# San Francisco Bay Coastal Management Program Assessment and Strategy

2021 to 2025 Enhancement Cycle

Bike Trail in Bothin Marsh, Marin County during King Tide
Photo Credit: Schuyler Olsson, San Francisco Bay Conservation Development and Commission

Prepared pursuant to the Provisions of Section 309 of the federal Coastal Zone Management Act for the Office for Coastal Management, National Ocean Service, National Oceanic and Atmospheric Administration

By

The San Francisco Bay Conservation and Development Commission
375 Beale Street, Suite 510
San Francisco, CA 94105

September 2020

# Table of Contents


**1. Introduction . ..... 3**

**2. Summary of Recent Achievements ..... 6**

Wetlands ..... 7
Coastal Hazards ..... 9
Special Area Management Planning ..... 15
Coastal and Estuarine Resources/Cumulative and Secondary Impacts ..... 17
Marine Debris ..... 19
Public Access ..... 20

**3. Assessment. ..... 22**

**A. Phase I Assessment ..... 22**

Wetlands ..... 22
Coastal Hazards ..... 28
Public Access ..... 36
Marine Debris ..... 43
Cumulative and Secondary Impacts ..... 46
Special Area Management Planning ..... 53
Ocean (Coastal and Estuarine) Resources ..... 56
Energy and Government Facility Siting ..... 63
Aquaculture ..... 65

**B. Phase II Assessment ..... 67**

Wetlands ..... 67
Coastal Hazards ..... 74
Ocean (Coastal and Estuarine) Resources ..... 83

**4. Strategy ..... 90**

Strategy 1: Improve the Region's Capacity to Understand and Adapt to Current and Future Coastal Hazards Risks ..... 90
Strategy 2: Improve Coastal Management Related to Water-Oriented Uses ..... 95
5-year Budget Summary by Strategy ..... 100

**5. Summary of Stakeholder and Public Comment ..... 101**

# Introduction

## Overview of the Section 309 Program

Section 309 of the Coastal Zone Management Act (CZMA), as amended in 1990 and 1996, establishes a voluntary coastal zone enhancement grant program to encourage Coastal Management Programs (CMPs) such as the San Francisco Bay Conservation and Development Commission ("BCDC" or "Commission") to develop innovative approaches to improving the following nine enhancement areas: (1) wetlands, (2) coastal hazards, (3) public access, (4) marine debris, (5) cumulative and secondary impacts, (6) special area management planning, (7) ocean/great lakes resources, (8) energy and government facility siting, and (9) aquaculture. Under the Section 309 program, the Secretary of Commerce is authorized to make awards to states and territories to develop and submit for federal approval of program changes that support one or more enhancement area objectives.

To be eligible for Section 309 funding, CMPs must successfully complete an Assessment and Strategy for review and approval by the National Oceanic and Atmospheric Administration's (NOAA) Office for Coastal Management (OCM). The Assessment considers the extent to which problems and opportunities exist with regards to the enhancement area objectives and the effectiveness of current efforts to address those problems. The Assessment provides the factual basis for the CMP and OCM to cooperatively determine priority needs for program improvement.

The Strategy is a comprehensive, multi-year statement that identifies program changes and implementation activities needed to address enhancement area objectives identified as high priority in the Assessment. The Strategy is based on priority needs and information gaps identified in the Assessment and covers the 5-year period from fiscal year 2021 to fiscal year 2025.

## Assessment and Strategy Development and Public Review Processes

This ~~draft~~ report is the culmination of a collaborative process to evaluate BCDC's CMP. Public input on priority enhancement areas, key issues, and management needs was gathered through a survey sent to over 1,000 stakeholders. BCDC staff was also engaged in the development of the ~~draft~~ Assessment and Strategy, and staff provided input both individually and in group meetings. Using staff and stakeholder input and various other sources of public information detailed throughout the report, the status of coastal resources, extent of problems and opportunities, and the effectiveness of existing management efforts were characterized for each of the nine enhancement areas. Three enhancement areas were designated as high priority: Wetlands, Coastal Hazards, and Ocean (Coastal and Estuarine) Resources. For these high priority enhancement areas, in-depth assessments of needs and opportunities were conducted, and strategies were developed to achieve program improvements.

Staff released a draft Assessment and Strategy on July 10, 2020 for public comment. The document was sent to the Commission and interested parties, and was posted on the BCDC website. After the public comment period, the Commission held a public hearing on the draft Assessment and Strategy on August 20, 2020. Public comments are detailed in the Public Comment section of the document below. Public and BCDC Commissioner comments were incorporated to develop this Assessment and Strategy.

## BCDC's Coastal Management Program

Through the McAteer-Petris Act of 1965, the State of California granted BCDC authority to plan and regulate activities and development in and around the San Francisco Bay (Bay). The Suisun Marsh Preservation Act of 1977 expanded BCDC's permit jurisdiction over the 85,000-acre Suisun Marsh, the largest remaining wetland in California. Together, these two statutes form the legal basis of the management program for the San Francisco Bay Segment of the California Coastal Zone, which was approved by the U.S. Secretary of Commerce on February 16, 1977. These acts, respectively, are carried out through policies detailed in the San Francisco Bay Plan (Bay Plan) and the Suisun Marsh Protection Plan (Marsh Plan).

The Commission's enabling legislation and associated policies focus on limiting fill, increasing public access to and along the Bay, and assuring that sufficient land is available for high priority water-dependent uses. BCDC administers a regulatory program based on the standards of the Bay Plan and Marsh Plan, in which permits are required for Bay filling and dredging and for development along a shoreline band extending 100 feet inland from the Bay. The Commission's Bay jurisdiction includes and all parts of the Bay that are subject to tidal action, including sloughs, marshlands, tidelands, and submerged lands. The Commission also has jurisdiction over salt ponds, managed wetlands, and certain named tidal waterways adjacent to the Bay.

The Bay Plan has dual mandates to (1) protect the Bay as a great natural resource for the benefit of present and future generations; and (2) develop the Bay and its shoreline to their highest potential with a minimum amount of fill. To achieve these mandates, the Bay Plan includes policies on fish and wildlife, water pollution, water surface area and volume, marshes and mudflats, fresh water inflow, dredging, water-related industries, ports, airports, recreation, public access, salt ponds, transportation, project appearance and design, scenic views, shoreline protection, environmental justice, and climate change.

The Marsh Plan, while prepared pursuant to the Suisun Marsh Preservation Act of 1977, is also a more specific application of the regional policies of the Bay Plan for areas within the Suisun Marsh subject to the McAteer-Petris Act jurisdiction and supplements such policies to accommodate the unique characteristics of the Suisun Marsh. The Marsh Plan's objectives are to preserve and enhance the quality and diversity of the area's 85,000 acres of wetland habitat, and to ensure that uses of adjacent upland areas are compatible with marsh protection. The Commission maintains permit authority over development in the primary management area of the Suisun Marsh, which includes 89,000 acres of tidal marsh, managed wetlands, adjacent grasslands, and waterways. The Marsh Plan required

that a Suisun Marsh Local Protection Program for the secondary management area of the Suisun Marsh be prepared by local governments and that those components be certified by BCDC. The Commission retains appellate authority over local government decisions within the secondary management area.

The Bay Plan and Marsh Plan are living documents and the Commission can amend these plans to keep them current. In addition to amending the Bay Plan itself, BCDC, with the support and cooperation of local governments, can develop special area plans containing enforceable policies and use designations. Special area plans are adopted by the Commission as amendments to the Bay Plan, and by local governments as amendments to their general plans and zoning ordinances.

The 27-member Commission is composed of one member from each of the nine Bay Area county boards of supervisors; four elected officials representing area municipalities appointed by the Association of Bay Area Governments; five state agency representatives from the Business and Transportation Agency, Department of Finance, Resources Agency, State Lands Commission, and the San Francisco Bay Regional Water Quality Control Board; two federal representatives of the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency; and seven appointees from members of the public, five appointed by the Governor and one each from the state senate and assembly. The Commission holds regular meetings and is served by an Executive Director and a staff of approximately 55.

## Summary of Recent Section 309 Achievements

Below is a summary of the BCDC's program changes and major achievements since 2015. The changes and achievements are classified by enhancement area and include efforts identified as program enhancement strategies in the previous assessment, the San Francisco Bay Coastal Management Program Final Assessment and Strategy: 2016 to 2020 Enhancement Cycle (2016 to 2020 Assessment and Strategy), as well as other major achievements that were not specifically identified in the previous assessment, but help further program strategies or the NOAA 309 enhancement areas in general. The following table summarizes the achievements that are detailed below.

| Enhancement Area | Achievement | 309 Funded or Related to 2016-2020 Strategy |
|---|---|---|
| Wetlands | Fill for Habitat Bay Plan Amendment (2019) | Strategy |
| Wetlands | Wetlands Regional Monitoring Program (2019) | Strategy |
| Wetlands | Wetlands Habitat Assessment Team (2017) | Strategy |
| Wetlands | Bay Restoration Regulatory Integration Team (2019) | Strategy |
| Coastal Hazards | Policies for a Rising Bay (2016) | Project of Special Merit |
| Coastal Hazards | Commission Workshops on Rising Sea Level (2017) | Strategy |
| Coastal Hazards | Environmental Justice Bay Plan Amendment (2018-2019) | Funded |
| Coastal Hazards | Adapting to Rising Tides Portfolio (2017) | Partially Funded |
| Coastal Hazards | Adapting to Rising Tides: Bay Area (2020) | Strategy |
| Coastal Hazards | Adapting to Rising Tides: West Contra Costa and East Contra Costa County (2020) | Partially Funded |
| Special Area Management Planning | San Francisco Waterfront Special Area Plan update (in progress) | Strategy |
| Special Area Management Planning | Suisun Marsh Protection Plan update (in progress) | Strategy |
| Special Area Management Planning | Seaport Plan update (in progress) | Strategy |
| Coastal and Estuarine Resources; Cumulative and Secondary Impacts | Sediment Management Program (ongoing) | Strategy |
| Coastal and Estuarine Resources; Cumulative and Secondary Impacts | Oil Spill Prevention and Response Program (ongoing) | N/A |

| | | |
|---|---|---|
| Marine Debris | Supporting Marine Debris removal (ongoing) | N/A |
| Public Access | Public Access improvements (ongoing) | N/A |

## Enhancement Area: Wetlands

**Fill for Habitat Bay Plan Amendment**

On July 20, 2017, the Commission unanimously initiated a process to amend the San Francisco Bay Plan to address the need for more Bay Fill to increase the resilience of natural habitat. The decision to initiate the amendment stemmed from several BCDC stakeholder and Commissioner engagement processes, including Policies for a Rising Bay (2016), which was funded as a NOAA Project of Special Merit, and the Commissioner Workshops on Rising Sea Level (2016-2017). The Fill for Habitat amendment was adopted by the Commission on October 3, 2019. The amendment was approved by the California Office of Administrative Law on December 27, 2019, officially incorporating the policies into state law. The changes were also incorporated into the federally approved coastal management program through a program change, which was approved with qualifications by the Office for Coastal Management on May 8, 2020. This amendment was the target program change of Strategy 1 from the 2016 to 2020 Assessment and Strategy, "Incorporate best available information into coastal wetlands management, planning, and decision-making."

*Accomplishments:*

- Amended BCDC's findings and policies in six sections of the Bay Plan to address the need for more fill for habitat restoration, enhancement, creation, and adaptation in the Bay, and to address associated issues. The complete policy changes and details of the process can be found at https://www.bcdc.ca.gov/BPAFHR/FillHabitat.html. The Program Change request for the Fill for Habitat amendment was submitted to OCM for review and approval on January 9, 2020.
- Engaged with the Commission to develop draft policy changes through the following activities: working with the Bay Fill Policies Commissioner Working Group to develop a project goal and identify priority policy changes; presenting a series of informational briefings for the Commission on topics related to the need for more fill for habitat projects in the Bay; and holding a Commissioner workshop to discuss and gain feedback on specific policy change recommendations.

- Engaged with stakeholders and the public by conducting interviews with stakeholders and interested parties to identify priority policy changes, holding a public workshop at a Commission meeting to support development of specific policy recommendations, and working to establish consensus on policy changes.
- Prepared (1) a background report entitled "Fill for Habitat Restoration, Enhancement, and Creation in a Changing Bay," released for public comment on May 24, 2019; (2) a staff report and preliminary recommendations on policy changes, which was released for Commission review and public comment on May 21, 2019, and was the subject of a public hearing on June 20, 2019; and (3) a final recommendation containing policy changes, which was adopted by the Commission on October 3, 2019.

**Wetlands Regional Monitoring Program**

BCDC staff have served on the steering committee of the Wetlands Regional Monitoring Program since the program was initiated in 2017. The Wetlands Regional Monitoring Program (WRMP) is a partnership among five Bay Area organizations to develop an implementable pilot program to monitor existing and restored tidal marsh habitat. The program's goals are to improve the efficiency of permitting and monitoring of wetland restoration projects, and to evaluate the condition of the tidal marsh ecosystem at a regional scale. BCDC staff's participation in the development of the WRMP is related to Strategy 1 of the 2016 to 2020 Assessment and Strategy.

*Accomplishments:*

- Participated in WRMP steering committee meetings, and provided input to develop and refine Guiding Questions, Science Priorities, and a Program Plan.
- Participated in technical workshops on monitoring of physical process, vegetation, and wildlife.
- Collaborated with WRMP staff to maximize consistency between the Fill for Habitat amendment/BCDC's monitoring permitting and compliance and the WRMP.

**Wetlands Habitat Assessment Team**

In 2017, BCDC staff from the Planning and Regulatory divisions created the Wetland Habitat Assessment Team (WHAT), which is an internal staff working group focused on habitat restoration projects in the San Francisco Bay Area, including proposed and previously permitted projects. The team was created with the goals of ensuring that permittees are conducting monitoring, submitting reports, and achieving goals required in BCDC permits; expanding staff knowledge to improve project review, permitting requirements, and review of monitoring reports; providing support to staff that need assistance with project review, permitting requirements, etc.; assessing how BCDC's current law, policies, and regulations allow or impede staff analysis and approval of projects; and providing a database that allows easy tracking of individual habitat project progress. While this effort was not specifically identified in the 2016 to 2020 Assessment and Strategy, it advances Strategy 1.

*Accomplishments:*

- Provided information to support the Fill for Habitat Bay Plan amendment and reviewed the draft policies through the BCDC wetland habitat permitting lens.
- Facilitated coordination with external parties working on issues related to wetland monitoring and adaptation, including hosting a presentation and discussion on the Wetlands Regional Monitoring Program.
- With the support of RIPTIDES interns (a collaboration with San Francisco State University), created a detailed database of BCDC monitoring requirements for habitat project permits over the past 20 years, and began investigating how those criteria could inform the development of a guidance document on habitat project monitoring requirements.

**Bay Restoration Regulatory Integration Team (BRRIT)**

Measure AA, or the San Francisco Bay Clean Water, Pollution Prevention and Habitat Restoration Measure, was placed on the June 2016 ballots of the nine-county San Francisco Bay Area by the San Francisco Bay Restoration Authority. The measure proposed a 20-year, $12 annual parcel tax to raise approximately $25 million annually, or $500 million over twenty years, to fund restoration projects in the Bay. It passed with 70 percent approval across the region and went into effect in 2017. To help accelerate permitting of Restoration Authority projects, funded through Measure AA, BCDC and other Bay regulatory agencies formed the Bay Restoration Regulatory Integration Team (BRRIT) to expedite the permitting process for multi-benefit habitat restoration projects and associated flood management and public access infrastructure in the San Francisco Bay and along the shoreline of the nine Bay Area counties. While this effort was not specifically identified in the 2016 to 2020 Assessment and Strategy, it advances Strategy 1.

*Accomplishments:*

- The BRRIT was formally created in 2019, with representatives from 6 different regulatory agencies throughout the Bay. The team is currently reviewing 11 project that have either submitted complete applications or are in the pre-application phase, and BCDC has successfully permitted one of these projects (900 Innes Voluntary Remediation Project).

## Enhancement Area: Coastal Hazards

**Policies for a Rising Bay**

In 2016, BCDC completed the Policies for a Rising Bay Project, a comprehensive assessment of the Commission's policies to determine: (1) how they affect shoreline adaptation proposals; (2) how they achieve the Commission's Bay protection objectives; and, (3) whether changes to the policies may be needed. Policies for a Rising Bay was funded as a NOAA Project of Special Merit.

*Accomplishments:*

- Established and worked with a steering committee composed of over 30 stakeholders representing public, private, and non-governmental organizations.
- Held a series of steering committee and subject-specific meetings, as well as a technical workshop, between March 2015 and May 2016. Through these meetings and additional efforts, BCDC staff, the steering committee, and stakeholders developed a project scope, conducted a policy analysis, analyzed case studies, and developed findings and policy options.
- Produced the Policies for a Rising Bay report, including four key policy options, related to (1) Fill for Resilience and Adaptation — Habitat Restoration and Protection; (2) Fill for Resilience and Adaptation — Innovative Shoreline Solutions; (3) Environmental Justice and Social Equity Policies; and (4) Adaptive Management Policies.
- Directly informed the outcomes of the Commission workshops on Rising Sea Level.

**Commission Workshops on Rising Sea Level**

In 2016 and 2017, BCDC held a series of public workshops at its Commission meetings to identify the actions that the Commission should take in coming years to address rising sea level. Five out of ten total workshops were held in 2016, and the other five were held in 2017. The workshops in the series were designed to inform, engage and provide a forum for participation by both the Commission and the public. The workshops were not specifically identified in the 2016 to 2020 Assessment and Strategy, but their goals and outcomes are directly related to Strategy 2, "Improve the region's capacity to understand and address current and future coastal hazards risks."

*Accomplishments*:

- Workshop 1 focused on implementing the Commission's 2011 update to the Bay Plan to address climate change and sea level rise.
- Workshop 2 presented the regional issues associated with climate change and sea level rise.
- Workshop 3 provided participants with an opportunity to select relevant actions that the Commission should prioritize.
- Workshop 4 presented the staff recommendations for action to the Commission based on the outcomes of the third workshop. Building off the fourth workshop, on October 6, 2016, the Commission adopted a set of eight specific recommendations and associated actions for advancing resilience in the region.[1]
- Workshop 5 provided participants with an opportunity to discuss implementation pathways for the identified adaptation actions.
- Workshop 6 focused on scoping the Regional Adaptation Plan, called for by the Bay Plan Climate Change policies.

[1] www.bcdc.ca.gov/cm/2017/ SLR-Policy-Recommendations.html

- Workshop 7 focused on discussion of "changing existing laws, policies and regulations to more fully consider the local and regional impacts of rising sea level in permitting and decision-making processes as needed" and was an extension of the Bay Fill Working Group discussions and Policies for a Rising Bay Project.
- Workshop 8 focused on policy priorities identified in Workshop 7.
- Workshop 9 refined priority actions on changes to the Commission's laws, policies, and practices regarding: (1) Fill for Habitat Projects; (2) Mitigation in the Face of Rising Seas; (3) Social Equity and Environmental Justice; and (4) Beneficial Use of Sediment.
- At the final Workshop, the Commission initiated two Bay Plan amendments regarding Bay Fill for habitat projects, and social equity and environmental justice.

**Environmental Justice Bay Plan Amendment**

On July 20, 2017, the Commission unanimously initiated a process to amend the San Francisco Bay Plan to address environmental justice and social equity. The decision to initiate the amendment stemmed from Policies for a Rising Bay and the Commissioner Workshops on Rising Sea Level. The Environmental Justice and Social Equity amendment was adopted by the Commission on October 17, 2019. The amendment was approved by the California Office of Administrative Law on December 27, 2019, officially incorporating the policies into state law. The changes were also incorporated into the federally approved coastal management program through a program change, which was approved with qualifications by the Office for Coastal Management on May 8, 2020. This work was a component of implementing Strategy 2 from the 2016 to 2020 Assessment and Strategy, and NOAA 309 funding was used to complete and implement this program change.

*Accomplishments*:

- Added a new section to the San Francisco Bay Plan and amended the findings and policies in three existing sections of the Bay Plan to integrate principles of environmental justice and social equity. The complete policy changes and details of the process can be found at https://www.bcdc.ca.gov/ejwg/BPAEJSE.html. The Program Change request for the Environmental Justice and Social Equity amendment was submitted to OCM for review and approval on January 9, 2020.
- Engaged with the Commission to develop draft policy changes through the following activities: working with the Environmental Justice Commissioner Working Group to develop a project goal and identify priority policy changes; providing informational briefings for the Commission; and holding a public workshop at a Commission meeting to discuss policy changes.
- Engaged with stakeholders and the public by conducting interviews and listening sessions with stakeholders and interested parties to identify priority policy changes, holding a public workshop to support the development of policy recommendations, working with a team of community-based organizations on the development of specific policy recommendations, and working to establish consensus on policy changes.

- Prepared (1) a Background report entitled "Toward Equitable Shorelines: Environmental Justice and Social Equity at the San Francisco Bay," released for public comment on June 7, 2019; (2) a staff report and preliminary recommendations on policy changes, which was released for Commission review and public comment on May 31, 2019, and was the subject of a public hearing on July 18, 2019; and (3) a final recommendation containing policy changes, which was adopted by the Commission on October 17, 2019.

**Adapting to Rising Tides (ART)**

In 2010, BCDC launched a collaborative planning effort to identify how sea level rise and storm event impacts would affect Bay Area communities, infrastructure, ecosystems and economy and identify potential adaptation responses. Since then, the ART Program has led and supported multi-sector, cross-jurisdictional projects that built local and regional capacity to plan for sea level rise and implement adaptation responses. These efforts enabled the ART Program to test and refine adaptation planning methods to integrate sustainability and transparent decision-making from start to finish, and foster robust collaborations that lead to action on adaptation. ART Program team members continue to utilize and share tools and expertise developed through these projects. More information can be found at www.adaptingtorisingtides.org. Expanding the content and supporting the use of the ART Portfolio was part of the work plan for Strategy 2 from the 2016 to 2020 Assessment and Strategy and was partially funded through Section 309 funding.

*Accomplishments*:

- In 2015, the Adapting to Rising Tides team launched the ART Portfolio, a collection of guidance, tools and information that have been developed, tested and refined by the ART Program to address the specific challenges of sea level rise. The ART Portfolio was designed to be useful to a wide variety of audiences in the Bay Area and beyond, including planners, flood managers, facilities managers, community group members and elected officials. The ART Portfolio website provides access to the planning guidance, tools, data and information developed and refined by ART Program staff based on their extensive experience and lessons learned in adaptation planning through leading and supporting numerous projects. In 2017, the ART Portfolio was updated to include flood maps for each San Francisco Bay county, geodatabases for each county and the entire region, a technical report on the methodology used to create ART's nine county sea level rise and flood maps, ART Bay Area regional working group pages, and other associated resources.
- During the past 5 year period, the ART team provided technical assistance and planning support to: (1) Caltrans by launching ART Bay Area (see below), in coordination with District 4, to conduct a region-wide assessment of transportation systems in the Bay Area; (2) the City of Oakland on its Sea Level Rise Roadmap and other resilience work; (3) the County of San Mateo during its county-wide transportation assessment; (4) the Port of San Francisco in its San Francisco Waterfront Working Group; (5) San Francisco Municipal Transportation Agency on an approach for its vulnerability assessment; (6) the City of Richmond's Climate Adaptation Plan; (7) the City of San Rafael's public engagement on sea level rise; (8) Marin County's outer coast and Bayside vulnerability

assessments; (9) Resilient by Design by helping identify potential sites for a regional design challenge, maps and analysis; (10) the Resilient Communities Initiative to design a workshop on sea level rise; (11) Metropolitan Transportation Commission's Horizon and Plan Bay Area; (12) Dumbarton Bridge Focus Area Study; (13) Highway 37 vulnerability and adaptation planning efforts; (14) the City of Corte Madera's Climate Adaptation Plan; (15) San Mateo County on various initiatives through their Sea Change program; and other local, regional, state and federal agencies and organizations.

- In 2016, the ART program completed a vulnerability assessment and developed adaptation strategies for the area around the Oakland Coliseum, Oakland International Airport, and Bay Farm Island, known as the Oakland/Alameda Resilience Study.
- BCDC staff completed the nine-county Adapting to Rising Tides Sea Level Rise and Overtopping maps. These maps will help local governments better identify specific areas that face the greatest risk from rising seas and storm surges. The maps have been ground-truthed by local shoreline experts and contain detailed and up-to-date information about the Bay shoreline.
- In 2017, the ART team, in partnership with other regional partners and the California College of the Arts, developed a board game called Bartertown to illustrate the importance of community resilience. The board game has been used as an engagement exercise in ART Program and Resilient by Design outreach events.
- In 2018, BCDC staff, with support from the San Francisco Estuary Institute (SFEI), launched the Bay Shoreline Flood Explorer website.[2] This new website helps Bay Area local governments and communities to access interactive maps of current and future local flood risks due to rising sea level and storms. The Bay Shoreline Flood Explorer is designed to be used by anyone, from novices to experts. BCDC staff conducted an extensive stakeholder review of the website and held numerous trainings for regional partners and community groups. The Bay Shoreline Flood Explorer is now being used by many, such as local jurisdictions and transit agencies, to raise awareness of flood risks and help plan for resilience. The Bay Shoreline Flood Explorer was supported with NOAA 309 funding as part of implementing the work plan for Strategy 2.

**Adapting to Rising Tides: Bay Area**

In 2016, BCDC partnered with the Metropolitan Transportation Commission (MTC) and the Bay Area Regional Collaborative (BARC) on a successful grant submittal for a Caltrans Sustainable Transportation Planning Grant. Caltrans awarded MTC and BCDC $1.2 million to assess the vulnerability of transportation assets and services, Priority Development Areas, Priority Conservation Areas, and communities with characteristics that make them more vulnerable to flooding. This three-year effort, titled Adapting to Rising Tides (ART) Bay Area, began in the fall of 2016, and the final report was released in March of 2020. ART Bay Area was not specifically identified in the 2016 to 2020 Assessment and Strategy, but the project fulfills several objectives from Strategy 2.

[2] explorer.adaptingtorisingtides.org

*Accomplishments*:

- Established a Regional Working Group, comprised of adaptation professionals, academics, community advocates, local planners, elected officials from across the Bay, and other interested stakeholders. ART staff held 12 meetings to solicit guidance on the ART Bay Area project and begin to build regional collaboration around sea level rise adaptation planning.
- Analyzed the worst-case scenario impacts and consequences to four critical regional systems—transportation, future growth areas, natural lands, and vulnerable communities—for 10 different flooding scenarios in the absence of action. Consequently, the program was able to assess the vulnerability of each of these systems to various sea level rise and coastal flooding scenarios.
- Conducted 13 site-specific local assessments to analyze shared vulnerabilities and consequences in specific settings.
- Identified "hot spots" where many regionally significant assets from each of the four regional systems are located together, making these critical locations where adaptation interventions could mitigate impacts across systems.
- Identified key regional planning issues that emerged as common, pressing challenges across the region.
- Developed adaptation responses including a variety of different actions for each of the key regional planning issues. Actions include capacity building, developing plans and policies, new or improved programs and operations, building projects, and funding and financing mechanisms.
- Engaged in three local community-based meetings in partnership with the Bay Area Regional Health Inequities Initiative and, Nuestra Casa in East Palo Alto and Ensuring Opportunities in Contra Costa County to engage local community members on local flooding issues.

**Adapting to Rising Tides: West Contra Costa and East Contra Costa County**

In 2015, BCDC initiated the Western and Central Contra Costa County ART project. Through this project, the ART program conducted a climate adaptation planning effort in western Contra Costa County, focusing on the risks to the county from current and future flooding, while also considering the other challenges and opportunities facing the county. The Contra Costa shoreline, with its varying local topographies (from bluff to wetland to creek mouth), different types of land uses, diverse communities, and the presence of extensive rail and energy infrastructure, offered an excellent opportunity to better understand the varied vulnerabilities and consequences of current and future flooding. This project, completed in 2017, has increased local and regional capacity to address the myriad challenges posed by sea level rise. Upon completion of the Western and Central Contra Costa project, BCDC initiated the Eastern Contra Costa County ART project in partnership with the Delta Stewardship Council and Contra Costa County. The project continued the successful work of the Central and Western ART Contra Costa project in the eastern, Delta-influenced portion of Contra Costa County. The East

Contra Costa project was completed in January 2020. The East and West Contra Costa ART projects were identified in the 2011 to 2015 Assessment and Strategy, and the West Contra Costa ART project was funded by NOAA 309 in the 2015-2016 fiscal year as part of implementing the 2011 to 2015 Assessment and Strategy.

*Accomplishments*:

- The ART Western and Central Contra Costa project resulted in outcomes including the convening of a diverse and capable working group, development of broad resilience goals, locally refined sea level rise maps and shoreline analyses, a robust vulnerability assessment of the area, and the development of detailed adaptation responses. Additionally, six key planning issues were identified, and potential adaptation responses were developed to address these issues.
- The ART East Contra Costa project produced a vulnerability assessment and adaptation plan to help communities in the area become more resilient to current and future flooding. This project also produced detailed mapping of flood risk from rising sea level in eastern Contra Costa and Solano Counties, including a public web-based tool linked to the ART Shoreline Flood Explorer, to inform the planning process for the eastern, Delta-influenced portion of Contra Costa County.

