.

#### INCIDENT RESPONSE GUIDELINES

Unforeseen incidents or events may occur at coastal park units, such as erosion or flooding events, which require an expedited process to allow for rapid response. The Incident Response Guidelines will consist of an emergency assessment process to determine the appropriate pathway during or following an incident and a decision flowchart that separates standard planning from incident response planning and outlines the process for expediting action.

#### SEA LEVEL RISE VULNERABILITY ASSESSMENT GUIDELINES

To assist with planning and project development, vulnerability assessments must be completed for each coastal park unit. The Sea Level Rise Vulnerability Assessment Guidelines will outline the

necessary steps and standardized process to complete a sea level rise vulnerability assessment and allow for consistent application across the State Park System.

#### MANAGEMENT ALTERNATIVES FOR COASTAL RESILIENCY

Increased resilience to sea level rise will require a suite of management actions at coastal units. In selecting possible management alternatives, staff must consider short-term and long-term impacts on a park unit’s resources, management actions taken by adjacent landowners, and alignment with state guidance and State Parks’ policies. The Management Alternatives for Coastal Resiliency tool will guide users through an evaluation and ranking of potential management actions based on a consistent methodology, providing support for selected management actions versus alternatives.

#### TRIGGER POINTS FOR ADAPTIVE MANAGEMENT

Identifying predetermined, observable levels of risk that prompt management actions can provide managers with more lead time to prepare adaptive management actions, better anticipate the adaptive limits of existing facilities or resources, and implement actions that avoid the most significant impact. The Trigger Points for Adaptive Management tool will help managers develop appropriate decision thresholds for projects along the coast, given the hazards and resources being addressed.



### COASTAL ECONOMIC ANALYSIS TOOL

Management alternatives offer different benefits and/or disadvantages to the resources and facilities that must be considered during the management alternatives selection process. An economic analysis can assess the costs and benefits of the range of feasible management alternatives relative to factors such as market and non-market value of the affected assets, revenue generation, affected businesses, and access. The Coastal Economic Analysis tool will help assess the value of resources and facilities within coastal units and identify benefits and costs of different management alternatives.

### COASTAL FACILITIES VIEWER

Infrastructure (e.g., roads, trails, buildings) in coastal units of the State Park System provides public access and recreational opportunities along the California coastline. These facilities may be at risk from sea level rise and its associated impacts. The Coastal Facilities Viewer will enable staff to overlay various scenarios with existing infrastructure data to assess how exposed facilities are to sea level rise. Staff will also be able to use the tool to assess the most appropriate location for new projects not exposed to sea level rise, flooding, or erosion.

### COASTAL HABITAT VIEWER

Sea level rise will have profound impacts on the California coastline and its natural resources. The Coastal Habitat Viewer will enable staff to visualize the vulnerability of coastal habitats under various sea level rise scenarios, allow for comparisons across coastal units, and identify system-wide habitat vulnerabilities. As such, it will help inform restoration priorities and management options while helping identify multibenefit projects alternatives.

### COASTAL CULTURAL RESOURCE VIEWER

Coastal park units preserve the unique cultural history of California in both onshore and offshore landmarks. The Coastal Cultural Resource Viewer will provide an analytical tool to identify potential threats to coastal cultural resources due to sea level rise.

### COASTAL MANAGEMENT PLAN GUIDELINES

Management plans serve to define the specific objectives, methodologies, and/or designs detailing how function-specific (e.g., roads and trails, facilities, natural resources, cultural resources, interpretation and education) management goals will be accomplished for a park unit or region. The Coastal Management Plan Guidelines will detail the required content of and process for developing a Coastal Management Plan that also takes sea level rise into consideration for adaptation planning.

### COASTAL MONITORING GUIDELINES

To understand coastal processes and inform adaptive management at park units, standardized monitoring should be practiced and trigger points established. Standardized monitoring can also establish baseline conditions, prioritize management actions (e.g., maintenance or restoration), identify unexpected conditions, and allow for comparisons within districts and across the State Park System. The Coastal Monitoring Guidelines will assist staff in establishing standardized monitoring protocols within coastal park units and make informed management decisions while guiding adaptive management at the local scale.

### COASTAL RESILIENCE CASE STUDIES LIBRARY

While many different management solutions have been used within coastal park units, lessons learned and project details are not adequately shared within State Parks. The Coastal Resilience Case Studies Library will facilitate the sharing of coastal resilience project information across the State Park System and bolster the technical guidance provided by State Parks staff.