## Enhancement Area: Special Area Management Planning

**San Francisco Waterfront Special Area Plan**

Since 2016, BCDC staff have participated in the Port of San Francisco's Waterfront Working Group, an effort led by the Port of San Francisco to assess the need to change the Port's Waterfront Land Use Plan to facilitate redevelopment of much of the waterfront, to adapt to rising sea levels, to anticipate the cost of maintaining and repairing existing Port resources, as well as the need to seismically retrofit the Port's seawall and other issues. Updating the San Francisco SAP was identified as an action in the 2016 to 2020 Assessment and Strategy as a component of Strategy 3, "Evaluate and Update Special Area and Sector Plans to Incorporate Best Available Information about Climate Changes, Reflect Current Status and Trends, and Address Other Emerging Issues."

*Accomplishments*:

- In late 2017, BCDC received a Bay Plan amendment application from the Port of San Francisco for a comprehensive San Francisco Waterfront Special Area Plan (SAP) update for the San Francisco Waterfront.
- BCDC staff and Port staff met regularly in late 2018 and early 2019 to discuss policy issues that the Port wished to include in the update, such as conflicts between maritime uses and public access and public spaces, the cost of developing and maintaining public spaces, the challenges and opportunities presented by historic resources and the historic district, and balancing the commercialization and privatization of parts of the waterfront with the requirements of the State's public trust doctrine.
- BCDC voted to initiate the SAP amendment in 2019, and BCDC staff and Port staff are currently developing proposed changes to the SAP findings and policies.

**Suisun Marsh Plan Updates**

Since the 2016 to 2020 Assessment and Strategy, BCDC has updated or started reviewing the Suisun Marsh Protection Plan and all seven Local Protection Program components (LPPs) for possible amendments. Updating the Suisun Marsh Protection Plan and the Solano County LPP was identified in the 2016 to 2020 Assessment and Strategy as a component of Strategy 3.

*Accomplishments*:

- BCDC staff worked collaboratively with the Suisun Resource Conservation District (SRCD) to begin an update to the SRCD LPP. Through this project, BCDC staff built relationships, opened paths of communication, and established partnerships with the SRCD and other regional agencies working in the Delta, including the Delta Conservancy and the Delta Stewardship Council. Other accomplishments coming out of this project are summarized in the 2016 to 2020 Assessment and Strategy. Additionally, BCDC staff worked with the SRCD to develop an online mapping platform called GeoMarsh, and to conduct on-the-ground GIS field mapping to show the boundaries of the managed wetlands and create an evolving inventory of the privately owned managed wetlands infrastructure and facilities (such as levees, water control structures, blinds, fish screens, pumps, weirs, ditches, and joint use facilities). This tool is still being developed and is already extremely helpful in tracking projects within the complex of privately-owned and managed wetlands. Collaboration with the SRCD was funded by NOAA 309 funds in FY 2014.
- On March 7, 2019, the Commission voted to certify the 2018 amendment to Solano County's component to the Suisun Marsh Local Protection Program. The amendment addressed the adoption of the County 2008 General Plan update, and adoption of 2012 Zoning Code text amendments. Proposed changes to the policies addressed the Potrero Hills Landfill, clarifications to Land Use Designations, and potential resolution to the issues raised in the incomplete 2012 amendment, including wind energy development and wireless communication facilities.
- In the fall of 2019, BCDC staff began a review of the Suisun Marsh local protection program components (LPPs) with the goal of assessing their consistency and bringing them into compliance with the Suisun Marsh Protection Plan.
- In 2020, BCDC staff began a process to review the policies of the Suisun Marsh Protection Plan, which has not been comprehensively reviewed or updated since its enactment in 1977.

**Seaport Plan**

The Commission's San Francisco Bay Area Seaport Plan ("Seaport Plan") expands on and provides more detail for the Commission's San Francisco Bay Plan ("Bay Plan") policies related to ports and port priority use areas. While amendments to the Seaport Plan (most of which were related to single applications by property owners) have occurred over the years, the last thorough plan review and update occurred during the two years prior to the plan's April 1996 adoption by the Commission. There has not been a comprehensive review of the Seaport Plan since then because the plan's cargo projections remain in effect through 2020. Updates to the Seaport Plan were identified in the 2016 to 2020 Assessment and Strategy as a component of Strategy 3.

*Accomplishments*:

- In 2018, recognizing the need to update the Seaport Plan, BCDC initiated project scoping and compilation of needed documents, background studies, and previous maritime reports.
- On January 19, 2019, the Commission voted to initiate a Bay Plan amendment to review and possibly revise the Seaport Plan Port Findings, Policies, and Designations.
- Staff has met three times with the Commission's Seaport Planning Advisory Committee (SPAC) to discuss the amendment process and to review an updated regional forecast of oceangoing cargo and a marine terminal capacity study, which could inform Seaport Plan revisions.
- A revised final draft for the 2019-2050 Bay Area Seaport Forecast was released for review in April 2020, and was accepted with the exception of minor edits and formatting by the Seaport Planning Advisory Committee in May 2020.

**Amendments to Priority Use Areas**

Since the 2016 to 2020 Assessment and Strategy, BCDC received requests for several updates to priority use areas, which require the Bay Plan to be amended. The changes adopted/being considered include removal of a port priority use designation at Howard Terminal; removal of a park priority use designation at India Basin; and the removal of a water-related industry priority use designation at a site near Martinez. Although updating priority use areas was not directly described in the 2016 to 2020 Assessment and Strategy, it is related to Strategy 3, to "Evaluate and Update Special Area and Sector Plans to… Reflect Current Status and Trends and Address Other Emerging Issues."

## Enhancement Areas: Coastal and Estuarine Resources/Cumulative and Secondary Impacts

**Bay Dredging and Sediment Management**

Efforts are ongoing to understand and improve regional-scale management of sediment and dredged material in the Bay. BCDC has continued its partnership with the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, the San Francisco Bay Regional Water Quality Control Board, and stakeholders on the Long-Term Management Strategy for Placement of Dredged Material in the Bay Region (LTMS) and the Dredged Material Management Office. Sediment management work was not specifically identified as a strategy in the 2016 to 2020 Assessment and Strategy, but it advances the goals of Strategy 1, "Incorporate best available information into coastal wetlands management, planning, and decision-making," and Strategy 2, "Improve the region's capacity to understand and address current and future coastal hazard risks."

*Accomplishments:*

- Led a workshop titled "The Science of Sediment" on October 13-14, 2015 to discuss management issues surrounding the physical processes of sediment in and around San Francisco Bay, and how to address knowledge gaps through the development of a prioritized research strategy. Much of the discussion centered around managing for the combined impacts of sea level rise and a reduction in sediment inputs to the Bay, which poses a clear challenge for maintaining marsh ecosystems into the future. Over 40 people participated from the science, management, regulatory, consulting, and non-profit sectors, with expertise spanning sediment transport, hydrology, geomorphology, wetland management, shoreline management, dredging management, and coastal engineering, and others. Management needs and prioritized research strategies identified during the workshop and further developed with partners have fed into BCDC's long-term sediment management planning process and facilitated the targeting of research and monitoring needed for the region.

- Completed the Central San Francisco Bay's Regional Sediment Management Plan and Summary of the Sediment Science Workshop. Both documents provide information and guidance about the Bay's sediment system, and how it affects shoreline and habitat resilience. The Central Bay Regional Sediment Management Plan includes regional challenges and opportunities, as well as recommended management actions. The Sediment Science Workshop summary prioritized management questions for the research community relating to risk and resilience, sediment budgets, and sediment transport and fate. This document will serve as a precursor to a sediment monitoring and research plan for the Bay.

- Collaborated with the U.S. Army Corps of Engineers and other Long-Term Management Strategy (LTMS) agencies to develop a framework addressing the strategic placement of dredged sediment for wetland adaptation. The framework includes a review of best available science on strategic sediment placement, and proposes a pilot project to assess the feasibility of strategic placement in the San Francisco Bay estuary.

- Co-authored and was awarded funding for a proposal with the California Coastal Conservancy for the Water Resources Development Act (WRDA) 2016 pilot program. The proposal, titled "Resilient San Francisco Bay," was one of 10 projects selected across the country to receive funding and be allowed to waive the federal standard to demonstrate the benefits of beneficial reuse of dredged sediment. The project proposed to use dredged sediment from four federal navigation projects to raise the elevation of four subsided restoration projects in the Bay. The proposal also included funds to support a pilot project testing the feasibility of strategic placement of dredged sediment for sediment supplementation, which was detailed in the Strategic Placement document described above. BCDC staff are currently working with the USACE and Coastal Conservancy to implement the project.

- Co-led a workshop and expert panel with other LTMS agencies and the San Francisco Estuary Institute (SFEI) on sediment screening guidelines for beneficial reuse of dredged material. The workshop was aimed at reviewing the beneficial reuse screening guidelines and discussing potential updates to the guidelines to allow for more beneficial reuse of dredged sediment.
- In 2015, BCDC issued three permits for sand mining in the San Francisco Bay. As part of the conditions for those permits, BCDC and other regulatory agencies required the completion of three studies related to the impacts of sand-mining: a benthic community study, a water quality monitoring study, and a sand transport study. The water quality study was completed in 2016, and the benthic community study is in the final phases of review. The third study plans to investigate the effects of sand mining on sand transport and supply in the Bay. A technical advisory committee (TAC) on the sand transport study was created in 2018, and BCDC staff, in collaboration with the TAC and other agencies, are currently finalizing the research framework for the sand transport study. These studies are expected to inform the feasibility and impacts of future sand mining in the San Francisco Bay.

**Oil spill response**

BCDC continues its involvement in the state's oil spill planning and response efforts through staff engagement in the San Francisco Bay-Delta Harbor Safety Committee, participation in Bay-Delta Area contingency planning, and participation in response planning/drills.

*Accomplishments*:

- BCDC Oil Spill Program staff led the development of an assessment of the Bay Area's tug capabilities to respond to emergency incidents offshore. Powerful oceangoing tugs are needed to prevent disabled ships from drifting to the coastline thereby preventing oil spills and damaging effects to the environment. The study was required by legislation enacted following a significant petroleum spill in Santa Barbara county and was submitted by the CDFW Office of Spill Prevention and Response (OSPR) Administrator to the Legislature in April 2017. This work does not directly relate to the strategies identified in the 2016 to 2020 Assessment and Strategy, but it represents an achievement of the CMP related to the Cumulative and Secondary Impacts and Coastal and Estuarine Resources Enhancement Areas.

## Enhancement Area: Marine Debris

Abandoned, deteriorating and unauthorized vessels adversely impact Bay resources and their removal can have significant and nearly immediate benefits to critical habitats and species. BCDC has continued ongoing efforts to promote the adoption, implementation, and enforcement of policies at the local level that result in the removal/control of derelict vessels. Removal of vessels improves the health of the Bay ecosystems, eliminates navigational hazards, and reduces pollution entering the Bay. This work does not directly relate to the strategies identified in the 2016 to 2020 Assessment and Strategy, but it represents an achievement of the CMP related to the Marine Debris Enhancement Area.

*Accomplishments*:

- Informed the Richardson's Bay Regional Agency (RBRA) of the NOAA Marine Debris Removal Grant Program and supported RBRA's application for funding to supplement its abandoned vessel removal efforts in Richardson Bay, Marin County.
- Participated in quarterly Abandoned and Derelict Vessel Working Group meetings sponsored by the U.S. Coast Guard, through which BCDC staff works with other local, state and federal agencies to identify and remove ADVs from the Bay and Delta.
- Held Enforcement Committee briefings addressing abandoned vessels and marine debris in San Francisco Bay in February, September, and November 2019.
- Held Commission briefings addressing marine debris and/or abandoned and derelict vessels:
    - In June 2018, the Commission was briefed by the California Regional Coordinator for the NOAA Marine Debris Program on NOAA's annual marine debris removal grant funding opportunity.
    - In November 2018, the Commission was briefed on trends of the boating industry and marina operations.
    - In December 2019 and February 2020, the Commission received an update on the progress of the Commission's Enforcement Committee and BCDC Enforcement Program with regards to abandoned and derelict vessels in Richardson Bay.

## Enhancement Area: Public Access

BCDC has continued to require maximum feasible public access associated with permitted projects, resulting in the addition of over 137 acres and 29 miles of public access between 2015 and the end of 2019. BCDC has also continued its partnerships with the San Francisco Bay Trail and the San Francisco Water Trail to plan for increased and continuous access to the Bay's shoreline and open water. This work does not directly relate to the strategies identified in the 2016 to 2020 Assessment and Strategy, but it represents an achievement of the CMP related to the Public Access Enhancement Area.

*Accomplishments*:

- BCDC's public access findings and policies were updated as part of the Environmental Justice and Social Equity Bay Plan amendment. New findings recognize that public access is not equally or evenly distributed around the Bay, and that not all public access areas are of the same quality or are equally accessible. The findings also recognize the importance of meaningful community involvement in the design and programming of public access areas. Additions to the policies require that:

- In-lieu public access should be located near vulnerable/disadvantaged communities who are in need of public access, if the in-lieu public access cannot be provided near the project site.
- Public access that substantially changes the use or character of the site should be sited, designed, and managed based on meaningful community involvement.
- Public access should provide barrier free access for persons with disabilities, for people of all income levels, and for people of all cultures to the maximum feasible extent, should include an ongoing maintenance program, and should be identified with appropriate signs, including using appropriate languages or culturally-relevant icon-based signage.
- The Design Review Board should encourage diverse and well-distributed public access opportunities.

## Assessment

The following is an assessment of the extent to which problems and opportunities exist with regards to the enhancement area objectives, and the effectiveness of current efforts to address those problems. The assessment provides the factual basis for the CMP and OCM to cooperatively determine priority needs for program improvement. The assessment utilizes a variety of tools and data to characterize resources and management approaches, including feedback from a survey that was sent to BCDC stakeholders (methodology and results are detailed in the "Summary of Stakeholder and Public Comment" section). If not otherwise noted, information on trends and changes is based on the best professional judgment of BCDC staff.

### A. Phase I Assessment

The following high-level assessments are intended to quickly determine which of the nine enhancement areas is a high priority enhancement objective that warrants a more in-depth assessment.

## Wetlands

**Objective.** Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands. §309(a)(1)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regard to the wetlands enhancement objective.

The extent, status, and trends of wetlands in the nine Bay Area counties (given BCDC's jurisdiction) are reported below. The data provided is based predominantly on state-specific data sources, including BCDC permit data and the California EcoAtlas,[3] which compiles several different data sources to provide information about the quantity and quality of California wetlands, as well as the landscape context for considering wetland extent and condition. Additionally, data synthesized in the Baylands Ecosystem Habitat Goals Update (BEHGU)[4] is reported.

**Current Extent of Coastal Wetlands:** 483,157 acres[5]

[3] California Wetlands Monitoring Workgroup (CWMW). EcoAtlas. Accessed 11/13/19. https://www.ecoatlas.org.
[4] Goals Project. 2015. *The Baylands and Climate Change: What We Can Do. Baylands Ecosystem Habitat Goals Science Update 2015* prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. California State Coastal Conservancy, Oakland, CA.
[5] CWMW. Summary of marine, estuarine and palustrine resources for 9 Bay Area counties.

**Table 1. Extent of wetlands in the San Francisco Bay Area[6]**

| Wetland category | Wetland type | Acres |
|---|---|---|
| Estuarine Wetlands | Subtidal Water | 257,747 |
| | Tidal Channel | 14,074 |
| | Tidal Marsh | 43,212 |
| | Tidal Flat and Marsh Panne | 36,637 |
| | Pond | 24,647 |
| | Beach, Dune, and Rocky Shore | 914 |
| Palustrine Wetlands | Pond and Associated Vegetation | 86,293 |
| | Playa | 6,992 |
| | Fluvial Channel | 3,959 |
| | Vernal Pool | 8,682 |
| **Total** | | **483,157** |

**Status of Coastal Wetlands:** The status of coastal wetlands in the San Francisco Bay estuary was summarized in BEHGU:

> The configuration of baylands habitats has changed dramatically since 1800. Tidal marshes have become more fragmented, with much more edge relative to interior or core areas and some isolated habitat patches. These changes in habitat configuration are common in modern landscapes and are likely to reduce some support functions for resident marsh wildlife above and beyond the loss in habitat extent. Against a background of severe habitat loss, fragmentation has reduced the baylands' ability to support wildlife by decreasing the connectivity between populations and increasing edge effects that promote predation and anthropogenic stress. Due to extensive fragmentation of once-large, nearly continuous marshes, the average size of tidal marsh habitat patches has declined since 1800. Large marsh patches in the current baylands are primarily composed of wide marsh areas connected by narrow fringing marsh… Marsh fragmentation varies across the region (Figure 1).[7]

Estuarine wetlands in the Bay Area have been assessed using the California Rapid Assessment Method[8] (CRAM), a cost-effective and scientifically defensible rapid assessment method for monitoring the ambient conditions of wetlands throughout California. 50% of the surveyed estuarine wetland acres for the San Francisco Bay Coastal Ecoregion have a CRAM score of 75 or more, which is considered "good" condition, and the other 50% of the surveyed estuarine wetlands have a CRAM score between 50 and 75, considered to be in "fair" condition.[9]

---

[6] Ibid.
[7] Goals Project, pgs 20-23
[8] https://www.cramwetlands.org/about
[9] CWMW. Using the "Landscape Profiles" tool, choose "CRAM an CSCI" for "Select Profile Mode" option, and "Counties" under Pre-defined areas for the "Define Profile Region" option. Select any Bay Area county. In the Landscape Profile data box that appears, select "View Scores on CRAM CDF." To generate a CRAM Cumulative Distribution Function for the San Francisco Bay EcoRegion, select "Estuarine" for CRAM wetland type, and select "San Francisco Bay Coastal EcoRegion" as the

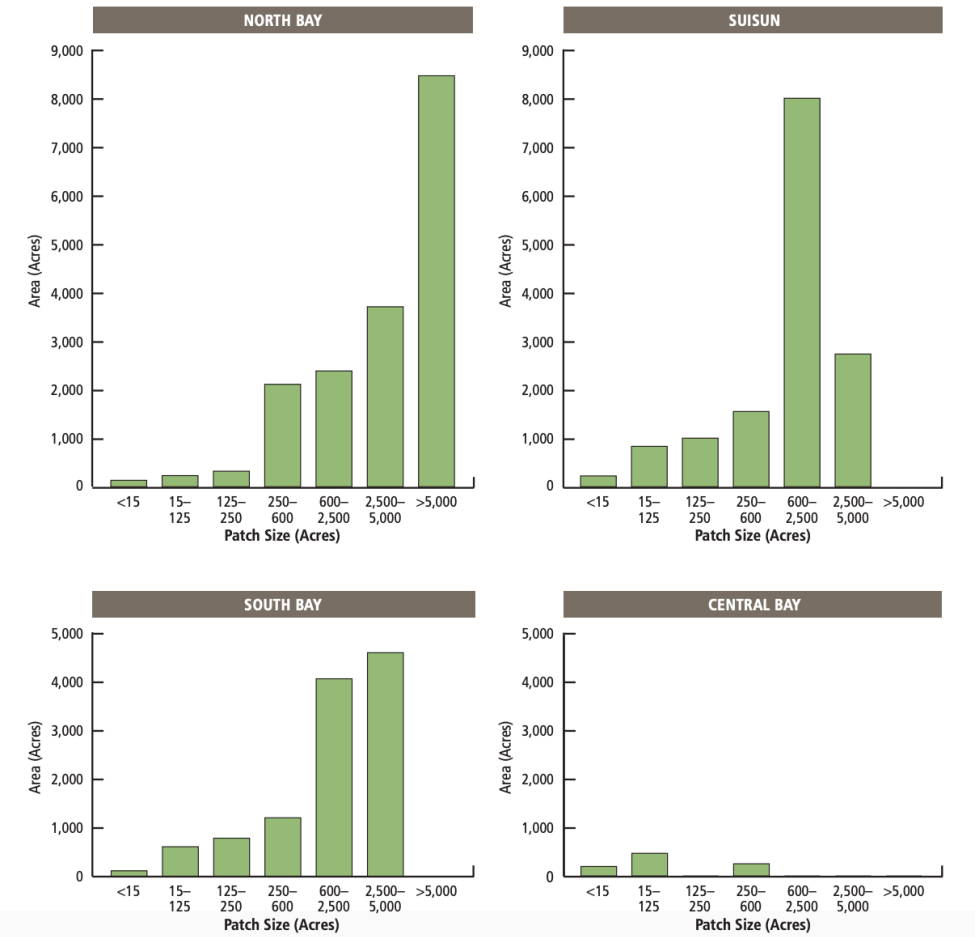


**Figure 1**. Total area of marsh at different patch sizes for four different sub-regions of the San Francisco Bay. Data was collected in 2009.[10]

**Trends in Coastal Wetlands:** Trends in coastal wetlands in the SF Bay estuary were also summarized in BEHGU. These trends are summarized in Figure 2:

> Between 1800 and 1998, 79 percent of tidal marshes (150,000 acres) and 42 percent of tidal flats (21,000 acres) were lost to diking and filling. In the late 1980s through the 1990s, habitat loss was slowed and then reversed through the protection of threatened parcels and early restoration activities…. Restoration projects completed by the year 1998 added 4,000 acres of tidal marsh and 2,000 acres of diked wetlands. If currently planned projects are successful, they will add around 30,000 acres of tidal marsh—including 6,000 acres of previously restored tidal flat that will evolve naturally into tidal marsh. Although 6,000 acres of managed ponds are planned for restoration or enhancement, the overall extent of managed ponds will be reduced by 13,000 acres. Similarly, 6,000 acres of diked

CDF curve to compare. The curve demonstrates CRAM wetland scores that are considered to be poor, good, and fair, and the relative distribution of CRAM scores for surveyed wetland acres for the San Francisco Bay coastal ecoregion.

[10] Goals Project, Figure 10, page 23.

wetlands will be created or enhanced, but the overall diked wetland extent will decrease by 5,000 acres. This estimation of future baylands extent includes restoration, enhancement, and mitigation projects that have been funded, permitted, or both and therefore have a high probability of completion within the next 20 to 30 years…. In summary, of the 60,000 acres of tidal marsh recommended for restoration by the 1999 Goals Project, over 7,000 acres of tidal marsh were restored as of 2009, and 30,000 more acres of restored tidal marsh are expected to result from future projects or habitat evolution of current projects.[11]

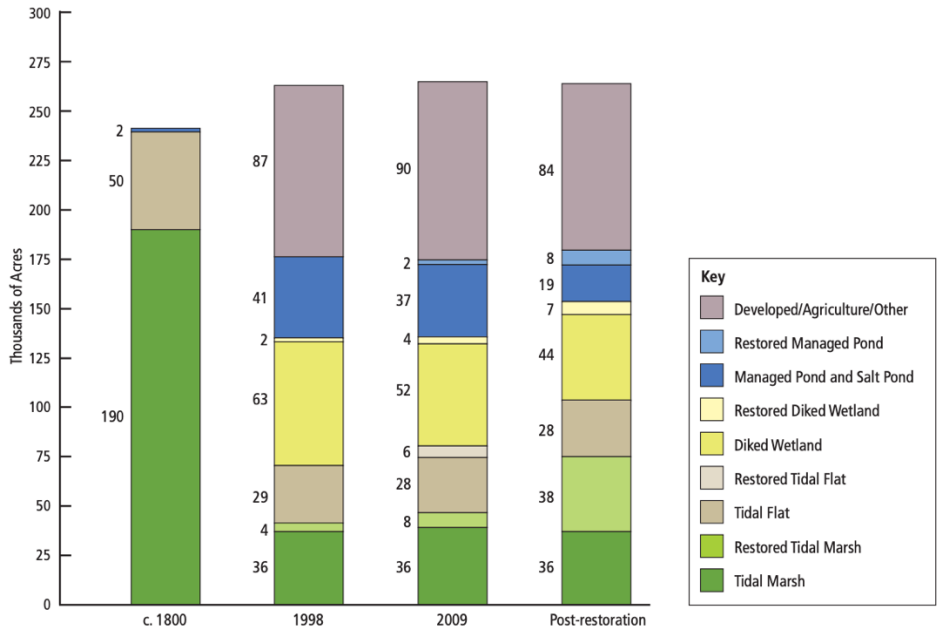


**Figure 2**. Change in the extent of baylands habitats over time. Numbers on bars represent thousands of acres. Acres of restored habitat in each time period are cumulative for each habitat type (e.g., restored tidal marsh in 2009 reflects all marsh restored before 2009, including marsh restored prior to 1998).[12]

Between 2016 and the end of 2019, BCDC authorized 3,697 acres of restoration in the Bay (Table 2), which is predominantly tidal wetland restoration, but also includes intertidal and subtidal estuarine habitat restoration. However, authorized restoration was not evenly distributed around the Bay, with the vast majority occurring in Alameda, San Mateo, and Santa Clara counties as part of the South Bay Salt Ponds Restoration project, and over 1,000 more acres of restoration were permitted in Solano county. Relatively small restoration projects were permitted in Contra Costa and Marin counties, while no restoration was authorized in Napa, Sonoma, or San Francisco counties.[13] This increase in wetland acreage contributes to the regional goals established in BEHGU.

[11] Goals Project, pgs 14-15
[12] Goals Project, Figure 1, pg 9.
[13] BCDC Annual Reports, 2016 - 2019

However, data on land cover change from the National Land Cover Dataset (NLCD)[14] depicts a different situation for wetlands in the Bay Area. The data show that Emergent Herbaceous Wetlands and Woody Wetlands comprised 12,433 acres in 2011, and 12,048.71 acres in 2016. It is possible that the apparent reduction in wetlands demonstrated by this dataset can be explained by the gradual process of wetland restoration. Once a diked area is breached to tidal action, a first step in many restoration projects, it often takes several years or more for vegetation to establish in the area. Thus, "restored wetlands" could appear on NLCD as open water or mudflat, although they are expected to eventually evolve into wetlands.

**Table 2. Restoration permitted by BCDC 2016-2019[15]**

| Year | Acres of Restoration |
|---|---|
| 2016 | 419.7 |
| 2017 | 603.1 |
| 2018 | 2672 |
| 2019 | 2.6 |
| **Total** | **3,697.4** |

**Management Characterization:**

**Table 3. Significant Changes in Wetland Management**

| Management Category | Significant Changes Since Last Assessment (Y or N) |
|---|---|
| Statutes, regulations, policies, or case law interpreting these | Y |
| Wetlands programs (e.g., regulatory, mitigation, restoration, acquisition) | Y |

*Completion of the Baylands Ecosystem Habitat Goals Science Update*

A science update to the 1999 Baylands Ecosystem Habitat Goals was initiated prior to the 2016 to 2020 Assessment and Strategy, but was not completed and released until the 2016 to 2020 Assessment and Strategy had been submitted. BCDC staff served on the project steering committee and attended plenary workshops supporting the development of the document. The release of BEHGU in 2015 has been central to the acceleration of wetland restoration efforts in the region, as the report highlights the importance of restoring wetlands by 2030 to allow them to naturally keep pace with sea level rise. Also, the report provides an updated consensus for wetland restoration and management goals for the region, and therefore served as a foundational document for BCDC's wetland policy updates.

*Fill for Habitat Bay Plan Amendment*

[14] Multi-Resolution Land Characteristics Consortium. National Land Cover Database. Accessed in December 2019. https://www.mrlc.gov/data. Wetland extent was calculated for Emergent Herbaceous Wetlands (95) and Woody Wetlands (90) for 2016 and 2011.

[15] BCDC Annual Reports, 2016-2019

In 2017, after a series of public workshops on rising sea level at BCDC Commission meetings, BCDC initiated the Fill for Habitat Bay Plan amendment with the goal of considering the need to allow more fill in the Bay for wetland restoration and sea level rise adaptation. The decision to amend the Bay Plan was also informed by Policies for a Rising Bay, a NOAA Project of Special Merit which is described in more detail in the Achievements section above. Policy changes were adopted by the Commission in the fall of 2019. The amended policies allow more fill and beneficial reuse of sediment for wetland habitat projects, and add or modify policies to better guide wetland restoration and conservation in the face of sea level rise. The policy changes are expected to facilitate wetland restoration and sea level rise adaptation throughout the Bay Area. More details are provided in the Accomplishments section above. This policy update was identified as a component of Strategy 1 from the 2016 to 2020 Assessment and Strategy.

*Measure AA and the Bay Restoration Regulatory Integration Team (BRRIT)*
As described in more detail in the Achievements section, Measure AA was adopted in 2016, and in 2018 BCDC and other Bay regulatory agencies formed the Bay Restoration Regulatory Integration Team (BRRIT) to coordinate the permitting process for multi-benefit habitat restoration projects and associated flood management and public access infrastructure in the San Francisco Bay and along the shoreline of the nine Bay Area counties. The funding through Measure AA and the formation of the BRRIT are expected to accelerate and facilitate wetland restoration throughout the Bay Area.

**Enhancement Area Prioritization:**

**High** __X__
**Medium** _____
**Low** _____

The HIGH priority level was given to this enhancement area due to the historic loss of wetlands, increasing threats to wetlands in the Bay Area, and the urgent need to restore wetlands to ensure that they are resilient to sea level rise. Stakeholder input reflects that protecting, restoring, and enhancing wetland function in the Bay Area is a high priority (see "Summary of Stakeholder and Public Comment"). Stakeholders who considered Wetlands a top priority enhancement area felt that the most critical issues affecting wetlands are sea level rise, lack of transition zone/migration space, and need for improved sediment management and increased beneficial reuse. Indeed, increasing water levels in the Bay due to rising sea levels in concert with a decreasing sediment supply and a fairly fixed shoreline that inhibits inland migration put the Bay's wetlands at great risk. The survival of Bay Area tidal wetlands will depend on the inherent resiliency of the wetlands systems themselves and our ability to protect, restore and enhance them. Without intervention, the region will lose critical wetlands and their functions, including habitat provision, flood protection, water quality improvements (pollutant reduction), carbon sequestration, and the prevention of shoreline erosion through wave energy attenuation.

## Coastal Hazards

**Objective:** Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level change. §309(a)(2)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regard to the coastal hazards enhancement objectives.

**Table 4. General Level of Hazard Risk in the Bay Area Coastal Zone[16]**

| Type of Hazard | General Level of Risk[17] (H, M, L) |
|---|---|
| Flooding (riverine, stormwater) | High |
| Coastal storms (including storm surge) | High |
| Earthquakes | High |
| Tsunamis | Low |
| Shoreline erosion | Medium |
| Sea level rise | High |
| Great Lakes level change | N/A |
| Land subsidence | Medium |
| Saltwater intrusion | High |
| Groundwater flooding | High |

*Flooding Risk (includes sea level rise, coastal storms, land-based flooding)*
The Bay Area is predicted to be at high risk for coastal flooding. Total water levels (TWL) are expected to rise from a combination of sea level rise, coastal storms, and land-based flooding (fluvial and groundwater flooding). The ART Bay Area assessment concluded that significant proportions of critical regional assets, specifically transportation infrastructure, vulnerable communities, future development areas, and natural lands, will be exceedingly vulnerable to flooding as water levels rise (subset of data provided in Table 5 below). Not only are these systems vulnerable, but many critical assets are co-located, resulting in regional hotspots where flooding impacts will be particularly problematic. Additionally, research summarized in BEHGU concluded that sea level rise could drastically alter the distribution of various ecosystem types around the Bay, including high, mid, and low tidal marsh, mudflats, and subtidal areas (Figure 3).

[16] Assessment based on information from http://myhazards.caloes.ca.gov/ and information presented through the rest of the Phase I Coastal Hazards Assessment.
[17] Risk is defined as "the estimated impact that a hazard would have on people, services, facilities and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage." *Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA 386-2. August 2001*

**Table 5. Flooding Impacts to the Bay Area Coastal Zone[18]**

| Bay Area Asset Impacted by Flooding | Impact-24" TWL | Impact-48" TWL | Impact – 108" TWL |
|---|---|---|---|
| Total regional miles of highway | 10 (<1%) | 60 (2%) | 190 (7%) |
| Total miles of commuter rail | 10 (1%) | 20 (3%) | 80 (13%) |
| Airport acreage | 1,130 (9%) | 4,760 (39%) | 5,200 (43%) |
| Seaport acreage | 370 (4%) | 780 (9%) | 3,320 (39%) |
| Miles of Bay trail | 60 (11%) | 160 (28%) | 330 (58%) |
| Number of Residential Units in Socially Vulnerable Block Groups | 6,280 | 27,950 | 91,460 |
| Number of Residential Units in Contamination Burdened Block Groups | 6,850 | 19,000 | 51,330 |
| Number of current residential units in priority development areas | 3,990 | 12,780 | 50,460 |
| Number of future residential units in priority development areas | 24,640 | 83,020 | 191,800 |
| Carbon Storage (acres times % weighted soil organic matter) | 430,160 | 547,650 | 571,150 |
| Square miles of tidal marsh habitat | 19.6 | 20.3 | 20.7 |

[18] Adapting to Rising Tides 2020. *Adapting to Rising Tides Bay Area: Regional Sea Level Rise Vulnerability and Adaptation Study*. Bay Conservation and Development Commission (BCDC) and Metropolitan Transportation Commission/Association of Bay Area Governments (MTC/ABAG), San Francisco, CA. Data show impacts caused by temporary or permanent flooding at the total water level (TWL) listed in each column.

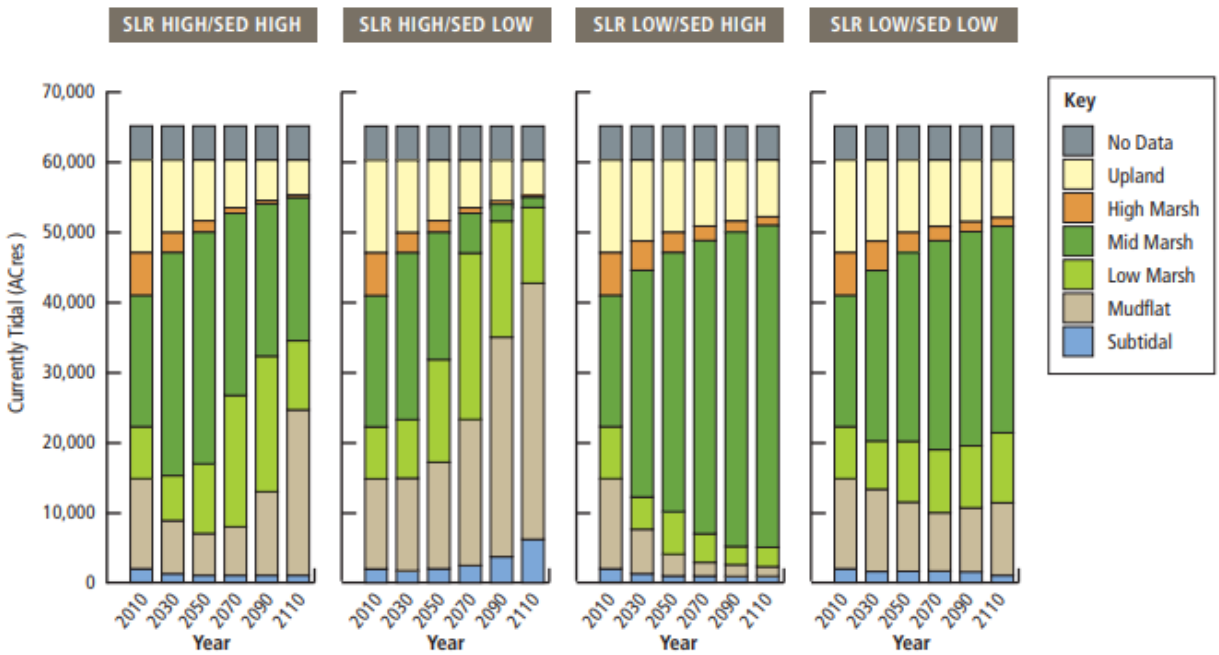


**Figure 3**. Predicted changes to existing coastal wetland habitat based on two sea level rise and sediment load projections. This figure is adapted from Stralberg, D. et al. 2011[19] in the 2015 Baylands Ecosystem Habitat Goals Update.[20]

*Saltwater Intrusion and Groundwater Flooding Risk*

A recent study[21] predicted the extent of groundwater flooding as a result of saltwater intrusion with one meter of sea level rise. The study concluded that there are widespread areas throughout the San Francisco Bay region where surface flooding from groundwater emergence is possible (Figure 4).

[19] Stralberg, D., Brennan, M., Callaway, J.C., Wood, J.K., Schile, L.M., Jongsomjit, D., Kelly, M., Parker, V.T., and Crooks, S. (2011). Evaluating tidal marsh sustainability in the face of sea-level rise: a hybrid modeling approach applied to San Francisco Bay. *PloS one*. 6(11).

[20] Goals Project.

[21] Plane, E., Hill, K., and May, C. (2019). A Rapid Assessment Method to Identify Potential Groundwater Flooding Hotspots as Sea Level Rises in Coastal Cities. *Water*. 11 (2228): 1-14. https://www.mdpi.com/2073-4441/11/11/2228/pdf

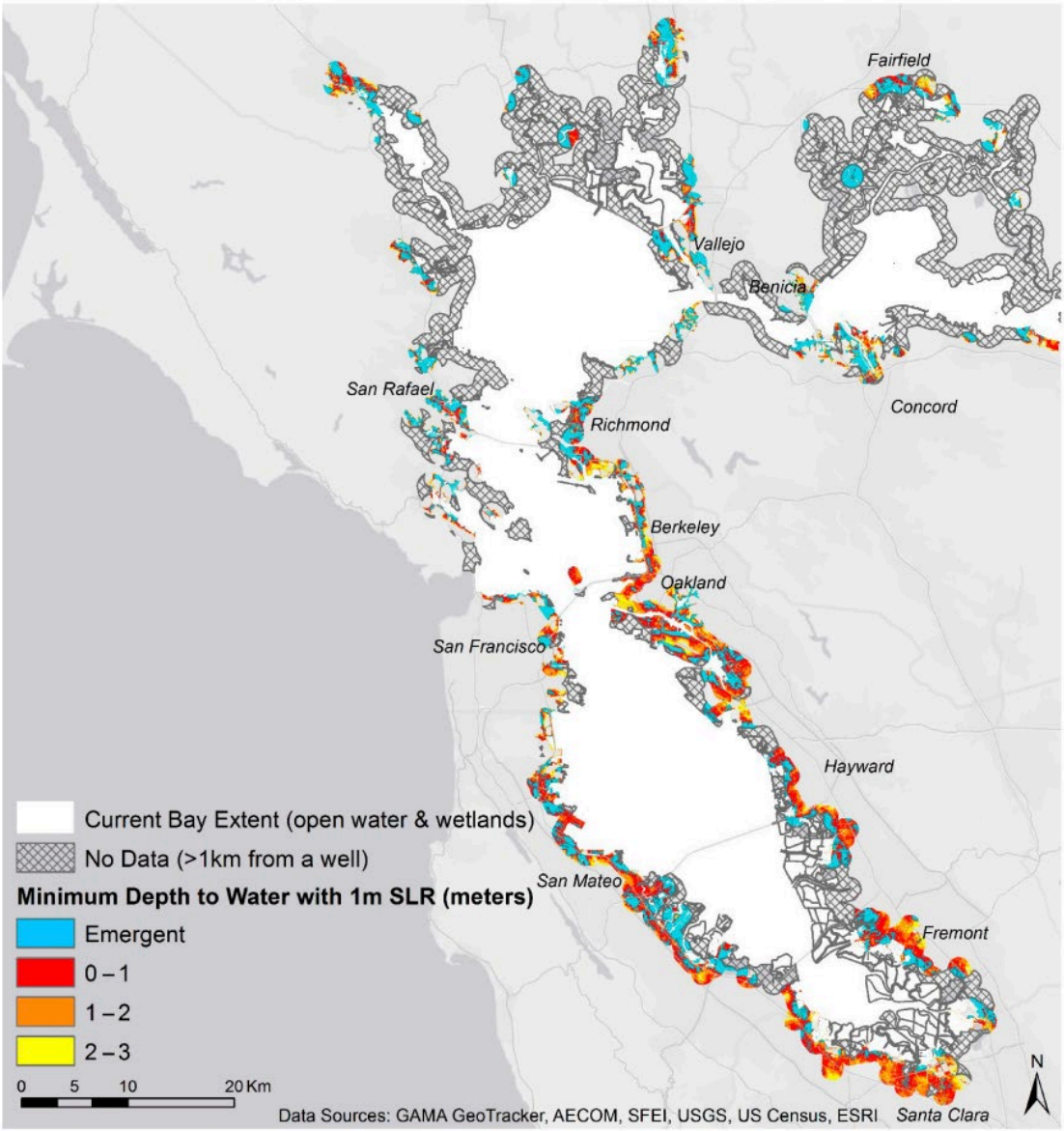


**Figure 4**. Future groundwater flooding. This map shows areas where groundwater is likely to emerge as surface flooding with 1 m of sea level rise (SLR). However, ponding may not necessarily occur in all of these areas, as the model does not account for surface discharge.[22]

*Land Subsidence Risk*

A recent study[23] demonstrated land subsidence rates of less than 2 mm/year along most of the coastal areas along San Francisco Bay. However, rates exceed 10 mm/year in some areas (Figure 5). Moreover, the study found that maps that estimate 100-year inundation hazards

[22] Ibid.

[23] Shirzaei, M. and Bürgmann, R. (2018). Global climate change and local land subsidence exacerbate inundation risk to the San Francisco Bay Area. *Science Advances*. 4: 1-8.

solely based on the projection of sea level rise from various emission scenarios underestimate the area at risk of flooding by 3.7% to 90.9%, compared with revised maps that account for the contribution of local land subsidence.

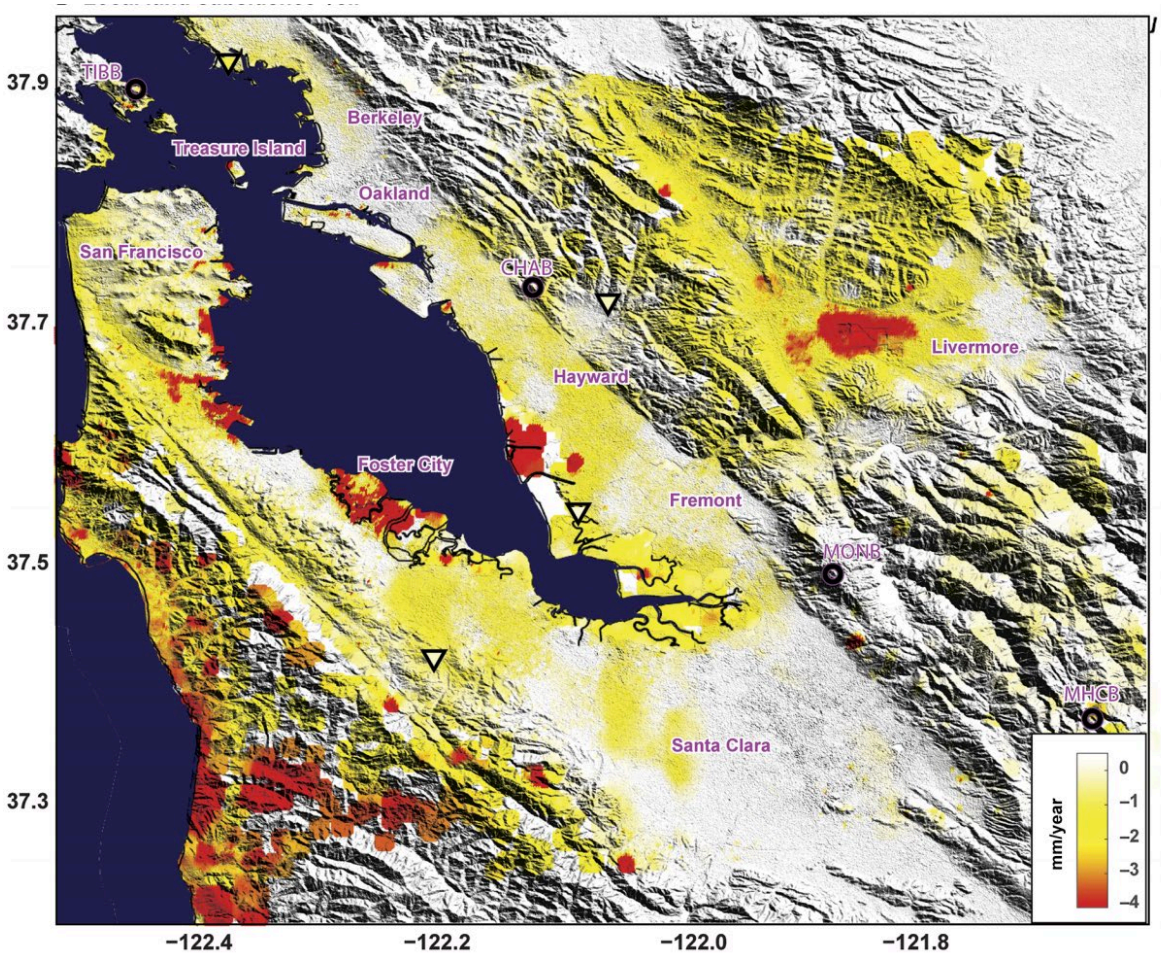


**Figure 5**. Local land subsidence velocity. Dark red areas indicate areas of highest land subsidence.[24]

[24] Ibid.

**Management Characterization:**

**Table 6. Significant Changes in Hazards Management**

| Topic Addressed | Employed by BCDC (Y or N) | CMP Provides Assistance to Locals that Employ (Y or N) | Significant Changes Since Last Assessment (Y or N) |
|---|---|---|---|
| **Changes in Statutes, Regulations, Policies, or Case Law** | | | |
| Elimination of development/redevelopment in high-hazard areas[25] | N | N | N |
| Management of development/redevelopment in other hazard areas | Y | Y | N |
| Climate change impacts, including sea level rise | Y | Y | Y |
| **Changes in Hazards Planning Programs or Initiatives** | | | |
| Hazard mitigation | N | Y | Y |
| Climate change impacts, including sea level rise | Y | Y | Y |
| **Changes in Hazards Mapping or Modeling Programs or Initiatives** | | | |
| Coastal flooding (sea level rise, coastal storm flooding, riverine/stormwater runoff) | Y | Y | Y |

*Definition of "High-Hazard Areas"*
Within BCDC's jurisdiction, high-hazard areas are generally considered to be those areas that already experience or are predicted to experience flooding in the coming years, whether from sea level rise, coastal storms, riverine flooding, groundwater flooding, or some combination of these factors. High-hazard areas also include areas with significant seismic risk for ground shaking and liquefaction.

**Significant Management Changes**

*Adapting to Rising Tides Bay Area*
The Adapting to Rising Tides (ART) program has made significant advances in planning for climate change impacts, as well as in sea level rise/coastal flooding mapping, since the last assessment. The ART program released the Bay Shoreline Flood Explorer, a coastal flooding assessment tool that allows viewers to visualize areas impacted by flooding at a range of total water levels. Additionally, the ART program concluded a two-year study, ART Bay Area, which conducted vulnerability assessments for four key regional assets (described in more detail in the Achievements section above) and developed potential adaptation actions for communities

[25] Using state's definition of high-hazard areas.

vulnerable to flooding of any of these major assets. BCDC staff and partners expect that the findings of ART Bay Area will be a key tool to local governments in future coastal flooding planning, and that results will benefit regional coastal hazard planning efforts, such as BCDC's Bay Adapt. The accomplishments of ART Bay Area are directly related to Strategy 2 from the 2016-2020 Assessment & Strategy.

*Adapting to Rising Tides Program*

As detailed in the Accomplishments section above, the ART program advanced hazards mapping by producing detailed overtopping maps, and advanced coastal hazard planning programs and initiatives through its work on the Oakland/Alameda resilience study, the West Contra Costa and East Contra Costa adaptation planning projects, and through the activities of the ART help desk by providing support to local and regional governments throughout the Bay Area in their adaptation planning efforts. The East and West Contra Costa projects also led to the development of hazard mitigation plans for the county. The accomplishments of the ART program were driven by Strategy 2 of the 2016 to 2020 Assessment and Strategy, and components of the ART program were supported by NOAA 309 funding in fiscal years 2015 and 2016.

*Local Hazard Mitigation and Climate Adaptation Plans*

In an effort to support local governments in planning for existing hazards and preparing for future hazards due to climate change, BCDC's ART program partnered with the Association of Bay Area Governments (ABAG) Resilience Program to develop a process to support the update and development of hazard mitigation and climate adaptation plans for communities throughout the region. Integrating hazard mitigation planning (focused on historic risks) with climate adaptation planning (focused on future risks) the program sought to develop clear guidance and a unified strategy to support community sustainability and resilience. In 2016, ABAG and BCDC staff provided assistance to communities updating or developing hazard mitigation plans by providing three public workshops, developing guidance documents, hosting an open data page, assembling additional resources, and offering specialized one-on-one technical assistance for plan development.[26]

*Bay Plan Amendments*

BCDC adopted two amendments to its Bay Plan in 2019—the Fill for Habitat Bay Plan amendment, and the Environmental Justice and Social Equity Bay Plan amendment. The policy changes resulting from both of these amendments addressed the impacts of sea level rise. Specifically, the Fill for Habitat amendment considered the need for more fill to foster greater resilience of Bay habitats to rising sea level, and considered issues like the need for migration space for habitats, and the need to consider sea level rise predictions in determining allowable volumes and locations of fill in the Bay. The Environmental Justice amendment included new policies to reduce the impacts of sea level rise on vulnerable communities. Both amendments are described in more detail in the Achievements section above, and both are expected to

[26] http://resilience.abag.ca.gov/projects/2016-mitigation-adaptation-plans/

increase the resilience of coastal communities and habitats and reduce sea level rise-associated impacts. The Fill for Habitat amendment was identified as a component of Strategy 1 of the 2016 to 2020 Assessment and Strategy. The Environmental Justice amendment was part of the work plan for Strategy 2 in the 2016 to 2020 Assessment and Strategy, and was supported by 309 funds in fiscal years 2017 - 2019.

*Bay Adapt: Regional Strategy for a Rising Bay*

In 2019, BCDC initiated work on an adaptation strategy for the Bay shoreline, called Bay Adapt. Bay Adapt is a joint initiative to lay out the actions necessary to adapt the Bay Area to rising sea level to protect people and the natural and built environment. This 6-month collaborative, action-setting process to address rising sea level will bring together Bay Area regional leadership and communities to enable them to reduce risk, foster local adaptation, prioritize and act regionally, fast-track implementation, remove barriers, and unlock and align funding and financing. The anticipated result of this initiative will be a shared Joint Platform, based on a set of Guiding Principles for adaptation in the Bay Area. This Joint Platform is expected to include 10 to 15 priority actions (such as planning, funding, permitting, policy, etc.) that regional leaders agree are necessary for coordinated sea level rise adaptation. At the end of this process, all members of the Leadership Advisory Group will consider committing to the adaptation actions, endorsing the Joint Platform and playing a leadership role in implementation.

**Enhancement Area Prioritization:**

**High** __X__
**Medium** _____
**Low** _____

The HIGH priority level was given to this enhancement area due to the significant impacts that coastal hazards will have on the San Francisco Bay Area's social, economic and ecological systems. Sea level rise, land-based and fluvial flooding, groundwater rise, and seismic events are predicted to have widespread impacts on many critical regional systems (characterized above), and thus collaborative development of adaptation solutions will be a top priority for BCDC's CMP in coming years. Stakeholder feedback reflected these concerns and identified Coastal Hazards as the highest priority enhancement area for BCDC's Coastal Management program (see "Summary of Stakeholder and Public Comment").

## Public Access

**Objective:** Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value. §309(a)(3)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regard to the public access enhancement objectives.

**Table 7. Public Access Status and Trends**

| Type of Access | Current number | Changes or Trends Since Last Assessment | Cite data source |
|---|---|---|---|
| Shoreline (including beach) access sites[27] | Over 1,204 acres and 172 miles of shoreline public access permitted since the inception of BCDC | Increase; over 137 acres and 29 miles added since last assessment | BCDC Annual Reports (2015-2019) |
| Recreational boat (power or nonmotorized) access sites | ~~42~~ 50 designated ~~Trailheads~~ sites of the SF Bay Water Trail; 57 marinas; 17,700 wet slips | There has been no comprehensive review of this trend. However, two new boat docks were permitted since 2015; all trailheads of the SF Bay Water Trail were officially established since 2015; there were 5 marina closures in the past 10 years, with more expected to close soon[28]; and increased number of and membership in boat share program/community sailing centers/commercial sailing schools | San Francisco Bay Water Trail[29]; Bay Planning Coalition Presentation to the Commission[30] |
| Number of designated scenic vistas or overlook points | 20 | No change | Bay Plan Maps |

[27] In the Bay, beach access and shoreline access sites are somewhat interchangeable, as the number of "beaches" would vary depending on the definition of beach used.
[28] This trend and its implications are discussed in more detail in the Ocean and Great Lakes Resources section of the Phase I Assessment.
[29] San Francisco Bay Water Trail Trailheads Map. Accessed December 2019. http://sfbaywatertrail.org/map/?id=182&type=trailheads
[30] Josh Burnham, Bay Planning Coalition. 2018 Presentation to the San Francisco Bay Conservation and Development Commission: Update on the San Francisco Marina Industry. https://bcdc.ca.gov/cm/2018/1101Recreationalboating.pdf

| Type of Access | Current number | Changes or Trends Since Last Assessment | Cite data source |
|---|---|---|---|
| Number of fishing access points (i.e. piers, jetties) | Over 75 fishing access points, including more than 40 public piers | Increase – two permits issued for pier renovation since last assessment | Recreation and San Francisco Bay[31]; San Francisco Bay Shoreline Guide[32]; BCDC permit data |
| Coastal trails/ boardwalks | San Francisco Bay Trail: Over 350 miles in place, 500 miles planned | Increase by ~~over 10 miles~~12 miles | San Francisco Bay Trail[33] |
| Number of acres parkland/open space | Over 30,000 acres | Increase – 20 new park/open space permits issued since 2015 | San Francisco Baykeeper[34]; Preserving Shoreline Parks in the Face of Climate Change[35]; BCDC permit data |

[31] BCDC Staff Report. 2006. *Recreation and San Francisco Bay*.
[32] State Coastal Conservancy. 2012. *San Francisco Bay Shoreline Guide*.
[33] https://baytrail.org/about-the-trail/welcome-to-the-san-francisco-bay-trail/
[34] https://baykeeper.org/shoreview/recreation.html
[35] Adapting to Rising Tides. 2015. *Preserving Shoreline Parks in the Face of Climate Change*. Bay Conservation and Development Commission, San Francisco, CA. http://www.adaptingtorisingtides.org/wp-content/uploads/2015/09/ART-Parks-Report_Aug2015.pdf

| Type of Access | Current number | Changes or Trends Since Last Assessment | Cite data source |
|---|---|---|---|
| Access sites that are permitted to require Americans with Disabilities Act (ADA) accessibility[36] | Over 1,204 acres and 172 miles of shoreline public access permitted since the inception of BCDC; Approximately 821 public access sites permitted since the inception of BCDC | Increase; over 137 acres and 29 miles of public access added since last assessment. Approximately 16 additional permits requiring public access. | BCDC Annual Reports (2015-2019); BCDC permit data |

**Public Access Demand and Assessment Process**

The San Francisco Bay Area is a rapidly growing metropolis, with projected population growth of 2.4 million people between 2010 and 2040, expected to reach a population of 9.6 million people by 2040.[37] Recreation located in the coastal zone is very popular among residents and tourists, and includes activities such as boating and sailing, hiking, kayaking, windsurfing, swimming, beach use, photography, surfing, scuba diving, and bicycling.[38] There is increasing demand for boat share programs, evidenced by growth of fleet size and membership in commercial sailing schools such as Olympic Circle Sailing Club (OCSC Sailing) and Club Nautique.[39] BCDC last officially assessed demand for coastal public access in its 2006 staff report, "Recreation and San Francisco Bay."[40] According to the report, there was growing demand at the time for water-oriented recreation, including some newer water-oriented activities.

The California Department of Parks and Recreation assessed demand for outdoor recreation at a statewide level fairly regularly until 2012 through the "Survey on Public Opinions and Attitudes on Outdoor Recreation in California," but the survey has not been conducted since 2012. Trends from the last survey, which were also reported in BCDC's 2016 to 2020

[36] BCDC policy requires provision of maximum feasible barrier-free public access for proposed fill projects. However, it is not always feasible to provide barrier-free public access, and BCDC does not have a compliance program to ensure that permitted barrier-free, ADA accessible public access is actually built and maintained as such. Thus, the exact number of ADA compliant public access sites is not known. However, the number of permits requiring public access provides an approximation of the number of public access sites that have permit requirements to be ADA accessible.

[37] Plan Bay Area: Forecasting the Future. http://2040.planbayarea.org/forecasting-the-future

[38] Battelle Memorial Institute. 2008. San Francisco Bay Subtidal Habitat Goals Project Appendix I-2: Economic Valuation of San Francisco Bay Natural Resources Services.

[39] OCSC Sailing and Club Nautique data, 2015

[40] BCDC 2006.

Assessment and Strategy, demonstrate regional demand for recreation in 2012 (Table 8), and projected trends for top recreational activities through 2060 (Table 9).

**Table 8. 2012 Regional Recreational Demand – Greater San Francisco Bay Area[41]**

| Top Facilities Used | % | Top Activities | % | Top Latent Demand for Activities | % |
|---|---|---|---|---|---|
| Unpaved trail | 65 | Walking | 49 | Picnicking in picnic areas (with tables, fire pits, or grills) | 55 |
| Paved trail | 58 | Hiking on unpaved trails | 42 | Walking for fitness or pleasure on paved surfaces | 33 |
| Scenic observation/wildlife viewing area | 54 | Eating/Picnicking | 30 | Camping in developed sites with facilities such as toilets and tables (not including backpacking | 33 |
| Picnic table, picnic pavilion | 53 | Playing | 27 | Day hiking on unpaved trails | 33 |
| Open space to play | 48 | Sedentary Activities | 22 | Shopping at a farmer's market | 31 |
| Beach or Water Recreation area | 44 | N/A | N/A | Beach activities (swimming, sunbathing, surf play, wading, playing on beach) | 31 |

**Table 9. Projected Top Activity Participation through 2060 – Greater San Francisco Bay Area[42]**

| Year/Activity | Walking % | Hiking % | Picnicking % | Playing % | Sedentary % |
|---|---|---|---|---|---|
| 2020 | 54 | 46 | 33 | 29 | 23 |
| 2030 | 57 | 49 | 34 | 31 | 25 |
| 2040 | 60 | 52 | 36 | 32 | 26 |
| 2050 | 64 | 55 | 37 | 33 | 27 |
| 2060 | 67 | 58 | 39 | 35 | 28 |

**Public Access Trends and Emerging Issues**

As noted in Table 7 above, the San Francisco Bay Trail and San Francisco Water Trail continue to expand to provide public access to the shoreline and water Baywide. BCDC remains committed to its partnership with these organizations and continues to support their respective goals to ensure the continuity and connectivity of the Bay Trail, and to provide a coordinated, improved, and safer set of water access locations.

In addition to continued growth in these established programs, newer public access trends have emerged as well. One of the most notable changes is the increasing call for equitable public access to the shoreline and Bay. Through a series of public workshops held by BCDC's

[41] California Department of Parks and Recreation. 2012. *Survey on Public Opinions and Attitudes on Outdoor Recreation in California 201*, page 155, Table 12.4.15.
[42] California Department of Parks and Recreation, page 156, Table 12.4.16.