### COASTAL ADAPTATION DATA PORTAL

Centralizing coastal adaptation data into a single portal will make resources easy to access and improve decision-making across management functions. Centralized data will also help identify problem areas, improve policies and guidance, and help State Parks share adaptation progress externally. The Coastal Adaptation Data Portal will serve as the central storage location for all coastal adaptation data.

### SEA LEVEL RISE INTERPRETATION AND ENGAGEMENT TOOLKIT

As coastal hazards and sea level rise continue to threaten resources and facilities at coastal park units, clear and consistent interpretation and education of impacts and management solutions will be essential to engage with the public. The Sea Level Rise Interpretation and Engagement Toolkit will align State Parks' interpretive and educational messaging on sea level rise and will assist staff in developing interpretive materials as part of the project and planning processes.

## ADAPTIVE MANAGEMENT



Sea level rise is a slow-moving threat to the California coastline, but it demands immediate attention and sustained action. Many coastal park units are already experiencing significant impacts to infrastructure and resources due to extreme events, and impacts will only intensify as sea levels continue to rise. Though the magnitude of sea level rise California will experience remains dependent on a number of factors, including the ability to curtail greenhouse gas emissions, adaptation planning enables managers to think ahead about how to address future impacts. The principles and actions identified in this Strategy form the basis for State Parks' approach to sea level rise adaptation. If implemented, these actions will achieve resilience in the near term and prepare State Parks for long-term adaptation.

Adapting to sea level rise will be a costly endeavor for State Parks and California. However, the cost of inaction is much greater than an early investment in proactive adaptation. This Strategy seeks efficiencies by focusing efforts on existing processes and multidisciplinary action. To strengthen implementation, this Strategy recommends support for staffing needs that will allow State Parks to effectively address sea level rise through expanded technical expertise and coordination. Funding dedicated to sea level rise adaptation planning and projects – as well as support for tool development – will enable successful implementation of this Strategy and promote a broad, coordinated response to sea level rise.

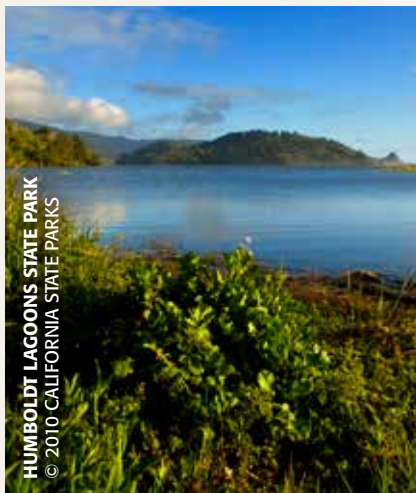
Adaptation cannot be a static process. Management and operations must continually adjust to keep pace with sea level rise. Successful management of coastal park units relies on managers understanding best practices and building them into all facets of operations in the coastal zone. Through adaptive implementation of the Strategy that assimilates lessons learned and new management practices into ongoing operations, coastal managers will inform a broader understanding of best practices throughout the implementation process. A robust program of training, performance tracking, and updating efforts will be required to ensure that the tools and processes developed in this Strategy are effectively implemented, managed, and updated over time. A 6-year evaluative and adaptive management process of hypothesis articulation, goal setting, monitoring, evaluating, and modifying will underpin the successful implementation of this Strategy. Following implementation of the framework outlined in this Strategy, State Parks aims to develop preparedness and adaptation targets to ensure the long-term resilience of the State Park System.

## CONCLUSION



Through the framework described in this Strategy, State Parks has made a commitment to address sea level rise adaptation along California's coast. However, it is just a starting point. Success will depend on the sustained commitment of staff, partners, political leaders, and the public to foster coastal resilience and address climate change impacts. State Parks recognizes the need to begin in earnest and to continually refine the Strategy to achieve the goal of resilience at coastal park units. Future versions of this Strategy will outline new management priorities, while incorporating emerging science, state guidance, and lessons learned by managing the State Park System.

Learn more at [www.parks.ca.gov/sealevelrise](http://www.parks.ca.gov/sealevelrise)



## ACKNOWLEDGEMENTS

State Parks would like to express sincere thanks to Parks California for their support during the final preparation of this Strategy. This Strategy reflects insight gained from the growing and impressive body of work on climate change adaptation and resilience. Thank you to the numerous department staff, partner agencies, organizations, and other thought partners whose work inspired and informed this effort; we are grateful for your contributions and guidance.





PIGEON POINT LIGHTHOUSE STATE HISTORIC PARK