Commission in 2016 and 2017, stakeholders identified environmental justice and social equity as key considerations in minimizing the impacts of sea level rise on the Bay Area and its residents. Through BCDC's resulting environmental justice and social equity Bay Plan amendment, issues related to public access were considered, specifically the distribution and quality of public access, the need for meaningful community involvement in public access development, public access barriers, and incorporation of environmental justice and social equity into the public access design review process. Additionally, the Environmental Justice and Social Equity Bay Plan amendment identified management changes that could further improve public access sites to ensure more equitable and accessible public spaces.

In recent years, conflicts between resource protection/restoration and public access provision have arisen repeatedly. While this issue is not new, and the Bay Plan contains policies aimed at reducing these conflicts, inherent differences remain in the priorities of natural resource managers and advocates, public access advocates, permit applicants, and various regulatory agencies. For example, through the Fill for Habitat Bay Plan amendment process, and initial discussions regarding updates to the Suisun Marsh Protection Plan, some stakeholders called for reduced public access requirements for restoration projects, and for a movement toward more strategic regional placement of public access. Other stakeholders believe that BCDC's policies already provide sufficient protection for wildlife and habitat, and maintain that maximum feasible public access should be provided for any proposed project, as current BCDC law and policy require. As more habitat restoration projects move forward in the coming decade to meet regional goals of restoring baylands by 2030,[43] resolution of these conflicting viewpoints on public access will be increasingly important. The projected impacts of coastal flooding and sea level rise on public access and habitat will further intensify use conflicts, not only between these two coastal uses but also for transportation projects, ports, airports, and other key water-oriented activities. Additionally, it will be important to ensure that community needs and potential disproportionate impacts to vulnerable populations are considered in resolving conflicts over public access, restoration, and rising sea level. BCDC remains committed to providing maximum feasible public access regionwide, while also protecting and restoring habitat and providing for other vital uses of the shoreline. Therefore, these use conflicts will be explored further through the Coastal and Estuarine Resources Phase II Assessment.

[43] Goals Project

**Management Characterization:**

**Table 10. Significant Changes in Public Access Management**

| Management Category | Employed by BCDC (Y or N) | CMP Provides Assistance to Locals that Employ (Y or N) | Significant Changes Since Last Assessment (Y or N) |
|---|---|---|---|
| Statutes, regulations, policies, or case law interpreting these | Y | Y | Y |
| Operation/maintenance of existing facilities | N | Y | N |
| Acquisition/enhancement programs | N | Y | N |

In October of 2019, the Commission adopted the Environmental Justice (EJ) and Social Equity Bay Plan amendment, which amended the Public Access Bay Plan policies. EJ-related changes to the public access policies are described above in the description of trends in demand for public access. These changes represent a significant step toward a more welcoming and accessible shoreline and Bay for all residents. The EJ amendment was part of the workplan for Strategy 2 of the 2016 to 2020 Assessment and Strategy and was supported by NOAA 309 funds for two years. The changes to public access policies are expected to result in more robust community engagement in public access development, the creation of more diverse public access opportunities in areas where they have been lacking, and barrier-free public access for those with disabilities, those of all income levels, and those of all cultures.

**Table 11. Publicly Available Access Guide**

| Public Access Guide | Printed | Online | Mobile App |
|---|---|---|---|
| State or territory has? | Yes[44] | Yes | No |
| Web address | https://baytrail.org/store/bay-trail-maps/ | http://sfbaywatertrail.org/map/<br>https://baytrail.org/baytrailmap.html | N/A |
| Date of last update | 2012 | Water Trail: 2019<br>Bay Trail: January 2020 | N/A |
| Frequency of update | Approximately every 2-3 years, depending on how much new access has been added | Water Trail: Quarterly<br>Bay Trail: Regularly-updates occur shortly after new access as added | N/A |

[44] State Coastal Conservancy (2012) *San Francisco Bay Shoreline Guide: Access Maps to the Entire San Francisco Bay Trail*

**Enhancement Area Prioritization:**

**High** _____
**Medium** __X__
**Low** _____

The MEDIUM priority level was given to this enhancement area due to ongoing regionwide information needs and management challenges related to public access. While public access continues to successfully expand under BCDC's laws and policies, and the work of the Bay Trail project, this public access growth is not inevitable. BCDC must continue to assess emerging challenges in providing equitable public access regionwide. It will be necessary to resolve ongoing use conflicts between public access and other shoreline uses, especially in light of rising sea level. The Environmental Justice (EJ) Bay Plan amendment highlighted public access management changes that are necessary to ensure the equitable provision of public access in the coastal zone. Updated studies and policy/management changes are necessary to address the growing need for diverse coastal recreation in light of population growth and demographic shifts, uncertainty in the extent and timing of climate change impacts on public access, the inherent conflicts between providing maximum feasible public access and restoration/wildlife habitat, and the intersection of all of these issues. Stakeholder input reflected a medium priority designation for public access (see "Summary of Stakeholder and Public Comment"). This Enhancement Area was not ranked "High" priority because of the stakeholder prioritization, and because most of the pressing needs were related to Coastal Hazards and use conflicts highlighted in the Coastal and Estuarine Resources, so the issues could be best addressed comprehensively through Phase II Assessments and Strategy development on those Enhancement Areas. The issue of public access and wildlife/restoration conflicts will be addressed through the Phase II Assessment and Strategy on Coastal and Estuarine Resources.

## Marine Debris

**Objective:** Reducing marine debris entering the nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris. §309(a)(4)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regards to the marine debris enhancement objectives.

**Table 12. Existing Status and Trends of Marine Debris in BCDC's Coastal Zone**

| Source of Marine Debris | Significance of Source | Type of Impact | Change Since Last Assessment |
|---|---|---|---|
| Beach/shore litter | High | Aesthetic, resource damage, water quality | Increase |
| Land-based dumping | Unknown | Aesthetic, resource damage, water quality | Unknown |
| Storm drains and runoff | High | Aesthetic, resource damage, water quality | Unknown |
| Land-based fishing (e.g., fishing line, gear) | Low | Resource damage, user conflicts | Unknown |
| Ocean/Great Lakes-based fishing (e.g., derelict fishing gear) | Low | Resource damage, user conflicts | Unknown |
| Derelict vessels | High | Aesthetic, resource damage, water quality, user conflicts, navigational hazard | No change |
| Vessel-based (e.g., cruise ship, cargo ship, general vessel) | Low | Aesthetic, resource damage, water quality | Unknown |
| Hurricane/Storm | Medium | Aesthetic, resource damage, water quality | Unknown |
| Tsunami | Low | Aesthetic, resource damage, water quality | Unknown |

*Derelict Vessels*

In 2019, research was published quantifying the damage to eelgrass beds caused by vessels that illegally anchor for long periods of time in the Bay, some of which are abandoned or derelict vessels (ADVs).[45] The study found that long-term illegal vessel anchorage causes visible scars in eelgrass beds, and has resulted in a 25-41% loss of eelgrass in the study area (Richardson Bay, Marin County, California).

[45] Kelly, J.J., Orr, D., and Takekawa, J.Y. (2019). Quantification of damage to eelgrass (*Zostera marina*) beds and evidence-based management strategies for boats anchoring in San Francisco Bay. *Environmental Management* 64: 20-26

*Litter*
Littering of the shoreline and adjacent areas, often resulting in litter in the Bay, remains a prominent issue for the San Francisco Bay Area. Every year communities throughout the Bay Area participate in California Coastal Cleanup Day, which coincides with the International Coastal Cleanup Day, and tally the amounts of litter collected. In 2018 Coastal Cleanup day events, the nine Bay Area counties collected 248,513 pounds of debris, including both trash and recyclables.[46] The amount of litter collected has increased almost every year since the last assessment.

*Microplastics*
Microplastics, or minute plastic particles formed by the breakdown of larger plastic debris, have been increasingly recognized as a potential threat to coastal ecosystems and human health. Microplastics can enter coastal waters through myriad pathways, including stormwater, wastewater, atmospheric deposition, rivers, and aquatic and shore activities. New research has started to assess the impacts and transport pathways of microplastics in the Bay Area, finding that these tiny particles are widespread in stormwater, treated wastewater, surface water, sediment, and prey fish.[47] Notably, the report found that stormwater discharges 300 times more microplastics than treated wastewater.

**Management Characterization:**

**Table 13. Significant Changes in Marine Debris Management**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Changes Since Last Assessment |
|---|---|---|---|
| Marine debris statutes, regulations, policies, or case law interpreting these | Yes | Yes | No |
| Marine debris removal programs | Yes | Yes | Yes |

BCDC monitors marine debris primarily through its enforcement program and its efforts on abandoned and derelict vessels (ADVs). BCDC's enforcement program staff regularly participate in the United States Coast Guard-sponsored Abandoned and Derelict Vessel Working Group meetings that occur four times per year, through which it works with other local, state and federal agencies to identify and remove ADVs from the Bay and Delta. Since the 2016 to 2020 Assessment and Strategy was finalized, the most significant management changes have

[46] California Coastal Cleanup Results. 2018. Data Accessed in January 2020. https://www.coastal.ca.gov/publiced/ccd/history.html. The sum of data for the 9 Bay Area Counties is reported.
[47] Sutton, R.; Lin, D.; Sedlak, M.; Box, C.; Gilbreath, A.; Holleman, R.; Miller, L.; Wong, A.; Munno, K.; Zhu, X.; et al. 2019. Understanding Microplastic Levels, Pathways, and Transport in the San Francisco Bay Region. SFEI Contribution No. 950. San Francisco Estuary Institute: Richmond, CA.

centered around management of ADVs in Richardson Bay, an area of Marin County where approximately 150 ADVs and illegally moored occupied vessels have presented problems for many years in conflict with BCDC's enforceable policies. Since the last Assessment, BCDC and its partners, the City of Sausalito and the Richardson's Bay Regional Agency (RBRA), with representatives from Marin County and the Cities of Belvedere, Tiburon and Mill Valley, have ramped up management efforts in Richardson Bay by: (1) hiring an Executive Director; (2) performing more frequent vessel inventories, which provide critical data about the number of vessels, duration of stay, frequency of movement, registration status, vessel condition and ownership, among other information; and (3) implementing measures, including ordinance updates, to limit the influx of new vessels into Richardson Bay. The BCDC enforcement staff informed the RBRA about the NOAA Marine Debris Removal Grant several years ago and, in response, the RBRA has applied for and received funding to augment its annual vessel abatement budget, largely from the State Department of Parks and Recreation, Division of Boating and Waterways and limited to recreational vessel abatement.[48] The NOAA- funded project is focused on the removal of about 25 abandoned or derelict vessels between 18 and 50 feet in length, some of which are commercial. The expected total weight of debris removed from the Bay using these grant funds will be about 250 tons.

**Enhancement Area Prioritization:**

| | |
|---|---|
| **High** | _____ |
| **Medium** | _____ |
| **Low** | __X__ |

The LOW priority level was given to this enhancement area because BCDC has limited authority over marine debris, particularly related to land-based sources, and has therefore been focusing primarily on issues regarding derelict vessels, derelict pile-supported structures, and non-authorized live-aboard vessels through permitting and enforcement activities. Additionally, stakeholder input ranked this enhancement area as a much lower priority than the six areas ranked as either high or medium priorities in this Assessment (see "Summary of Stakeholder and Public Comment"). Despite the low priority ranking in relation to other coastal management issues, BCDC will continue to work on important marine debris concerns pertaining to its jurisdiction though its regulatory and enforcement programs.

[48] https://marinedebris.noaa.gov/removal/cleaning-richardson-bay-one-vessel-time

## Cumulative and Secondary Impacts

**Objective:** Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources. §309(a)(5)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regards to the Cumulative and Secondary Impacts enhancement objectives.

**Table 14. Trends in Coastal Population and Housing Units in Nine Bay Area Counties**[49]

| | 2013 | 2018 | Percent Change (2013-2018) |
|---|---|---|---|
| **Number of people** | 7,446,312 | 7,753,023 | 4.12% |
| **Number of housing units** | 2,821,240 | 2,923,076 | 3.61% |

**Distribution of Land Cover Types in Coastal Counties**

In the absence of 2016 data from NOAA's Land Cover Atlas (C-CAP), information on land cover, or "place types", from the San Francisco Bay Shoreline Adaptation Atlas is provided:

> The San Francisco Bay Area Planning and Urban Research Association (SPUR) developed place types to classify every quarter-square-mile of the Bay Area into major categories of land use and physical form. SPUR defined 14 distinct place types in four different categories: rural and open space, primarily residential, primarily job centers, and densely mixed uses. Place types were generated from five variables: housing density, job density, road intersection density, pavement permeability, and how mixed the land use is.[50]

Analysis of place types, depicted in Figure 6 below, revealed that roughly 84 percent of the land in the nine-county region is in rural open space or agriculture. Twenty-six percent of that land is already protected. Of the urbanized area, about 75 percent is in primarily single-family residential neighborhoods.[51]

[49] National Ocean Economics Program – Population and Housing Data. *www.oceaneconomics.org/Demographics/PHsearch.aspx*.
[50] SFEI and SPUR. 2019. San Francisco Bay Shoreline Adaptation Atlas: Working with Nature to Plan for Sea Level Rise Using Operational Landscape Units. Publication number 915, San Francisco Estuary Institute, Richmond, CA, page 48
[51] https://www.spur.org/publications/urbanist-article/2019-03-01/bay-area-place-types

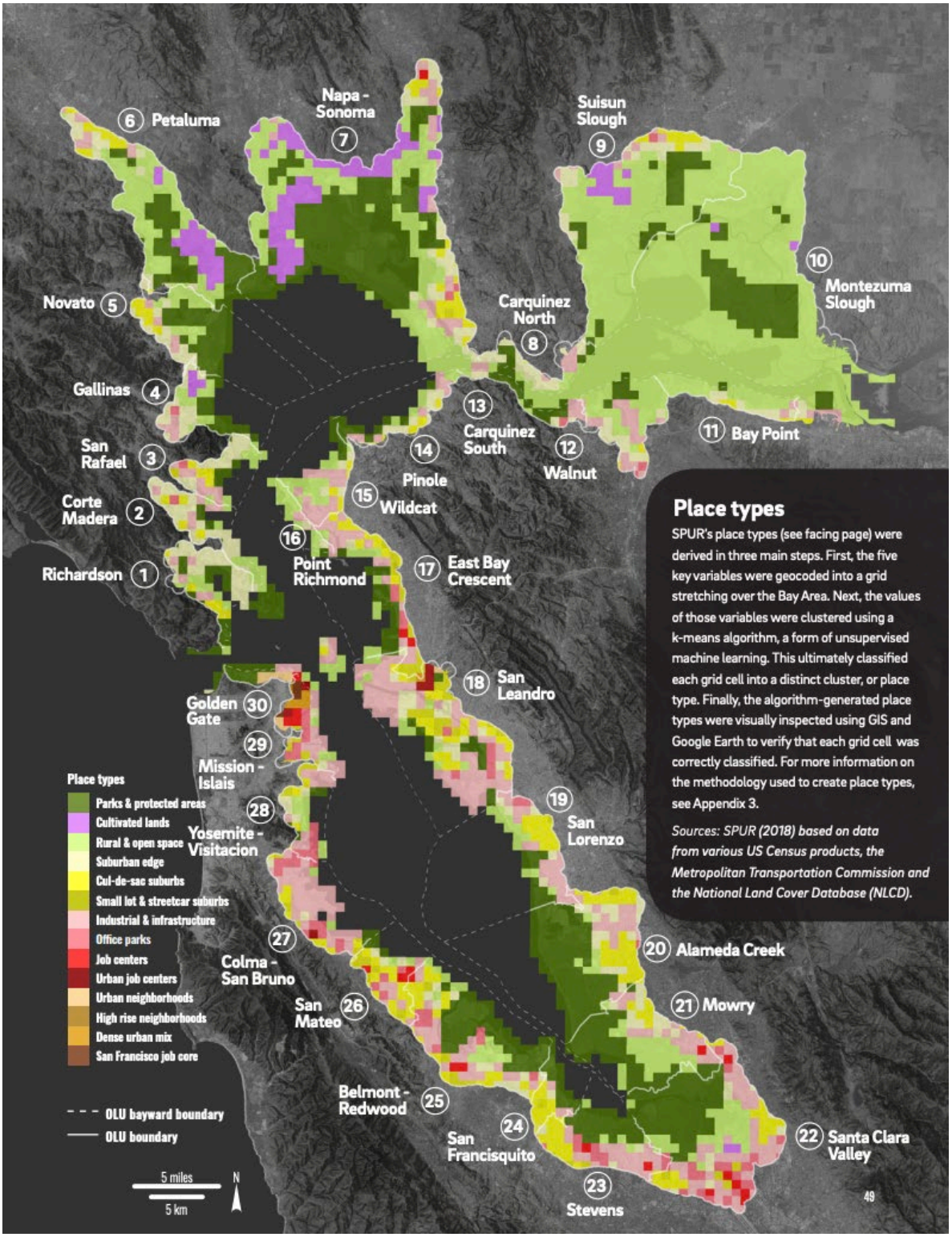


**Figure 6.** Recent breakdown of land uses throughout the Bay Area.[52]

[52] Figure source: SFEI and SPUR, page 49. Data source for figure: SPUR (San Francisco Bay Area Planning and Urban Research Association). 2018. Bay Area Place Types Dataset

**Coastal Development Change**

Because the C-CAP data are not yet available for 2016, we were unable to provide specific data on land use change between 1996 and 2016. However, as depicted in images of 2016 and 2011 land cover data for the Bay Area (Figure 7), there was not any substantial change in development patterns during this period. BCDC permitting data also provides some insight into how shoreline and land use has changed since the last assessment. Altogether, 133 projects were permitted between 2015 and 2018, including multi-use housing developments, ferry terminals, construction of parks or other open spaces, and structural shoreline protection projects. However, some of these permits have also included restoration, fill removal, and natural shoreline protection projects, and so the surface area of the Bay has increased by 3,694.7 acres between 2015 and 2018.[53] The majority of that increase has resulted from restoration projects, in particular the breaching of the South Bay Salt Ponds Restoration Project.

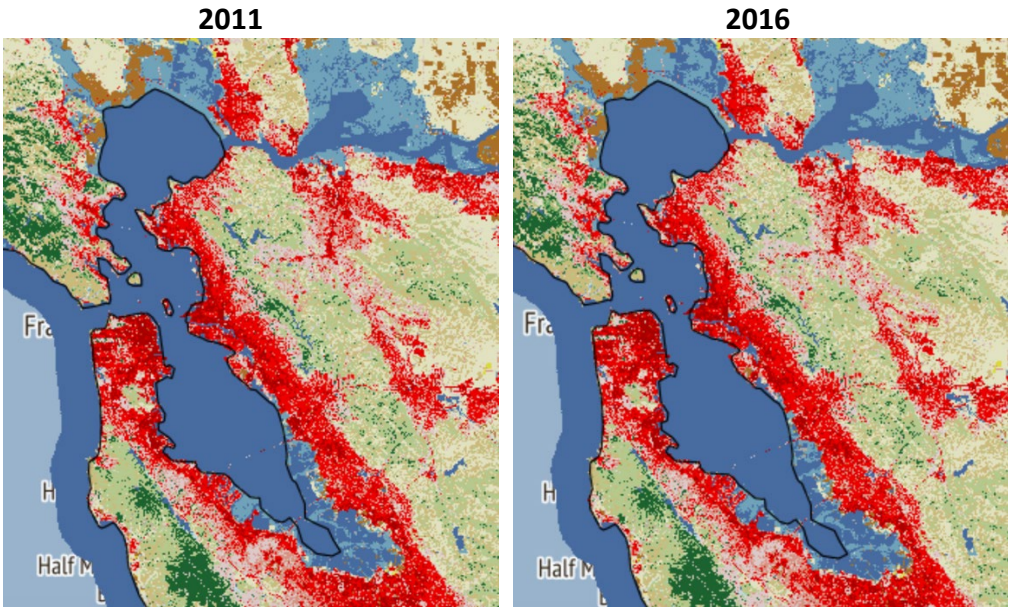


**Figure 7.** Land cover data in 2011 on the left, compared to 2016 on the right.[54]

**Cumulative and Secondary Impacts Status and Trends**

*Shoreline Inventory*

In 2016, the San Francisco Estuary Institute completed a mapping study of the Bay Area shoreline to support sea level rise planning efforts. The inventory revealed that berms make up the largest category of shoreline type around the Bay, followed by embankments and wetlands (Table 15).

[53] BCDC Annual Reports, 2015-2018.

[54] Multi-Resolution Land Characteristics Consortium Data Viewer. National Land Cover Dataset: 2016 CONUS Land Cover; 2011 CONUS Land Cover. Viewed in January 2020. https://www.mrlc.gov/viewer/

**Table 15. Shoreline Inventory around the San Francisco Bay**[55]

| Class | Percent | Miles |
|---|---|---|
| Engineered Levee | 6 | 170 |
| Berm | 40 | 1215 |
| Shoreline Protection Structure | 6 | 175 |
| Embankment | 19 | 558 |
| Transportation structure (major road, railroad) | 10 | 313 |
| Natural shoreline | 2 | 66 |
| Wetland | 16 | 486 |
| Other | 1 | 29 |

*Habitat Fragmentation*

As described in the Wetlands Assessment above, tidal marshes have been fragmented by development since their historic pre-settlement state (around the year 1800). Against a background of severe habitat loss, fragmentation has reduced the baylands' support for wildlife by decreasing the connectivity between populations and increasing edge effects that promote predation and anthropogenic stress. Large marsh patches in the current baylands are primarily composed of wide marsh areas connected by narrow fringing marsh. The extent of wetland fragmentation is depicted in Figure 2 above. Despite this historic fragmentation of wetlands, recent restoration work has aimed to re-establish connectivity in these habitats.[56]

*Secondary Impacts of Shoreline Protection*

Recent research investigated the impact of local shoreline protection on regional flood risk, considering sea level rise scenarios up to 1.5 meters for San Francisco Bay. The study found that measures to prevent flooding along a shoreline in one location or subregion may increase inundation elsewhere in the system, and that this network of interactions could occur across the entire Bay, especially as sea level rises.[57] The modeled effects of shoreline protection in one area and its impacts on other parts of the Bay are depicted in Figure 8 below. To ensure that cross-jurisdictional flooding impacts of shoreline protection are considered in future adaptation discussions, the San Francisco Bay Coastal Hazards Adaptation Resiliency Group (CHARG) recently released a series of maps that demonstrate sea level rise flood connectivity between Bay Area jurisdictions.[58]

[55] SFEI. 2016. San Francisco Bay Shore Inventory: Mapping for Sea Level Rise Planning. SFEI Publication number 779. San Francisco Estuarine Institute-Aquatic Science Center, Richmond, CA. Mapping of Bay shore features was accomplished by digitizing the highest ridge or edge of the highest surface that was visible in the LiDAR derived DEM (USGS 2010, NOAA/OPC 2010) datasets. This was completed for the first raised feature along the Bay shoreline and a sub-set of raised features within the landscape and along waterways inland to MHHW plus three meters (10ft) in elevation.

[56] Goals Project, pgs 20-23

[57] Wang, R-Q, Stacey, M.T., Herdman, L.M.M., Barnard, P.L., and Erikson, L. (2018). The Influence of Sea Level Rise on the Regional Interdependence of Coastal Infrastructure. *Earth's Future*. Special Issue: Resilient Decision-Making for a Riskier World: pgs 677-688.

[58] https://sfbaycharg.org/our-work/jurisdiction-connectivity/

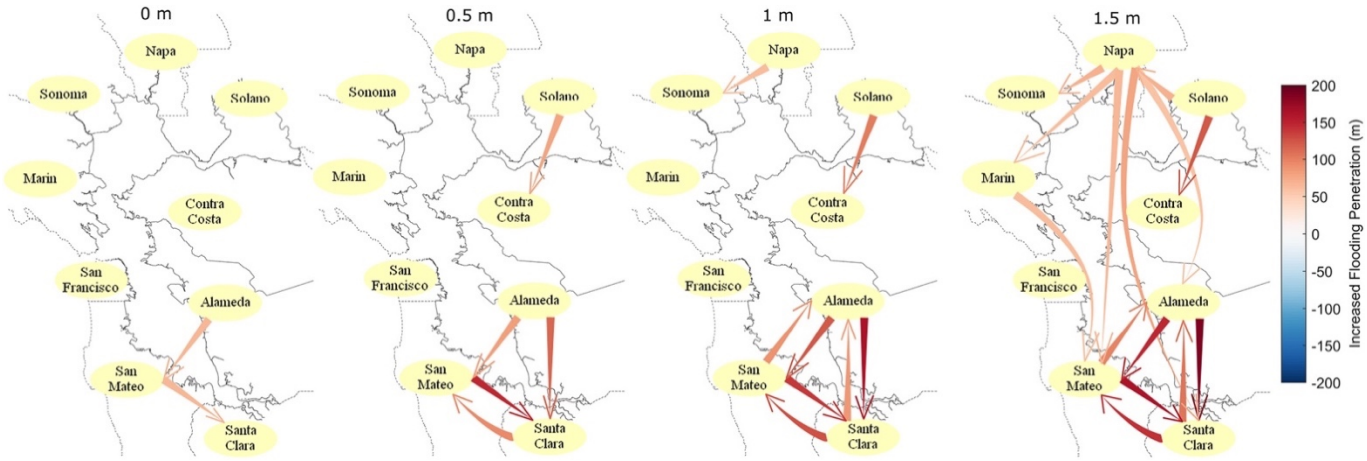


**Figure 8**. Network depicting regionwide flooding impacts of shoreline protection. Links are shown when the equivalent penetration distance of new inundation is greater than 60 meters. The thin head of the edge points to the county that is impacted, and the thick base is placed at the county that takes an action. The color of the edge shows the average penetration distance of the total flood water change, and the scale is shown using the color bar on the right.[59]

*Water Quality*

The Bay's Regional Monitoring Program (RMP) has monitored numerous contaminants, including mercury, polychlorinated bisphenols (PCBs), contaminants of emerging concern (CECs), copper, and lead for over two decades. A 2017 RMP report summarizing trends of these contaminants through time indicates that concentrations of most contaminants in water, sediment, and wildlife have declined or remained stable during this period.[60] However, concerns have emerged that sea level rise-associated flooding of contaminated sites on San Francisco Bay's shoreline and in adjacent subtidal areas could result in mobilization of contaminants, posing health risks to human and natural communities.

*Marine Transportation*

Marine transportation in San Francisco Bay has steadily expanded over the past two decades, with plans to continue this expansion in coming years.[61, 62] The Water Emergency Transportation Authority (WETA)'s current operations include 12 vessels serving four separate routes to eight terminals. WETA's Strategic Plan (2016) for the following 20-year period projects an expansion to 44 vessels serving 12 routes to 16 terminals. While ferries and water taxis provide benefits by reducing traffic and providing access to the water, they are also known to impact natural resources in the Bay Area and in other coastal environments. Ferry wakes have the potential to erode marsh shorelines in the San Francisco Bay,[63] and in other regions shoreline erosion caused by boat wakes is well documented, although the location and

[59]Wang et al., 2018.
[60]SFEI. 2017. The Pulse of the Bay: The 25th Anniversary of the RMP. SFEI Contribution number 841. San Francisco Estuary Institute, Richmond, CA.
[61]San Francisco Bay Area Water Emergency Transportation Authority. 2016 Strategic Plan.
[62] https://www.businessinsider.com/san-francisco-approves-ferry-tideline-2016-10
[63] Lacy, J.R., and Hoover, D.J. 2011. Wave Exposure of Corte Madera Marsh, Marin County, California—a Field Investigation. US Geological Survey Open-File Report 2011-1183.

presence of wind waves can influence the relative importance of boat wake impacts.[64] Ferry activity in the San Francisco Bay can also alter behavior of waterbirds and preclude waterbird use of open water habitats for extended periods.[65] A 2003 analysis of proposed expansion of ferries also identified marine mammal strikes/disturbance and impacts to state/federally listed species as potentially significant environmental impacts of increased ferry activity.[66] The cumulative effects of recently proposed increases in ferry activity in the San Francisco Bay Area have not been studied, but based on known impacts of ferries on natural resources, BCDC staff recognize that expansion of the ferry system must be carefully managed and planned with natural resources in mind.

**Management Characterization:**

**Table 16. Significant Changes in Management of Cumulative and Secondary Impacts of Development**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Changes Since Last Assessment |
|---|---|---|---|
| Statutes, regulations, policies, or case law interpreting these | Yes | Yes | Yes |
| Guidance documents | No | No | No |
| Management plans (including SAMPs) | Yes | Yes | Yes |

As described in the Achievements section above, BCDC recently adopted two sets of policy changes to the Bay Plan. Through the Environmental Justice Bay Plan amendment (BPA), BCDC's Shoreline Protection policies were updated to require that shoreline protection measures do not increase flooding or accelerate erosion for adjacent communities, and that contamination remediation projects mitigate risk of contaminant mobilization by integrating best available science into project design. The Fill for Habitat Bay Plan amendment (BPA) requires projects that restore, enhance, or create tidal marsh and tidal flats to increase habitat connectivity to the greatest extent feasible. All of these policy changes will help to address and reduce some of the cumulative and secondary impacts of development and rising sea level.

In addition to the Bay Plan, BCDC administers several Special Area Management Plans that provide more detailed application of BCDC's policies in areas or sectors where use conflicts are particularly high. This includes the Suisun Marsh Protection Plan, the San Francisco Waterfront Special Area Plan, and the Seaport Plan, all of which were identified for updates in the 2016 to

[64] Bilkovic, D., M. Mitchell, J. Davis, E. Andrews, A. King, P. Mason, J. Herman, N. Tahvildari, J. Davis. 2017. Review of boat wake wave impacts on shoreline erosion and potential solutions for the Chesapeake Bay. STAC Publication Number 17-002, Edgewater, MD. 68 pp., and sources therein.
[65] Unpublished data: Takekawa, J.Y., Wilson, N.R., De La Cruz, S.W., and Anfinson, J.O. 2009. Effects of Ferry Traffic on Migratory Waterbirds in the San Francisco Bay. U.S. Geological Survey.
[66] URS Corporation, prepared for Water Transit Authority. 2003. Final Program Environmental Impact Report: Expansion of Ferry Transit Service in the San Francisco Bay Area.

2020 Assessment and Strategy and are currently under review for potential amendment. Changes to any these plans would likely change management of cumulative and secondary impacts of development or water-oriented uses to some extent. Progress made on each of these efforts is outlined in the Achievements section above, and issues that each plan update would address are detailed in the Special Area Management Plan Assessment below.

**Enhancement Area Prioritization:**

**High** _____
**Medium** __X__
**Low** _____

The MEDIUM priority level was given to this enhancement area because of the diversity of critical issues leading to Cumulative and Secondary Impacts (CSIs) in the Bay and the management challenges of addressing those issues, as well as stakeholder input reflecting a medium priority designation for this enhancement area (see "Summary of Stakeholder and Public Comment"). BCDC addresses CSI through many of its policies (including Plan Maps) and management plans, and has updated some policies related to CSI since the last assessment. As BCDC moves forward with regional planning efforts and program changes on several fronts, the need to consider cumulative impacts remains at the forefront of many subject-specific conversations, including wetlands, coastal hazards, and coastal and estuarine resources. This Enhancement Area was not ranked "High" priority because most of the pressing needs could already be addressed through these other three high-priority enhancement areas. The focus of BCDC's coastal management program as it relates to CSIs will be addressed through these other related Enhancement Areas.

## Special Area Management Planning

**Objective:** Preparing and implementing special area management plans for important coastal areas— §309(a)(6).

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regards to the special area management planning enhancement objectives.

**Table 17. Opportunities for New or Updated Special Area Management Plans in BCDC's Jurisdiction**

| Geographic Area | Major conflicts/issues |
|---|---|
| Suisun Marsh | Though a few targeted amendments to the Suisun Marsh Protection Plan have been adopted, the Protection Plan has never been comprehensively reviewed or updated since its adoption in 1977. Thus, the Plan lacks references to climate change, has limited references sea level rise, and does not include considerations of new technologies (e.g., cellular communication towers, etc.) or environmental justice. Additionally, the Suisun Marsh Local Protection Program has never been comprehensively reviewed and these same knowledge gaps exist in most of the LPP components. |
| San Francisco Waterfront | The San Francisco Waterfront Special Area Plan is in need of revision to address sea level rise adaptation, as well as issues such as conflicts between maritime uses and public access and public spaces, the cost of developing and maintaining public spaces, the challenges and opportunities presented by historic resources and the historic district, and balancing the commercialization and privatization of parts of the waterfront with public trust consistency. |
| Seaport Plan | The San Francisco Bay Area Seaport Plan last underwent a thorough technical update and policy review in the mid-1990s. The Seaport Plan planning horizon is tied to a regional forecast of ocean-borne cargo that sunsets in 2020, so a complete review and update of the plan is timely. An update to the plan is important to address competing uses of the Bay shoreline. One of the goals of the Seaport Plan is to reserve appropriate and adequate waterfront areas for ocean shipping activities to avoid filling the Bay once existing shoreline may have been developed for non-water related purposes. |

**Management Characterization:**

**Table 18. Significant Changes in Special Area Management Planning**

| **Management Category** | **Employed by BCDC** (Y or N) | **CMP Provides Assistance to Locals that Employ** (Y or N) | **Significant Changes Since Last Assessment** (Y or N) |
|---|---|---|---|
| SAMP policies, or case law interpreting these | Y | Y | Y |
| SAMP plans | Y | Y | Y |

Since the last assessment, the Solano County Local Protection Program (LPP) was amended, as described in more detail in the Achievements section above. Additionally, three separate processes to update Special Area Management Plans and the policies that they include have been initiated. These updates were identified as potential needs in the 2016 to 2020 Assessment and Strategy and were the subject of Strategy 3. NOAA 309 funds will be used to directly support the Suisun Marsh Protection Plan update in fiscal year 2020.

*Suisun Marsh Protection Plan*
An update to the Solano County LPP was certified in 2019, as described in the Achievements section above. Also in 2019, the Commission highlighted the need to review the Suisun Marsh Protection Plan (SMPP) to consider emerging issues such as sea level rise, technological improvements, and environmental justice. In the fall of 2019, BCDC staff began a review of all seven LPP components to ensure consistency with the SMPP, and, in February of 2020, BCDC staff began the first comprehensive review of the SMPP. The expected outcome of this review is an up to date SMPP that addresses climate change, restoration needs, public access and other pressing issues to ensure that we continue to preserve and protect a functional Suisun Marsh.

*San Francisco Waterfront Special Area Plan*
In late 2017, BCDC received a Bay Plan amendment application from the Port of San Francisco for a comprehensive San Francisco Waterfront Special Area Plan (SFWSAP) update. BCDC staff and Port staff began meeting in late 2018 and early 2019 to discuss policy issues that the Port wished to include in the update, such as conflicts between maritime uses and public access/public spaces, the cost of developing and maintaining public spaces, the challenges and opportunities presented by historic resources and the historic district, and the commercialization and privatization of parts of the waterfront. BCDC voted to initiate the SAP amendment in late 2019. Port staff are expected to submit proposed changes to SAP findings and policies in 2020. The expected outcome of this process is amendments to the SFWSAP that bring the plan into alignment with the Port of San Francisco Waterfront Land Use Plan, including new policies regarding the resilience of the waterfront.

*Seaport Plan*
In 2019, BCDC initiated a public stakeholder process to conduct a thorough review of Seaport Plan findings and policies including the Port Priority Use Area designations. Concurrently, the Commission received requests to modify or remove the boundaries of a number of areas now

designated for port use. BCDC staff and consultants will perform a series of analyses at the local and regional levels to bring the plan up-to-date and to respond to requests for changes. Additionally, the plan must now consider potential effects of rising sea level to the ports and supporting ground transportation infrastructure, as well as reflect the concerns of neighboring communities and the Commission's newly adopted EJ/Social Equity policies. The expected outcome of this update is a revised Seaport Plan that accounts for predicted changes in cargo needs through the middle of the century, rising sea level, and environmental justice and social equity concerns.

**Enhancement Area Prioritization:**

| | |
|---|---|
| **High** | _____ |
| **Medium** | __X__ |
| **Low** | _____ |

The MEDIUM priority level was given to this enhancement area because of the many resource planning and protection issues in the Bay Area that could be addressed through special area management plans. Climate impacts, habitat, cumulative and secondary impacts, seaport management and development, and public access issues could all be undertaken in the context of special area management planning. Additionally, three of BCDC's major special area management plans are currently undergoing revision processes. Stakeholder input also reflected a medium priority designation for this enhancement area (see "Summary of Stakeholder and Public Comment"). This Enhancement Area was not ranked "High" priority because updates to many of these plans are already underway, and many of the issues that will be addressed are associated with climate change/coastal hazards, so can be addressed more generally through the Coastal Hazards Enhancement Area.

## Ocean (Coastal and Estuarine) Resources

**Objective:** Planning for the use of ocean and Great Lakes resources. §309(a)(7) Given BCDC's jurisdiction, this assessment was carried out for coastal and estuarine areas, rather than the ocean or Great Lakes.

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regards to the ocean (coastal and estuarine) resources enhancement objective.

**Table 19. Status of Ocean Economy for Nine Bay Area Counties (2016)**[67]

| | All Ocean Sectors | Living Resources | Marine Construction | Ship & Boat Building | Marine Transportation | Offshore Mineral Extraction | Tourism & Recreation |
|---|---|---|---|---|---|---|---|
| Employment (number of Jobs) | 179110 | 1482 | 2484 | 369 | 5688 | 257 | 161512 |
| Establishments (number of Establishments) | 9558 | 146 | 85 | 7 | 355 | 78 | 8839 |
| Wages (Millions of Dollars) | 6304 | 69 | 241 | 25 | 380 | 22 | 4781 |
| GDP (Millions of Dollars) | 12996 | 182 | 486 | 47 | 584 | 46 | 9690 |

**Table 20. Change in Ocean and Great Lakes Economy for Nine Bay Area Counties (2006-2016)**[68]

| | All Ocean Sectors | Living Resources | Marine Construction | Ship & Boat Building | Marine Transportation | Offshore Mineral Extraction | Tourism & Recreation |
|---|---|---|---|---|---|---|---|
| Employment (number of Jobs) | 37802 | 1042 | 315 | 369 | -3995 | -304 | 39254 |
| Establishments (number of Establishments) | 1834 | 75 | 2 | 7 | -28 | 1 | 1716 |
| Wages (Millions of Dollars) | 2400 | 54 | 82 | 25 | -155 | -22 | 2095 |
| GDP (Millions of Dollars) | 2773 | 143 | 144 | 47 | -317 | -83 | 3603 |

[67] www.coast.noaa.gov/digitalcoast/tools/enow.html.
[68] Ibid.

**Table 21. San Francisco Bay Area Coastal/Ocean Uses**

| Type of Use | Approximate Number of Sites |
|---|---|
| Federal sand and gravel leases *(Completed)* | 0[a] |
| Federal sand and gravel leases *(Active)* | 0 [a] |
| Federal sand and gravel leases *(Expired)* | 0 [a] |
| Federal sand and gravel leases *(Proposed)* | 0 [a] |
| Beach Nourishment Projects | 3 [b] |
| Ocean Disposal Sites | 1 [c] |
| Principle Ports *(Number and Total Tonnage)* | 4 [a,b] |
| Coastal Maintained Channels | 30 [d] |
| Designated Anchorage Areas | 24 [d] |
| Danger Zones and Restricted Areas | 4 [d] |

[a]Data obtained from drawing a custom polygon around the San Francisco Bay in OceanReports (https://www.coast.noaa.gov/digitalcoast/tools/ort.html)
[b]BCDC data
[c]Data obtained from drawing a custom polygon around the San Francisco Bay in OceanReports (https://www.coast.noaa.gov/digitalcoast/tools/ort.html); information reported is within the polygon or within 10 nautical miles of the polygon area
[d]Data obtained from drawing a custom polygon around the San Francisco Bay in OceanReports (https://www.coast.noaa.gov/digitalcoast/tools/ort.html); information reported is within the polygon or within 1 nautical mile of the polygon area

**Table 22. Significant Changes to Coastal and Estuarine Resources and Uses in BCDC's Jurisdiction**

| Resource/Use | Change in the Threat to the Resource or Use Conflict Since Last Assessment |
|---|---|
| Benthic habitat | Increase |
| Living marine resources (fish, shellfish, marine mammals, birds, etc.) | Increase |
| Sand/gravel | Increase |
| Cultural/historic | Increase |
| Transportation | Increase |
| Boating and Marinas | Possible Increase |
| Offshore development[69] | N/A |
| Energy production | - |
| Fishing (commercial and recreational) | - |
| Public Access (Recreation/tourism) | Increase |
| Sand/gravel extraction | Increase |
| Dredge disposal | Increase |
| Aquaculture | N/A |

[69] Offshore development includes underwater cables and pipelines, although any infrastructure specifically associated with the energy industry should be captured under the "energy production" category.

**Table 23. Major Contributors to an Increase in Threat or Use Conflict to Coastal and Estuarine Resources in BCDC's Jurisdiction**

| | Land-based development | Polluted runoff | Invasive species | Recreation | Marine Transportation | Dredging | Sand/Mineral Extraction | Sea Level Rise | Living Marine Resources | Benthic habitat | Conflicting laws and policies |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Benthic Habitat | X | X | X | | X | X | X | | | | |
| Living Marine Resources | X | X | X | X | X | | | X | | | |
| Sand/Gravel | | | | | | X | X | | | | |
| Cultural/Historic | X | | | | | | | X | | | |
| Marine transportation | | | | | | X | | X | X | X | |
| Boating and marinas | X | | | X | | | | X | X | X | |
| Public Access/Recreation | | | | | | | | X | X | | |
| Sand/gravel extraction | | | | | | | | | X | X | |
| Dredge disposal | | | | | | | | | X | X | X |

## Use Conflicts

*Public Access and Habitat Preservation/Conservation*

As detailed in the Phase I Assessment on Public Access, stakeholders have increasingly raised concerns about public access conflicts with wildlife conservation, habitat restoration, and other coastal uses as restoration projects increase throughout the Bay Area. Additionally, rising sea level could intensify this conflict by further limiting shoreline space for these uses.

*Changing ~~Marinas~~ Boating Trends and Equitable Access*

In 2018, the Bay Planning Coalition raised the issue of shifting boat sizes and marina needs to BCDC staff and the Commission. Data collected annually by the Marine Recreation Association (MRA) indicates that marinas in the Bay Area have been closing as their revenues decrease, ~~primarily because~~ likely due to~~of~~ reduced demand for available slip sizes, ~~and~~ the relatively low cost to boat owners of berthing vessels (resulting in less revenue per slip rented for marina owners)~~.~~[70], and possibly increased popularity and feasibility of boat rental/sharing programs.[71] Because marinas support associated businesses (bait shops, fueling stations, etc.), these closures have rippling effects on local economies. The MRA survey found that demand for smaller slip sizes had decreased partially as a result of increased small vessel storage on land (dry storage). To respond to this changing demand and remain economically viable, marinas have started to reconfigure their layouts and relative proportions of large and small slips, and more marinas are expected to come to the Commission with reconfiguration proposals in the coming years.

[70] Josh Burnham, Bay Planning Coalition. 2018 Presentation to the San Francisco Bay Conservation and Development Commission: Update on the San Francisco Marina Industry. https://bcdc.ca.gov/cm/2018/1101Recreationalboating.pdf

[71] Sources included in public comment

However, reduced demand for small slip sizes does not necessarily equate to reduced demand for recreating on small boats. Preliminary data suggests that boat use trends and access to boating on the Bay have changed substantially in the past decade. Decreased registration of pleasure craft and sailboats in California appear to indicate that statewide boat ownership has decreased,[72] while membership in boat share programs or sailing clubs appears to be increasing.[73] Additionally, as mentioned above, trailering or dry storage of smaller vessels appears to have increased. Thus, the number of occupied permanent slips in marinas does not necessarily represent the population of active boat users, and it is important to ensure that sufficient opportunities are provided for active boat users to access the Bay in ways that are more economically and logistically feasible.

In permitting ~~these~~ potential changes in marinas, BCDC will have to consider the equity implications of fewer small slips at marinas, and how to ensure alternative options for equitable access to the Bay, including how to ensure sufficient access points for increasingly popular boat share programs and sailing clubs, and how to ensure sufficient facilities and access for dry storage. Additionally, it will be important to assess ~~BCDC's~~ the Bay Plan's current recreation policies in light of these changing trends, and whether they adequately support and facilitate shifting recreational boating demand. For example, as ~~they~~ small boat owners move to dry ~~docking~~storage, do ~~small boat owners~~they have sufficient access to the Bay? What are the actual numbers of small boat ownership, and if ownership is decreasing (as it appears to be), what are the driving factors?~~,~~ What can be done to further facilitate boat share programs and other options for more equitable boating access on the Bay? In addition to boat share programs, what recreational activities on the Bay have become preferable, and how can BCDC ensure access for those preferred activities? BCDC staff anticipates that program changes may be necessary to ensure equitable opportunities for access to the Bay in light of this shift and answers to these questions.

*Live-Aboards*

In recent years, marinas and live-aboard dwellers throughout the Bay Area have contacted BCDC staff requesting increased quotas for residential usage of marina slips. Marina owners and operators have cited the desire to have more long-term, permanent users of the slips to increase security at marinas. Other interested parties have expressed that they would like the opportunity to acquire a live-aboard slip, but it is difficult because authorized live-aboard capacity is maxed out at most marinas. BCDC policy currently states that the number of live-aboards in a marina should not exceed ten percent of the total authorized boat berths, "unless the applicant can demonstrate clearly that a greater number of live-aboards boats is necessary to provide security or other use incidental to the marina use."[74] Research supporting the development of the Bay Plan determined that housing on or along the Bay is a desirable but not a necessary use of the Bay, as there was not a regional shortage of residential land at the time.[75] More importantly, this research found that fill for housing on the Bay provides primarily

[72] California Department of Boating and Waterways, 2015
[73] OCSC Sailing and Club Nautique data, 2015
[74] San Francisco Bay Plan, Recreation Policy 3c.
[75] San Francisco Bay Plan Supplement. 1969.

private benefits, but damages caused to Bay resources are borne by the public as a whole. However, live-aboards also provide a source of affordable housing in a very expensive regional housing market, and they provide security for marinas and other live-aboards. BCDC last formally and comprehensively assessed trends and needs associated with live-aboards in 1985,[76] but stakeholder demand for increased live-aboard authorization indicates that BCDC needs to investigate this issue and reconsider management of live-aboards in the Bay .

*Marine Transportation and Impacts to Coastal Habitats and Wildlife*
As detailed in the Phase I Assessment on Cumulative and Secondary Impacts, commuter boating via ferry and water taxi has increased in recent years, and is projected to increase further as the Bay's ferry system expands. Based on preliminary research findings in the Bay Area, and issues in other regions of California and around the country, this predicted increase has raised concern for BCDC staff about potential conflicts between natural resource protection and marine transportation expansion.

**Management Characterization:**

**Table 24. Significant Changes to Management of Ocean or Coastal Resources**

| Management Category | Employed by BCDC or Statewide | CMP Provides Assistance to Locals that Employ | Significant Changes Since Last Assessment |
|---|---|---|---|
| Statutes, regulations, policies, or case law interpreting these | Yes | Yes | Yes |
| Regional (California, Oregon, Washington) comprehensive ocean management plan | No | No | Yes |
| State comprehensive ocean management plans | No | No | Yes |
| Single-sector management plans (state and BCDC) | Yes | Yes | Yes |

The State of California is part of several regional ocean management partnerships—the West Coast Ocean Alliance, the West Coast Governors' Alliance on Ocean Health, and the West Coast Ocean Data Portal. While the West Coast Governors' Alliance and the West Coast Ocean Data Portal existed in some form prior to the last assessment, the West Coast Ocean Alliance was formed in December 2018 as a continuation of previous efforts including the West Coast Regional Planning Body and the West Coast Ocean Partnership.[77] However, none of these partnerships employ a comprehensive ocean management plan for the region.

[76] BCDC Staff Report. 1985. Houseboats and Live-aboard Boats.
[77] https://westcoastoceanalliance.org/

The state's ocean management agency, the Ocean Protection Council, recently released its Strategic Plan to Protect California's Coast and Ocean for 2020-2025. According to the OPC, "the plan establishes an ambitious collective vision for protecting the intrinsic, cultural, ecological and economic benefits provided by California's coast and ocean and identifies objectives, targets and actions in four key areas: climate, equity, biodiversity and the blue economy. Actions address issues ranging from sea-level rise and ocean acidification to universal coastal access, offshore wind energy, aquaculture, whale entanglement, plastic pollution, wetlands, beaches and fisheries."[78]

Within the San Francisco Bay sub-region, the San Francisco Bay Plan and the Suisun Marsh Protection Plan both manage multiple uses of the coastal zone, including living marine resources, benthic habitat, land-based development, recreation, public access, sand mining, and dredging. These plans manage coastal resources through enforceable policies, and work in the coastal zone must be permitted by BCDC to ensure that the project is consistent with BCDC's policies. The Bay Plan was updated in 2019 to address some of the resources and uses discussed above, including public access, land-based development, living marine resources, dredged material, and impacts of sea level rise on these uses and resources. The Suisun Marsh Protection Plan has not been changed since the last assessment, but is currently under review and may be amended. Similarly, the Seaport Plan, a single-sector management plan administered by BCDC, has not been changed since the last assessment, but is currently under review and may be amended.

**Table 25. State and Regional Comprehensive Ocean Management Plans**

| Comprehensive Ocean/Great Lakes Management Plan | State Plan | Regional Plan |
|---|---|---|
| Completed plan | No | No |
| Under development | No | No |
| Web address | http://www.opc.ca.gov/webmaster/ftp/pdf/2020-2025-strategic-plan/OPC-2020-2025-Strategic-Plan-FINAL-20200228.pdf | https://westcoastoceanalliance.org/ |
| Area covered by plan | California | California, Oregon, Washington |

**Enhancement Area Prioritization:**

**High** __X__
**Medium** _____
**Low** _____

[78] http://www.opc.ca.gov/

For the 2021-2025 Assessment Cycle, BCDC staff has chosen to consider the resources and issues that are addressed through the Ocean/Great Lakes Resources Enhancement Area for coastal and estuarine environments. The 2016 to 2020 Assessment and Strategy determined this to be a low priority because it focused specifically on ocean issues. Issues related to coastal and estuarine resource and use conflicts are, on the other hand, much more central to BCDC's mission. As noted above, there are several coastal use conflicts that could potentially be addressed through program changes —public access/wildlife/sea level rise/equity conflicts; changing ~~sizes of boat slips and ensuring equitable access~~recreational boating patterns; and balancing recreational access to the Bay, residential use of the Bay (on live-aboards), and natural resource protection . Concerns raised by stakeholders, as well as planned or anticipated projects that could increase conflicts, have elevated these as important issues to address in the near future. Therefore, this Enhancement Area is a HIGH Priority. Stakeholders selected this Enhancement Area as the third highest priority in the survey to support the Assessment & Strategy (see "Summary of Stakeholder and Public Comment" section). Surveyed stakeholders highlighted land-based development as the main coastal and estuarine resource conflict of concern in the survey, an issue which is addressed partially through the coastal hazards Enhancement Area, and partially through the public access/wildlife/sea level rise component of the Ocean Resources Enhancement. Other top priority issues for coastal and estuarine resources were invasive species and dredging/sand mining. While these remain key issues in coastal and estuarine resource management, they are actively being considered and addressed through existing BCDC policies and other programs/task forces, so further program changes do not appear necessary at this time. The issues related to boating that are identified in the assessment were not raised in the survey, but stakeholders have brought these issues to the Commission and BCDC staff to highlight specific problems that they are experiencing or anticipate.

## Energy and Government Facility Siting

**Objective:** Adoption of procedures and enforceable policies to help facilitate the siting of energy facilities and Government facilities and energy-related activities and Government activities which may be of greater than local significance. §309(a)(8)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regards to the energy and government facility siting enhancement objectives.

**Table 26: Status and Trends in Energy Facilities and Activities in BCDC's Coastal Zone**

| Type of Energy Facility/Activity | Exists in 9 Bay Area Counties (number or Y/N) | Change in Existing Facilities/Activities Since Last Assessment (□□□□□□□□□□unkwn) | Proposed in Coastal Zone (number or Y/N) | Change in Proposed Facilities/Activities Since Last Assessment (□□□□□□□□□□unkwn) |
|---|---|---|---|---|
| Pipelines | Yes[a] | Unknown | Unknown | - |
| Electrical grid (transmission cables) | Yes[a] | Unknown | Unknown | - |
| Ports | 7[b] | - | No | - |
| Liquid natural gas (LNG) | No[a] | - | No | - |
| Oil and gas | 57[a] | □ | No | - |
| Coal | 5[a] | - | Yes | - |
| Nuclear | No[a] | - | No | - |
| Wind | 43[a] | - | No | - |
| Wave | No[a] | - | No | - |
| Tidal | No[a] | - | No | - |
| Current (ocean, lake, river) | No[a] | - | No | - |
| Hydropower | No[a] | □ | No | - |
| Ocean thermal energy conversion | No[a] | - | No | - |
| Solar | 91[a] | □ | No | - |
| Biomass | 66[c] | □ | 7 | □ |

a. California Energy Commission. GIS Data Hub. Data Accessed in February 2020. https://cecgis-caenergy.opendata.arcgis.com/
b. SFEI and SPUR (2019), pg 45
c. UC Davis. California Biomass Facilities Database. Data Accessed in February 2020. https://biomass.ucdavis.edu/tools/california-biomass-facilities-reporting-system/

### Status and Trends

Since the last Assessment, there were two minor changes to energy facilities within BCDC's coastal zone. In 2016, a BCDC permit was granted to Tesoro Golden Eagle Refinery to conduct repairs and upgrade work at Avon Marine Terminal to comply with California Marine Terminal Engineering and Maintenance Standards (MOTEMS). Additionally, a BCDC permit was issued in 2017 to allow repairs to segments of the Bay Area Products Line (BAPL) Sacramento Leg, a hydrocarbons pipeline. The California Energy Commission is the state's primary energy policy and planning agency. Further information on energy facilities and activities can be found at www.energy.ca.gov.

There are numerous federal government facilities or federally leased buildings within the nine Bay Area counties, and some within BCDC's coastal zone jurisdiction. One of the most notable federal facilities in the coastal zone is the Military Ocean Terminal Concord (MOTCO). However, there have not been any proposed expansion or reduction in federal government facilities, or activities of greater than local significance at federal government facilities, in BCDC's jurisdiction since the last assessment.

**Management Characterization:**

**Table 27. Significant Changes in Energy and Government Facility Management**

| **Management Category** | **Employed by BCDC** (Y or N) | **CMP Provides Assistance to Locals that Employ** (Y or N) | **Significant Changes Since Last Assessment** (Y or N) |
|---|---|---|---|
| Statutes, regulations, policies, or case law interpreting these | Yes | No | No |
| State comprehensive siting plans or procedures | No | No | No |

**Enhancement Area Prioritization:**

**High** _____
**Medium** _____
**Low** __X__

The LOW priority level is due to BCDC's lack of jurisdiction over energy facility siting, and because the potential for new government facility siting is low. Regional efforts are focused on redevelopment, realignment, or reuse of government facilities, including closed military bases and the regional airports. The focus of BCDC's coastal management program as it relates to these facilities will be on climate change adaptation, addressed under the Coastal Hazards enhancement area.

## Aquaculture

**Objective:** Adoption of procedures and policies to evaluate and facilitate the siting of public and private aquaculture facilities in the coastal zone, which will enable states to formulate, administer, and implement strategic plans for marine aquaculture. §309(a)(9)

**Resource Characterization:** This section describes the extent to which problems and opportunities exist with regards to the aquaculture enhancement objectives

**Table 28. Status and Trends of California Aquaculture Facilities and Activities[79]**

| Type of Facility/Activity | number of Facilities | Approximate Economic Value | Change Since Last Assessment |
|---|---|---|---|
| Total Aquaculture | 91 | $106,021,000 | Increased economic value<br>Decreased number facilities |
| Food Fish | 55 | $43,911,000 | Increased economic value<br>Decreased number facilities |
| Sport Fish | 17 | $9,559,000 | Increase |
| Baitfish | 2 | 0 | - |
| Crustaceans | 1 | 0 | Increase |
| Mollusks | 20 | $33,685,000 | Increased economic value<br>Decreased number facilities |
| Ornamental Fish | 7 | 0 | Decrease |
| Misc. Aquaculture | 13 | $18,491,000 | Decrease |

**Management Characterization:**

**Table 29. Significant Changes in Aquaculture Management**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Changes Since Last Assessment |
|---|---|---|---|
| Aquaculture comprehensive siting plans or procedures | No | No | No |
| Other aquaculture statutes, regulations, policies, or case law interpreting these | No | No | No |

[79] United States Department of Agriculture. 2018 U.S. Census of Aquaculture. *www.agcensus.usda.gov/Publications/Census_of_Aquaculture/.* No aquaculture operations or facilities exist in BCDC's jurisdiction, so data is reported for the entire state of California.

**Enhancement Area Prioritization:**

**High** _____
**Medium** _____
**Low** __X__

Due to contamination and lingering water quality issues, there have not been and are unlikely to be aquaculture facilities in San Francisco Bay until water quality improves. Additionally, there is no commercial harvesting of mollusks or ornamental fish. Therefore, the LOW ranking of this enhancement area has not changed since the previous Assessment.

## B. Phase II Assessment

The following in-depth assessment is intended to help the CMP understand key problems and opportunities that exist for program enhancement and determine the effectiveness of existing management efforts to address those problems. This assessment focuses on enhancement areas identified as high priorities in the Phase I Assessment above.

### Wetlands

**In-Depth Resource Characterization**

This section describes key problems and opportunities to improve BCDC's ability to protect, restore, and enhance wetlands.

**Table 30: Three Most Significant Existing Physical Stressors or Threats to Wetlands within San Francisco Bay**

| | Stressor/Threat | Geographic Scope |
|---|---|---|
| Stressor 1 | Sea level rise | Regionwide |
| Stressor 2 | Limited sediment supply | Regionwide, but suspended sediment settles more readily in the North Bay and South Bay |
| Stressor 3 | Lack of wetlands migration space | Regionwide, but these issues are more pronounced in the Central Bay and many parts of the South Bay, where significant development is directly adjacent to wetlands. In the North Bay, many wetlands are backed by agricultural land or limited development, so there are more options for wetland migration. |

These three stressors together result in a wetland system with limited resilience and increased risk for damage or loss. Sea level rise threatens to drown wetlands as rising waters overtake vegetation that cannot survive with permanent inundation. Wetlands could survive rising waters by sediment accretion to maintain appropriate elevation, and/or by migration to higher elevations. However, with limited sediment and lack of migration space, wetlands may not be able to reach sufficient elevations to survive sea level rise.[80] Stakeholders also recognize these three stressors as the most critical (see Summary of Stakeholder and Public Comment section).

[80] Goals Project.

**Table 31: Emerging Issues of Concern for Wetlands**

| Emerging Issue | Information Needed |
|---|---|
| Habitat type conversion | More data on the exact patterns of wildlife use of various habitat types (e.g. variability in habitat use at small scales) is necessary to inform the extent of impacts when converting one wetland habitat type into another. |
| Salinity changes | How extensively will salinity change throughout the Bay and Suisun Marsh in response to sea level rise? What impacts will salinity changes have on ecosystems throughout the Bay? How should salinity changes be considered in conjunction with other climate-induced changes in the physical environment? |
| Restoration of subsided lands in Suisun Marsh | Regarding subsidence reversal and prevention: How can agricultural practices be altered to reduce land subsidence? Does what we know now about restoring subsided lands change with sea level rise? What can we learn about subsidence reversal from the limited number of examples we have? How might increasing temperatures associated with climate change and rising ground water with rising sea level affect subsidence rates? |

**In-Depth Management Characterization**

This section helps to determine the effectiveness of management efforts to address identified problems related to the wetlands enhancement objective.

**Table 32: Significant Changes in Wetland Management**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Changes Since Last Assessment |
|---|---|---|---|
| Wetland assessment methodologies | N | Y | Y |
| Wetland mapping and GIS | Y | Y | Y |
| Watershed or special area management plans addressing wetlands | Y | Y | Y |
| Wetland technical assistance, education, and outreach | N | Y | Y |

**Significant Management Changes**

Significant changes related to wetland management, particularly in terms of policy and permitting, are discussed in the Phase I Assessment. Additional changes in wetland management have occurred since the last assessment as well.

*GeoMarsh*

As described in the Accomplishments section above, BCDC staff and the Suisun Resource Conservation District developed GeoMarsh, a mapping tool to visualize boundaries of managed wetlands in the Suisun Marsh. This tool has already benefitted management and decision-making in the Suisun Marsh, and is expected to support upcoming policy changes to the Suisun Marsh Protection Plan.

*Baylands Ecosystem Habitat Goals Update (BEHGU)*

As discussed in the Wetlands Phase I Assessment above, the BEHGU report was finalized in 2015, shortly after the last assessment. This document details a wetland restoration plan and framework for the San Francisco Bay estuary which has supported wetland management decisions. BEHGU highlights the importance of achieving wetland restoration as quickly as possible to ensure that wetlands are resilient and as self-sustaining as possible before predicted sea level rise acceleration in the middle of the century. Achieving the habitat restoration goals detailed in BEHGU will be essential to addressing the first two stressors above.

*Suisun Marsh Protection Plan*

As discussed in the Special Area Management Plan Phase I Assessment above, in early 2020, BCDC staff commenced a process to update the findings and policies of the Suisun Marsh Protection Plan. These changes will likely address health and sustainability of wetlands in the Suisun Marsh, and incorporate updated management strategies for Suisun Marsh wetlands.

*Wetlands Regional Monitoring Program*
As discussed in the Accomplishments section above, BCDC staff serve on the Steering Committee of the developing Wetlands Regional Monitoring Program (WRMP). The WRMP process has developed new workflows and approaches for assessment of wetlands, and incorporates new wetland assessment methodologies, such as the use of high-resolution imagery gathered by drones, into its plan. BCDC staff have also informed the WRMP through their involvement in the SF estuary geospatial working group, which has contributed insight on geospatial techniques into monitoring approaches for the WRMP.

*San Francisco Estuary Geospatial Working Group*
BCDC staff have continued their participation in the San Francisco Estuary Geospatial Working Group, a group of researchers, managers, scientists, agencies, and more engaged in coastal management and ecology. This multidisciplinary partnership emphasizes integration of geospatial technology in coastal management and restoration. Through the Working Group, BCDC staff have contributed to discussions and decisions around advancing wetland mapping and GIS throughout the estuary.

*Sentinel Site Cooperative*
BCDC is one of five organizations that make up the Management Team for the San Francisco Bay and Outer Coast Sentinel Site Cooperative. While the San Francisco Bay Cooperative had been initiated during the last assessment, the bulk of its work has occurred during the 5-year period following the last assessment. During this time, the Sentinel Site Cooperative (led by the Sentinel Site Cooperative Coordinator and supported by BCDC staff) has provided technical assistance to the Wetlands Regional Monitoring Program, and provided support in the development of educational workshops on living shorelines and outer bay to estuary connections.

*Bay Restoration Regulatory Integration Team*
As described in the Achievements section above, regulatory agencies in the Bay Area have come together to create the Bay Restoration Regulatory Integration Team (BRRIT), aimed at facilitating permitting of restoration projects in the Bay.

**Effectiveness of Coastal Wetlands Management Efforts**
Many changes in the state's management efforts have only recently been initiated within the past year. Therefore, it is still too early to determine the effectiveness of these efforts. Recent changes in management efforts stem from past BCDC involvement in wetland management efforts, particularly the development of the Baylands Ecosystem Habitat Goals Update (BEHGU). The formal adoption of many of the recommendations from BEHGU through the Fill for Habitat Bay Plan amendment illustrates that this document was effective in communicating best available science to drive changes in wetlands policy and management. In a broader sense, the continually increasing area of wetlands restored, protected, and enhanced since BCDC's creation indicates that the Bay segment of the federally approved California Coastal Management Program, along with numerous partners throughout the region, has been successful in managing coastal wetlands to achieve shared restoration goals.

However, the Bay Area still has a long way to go to fully achieve the restoration goals detailed in BEHGU. It will be important to closely monitor restoration progress to ensure that coastal wetlands management efforts sufficiently advance this important work. As highlighted in comments from the Citizens' Committee to Complete the Refuge, continued progress toward achieving the Baylands goals will require development around the Bay to proceed with ecosystem goals and needs in mind. To achieve these goals, BCDC must ensure that restorable lands are protected where possible, and that development projects within BCDC's Bay jurisdiction are considered with regional restoration goals and ecosystem needs in mind. While BCDC laws and policies already include significant protections to this effect, staff will continue to monitor the progress of development around the Bay over the next 5-year period and assess whether additional legislative or policy changes may be necessary to achieve these goals.

**Identification of Priorities**

This section identifies the top ~~three~~ four management priorities where there is the greatest opportunity for BCDC to improve its management of significant wetlands stressors. This section also identifies priority needs and information gaps to help address the management priorities.

*Management Priority 1: Investigating the feasibility and efficacy of wetland adaptation measures by supporting monitoring and developing metrics of success, and facilitating the implementation of these measures.*

> Description: (1) Modeling and pilot work to demonstrate the efficacy of various wetland adaptation measures (e.g., opportunities for beneficial reuse of dredged sediment, transition areas for landward migration of wetlands, and measures to increase connectivity of wetland habitats) and to develop best practices/design guidance on how these measures can be most effectively implemented; (2) Monitoring of baseline conditions, as well as monitoring the efficacy and evolution of sea level rise adaptation techniques over time; and (3) Creation and dissemination of guidance documents, monitoring reports, studies, and other information that will facilitate the implementation of these measures, especially regarding increased opportunities for beneficial reuse of dredged sediment.

*Management Priority 2: Improving regulatory permitting to expedite wetland restoration and adaptation*

> Description: Changes to policies, regulations, and processes to further facilitate the timely implementation of wetland restoration and adaptation. This work aims to advance achievement of the Baylands Ecosystem Habitat Goals as quickly and efficiently as possible.

*Management Priority 3: Planning for protection and provision of lands for wetland restoration and migration space*

> Description: Partner with state agencies, regional agencies, nine Bay Area counties, and the shoreline cities and communities to develop and implement plans such that

sufficient areas are available for wetlands restoration, and that wetlands can migrate vertically and horizontally as sea level rises. Advance the Baylands Goals by ensuring space is available for wetlands restoration and migration.

*Management Priority 4~~3~~: Encouraging the restoration, enhancement, or creation of wetlands and other natural solutions for shoreline protection of the built environment*

Description: Building on recent changes to the Bay Plan and recommendations of the San Francisco Bay Shoreline Adaptation Atlas,[81] BCDC staff will engage in regional planning, research and monitoring efforts, work with permit applicants in the pre-application phase, and otherwise support partners to encourage the design and construction of geographically appropriate multi-benefit wetlands projects (both pilot and full-scale) in the Bay Area, and in monitoring their efficacy in providing shoreline protection. Provide lessons learned to develop best practices. Continue engagement with the CA Sea Grant Extension Advisory Team (formerly Sentinel Site Cooperative Management Team) to advance natural solutions for shoreline protection.

Table 33 below identifies and briefly explains priority needs and information gaps BCDC's Coastal Management Program has to help it address the management priorities identified above. The needs and gaps identified here are not limited to those items that will be addressed through a Section 309 strategy but include any items that are part of a strategy.

**Table 33: Priority Needs and Information Gaps in Addressing Wetlands Management Priorities**

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| Research | Yes | Research on the effectiveness and optimal design of living shorelines; research on methods/approaches for sea level rise adaptation of wetlands in the Bay (what will work where, what won't)<br><br>Investigate tools and strategies to protect undeveloped baylands that expand on the concept of "Priority Conservation Areas (PCAs)" and more accurately identify important conservation areas. |
| Mapping/GIS | Yes | Fine-scale, ground-truthed vegetation maps for all counties in the Bay Area to set baselines for future wetland condition monitoring |
| Data and information management | Yes | Sharing and maintenance of regional wetland monitoring data, including both project-based monitoring and regionwide wetland health monitoring assessments. Project-specific monitoring data often is never shared |

[81] SFEI & SPUR (2019), pg 255.

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| | | beyond the agency(ies) who required the monitoring for compliance—a centralized data management mechanism would be useful. |
| Training/capacity building | Yes | Capacity building needs mostly relate to funding acquisition and regional coordination of wetland conservation/restoration. |
| Decision-support tools | Yes | Tools are needed to prioritize how the region will spend limited resources (sediment, funding, etc.) on wetland restoration/enhancement/creation activities. |
| Communication and outreach | Yes | The very long timelines of the regulatory process are often cited as a key issue hindering wetland restoration. However, many of the delays caused by the regulatory system could be avoided by early and frequent communication between applicants and regulatory agencies. |
| Regulatory process | Yes | Improvements are still needed to ensure that the regulatory process is efficient and effective in allowing good wetland restoration work to go forward, while still protecting the natural resources that regulatory agencies are mandated to protect.<br><br>Investigation of how BCDC's policies could be strengthened or implemented differently to better preserve restorable baylands and consider regional ecosystem needs. |

**Enhancement Area Strategy Development**
Will the CMP develop one or more strategies for this enhancement area?

**Yes** __X__
**No** _____

Wetlands, and particularly wetland resilience to sea level rise, was identified as the second highest priority for the CMP through stakeholder and staff surveys and the Phase I Assessment. Building on the completion of BEHGU, the Fill for Habitat Bay Plan amendment, and other measures/processes aimed at expediting wetland restoration, it is important for BCDC to address remaining policy needs, including increasing beneficial reuse of dredged sediment; addressing the planning, implementation, and maintenance of compensatory mitigation projects; and providing more guidance on the adaptive management of wetlands to realize the goal of increased wetland resilience. The Wetlands Enhancement Area will be addressed through a combined strategy with Coastal Hazards, as the most pressing issues for wetlands relate to sustainability in light of sea level rise.

# Coastal Hazards

**In-Depth Resource Characterization**

This section describes key problems and opportunities to improve BCDC's ability to prevent or significantly reduce coastal hazard risks by managing development and redevelopment in high-hazard areas and managing the effects of potential sea level rise and other coastal hazards.

Based on the characterization of coastal hazard risk in the Phase I Assessment, Table 34 identifies the three most significant coastal hazards within the coastal zone, and indicates the geographic scope of each hazard. The explanation of these stressors is detailed below.

**Table 34: Three Most Significant Coastal Hazards in the San Francisco Bay Area**

| | Type of Hazard | Geographic Scope |
|---|---|---|
| Hazard 1 | Sea level rise and groundwater rise (permanent inundation) | Throughout the Bay Area Region |
| Hazard 2 | Temporary flooding (resulting from coastal storms, wave runup, and riverine flooding) | Throughout the Bay Area Region |
| Hazard 3 | Compounding effects of multiple hazards | Throughout the Bay Area Region |

The ART Bay Area Regional Sea Level Rise Vulnerability and Adaptation Study revealed that communities, ecosystems, and built infrastructure are vulnerable to flooding and sea level rise throughout the region, and that overlapping vulnerabilities will make some areas particularly susceptible to the impacts of flooding (Table 5). As sea level rises, flooding impacts are predicted to intensify significantly for several critical systems. Acting now to better understand and adapt to increased flooding is essential to minimize future risk. Flooding of shoreline communities and impacts to critical infrastructure was chosen as a critical issue by over 90% of stakeholders who selected coastal hazards among the top three priority enhancement areas. Temporary flooding could result from coastal storms and riverine inputs in the short term, and permanent inundation of critical shoreline assets could result from sea level rise and associated groundwater rise in the long term, with continued exacerbation of flooding by temporary sources. In addition to flooding, the Bay Area is particularly susceptible to seismic hazards, which intensify the potential impacts of flooding. Thus, understanding the combined effects of seismic events and flooding, and solutions for mitigating this risk, will be essential. The compounding effects of multiple hazards was ranked highly by stakeholders as a critical issue.

**Table 35: Emerging Issues of Concern Related to Coastal Hazards**

| Emerging Issue | Information Needed |
|---|---|
| Groundwater flooding | How does groundwater interact with sea level rise? What structures, areas, and communities will be affected in what ways by groundwater flooding? What adaptation options are available to address this issue? |
| Contaminant mobilization | Where are all of the existing sources of uncapped contaminants, or sites that were not remediated to contain contaminants when groundwater rises, that could be mobilized by Bay water or groundwater infiltration? What are the predicted outcomes of contaminant mobilization? |
| Effects of combined fluvial and tidal flooding | What are the predicted impacts on coastal infrastructure, communities, and natural areas when both riverine and stream flooding and tidal flooding (sea level rise, coastal wave runup, etc.) are taken into account? |
| Effects of shoreline protection on other areas bay-wide and on Bay surface area, volume, and natural resources | More detailed studies of potential secondary impacts of shoreline protection structures in specific geographic sub-regions of the Bay on neighboring areas and other areas across or around the Bay. Also, more detailed studies of optimal placement (landward vs bayward) of hardened and other shoreline protection structures to minimize cumulative impacts on Bay volume, surface area, and natural resources. |
| Saltwater intrusion | What is the extent of predicted saltwater intrusion into the water table and groundwater, and how will this intrusion increase flooding/affect freshwater drinking supplies? |
| Stormwater and wastewater systems as points of water intrusion | Where are stormwater and wastewater systems vulnerable, how could sea level rise result in saltwater intrusion in these areas, and what are the consequences of that intrusion (i.e. model where additional flooding might occur and impacts to treatment plants). |
| Bay-Delta connections | What are the impacts of changes in the Delta and beyond on the Bay, and vice versa? |

**In-Depth Management Characterization**

This section helps to determine the effectiveness of management efforts to address identified problems related to the coastal hazards enhancement objective.

**Table 36: Significant Changes in Coastal Hazards Statutes, Regulations, and Policies**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Change Since the Last Assessment |
|---|---|---|---|
| Shorefront setbacks/no build areas | N | N | N |
| Rolling easements | N | N | N |
| Repair/rebuilding restrictions | Y | Y | N |
| Hard shoreline protection structure restrictions | Y | Y | Y |
| Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure) | Y | Y | Y |
| Repair/replacement of shore protection structure restrictions | Y | Y | Y |
| Inlet management | N | N | N |
| Protection of important natural resources for hazard mitigation benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas) | Y | Y | Y |
| Repetitive flood loss policies (e.g., relocation, buyouts) | N | N | N |
| Freeboard requirements | N | N | N |
| Real estate sales disclosure requirements | N | N | N |
| Restrictions on publicly funded infrastructure | N | N | N |
| Infrastructure protection (e.g., considering hazards in siting and design) | Y | Y | Y |

**Table 37: Significant Changes to Coastal Hazard Management Planning Programs or Initiatives**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Change Since the Last Assessment |
|---|---|---|---|
| Hazard mitigation plans | N | Y | Y |
| Sea level rise change or climate change adaptation plans | Y | Y | Y |
| Statewide requirement for local post-disaster recovery planning | N | N | N |
| Sediment management plans | Y | Y | Y |
| Beach nourishment plans | N | Y | N |
| Special Area Management Plans (that address hazards issues) | Y | Y | Y |
| Managed retreat plans | N | N | N |

**Table 38: Significant Changes to Coastal Hazard Research, Mapping, and Education Programs or Initiatives**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Change Since the Last Assessment |
|---|---|---|---|
| General hazards mapping or modeling | Y | Y | Y |
| Sea level rise mapping or modeling | Y | Y | Y |
| Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks) | N | Y | Y |
| Hazards education and outreach | Y | Y | Y |

**Significant Management Changes**

*Coastal Hazards Statutes, Regulations, and Policies*

Bay Plan policies related to coastal hazards have been recently updated through the Fill for Habitat and Environmental Justice (EJ) Bay Plan amendments. The Fill for Habitat amendment places restrictions on creation, repair, or replacement of hard shoreline protection structures, and promotes alternative shoreline stabilization methods by requiring that all shoreline development projects evaluate the possibility of using natural and nature-based features, and

that these natural solutions are used to the greatest extent feasible. Similarly, by requiring that shoreline protection does not result in wave deflection that increases impacts to adjacent areas, the EJ amendment places restrictions on the creation, repair, or replacement of hard shoreline protection structures. Policies were added to protect wetlands and other coastal habitats that confer hazard mitigation benefits, both by facilitating restoration and adaptation of these habitats, and by promoting the protection and acquisition of restorable lands. Finally, policies on infrastructure protection were updated to ensure that coastal hazard adaptation and infrastructure protection involves members of affected communities, and protects communities that are already at risk. Both of the policy amendments were driven by the strategies in the 2016 to 2020 Assessment and Strategy.

*Coastal Hazards Management Planning Programs and Initiatives*
The ART program has developed and contributed to several sea level rise/flooding adaptation plans since the last Assessment. Key outcomes of the ART Bay Area project include local assessments of 13 operational landscape units, and adaptation strategies unique to each of those areas, as well as suggestions of 80+ regional adaptation responses that are either: 1) large enough in scope that they need to be initiated or carried out by a regional or state agency, 2) are well-suited to an existing regional or state tool, 3) require coordination across jurisdictions, or 4) are considered low-hanging fruit or standard best practices that any jurisdiction facing flooding could benefit from, even in the absence of an in-depth local vulnerability assessment. The ART East and West Contra Costa projects both produced plans for adaptation action and hazard mitigation in Contra Costa county. ART staff also provided support to other governments or organizations on climate adaptation or hazard mitigation planning initiatives. The ART program has continued to provide support to local communities in development of adaptation plans, as described in the Achievements section above. Additionally, ART staff contributed to a series of workshops on climate adaptation and hazard mitigation that were hosted by the Association of Bay Area Governments in 2016. The workshops are described in more detail in the Phase I Assessment for Coastal Hazards. ART Bay Area's work was driven by the 2016 to 2020 Assessment and Strategy.

Changes to Special Area Management Plans that address coastal hazards have been initiated through the San Francisco Waterfront Special Area Plan update. The changes to the plan will address earthquake and flood risks, and are expected to be presented to the Commission for adoption in 2021. An update to the SF Waterfront SAP was identified as a component of Strategy 3 in the 2016 to 2020 Assessment and Strategy.

In 2015, BCDC and Dredged Material Management Office (DMMO) partners completed the Central San Francisco Bay's Regional Sediment Management Plan. The Plan details the state of knowledge of sediment in the Central Bay, identifies sediment management challenges and opportunities for various reaches of the Central Bay, and provides recommendations for further monitoring and data that will address management and research needs for the region. The development of this plan was not specifically 309-driven, although sediment management falls within the broader Wetlands challenges and opportunities of the 2016 to 2020 Assessment and Strategy.

*Coastal Hazards Research, Mapping, Education*

The ART program has advanced BCDC's coastal hazards mapping work since the last assessment, and advanced education and outreach through these mapping efforts as well. The ART Bay Area project mapped and analyzed the impacts of flooding to four critical regional systems, as detailed in the Achievements and Coastal Hazards Phase I Assessment sections above. The ART team also developed the Bay Shoreline Flood Explorer, an interactive online map designed to allow Bay Area communities to learn about causes of flooding, explore maps of flood risk along our shoreline, and download data for further analysis. These maps increase understanding of what could be at risk without future planning and adaptation, helping Bay communities, governments, and businesses to drive action. In addition to the Flood Explorer, the ART program created an educational web application to visualize community vulnerability to current and future flooding due to sea level rise and storm surges. Certain socioeconomic characteristics may reduce ability to prepare for, respond to, or recover from a disaster (e.g., income status, age, rental status, primary language). In the dataset that feeds into the online mapping tool, census block groups with high concentrations (relative to the nine county Bay Area) of these characteristics are flagged as socially vulnerable, with each block group assigned a rank of highest, high, moderate, and low.

To further the reach of these datasets, BCDC staff participate in two data-sharing initiatives led by the California Natural Resources Agency and the State of California, respectively. The CNRA Open Data and California Open Data sites allow agencies to upload datasets in a user-friendly format, making them publicly accessible. BCDC staff has already added tidal datums that were used to create the ART program's sea level rise maps, and will soon add community vulnerability data.

The ART program further advanced coastal hazards education and outreach through engagement of stakeholders at ART Bay Area Regional Working Group meetings, and at East Contra Costa and West Contra Costa Working Group meetings. In addition to these working group meetings, ART staff delivered educational presentations on the causes and community-specific impacts of sea level rise at East Palo Alto and East Contra Costa in March 2018.

BCDC does not directly monitor coastal hazards, but through permit requirements and partnerships, BCDC has advanced the monitoring of coastal hazards since the 2016 to 2020 Assessment and Strategy was finalized. Permittees who are authorized by BCDC to construct large projects along the shoreline are often required to adaptively manage these projects (depending on the expected life of the project), which requires ongoing monitoring of flooding impacts on certain sites along the shoreline. Additionally, BCDC staff has provided support to the California King Tides project, a partnership of state and federal agencies and non-profit organizations that uses photos and aerial imagery of king tides to document how sea level rise would look at various spots along the California coast and Bay Area shoreline. The project both monitors flooding and sea level rise through the photos, and conducts outreach and education by involving the public photo collection.

**Effectiveness of State Coastal Hazards Management Efforts**

A recent report released by the state Legislative Analysts' Office highlights the results of detailed surveys with over 100 stakeholders statewide to understand the status of and needs for sea level rise adaptation support.[82] The report recognizes that there has been progress made in terms of regional coordination and support of local sea level rise adaptation from the state, but that significant needs remain, particularly in terms of building local capacity, funding for local adaptation planning and implementation, and outreach and education to convey the urgency of the issue. The effectiveness of BCDC's management efforts have not been formally assessed, but the products of the Adapting to Rising Tides program, particularly those that supported local communities in developing sea level rise adaptation and hazard mitigation plans, represent tangible steps toward local community adaptation, the benefits of which will likely be realized in the coming decades as sea level rises. It is also essential to note that BCDC is only one of many agencies working to address coastal hazards, and that intergovernmental coordination and partnership will be central to achieving regional resilience goals. While there is already substantial intergovernmental collaboration in the Bay Area, it will be important for this work to continue and improve to strengthen strategic planning and implement policies and actions to mitigate and reduce coastal hazards.

**Identification of Priorities**

This section identifies the top three management priorities where there is the greatest opportunity for BCDC to improve its ability to more effectively address the most significant hazard risks. This section also identifies priority needs and information gaps to help address the management priorities.

*Management Priority 1: Planning for the Bay-wide impacts of sea level rise and coastal flooding*

Description: Continuation of the ART program's work in mapping and planning for flooding impacts and other coastal hazards, including exploring interactions among newly recognized sources of flooding. Updating policies to prepare for sea level rise adaptation.

*Management Priority 2: Coordinating equitable regional adaptation actions*

Description: Leading the implementation of BCDC's recently adopted Environmental Justice and Social Equity Bay Plan policies, and the Bay Adapt platform. Updating BCDC policies, practices, and plans to align with coordinated regional adaptation actions recommended through the Bay Adapt process and leading toward a regional strategy. Coordinating with other government agencies to implement regional strategies.

*Management Priority 3: Supporting sub-regional/local adaptation planning and implementation processes*

[82] Petek, G. (2019). Preparing for Rising Seas: How the State Can Help Support Local Coastal Adaptation Efforts. Legislative Analyst's Office.

Description: Continued outreach and engagement with local governments and communities, both through Bay Adapt and ART Bay Area, to provide information and planning support, as well as regional vision and resources, for local sea level rise adaptation efforts.

Table 39 identifies and briefly explains priority needs and information gaps that BCDC's Coastal Management Program has for addressing the management priorities identified above. The needs and gaps identified here are not limited to those items that will be addressed through a Section 309 strategy but include items that will be part of a strategy.

**Table 39: Priority Needs and Information Gaps in Addressing Coastal Hazards Management Priorities**

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| Research | Yes | Research is needed on the risks posed by groundwater/sea level rise on contaminant mobilization.<br><br>It is necessary to better understand how hardened shoreline protection structures (when they are necessary) and where they are placed (e.g. in the Bay, on the shore, upland) will cumulatively impact Bay surface area, volume, and natural resources. |
| Mapping/GIS | Yes | There is a need to map flooding that would occur from sea level rise combined with groundwater rise, riverine flooding, and other land-based sources of flooding. There is also a need to map contaminated sites along the shoreline that could be flooded by sea level rise/groundwater rise. |
| Data and information management | Yes | There is a need to track adaptation projects to better understand how they are reducing risk Bay-wide. |
| Training/capacity building | Yes | Many local governments want to begin adaptation planning processes, but do not have the in-house expertise, available funding, or regionwide influence necessary to carry out planning processes or implement adaptation actions. There is a need for state and regional government to provide additional resources to local governments to increase their capacity to respond to challenges at a local level. Specifically, there is a need for regional coordination of sea level rise adaptation activities. |
| Decision-support tools | Yes | Tools, such as more detailed and specific adaptation planning pathways, are necessary to help organizations at the local and regional level to choose the right combination of adaptation strategies based on the |

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| | | challenges they face, economic feasibility, and regional context. |
| Communication and outreach | Yes | Although many governments and communities in the Bay Area recognize that climate change-associated changes could pose problems eventually, because these changes (particularly sea level rise) are slow to occur, they often do not feel the urgency to act now in preparation for future climate hazards. Increased communication and outreach are necessary to convey the urgency of preparing for future sea level rise scenarios now, while achieving regional resilience is still possible and much more feasible. |
| Policy Changes | Yes | BCDC fill policies likely will need to be updated to address whether and how to approve more and different kinds of fill for shoreline protection (e.g. tide gates, levees, other flood control structures). Additionally, BCDC policies may need to be updated to consider the long-term adaptive management of the natural and built environments, including public access that is meant to be guaranteed in perpetuity, as well as allowing additional Bay fill for multi-benefit shoreline protection. |

**Enhancement Area Strategy Development**
Will the CMP develop one or more strategies for this enhancement area?

**Yes** __X___
**No** _____

Sea level rise and coastal flooding were identified as the highest priority for the CMP through stakeholder and staff surveys and the Phase I Assessment. While planning for coastal hazard adaptation has advanced significantly in the past decade, work must still be done to ensure implementation of strategies that can create a more resilient Bay Area. This includes implementation of recently adopted Bay Plan policies to incorporate environmental justice and social equity into coastal hazard adaptation, additional policy changes and guidance development that were identified through BCDC's Commission Workshops on Rising Sea Level, as well as implementation of actions that will be identified through the Bay Adapt process.

## Ocean (Coastal and Estuarine) Resources

**In-Depth Resource Characterization**

This section describes key problems and opportunities to enhance BCDC's ability to better address coastal and estuarine resources and uses.

**Table 40: Three Most Significant Issues Related to Coastal and Estuarine Resources**

| | Issue Area | Geographic Scope |
|---|---|---|
| Stressor 1 | Sea level rise/coastal flooding | Regionwide (the whole Bay Area) |
| Stressor 2 | Public access | Regionwide (the whole Bay Area) |
| Stressor 3 | Changing recreational boating needs | Regionwide (the whole Bay Area) |

**Explanation of Significant Issues**

*Sea Level Rise/Coastal Flooding*

Sea level rise/increased coastal flooding provides a backdrop against which all coastal uses must be re-considered. Sea level rise will likely intensify use conflicts and increase stressors/threats to many coastal resources and coastal uses. Some of the many potential impacts of sea level rise on coastal communities, ecosystems, and infrastructure are detailed in the Phase I and Phase II Assessments for Coastal Hazards and Wetlands. Because of the potential for pervasive effects of sea level rise on nearly all coastal activities, and the potential for sea level rise to amplify existing conflicts, we ranked this as the most significant issue affecting coastal and estuarine resources. While additional significant stressors to coastal and estuarine resources related to wetlands and coastal hazards also exist, those issues are addressed in the more targeted Phase II Assessments for the Wetlands and Coastal Hazards Enhancement Areas. Beyond sea level rise, significant issues that are related primarily to conflicting uses of coastal and estuarine resources are highlighted here.

*Public Access*

Provision of maximum feasible public access is one of BCDC's core goals. However, ongoing and emerging issues around public access make this a topic ripe for consideration. Conflicts between providing maximum feasible public access and conserving wildlife are not new, but with the recent push to quickly restore significant areas of wetland ecosystems, these issues have been amplified. Stakeholders have raised this issue through several different BCDC public engagement processes, including the recent Fill for Habitat Bay Plan amendment, and through stakeholder engagement on a possible update to the Suisun Marsh Protection Plan. The issue also comes up often in permitting of habitat or public access projects. The effects of sea level rise on public access/recreation and restoration was highlighted in ART Bay Area Key Issue number 7, which noted "Rising Sea Level will Put Pressure on the Relationship Between Regional Recreation and Habitat." Beyond this specific conflict, public access growth — especially to meet the goals of the Bay Trail project — is often limited by other use conflicts with transportation projects, airports, ports, and more. Because of the regular concern raised by stakeholders, the amplification of the issue due to recent and expected increases in

restoration, and the expected decrease in available shoreline space resulting from sea level rise, we have ranked this as the second most significant stressor. Questions that have been raised include whether public access should be required on a regional scale or a project-by-project basis, and how quality vs quantity contributes to maximum feasible public access. The Environmental Justice Bay Plan amendment also identified the need for more equitable public access, and changed policies toward this end, but recognized that other management changes are likely necessary to accomplish this goal. Underscoring both of these issues is sea level rise, and the question of how to handle public access/wildlife/social equity conflicts in a dynamic coastal zone.

*Changing Recreational Boating Needs*

As detailed in the Phase I Assessment on Coastal and Estuarine Resources and Cumulative and Secondary Impacts, stakeholders and BCDC staff have raised several issues related to recreational boating and equity. Specifically, stakeholder concerns and new preliminary data have highlighted the following management challenges: (1) How should we handle demand for increased live-aboard quotas while maintaining equitable access and recreation opportunities and minimizing impacts that residential use of the Bay (which is not a water-oriented use) can have on Bay resources? and (2) How can we ensure the economic viability of marinas, while also supporting growing boat-share and community sailing programs that offer Bay access to many people, ensuring that small boat owners still have sufficient resources and access to the Bay (e.g. sufficient dry storage facilities), and generally ensuring that boating and marinas are equitable and accessible to all? BCDC staff have ranked the overarching issue of changing recreational boating needs as the third most significant stressor as a result of stakeholder and staff concern about the specific management challenges identified, and the fact that these are discrete problems that could benefit greatly from NOAA 309 support. Specifically, it is particularly timely and important to understand how to best provide and facilitate equitable access to the Bay through a number of avenues, including boating, and to make management changes accordingly. Additionally, outdated policies and the lack of information around boating and water-oriented recreation in and around the Bay led BCDC staff to identify this as a significant issue. Boating, marinas, and live-aboards are addressed through the Bay Plan Recreation section, which was last updated in 2006. The Bay Plan recreation policies may not adequately address current challenges in managing these activities, and furthermore, Bay Plan policies in this section may not address other recent or emerging issues, including environmental justice and social equity. Because recreational needs and trends in general have not been assessed in many years, there may be needs or issues that have not explicitly been raised to BCDC, but that signal a need for management changes.

**Table 41: Emerging Issues of Concern for Coastal and Estuarine Resources**

| Emerging Issue | Information Needed |
|---|---|
| Cumulative impacts of marine transportation in the Bay Area | How will increased ferry activity Bay-wide impact living marine resources, particularly waterfowl and habitats, through erosion and increasing disturbance of wildlife both spatially and temporally? Cumulative impacts of ferries have been assessed in |

| Emerging Issue | Information Needed |
|---|---|
| | the past[83], but not considering current projections for increased ferry activity and expansion of ferry routes. Preliminary work exists on boat wake impacts on waterfowl and habitats in the Bay Area, but a more detailed assessment is necessary to understand the projected magnitude of impacts. |
| Use of public boat launches by private ferry operators | Analysis of whether increased operation of private, for-profit ferries is an appropriate change of use for BCDC-permitted boat launches and boat docks |

**In-Depth Management Characterization**

This section helps to determine the effectiveness of management efforts to address identified problems related to the ocean and Great Lakes resources enhancement objective.

**Table 42: Significant Changes in Management of Ocean and Great Lakes Resources**

| Management Category | Employed by BCDC | CMP Provides Assistance to Locals that Employ | Significant Changes Since Last Assessment |
|---|---|---|---|
| Coastal and Estuarine research, assessment, monitoring | Y | Y | Y |
| Coastal and Estuarine GIS mapping/database | Y | Y | Y |
| Coastal and Estuarine technical assistance, education, and outreach | N | Y | N |

**Significant Management Changes**

Several management changes related to Coastal and Estuarine Resources have occurred since the last assessment. The ART Bay Area Project mapped transportation networks, vulnerable communities, future growth areas, and natural lands and analyzed the impacts of rising sea level and coastal flooding on these communities and resources, providing recommendations for possible adaptation actions as well. This project is described in more detail in the Achievements, Phase I Assessment, and Phase II Assessment sections for Coastal Hazards. BCDC and its partners assess coastal resources and uses periodically in a topical way. Most recently, trends and needs related to wetlands were assessed through the Baylands Ecosystem Habitat Goals Update and the Fill for Habitat Bay Plan amendment (described in more detail in the

Accomplishments section above), and an assessment of trends and needs for seaports is currently underway as part of the Seaport Plan update. Recognizing the need for more information on boating and marinas in the Bay, in 2018 BCDC staff began collecting information on live-aboard boating trends in the Bay, and hosted a briefing by the Bay Planning Coalition on changing boating and marina use throughout the Bay. However, the information gathered through these assessments was limited and provided evidence that a more detailed assessment is warranted.

**Effectiveness of Coastal and Estuarine Resource Planning Efforts**

The effectiveness of the state's management efforts in planning for the use of wetlands and planning for the impacts of coastal hazards on coastal uses are described in the Phase II Assessments above. Although there is limited current information on effectiveness of management efforts related to the key stressors identified above (such as boating conflicts and public access), concerns raised by stakeholders and preliminary data (detailed in Issue Areas above and in Phase I Assessment) indicate that management of certain coastal and estuarine uses could be improved, and should certainly be evaluated. The last comprehensive inventory of recreation (including boating and live-aboards) in the Bay was conducted in 2006, despite mounting evidence that boat-related trends, needs, and impacts are changing. Similarly, the inventory of public access permitted by BCDC is regularly updated, but the status of public access sites, use of those sites, and changing public access needs are not well documented.

**Identification of Priorities**

This section identifies the top three management priorities where there is the greatest opportunity for BCDC to improve its ability to effectively plan for the use of coastal and estuarine resources. This section also identifies priority needs and information gaps to help address the management priorities.

*Management Priority 1: Addressing public access needs and conflicts.*

> Description: Update public access inventory, policies, guidance, and management strategies to address use conflicts, equitable and well-distributed access opportunities, and sea level rise impacts. Current policies and/or guidance could be updated to consider alternative management strategies and to address the public access/wildlife/sea level rise/equity conflict more comprehensively by incorporating new data, and by providing additional certainty and objectivity to applicants seeking to develop public access, ~~or~~ habitat restoration projects, or other essential shoreline projects.

*Management Priority 2: Addressing changing needs for recreational boating in the Bay.*

> Description: Conduct a survey and research to address data gaps, and update policies or plans accordingly. Current policies and/or guidance could be updated to potentially change live-aboard quotas or provide more clarity on how to determine appropriate quotas, and to guide decisions on providing equitable access in light of reduced boat ownership, changing marina usage, and increased popularity of shared boating programs. Develop guidelines that would prioritize expansion of access points, like marinas, to programs or organizations

that optimize use of boats in terms of person-hours spent on the water, the number of people in the community served per boat and the frequency of boat use.

*Management Priority 3: Updating coastal resource/use management plans to incorporate new information on coastal/estuarine resources and uses, and to address changing needs and trends.*

Description: Periodically survey emerging coastal use needs and conflicts. Update Bay Plan, Seaport Plan, Suisun Marsh Protection Plan, and Special Area Plans to address conflicts or needs identified.

Table 43 identifies and briefly explains priority needs and information gaps BCDC's Coastal Management Program has to help it address the management priorities identified above. The needs and gaps identified here are not limited to those items that will be addressed through a Section 309 strategy, but include items that will be part of a strategy.

**Table 43: Priority Needs and Information Gaps in Managing Coastal and Estuarine Resources**

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| Research | Yes | An assessment of trends and needs regarding boat use in the Bay is necessary to inform how policy changes or development of management plans could best address issues and best reflect current needs. Necessary information includes the number of BCDC permits for marinas; the number of live-aboards within marinas; an inventory of recreational boats in the Bay; frequency, duration, and type of boat use by different populations and different sub-regions around the Bay; an inventory of the number of boats in active use at marinas; an inventory of number of boaters that gain access through shared equipment programs; number of people served by shared boating programs; number of and demand for dry storage facilities; the number of available slips at marinas and how this is distributed around the Bay; non-motorized boating trends, locations and numbers of boat launch sites, anchorage numbers and needs, the intersection of recreational boating and shipping, demographic information on boating in the Bay, cost of access to the Bay via boating, information on economic trends in both recreational and industrial maritime activities, etc.<br><br>Assessment of status and use of existing public access sites around the Bay, as well as needs for future public access. |

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| Mapping/GIS | Yes | Mapping of the data and trends described in Research Needs to understand how boating and public access patterns have changed geographically, as well as the current geographical distribution of various boating and public access amenities, opportunities, and conflicts. Mapped data would provide a tool for policy and management decisions regarding public access or boating in the Bay.<br><br>Mapping potential sites for future regional public access projects, taking into account wildlife/habitat hotspots, equitable distribution, and sea level rise. |
| Data and information management | No | N/A |
| Training/capacity building | Yes | Increased capacity to conduct assessments of coastal uses and coastal resource management needs on a more regular basis (e.g., economic analyses to support seaport plan updates at 5-year intervals). |
| Decision-support tools | Yes | Consideration of a regional planning process to set up a regional public access "bank," including proposed locations and public access types that would meet the needs of all key stakeholders. Assessment of whether a regional plan/bank could guide future public access project decisions. |
| Communication and outreach | Yes | Coordination among organizations central to discussions over coastal use conflicts, including representatives of organizations that provide public access and representatives of organizations aiming to protect habitat and natural resources, will be necessary to ensure buy-in and agreement on any processes or policies developed.<br><br>Also, w~~W~~hile issues genuinely exist related to the inherent conflict between maximizing public access and protecting wildlife, some of the conflict around this issue stems from a lack of understanding of BCDC's Public Access policies regarding wildlife. There is a need for continued outreach and education of relevant stakeholders about BCDC public access policies as they relate to wildlife. |

| Priority Needs | Need? | Brief Explanation of Need/Gap |
|---|---|---|
| Policy Changes | Yes | Changes to BCDC's policies or permitting guidance will likely be necessary to incorporate newest information/research. |

**Enhancement Area Strategy Development**

Will the CMP develop one or more strategies for this enhancement area?

**Yes** __X__

**No** _____

BCDC staff decided to develop a strategy on the "Coastal and Estuarine Resources" Enhancement Area in order to update Bay Plan policies on recreation, and to address two specific coastal and estuarine resource use conflicts: (1) the conflict among public access, wildlife/restoration, rising sea level, and equity; and (2) changing needs in recreational boating. This decision is based on stakeholder concerns surrounding public access, live-aboards, and changing boat sizes (characterized in more detail above and in the Phase I Assessment). Additionally, BCDC staff has elevated the need to re-assess and update the Recreation Bay Plan policy section, which is outdated and provides challenges in permitting. The issues we intend to explore include discrete and manageable tasks leading to a program change, so Section 309 funds could provide necessary and meaningful support to address these topics.

## Strategy

The following is a comprehensive, multi-year strategy that identifies program changes and implementation activities needed to address enhancement area objectives identified as high priority in the Assessment. The strategy is based on the needs identified in the Assessment and covers the 5-year period from fiscal year 2021 to fiscal year 2025. The strategy provides two main components that each aim to accomplish one or more program changes by the end of the 5-year period.

### Strategy 1: Improve the Region's Capacity to Understand and Adapt to Current and Future Coastal Hazards

**I. Issue Area(s)**

The proposed strategy or implementation activities will support the following high-priority enhancement areas *(check all that apply)*:

- ☐ Aquaculture
- ☐ Energy and Government Facility Siting
- ☒ **Coastal Hazards**
- ☐ Ocean/Great Lakes Resources
- ☐ Special Area Management Planning
- ☐ Cumulative and Secondary Impacts
- ☒ **Wetlands**
- ☐ Marine Debris
- ☐ Public Access

**II. Strategy Description**

**A.** The proposed strategy will lead to, or implement, the following types of program changes *(check all that apply):*

☐ A change to coastal zone boundaries;

☒ **New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;**

☐ New or revised local coastal programs and implementing ordinances;

☐ New or revised coastal land acquisition, management, and restoration programs;

☐ New or revised special area management plans (SAMP) or plans for areas of particular concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,

☒ **New or revised guidelines, procedures, and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government, and other agencies that will result in meaningful improvements in coastal resource management**.

B. **Strategy Goal.** The goal of this strategy is to improve the region's capacity to understand and address risks to the built and natural environments presented by current and future coastal hazards. The strategy focuses on incorporating best available information, approaches, and recommendations from current and ongoing hazards and adaptation planning efforts into coastal management planning projects, BCDC findings and policies, and BCDC processes.

C. **Describe the proposed strategy and how the strategy will lead to and/or implement the program changes selected above.** This strategy focuses on updating BCDC's coastal management program to advance the planning and implementation of sea level rise adaptation solutions for coastal communities and the built and natural environments. Specifically, this strategy involves (1) updating Bay Plan and/or Suisun Marsh Plan findings and policies to address key issues identified in the Commission's Rising Sea Level workshops, the Bay Adapt process, the Environmental Justice Bay Plan amendment, the Fill for Habitat Bay Plan amendment, the development of the Wetlands Regional Monitoring Program, Adapting to Rising Tides Bay Area, ~~and~~ the work of the Bay Restoration Regulatory Integration Team, and the Baylands Ecosystem Habitat Goals Update (BEHGU); (2) increasing regional coordination and collaborating with local governments, communities, and other key organizations to implement and coordinate recently adopted policy changes and local and regional sea level rise adaptation actions (e.g., local adaptation projects, local policies/zoning changes, regional sediment management changes); and (3) advancing research that is necessary to support and guide the actions described above. BCDC will address much of the progress toward on-the-ground action through changes to its enforceable policies, which will ensure that the regulatory program can permit and condition shoreline adaptation strategies that have been developed through planning processes.

This strategy will address the management priorities that were identified through the Phase II Assessments for Wetlands and Coastal Hazards:

- Planning for the Bay-wide impacts of sea level rise and coastal flooding
- Coordinating equitable regional adaptation actions
- Supporting sub-regional/local adaptation planning and implementation processes
- Investigating the feasibility and efficacy of wetland adaptation measures by supporting monitoring and developing metrics of success, and facilitating the implementation of these measures
- Improving regulatory permitting to expedite wetland restoration and adaptation
- Planning for protection of lands for wetland restoration and migration space
- Encouraging the restoration, enhancement, or creation of wetlands and other natural solutions for shoreline protection of the built environment

## III. Needs and Gaps Addressed

At the highest level, this strategy addresses the need to move sea level rise adaptation planning efforts forward to implement on-the-ground action. To create a more resilient Bay Area, there are still many needs in terms of research, regional coordination, increased local capacity, policy/regulatory changes, and, of course, funding. This strategy provides for necessary research to improve understanding of flooding risks and adaptation solutions for Bay Area communities, infrastructure, and ecosystems. The strategy also calls for regional coordination around adaptation priorities and strategies (for communities, ecosystems, and the built environment), and for increased support to local organizations to integrate their work into a regional framework and implement key adaptation solutions. Finally, the strategy proposes two major program changes to improve regulatory processes and facilitate implementation of sea level rise adaptation measures for the natural and built environment. These program changes could include Bay Plan Amendments to address adaptive management of the built and natural environments, beneficial reuse of dredged sediment, fill for shoreline protection, or other emerging issues. These issues could also be addressed through an amendment to the Suisun Marsh Protection Plan. The research and regional coordination components of this strategy will inform the program changes, and additional regional coordination may be necessary to implement the program changes once they are complete.

Specific planning and policy needs that have already been identified through the Commission's workshops on Rising Sea Level and additional needs identified through recent policy amendments will be addressed through this strategy. This includes proposed Bay Plan amendments on the intersection of sea level rise with beneficial reuse of dredged sediment, adaptive management, including the long-term management and maintenance of public access, and fill for shoreline protection. Additionally, the strategy will identify and implement changes necessary to address remaining adaptation needs identified through Adapting to Rising Tides Bay Area and Bay Adapt: Regional Strategy for a Rising Bay, and changes necessary to successfully implement the Baylands goals, as identified through the Bay Restoration Regulatory Integration Team's Policy Management Team (PMT), implementation of the Fill for Habitat BPA, and other relevant processes.

## IV. Benefits to Coastal Management

This strategy will build upon recent regional planning efforts by working toward implementation of recommended actions. By providing necessary information, regional coordination, and updated enforceable policies, this strategy will facilitate activities that will build resilience and ultimately improve the management of coastal hazards and wetlands. Because coastal hazards and wetlands management are central to BCDC's coastal program, the strategy will greatly benefit coastal management in the Bay Area.

## V. Likelihood of Success

This strategy capitalizes on numerous recently completed planning efforts, research studies, policy changes, and collaborative processes to address sea level rise adaptation of the built and natural environments. Additionally, increasing demand from the public, elected officials, and the state for immediate action on sea level rise adaptation continues to drive these efforts forward. During the public comment period, the Delta Stewardship Council and the State Lands Commission, with whom BCDC regularly partners on issues related to

the Suisun Marsh and public trust, respectively, also expressed interest in collaborating to advance this strategy. Because the strategy builds on this impetus and previous work, including existing relationships, research, and fora for discussion, it is highly likely that proposed program changes to increase resilience will succeed.

## VI. Strategy Work Plan

**Total Years**: 5

**Total 309 Budget**: $0

| Year | Activities | Outcomes | 309 Budget | Other Funds |
|---|---|---|---|---|
| FY '21 | Collaborate with local governments, land use planners, coastal resilience specialists, wetland restoration practitioners, scientists, community groups, environmental justice organizations, regional agencies/regional coordination bodies, and other key stakeholders to assess policy and management strategies for increasing resilience of coastal communities and built and natural environments. Where necessary to inform these strategies, conduct background research, model outcomes, and build consensus on adaptation solutions. Part of this work will include and rely on implementation of BCDC's recently adopted Environmental Justice and Social Equity Bay Plan policies, and recommendations that emerged from the amendment process. | • Information necessary to support and guide policy changes and collaborative planning efforts.<br>• Tools, partnerships, and strategies to advance sea level rise adaptation and coastal resilience<br>• Additional vulnerability and adaptation studies and planning in key gap areas (i.e. combined flooding) and locations | $0 | $238,631 |
| FY '22 | | | $0 | $250,562 |
| FY '22 | Update the Bay Plan and/or Suisun Marsh Protection Plan findings and policies to address topics related to sea level rise resilience and wetland sustainability, such as adaptive management of the built and natural environments (including public access), beneficial reuse of dredged sediment, fill for shoreline protection (including large, multi-benefit projects), or other emerging issues. | • Draft background report(s) on necessary changes to the Bay Plan/Suisun Marsh Protection Plan to address climate adaptation of Bay Area communities, natural and built environments<br>• Commission consideration of proposed revisions to findings and policies | $0 | $250,562 |
| FY '23 | | | $0 | $263,090 |

| | | | | |
|---|---|---|---|---|
| FY '24 | | addressing sea level rise adaptation and wetland sustainability | $0 | $276,245 |
| FY '25 | Implement adopted policies by developing guidance and leading additional regional efforts to prioritize necessary adaptation actions. Assess necessary program or process changes. | • Development of tools, materials, and processes that further increase BCDC's ability to facilitate sea level rise adaptation efforts. | $0 | $290,057 |

## VII. Fiscal and Technical Needs

A. **Fiscal Needs.** Because of the broad scope of sea level rise adaptation efforts, 309 funding alone is not sufficient to carry out the proposed strategy. BCDC has other sources of funding that will also contribute to completion of this strategy. The strategy will rely on BCDC's funding allocation from California's Cap-and-Trade program (Greenhouse Gas Reduction Fund), additional grants and contracts, and will leverage funds provided by partners through efforts such as Bay Adapt and the Bay Restoration Regulatory Integration Team.

B. **Technical Needs.** BCDC staff will continue to work with a broad base of local, regional, state, and federal partners to advance this strategy and ensure that policy/management changes are based on the best available information. BCDC staff have fostered numerous partnerships with technical experts and decision-makers that will be leveraged to ensure this strategy is successful. This includes other regional, state, and federal agencies; local jurisdictions; academic institutions; the regulated community; private entities; community-based organizations and nonprofit organizations. Since the last assessment, BCDC has continued to grow its network of partnerships. Technical support around specific topic areas and technology needs will be necessary to supplement BCDC's in-house staff expertise. For example, implementing several of the management priorities will require technical support from wetland scientists, restoration ecologists, engineers, and planners to implement and monitor projects that test new approaches to wetland restoration and assess the use of wetlands for shoreline protection. BCDC staff believes that the State Coastal Conservancy and SF Bay National Estuarine Research Reserve, among others, could be partners on this work, highlighting an opportunity for collaboration across NOAA partner agencies/organizations. Additionally, implementation of management priorities related to coastal hazards and wetlands (including coordination of regionwide climate adaptation work) may require mapping of climate-related impacts (including groundwater/stormwater flooding), and planned and in-progress adaptation projects. Finally, modeling may be necessary to predict benefits and impacts of planned shoreline protection/sea level rise adaptation projects on communities, ecosystems, and infrastructure regionwide.

## Strategy 2: Improve Coastal Management Related to Water-Oriented Uses

### I. Issue Area(s)

The proposed strategy or implementation activities will support the following enhancement areas *(check all that apply)*:

- ☐ Aquaculture
- ☐ Energy and Government Facility Siting
- ☐ Coastal Hazards
- ☒ **Ocean/Great Lakes Resources**
- ☐ Special Area Management Planning
- ☐ Cumulative and Secondary Impacts
- ☐ Wetlands
- ☐ Marine Debris
- ☒ **Public Access**

### II. Strategy Description

**A.** The proposed strategy will lead to, or implement, the following types of program changes *(check all that apply):*

☐ A change to coastal zone boundaries;

☒ **New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;**

☐ New or revised local coastal programs and implementing ordinances;

☐ New or revised coastal land acquisition, management, and restoration programs;

☐ New or revised special area management plans (SAMP) or plans for areas of particular concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,

☒ **New or revised guidelines, procedures, and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government, and other agencies that will result in meaningful improvements in coastal resource management**.

**B. Strategy Goal.** Update policies, guidance, and/or regulations to incorporate up-to-date information into coastal use policies and resolve coastal use conflicts.

**C. Describe the proposed strategy and how the strategy will lead to and/or implement the program changes selected above.** As the population of the Bay Area rapidly grows, increasing demand on shoreline resources for public access, recreation, and housing, planning for resource use conflicts becomes increasingly important. Two specific coastal and estuarine use conflicts have been raised by stakeholders and BCDC staff in recent years: (1) the conflicts among public access, wildlife/restoration, rising sea level, ~~and~~ equity, and other key coastal uses; and (2) changing recreational boating needs and conflicts (including issues related to live-aboard quotas, changing boat use trends, and changing marina needs)~~(specifically issues related to live-aboard quotas and boater demand for larger slip sizes)~~.~~-~~ Policy changes and/or guidance development will likely be necessary to resolve these use conflicts. More generally, Bay Plan policies on Recreation

have not been updated in nearly 15 years, and BCDC staff have raised the need to update these policies with new information. To resolve use conflicts and incorporate up-to-date information, this strategy will update BCDC policies and/or develop guidance documents on best management practices for the above issues. This strategy will accomplish these program changes by first collecting necessary data on changing patterns of coastal resource use. Up-to-date information on needs, trends, and conflicts in coastal resource use, particularly related to live-aboard vessels, use of public access spaces, and recreational needs, will be necessary to effectively update BCDC policies and develop guidance. Once data is collected, BCDC staff will prepare background report(s) to summarize findings, begin a public engagement process to identify specific policy changes or guidance development that is necessary, and formally initiate the amendment process(es).

This strategy will address the management priorities that were identified through the Phase II Assessment for Coastal and Estuarine Resources:

- Addressing public access needs and conflicts.
- Addressing changing needs for boating and live-aboards in the Bay and resolving associated use conflicts.
- Updating coastal resource/use management plans to incorporate new information on coastal/estuarine resources and uses, and to address changing needs and trends.

## III. Needs and Gaps Addressed

This strategy addresses the need to resolve several increasingly problematic coastal use conflicts by gathering information and changing BCDC policies and/or guidance. Of the priority needs/information gaps identified in Table 43 of the Phase II Assessment, this strategy primarily addresses research, mapping, and policy or management changes. Because the strategy focuses on incorporating up-to-date information into coastal use management, research, including geospatial analysis, is first necessary to get a better understanding of emerging coastal use trends, particularly around areas that have not been assessed for some time—boating, live-aboards, water-oriented recreation in general, and public access. Research conducted through the strategy will provide up-to-date information on boating and marina trends, including trends in boat share programs and community sailing centers, as well as on public access needs, trends, and conflicts. The strategy also will provide information on the geographic distribution of these trends. This information will then be used to support program changes that would meet several management needs: (1) the need to incorporate new information and address current issues, such as environmental justice and social equity, in BCDC policies on recreation; (2) the need to resolve ongoing debates among how limited shoreline space should be used for public access and wildlife habitat, especially in light of rising sea level and ensuring equitable access to the Bay and its resources; (3) the need to re-consider policies on live-aboards in light of recreational and security needs; and (4) the need to~~-~~ to ensure equitable boating access and preserve working waterfronts in light of ~~reconcile~~ changing patterns in boat ownership and activity, changing use of marinas, and increased popularity of boat share programs~~marina configurations with ensuring equitable access to all~~. Changes to policy or guidance are expected to be appropriate means to address these needs because current policies are out of date or do not sufficiently address these issues, and could potentially restrict necessary

management changes. BCDC staff will engage stakeholders and the Commission to identify and choose appropriate policy or management options/changes, and ultimately bring these proposed changes before the Commission for approval.

## IV. Benefits to Coastal Management

This strategy will result in much-needed information and program changes regarding two very important coastal uses—boating, ~~/~~marinas and public access— that are regulated through BCDC's coastal management program. Because the research and program changes proposed will improve understanding and management of these uses, and will minimize conflicts between these and other coastal uses, the strategy will benefit the coastal management program as a whole.

## V. Likelihood of Success

This strategy will address two distinct issue areas, as described in Section II.C of the strategy above. Issues related to public access/wildlife/sea level rise conflicts and changing needs for live-aboards and boat slip size have been raised to the Commission and BCDC staff increasingly in recent years, indicating a desire among stakeholders and the public to address use conflicts on these topics. BCDC staff have likewise recognized the need for policy updates to the Recreation section of the Bay Plan, and believe that an assessment of boating and public access needs/trends is overdue. Additionally, the State Lands Commission, with whom BCDC works to address issues related to the public trust, and the Bay Trail project, a long-standing partner on public access, have expressed interest in collaborating on this strategy. Because there is broad interest in these changes from BCDC staff, stakeholders, and partner organizations, it is likely that this strategy will succeed in gathering up-to-date information, although it raises controversial topics that may make policy/management changes more difficult. The strategy consists of discrete tasks that can be accomplished in the timeframe proposed.

## VI. Strategy Work Plan

**Total Years**: 5

**Total 309 Budget**: $643,750

| Year | Activities | Outcomes | 309 Budget | Other Funds |
|---|---|---|---|---|
| FY '21 | Evaluate key areas of resource use conflicts, including emerging issues related to 1) the conflict among public access, wildlife/restoration, rising sea level, and equity; and 2) changing recreational boating needs. Evaluate suitable methods for addressing resource use conflicts identified as needing management changes, including | • Increased and up-to-date information on shoreline use conflicts and the extent of these issues<br>• Recommendation for management changes needed to address use conflicts, including the specific management plan | $128,750 | $109,881 |

| | | | | |
|---|---|---|---|---|
| FY '22 | policy changes, development of guidance documents, and development of regional management plans.<br><br>Identify key stakeholders to be involved in each of these efforts, and engage stakeholders through one-on-one interviews, discussions at relevant public fora (e.g. SF Bay Joint Venture, Bay Planning Coalition meetings), and workshops. | or policy changes required and the timing of accomplishing these changes. | $128,750 | $121,812 |

| Year | Activities | Outcomes | 309 Budget | Other Funds |
|---|---|---|---|---|
| FY '23 | Update the findings and policies in the Bay Plan, Suisun Marsh Protection Plan, Seaport Plan, and/or Special Area Plans (depending on which policy document(s) could best resolve the specific issues identified), and/or develop regional management plans, to address the actionable issues identified in FY '22 | • Draft background report(s) on necessary changes to the Bay Plan or development of regional management plans | $128,750 | $134,340 |
| FY '24 | | • Commission consideration of proposed revised Bay Plan findings and policies or regional management plans | $128,750 | $147,495 |
| FY '25 | Implement adopted Bay Plan policies by developing guidance and assessing additional necessary programs or process changes | • Development of tools, materials, and processes that reduce resource use conflicts and ensure that BCDC practices reflect up-to-date coastal and estuarine resource management needs | $128,750 | $161,307 |

## VII. Fiscal and Technical Needs

**A. Fiscal Needs.** 309 funding will cover a large fraction of activities related to this strategy, but some additional funding will be necessary to accomplish two program changes. Additional funding would be provided through State General Funds. BCDC staff anticipates that program changes proposed through the strategy could be completed using Section 309 and other guaranteed BCDC funding. 309 funding would focus primarily on completing one of the two program changes, while BCDC funding would focus primarily on completing the other program change.

B. **Technical Needs.** As described in Strategy 1 above, BCDC staff collaborates with other entities when necessary to ensure that the best available information is considered in changes to the CMP. BCDC staff will continue to leverage these connections to ensure that assessment of the status of coastal uses is effectively and accurately carried out. To achieve the goals of this strategy, BCDC staff will likely need to collaborate with social scientists to inform best practices for surveys of stakeholders, and with GIS specialists to inform the development of new geospatial products. BCDC staff believe that the State Coastal Conservancy could be a partner in some of this work, particularly the public access and recreation pieces, so this strategy would provide an opportunity for leveraging the resources of another agency that comprises the California Coastal Management Program.

## 5-Year Budget Summary by Strategy

The following budget table summarizes BCDC staff's anticipated Section 309 expenses by strategy for each year.

| Strategy Title | Anticipated Funding Source (309 or Other) | FY '21 | FY '22 | FY '23 | FY '24 | FY '25 | Total Funding |
|---|---|---|---|---|---|---|---|
| ***1. Improve the Region's Capacity to Understand and Address Current and Future Coastal Hazard Risks*** | Other | $238,631 | $250,562 | $263,090 | $276,245 | $290,057 | $1,318,585 |
| ***2. Update policies to address changing trends in coastal / estuarine resource use and resolve resource use conflicts*** | NOAA 309 | $128,750 | $128,750 | $128,750 | $128,750 | $128,750 | $643,750 |
| | Other | $109,881 | $121,812 | $134,340 | $147,495 | $161,307 | $674,835 |
| **Total Funding** | | $477,262 | $501,124 | $526,180 | $552,490 | $580,114 | $2,637,170 |

## Summary of Stakeholder and Public Comment

**Stakeholder Outreach**

In December 2019, BCDC staff distributed an online survey to gather stakeholder feedback on enhancement area priorities, the critical problems related to those enhancement areas, and opportunities for improvement of BCDC's coastal management program. The survey was sent to approximately 1,000 stakeholders, including the mailing lists for BCDC's Commissioner Working Groups, the Adapting to Rising Tides Program, the Long Term Management Strategy for Placement of Dredged Material in the Bay Region (LTMS), Bay Plan/Suisun Marsh Plan amendment Interested Parties, the Seaport Planning Advisory Committee, the San Francisco Waterfront Working Group, the Bay Adapt Leadership Advisory Group and other interested parties. The survey was also sent to BCDC's Commissioners and Alternates, Design Review Board, and Engineering Criteria Review Board. Additionally, the survey was distributed internally to BCDC staff. 167 individuals representing a diversity of sectors and interests, including at least 14 staff members, completed the survey (Figure 9).

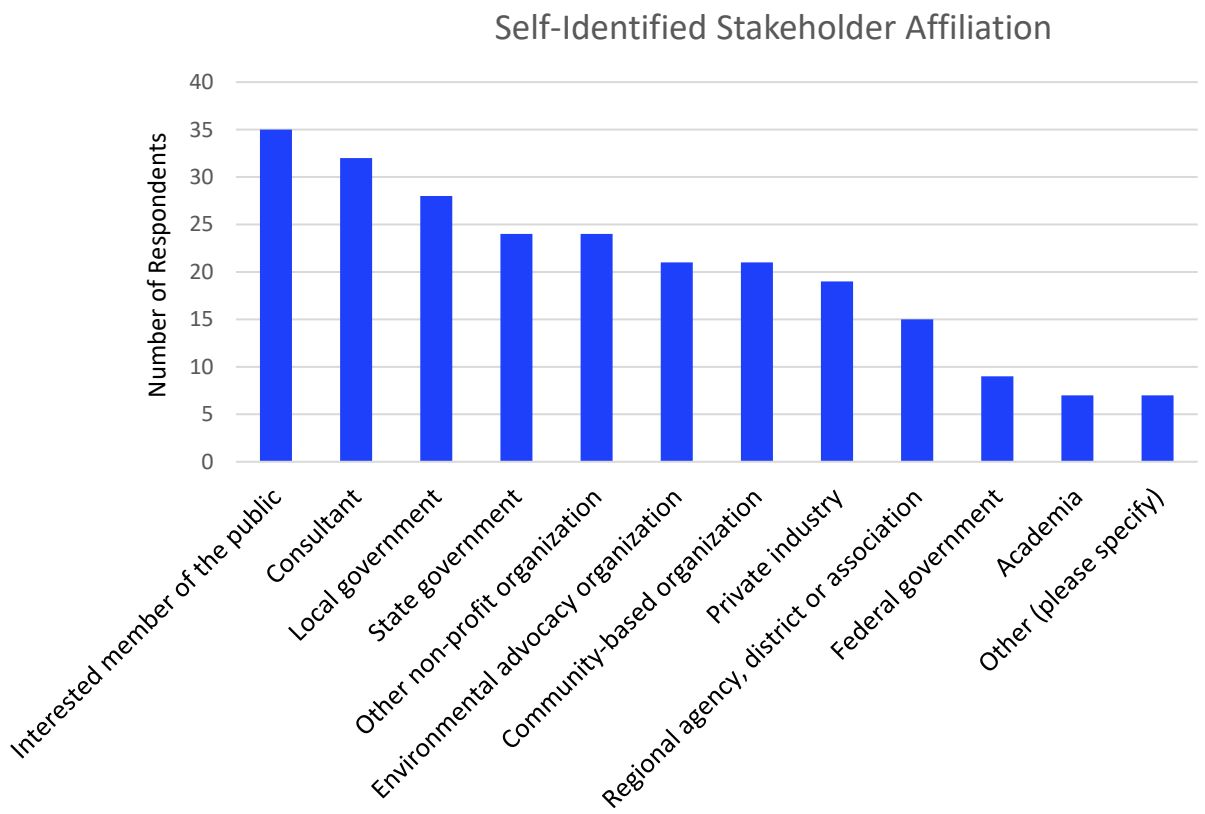


**Figure 9.** Stakeholders were asked to indicate the sector(s) in which they worked, with the opportunity to select any sectors that applied. Therefore, one individual may have chosen more than one affiliation.

**Enhancement Area Priorities**

Generally, survey responses identified a need to focus on Coastal Hazards and Wetlands as high priority enhancement areas, with many stakeholder prioritizing Coastal and Estuarine Resources as well (see Figure 10). Coastal Hazards ranked highest, with 67% of stakeholders and 71% of staff identifying this enhancement area as a top priority. Wetlands received similar responses, with 62% of stakeholders and 57% of staff identifying this enhancement area as a priority. Coastal and Estuarine Resources was the third highest priority for stakeholders, with 47% of respondents ranking this among their top 3 priorities, and was a relatively high priority for staff as well, with 50% of staff identifying this EA among their top 3 priorities.

Three other enhancement areas received moderate response rates: Special Area Management Planning, Cumulative and Secondary Impacts, and Public Access. 30-39% of stakeholders identified these enhancement areas as a top priority. 50% of staff identified Cumulative and Secondary Impacts and Public Access among their top 3 priorities, but only 14% of staff prioritized Special Area Management Planning. Marine Debris and Energy and Government Facility Siting were much lower priority for both staff and stakeholders. Aquaculture was not included in the survey, as this Enhancement Area is not relevant for BCDC's Coastal Management Program.

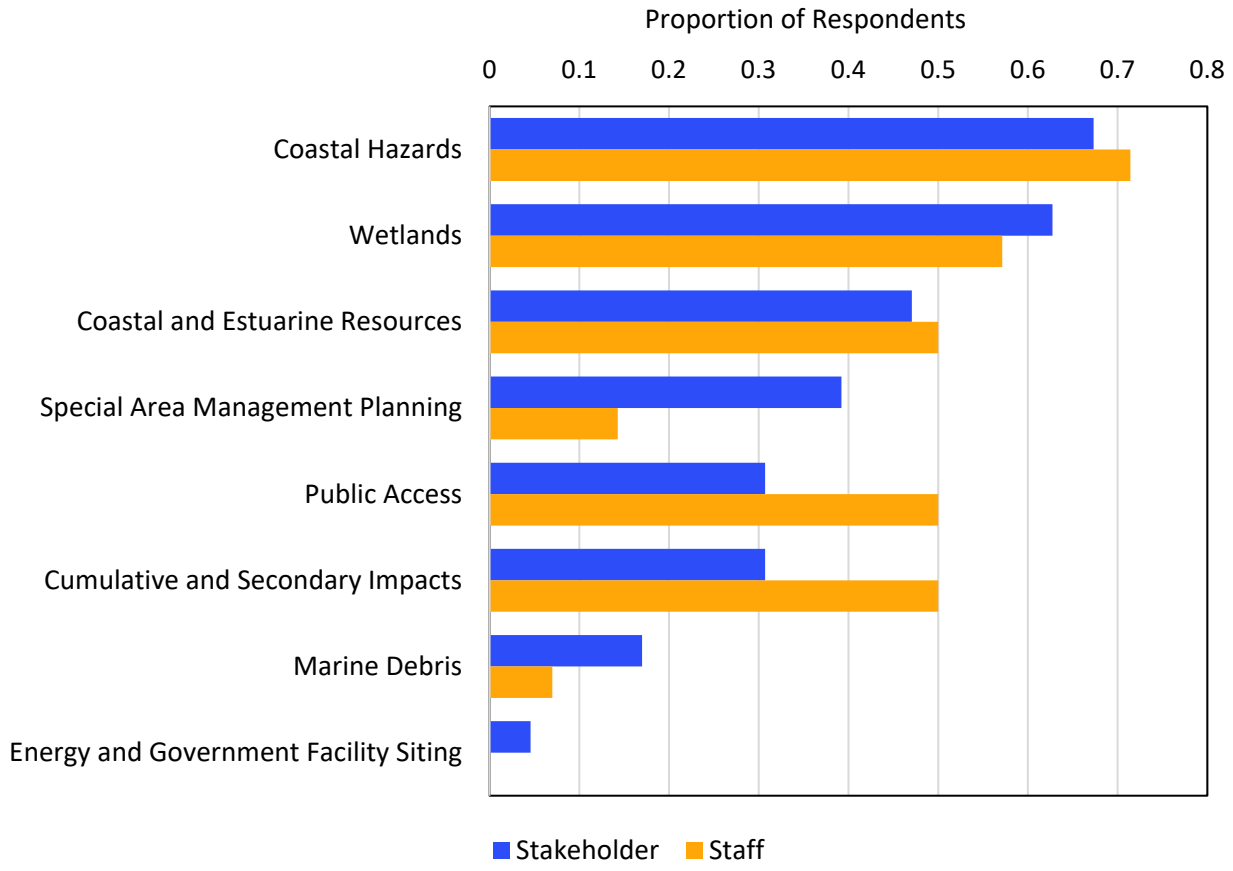


**Figure 10.** Proportion of staff and stakeholders identifying each enhancement area within their top 3 priorities.

**Critical Issues, Management Challenges, and Solutions**

- *Wetlands*. Stakeholders and staff identified sea level rise as the most critical issue facing wetlands, in addition to the related challenges of the need for upland transition areas to allow wetlands to migrate inland, and the need for improved sediment management and increased beneficial reuse.
- *Coastal Hazards.* Survey respondents identified flooding shoreline communities/disruption to adjacent critical infrastructure as the most critical issue related to coastal hazards, with 94% of stakeholders choosing this as the most critical issue. After that, 72% of stakeholders identified sustainability of natural Bay ecosystems as sea level rises as a critical issue.
- *Coastal and Estuarine Resources.* Stakeholders predominantly identified land-based development as the most critical issue contributing to use conflicts for coastal and estuarine resources. Other priority critical issues included invasive species and dredging/sand mining.
- *Cumulative and Secondary Impacts.* Staff and stakeholders did not identify a clear priority for Cumulative and Secondary Impacts. A wide variety of issues were identified as important, including concerns about aging public infrastructure, development in low-lying areas, impacts of patchy hardening of Bay shorelines, failure to consider cumulative and secondary impacts in mitigation requirements, and collective impacts of Bay fill.
- *Special Area Management Planning.* Priority critical issues that could be addressed through improved special area management planning depend on the area in question. The highest priority issues for San Francisco Bay were landscape-scale shoreline management and sediment management/beneficial reuse of dredged sediment. For Suisun Marsh, the highest priority issues were managing wetlands for sea level rise, landscape-scale shoreline management, and flooding shoreline communities/infrastructure.
- *Public Access.* Critical issues facing public access were prioritized along a spectrum. Slightly higher priority issues included long-term maintenance of public access, loss of access due to sea level rise, and diversity of public access uses or types. Slightly lower priority issues included need for regionwide planning of public access, creating public access that is welcoming to all users and is ADA accessible, conflicts between public access and wildlife, and the need for stronger enforcement of public access requirement violations.
- *Marine Debris.* Stakeholders identified derelict/abandoned vessel removal as the highest priority critical issue, with three other issues identified as relatively high priorities: post-storm debris cleanup, reduction of trash from local watersheds, and removal of derelict pile-supported structures.
- *Energy and Government Facility Siting*. Among the small number of stakeholders who chose Energy and Government Facility Siting as a priority enhancement area, the most critical issues identified were energy facility impacts to Bay natural resources, and siting non-renewable energy facilities near disadvantaged communities.

**Management Challenges and Solutions for Improvement**

For the three highest priority enhancement areas (Coastal Hazards, Wetlands, and Coastal and Estuarine Resources), the same two management challenges were identified as the most important to address: (1) funding for planning and response to impacts, and (2) regional coordination on planning and management. Similarly, three solutions to addressing critical issues and management challenges were ranked highest in all three of these top priority enhancement areas: (1) increasing the region's capacity by providing resources such as planning tools, guidance, trainings, and pathways to obtain funding; (2) increasing regional coordination on coastal planning and adaptation strategies; and (3) improving regulatory and enforcement programs by updating policies, special area plans, and guidance documents. In general, these same two management challenges and three solutions were also ranked the most highly for medium enhancement areas as well, with some small variations.

## Response to Public Comments Received

BCDC received seven public comment letters in advance of and two oral comments at the August 20, 2020 public hearing. Numbered responses are attached in Appendix A. The responses below correspond to specific numbered comments in the Appendix. In general, BCDC received comments on a range of issues, including public access, wetlands and habitat restoration, and boating.

**General Response:**

1) The SF Bay Coastal Management Program Assessment and Strategy is created every five years to detail how BCDC will spend funding from NOAA to address key management issues that BCDC can address by changing its laws, policies, and by creating guidance. The document is not intended to address all of BCDC's planning priorities, and does not focus on topics for which law, policy, or guidance changes are not necessary. Therefore, some issues that are high priority for BCDC may not be discussed or highlighted in the document if law, policy, or guidance changes are not necessary to address these issues. For example, issues or challenges that could better be addressed through regional coordination or altered application of BCDC's existing laws and policies would not be highlighted in this document. Additionally, high priority topics for which there are not notable management challenges may not be discussed in detail through the Assessment and Strategy. Finally, the document does not lay out plans for BCDC's regulatory or enforcement programs.

**Comment letters**

**1. Lee Huo, San Francisco Bay Trail Project, received August 13, 2020:**

1) Staff added language to address this concern to the Public Access Phase I Assessment. The Phase II Assessment and Strategy are aimed at resolving specific management challenges. Because BCDC's partnership with the Bay Trail does not represent a

management challenge, BCDC's commitment to this partnership was not explicitly reiterated in these sections. Bay Trail staff would certainly be a key stakeholder/partner in the implementation of Strategy 2, and this was added to the Strategy 2 "Likelihood of Success" section.

2) Staff agrees that equal consideration must be given to wildlife/restoration goals and Bay Trail/public access goals, which is why Strategy 2 focuses on resolving these conflicts. Staff also agrees that public access trails and the Bay Trail's goals are especially important in light of the COVID-19 pandemic. Providing maximum feasible public access is a continued goal and legal/policy requirement for BCDC. The Public Access enhancement area was not identified as high priority in the Phase I Assessment based on feedback received through the stakeholder survey, but in effect public access is a high priority because it is the focus of Strategy 2. Language was added to the "Enhancement Area Prioritization" in the Public Access Phase I Assessment to clarify. Also, this document does not represent all of BCDC's priorities and goals for the next five years — please see General Response number 1 above.
3) The characterization of "wildlife/habitat and public access conflicts" and "the need for regional public access planning" as being "slightly lower priority issues" in the Comments Summary section is a direct summary of stakeholder feedback because these two topics were not selected as top priority issues as often as the others listed. Therefore, they were, on average, lower priority to stakeholders than the other issues.
4) This document represents an iterative process of prioritizing issues and identifying management challenges that can be resolved through a targeted strategy supported by a small amount of federal funding. The Phase I Assessment process identifies enhancement areas as high, medium, or low priority based on issues identified in the assessment and the stakeholder survey. Enhancement areas that rank as high priority in the Phase I assessment are then carried forward into the Phase II Assessment, which is a more in-depth assessment of the issues and management challenges associated with each of those enhancement areas. Finally, strategies are developed to address a subset of management priorities identified in the Phase II Assessments. Specifically, strategies must result in "program changes", as defined by the Coastal Zone Management Act, which for BCDC most often means policy changes and Commission-adopted guidance document development. Strategy 1 and Strategy 2 are "prioritized" equally in terms of BCDC's overall planning program. Also, please see General Response number 1 above.
5) Thank you for providing clarifications regarding the data shown in Table 7. It has been updated accordingly.

**2. Sheri Pemberton, State Lands Commission, received August 14, 2020:**

1) Thank you for the suggestion. The table has been added.
2) Because BCDC must submit the revised Assessment and Strategy to NOAA by October 1, including holding a Commission vote to adopt the Assessment and Strategy, staff believes there is unfortunately insufficient time to meaningfully involve tribes in the review of the document. However, the California Indian Environmental Alliance contacted BCDC staff regarding review of the document shortly after the Commission hearing on August 20. Staff responded by inviting them to provide comments and

offering to have a phone discussion. BCDC staff are starting the process of adopting a tribal engagement strategy. Staff anticipates that the tribal engagement strategy will be adopted by the time Strategy implementation begins in July of 2021, and therefore staff will consult with tribes as needed on a project-by-project basis throughout Strategy implementation.

3) Thank you for the suggestion. This management priority has been added.
4) Staff appreciates the comment and agrees. The importance of intergovernmental coordination was added to Coastal Hazards Phase II Assessment under the "Effectiveness of Coastal Hazards Management Efforts" section and the "Description" of Management Priority 2.
5) Staff also looks forward to partnering with the State Lands Commission (SLC) on implementation of Strategy 1.
6) Staff would be happy to discuss any specific concerns with projects that are now allowed as a result of the Fill for Habitat Bay Plan Amendment.
7) Staff also agrees that SLC will be an important partner in implementation of Strategy 2, and looks forward to coordinating as staff moves forward with strategy implementation.

**3. Richard Jepsen, US Sailing, received August 14, 2020:**

1) Thank you for raising this concern, and BCDC staff have attempted to rectify this omission by including specific information from your letter throughout the Assessment and Strategy.
2) Comment noted, and this information has been incorporated into the revised Assessment and Strategy.
3) The Assessment does not intend to quantify public access as the number and length of slips. Rather, it notes that marinas have been closing and changing in response to changing demand of slips. This is merely one consideration in assessing proper management of recreational boating on the Bay.
4) Staff greatly appreciate this information, and have noted the increasing prominence of boat share programs, community sailing clubs, and commercial sailing schools in the "Public Access" and "Coastal and Estuarine Resources" Phase I Assessments, and in the "Coastal and Estuarine Resources" Phase II Assessment.
5) Staff appreciates the proposed approach to investigating changing recreational boating trends on the Bay. These suggestions will be invaluable in implementation of Strategy 2 of the Assessment and Strategy. To that end, the suggested approach has been incorporated into 'Needs and Gaps' table for Coastal and Estuarine Resources. The first step of Strategy 2 involves researching the questions/topics detailed in this table.
6) Staff appreciates this offer, and will reach out to discuss once implementation of Strategy 2 is underway.

**4. Hunter Cutting, San Francisco Sierra Club, received August 14, 2020:**

1) Thank you for raising this concern, and BCDC staff have attempted to rectify this omission by including specific information from your letter throughout the Assessment and Strategy.

2) Discussion of community sailing centers and boat share programs, and the need to consider these programs in assessing possible BCDC program changes, has been incorporated throughout the Assessment and Strategy. While marinas are a water-oriented use, the Assessment and Strategy does not intend to equate water-oriented use of the Bay with marina *capacity* – it highlights marinas as one topic area where changing marina usage patterns may warrant a BCDC program change.
3) Staff appreciates this information, and recognizes that marina slip demand does not necessarily represent boating activity on the Bay.
4) Staff does not currently have data on the uneven nature of demand for large slips around the Bay, but recognize that this would influence management decisions. The research phase of the Coastal and Estuarine Resources Phase II Assessment would include gathering this information, and this has been added as a topic for further investigation in Table 43.
5) Staff appreciates this information, and has incorporated these details into the revised Assessment and Strategy.
6) Table 22 does not intend to equate marinas with boating, but recognizes these closely related water-oriented activities are facing use conflicts (to some extent with each other).
7) Table 23 does not intend to equate marinas with boating, but recognizes these closely related water-oriented activities face similar use conflicts. Even when boats don't enter the Bay through marinas, they still require some land-based point of access.
8) Under the Phase I Assessment for Coastal and Estuarine Resources, "Changing Marinas and Equitable Access" has been updated to clarify that small boat ownership/parking is not synonymous with small boat operations.
9) The description of "Changing Recreational Boating Needs" was updated to note the need to explore how to facilitate equitable access options such as boat share programs and sailing clubs.
10) The description of Management Priority 2 has been updated to reflect changes in boating besides marinas.
11) Research questions related to community sailing centers and boat sharing programs were added to the Research row of Table 43.
12) The "Needs and Gaps Addressed" section for Strategy 2 was updated to mention community sailing centers and boat sharing programs.
13) This section does not equate boating and marinas, and does not explicitly mention any details of boating and marinas on the Bay. This section was not updated, as the language included already encompasses all management issues related to boating on the Bay.
14) Staff greatly appreciates your detailed comments, and in response information on boat sharing programs and community sailing centers has been incorporated throughout the document. Staff will explore these trends and other emerging boating trends further through implementation of Strategy 2.

**5. Carin High and Rick Johnson, Citizens' Committee to Complete the Refuge, received August 14, 2020.**

Overall response: Staff greatly appreciates the time and effort dedicated by CCCR in providing these thorough and well-informed comments. Please note that this document is not intended to be a comprehensive statement of all of BCDC's priorities and planning actions over the next five years. The document proposes targeted strategies to accomplish "program changes," as defined by the Coastal Zone Management Act, which typically includes policy changes or guidance document development for BCDC. Staff agrees that it is important to protect restorable lands, consider impacts to ecosystems in assessment of development projects, and consider cumulative impacts of development in project permitting. BCDC has limited authority in its shoreline band jurisdiction, and can only approve or deny projects on the basis of public access. For projects sited in the Bay jurisdiction, staff believes that the McAteer-Petris Act and current Bay Plan policies already include significant measures to achieve the protections detailed in your letter, and that further improvements could be made through collaborative planning efforts and possible changes to implementation of existing policies. Therefore, many of these comments would not fall within the scope of the Assessment and Strategy. However, these comments are helpful as BCDC continues to advance discussions on restoration and sea level rise adaptation regionwide through efforts like Bay Adapt. Staff has added information to the Wetlands Phase II Assessment to highlight the priority to protect baylands for restoration and migration space, and the need to further investigate whether BCDC legislative, policy, or guidance improvements are necessary to address the issues you've raised. Strategy 1 could also include program changes to ensure wetland protection as sea level rises.

Specific responses:

1) Staff agrees that further actions are needed to meet regional goals for wetland restoration, but believes that action items relevant to the strategy (law, policy, and guidance changes) are sufficiently addressed through the strategy as written. Changes were made throughout the Phase I and Phase II Assessments to address your more detailed comments as described below.
2) Staff thanks CCCR for noting regional accomplishments regarding wetlands over the past five years, and recognizes that the Baylands Goals and Adaptation Atlas do not explicitly ask that planners and applicants commit to protecting and enhancing the ecosystem elements in their counties. Staff anticipates that more accountability for local governments and applicants for implementing these plans may be part of the Bay Adapt Joint Platform, which could be supported through Strategy 1 of the Assessment and Strategy.
3) Staff agrees that BCDC should define and help implement appropriate interventions to preserve and restore critical wetlands and their functions. Management Priority 1 of the Wetlands Phase II Assessment, "Investigating the feasibility and efficacy of wetland adaptation measures by supporting monitoring and developing metrics of success, and facilitating the implementation of these measures", and Strategy 1, which focuses on the Wetlands and Coastal Hazards enhancement areas, both aim to define and implement appropriate interventions. Newly added Management Priority 3 also aims to accomplish this goal by "Planning for protection of lands for wetland restoration and migration space."

4) Strategy 1 focuses on increasing resilience of both the natural environment and human welfare. The Strategy includes a Bay Plan Amendment to increase the beneficial reuse of dredged sediment, an amendment to the Suisun Marsh Protection Plan to ensure continued preservation of Suisun Marsh, and could include any other possible policy amendments or guidance documents that are determined necessary through the research and collaboration involved in Strategy 1.
5) Staff agrees that current Bay Plan policies can continue to improve the balance between ecological and built systems. A guidance document to clarify the application of the Climate Change policies is nearly complete, and other guidance documents to clarify the application of Tidal Marshes and Tidal Flats policies in light of sea level rise are also in BCDC's workplan. Beyond the development of guidance, permitting and policy application is not within the scope of the Assessment and Strategy.
6) Bay Plan policies actively encourage the preservation of restorable lands (Tidal Marshes and Tidal Flats Policy 4) and require the restoration of 65,000 acres of areas diked from the Bay, as recommended in BEHGU (Tidal Marshes and Tidal Flats Policy 5). All relevant Bay Plan policies, including these, are considered in determining whether new development is acceptable in the Bay jurisdiction. In the shoreline band jurisdiction, BCDC only has authority to approve or deny projects on the basis of maximum feasible public access.
7) A summary of authorized restoration amounts in each of the Bay's counties (as a proxy for sub-regions) between 2016 and 2019 was added to the Wetlands Phase I Assessment, to provide an overview of how each sub-region has contributed toward achieving the habitat goals since BCDC's 2016 Assessment and Strategy.
8) Additions to the Wetlands Phase II Assessment and Strategy 1 emphasize how the management priorities and Strategy aim to advance BEHGU. See Comment 6 above for response to "projects should be reviewed to assess whether they contribute or present obstacles towards reaching the habitat goals…"
9) BCDC does not sponsor projects – it permits projects in accordance with its laws and policies. BCDC's existing laws and policies aim to balance conservation and development, and all relevant laws and policies are applied to every project that comes before BCDC. Thus, staff considers necessary preservation and enhancement of the Bay's ecosystems in all projects permitted.
10) Staff agrees that integrating and placing equal value on needs of ecosystems, communities, and sustainable development is critical in considering adaptation decisions, and appreciates the examples of Corte Madera and Highway 37.
11) Strategy 1 considers how policy (or possibly legislative) changes may be necessary to balance social justice, ecosystem stewardship, and sustainable development in sea level rise adaptation. The goal of the strategy is to comprehensively examine all of these aspects of adaptation and recommend policy/legislative/guidance changes accordingly.
12) Staff agrees that it is essential to consider habitat needs in a regional context to avoid fragmentation. Existing BCDC policies address these issues. Tidal Marshes and Tidal Flats Policy 5 states that "As recommended in the Baylands Ecosystem Habitat Goals Update report (2015), approximately 65,000 acres of areas diked from the Bay should be restored to tidal action and supported to maintain a healthy Bay ecosystem on a regional scale…To the greatest extent feasible, habitat projects should…increase habitat

connectivity…". Also, as noted in the response to Comment 6, Tidal Marshes and Tidal Flats Policy 4 also encourages the preservation of restorable lands to avoid fragmentation. However, more explicit policies stating the importance of assessing the impacts of projects on habitat fragmentation could be beneficial. This question could be investigated through the Strategy 1 research process, and necessary policy or guidance changes could be developed through Strategy 1.

13) Staff agrees that it is essential to consider cumulative impacts of adaptation efforts. It is likely that the Bay Adapt joint platform will aim to identify and address these cumulative impacts on the Bay ecosystem. Strategy 1 could develop necessary program changes (policy changes, legislative changes, or guidance development) identified through the joint platform.
14) See "Overall response" above – staff believes strengthening the strategy identified in this policy could be achieved through activities outside the scope of the Assessment and Strategy.
15) Investigation and development of tools and strategies to protect undeveloped baylands has been added to the "Needs and Gaps" for the Wetlands Phase II Assessment.
16) Strategy 2 will address this concern by examining necessary policy or guidance changes to address the conflicts between public access, habitat (including baylands), and sea level rise. Assessing specific public access facilities may be included in the research component of this strategy.
17) Assessment of the Water Trail's program and efficacy of monitoring/mitigation could be a component of the research for Strategy 2.
18) Staff appreciates your comment, and has added this as a topic for further investigation in the "Emerging Issues" table in the Coastal and Estuarine Resources Phase II Assessment.
19) Permit compliance and enforcement are not within the scope of the Assessment and Strategy. Please see General Response number 1 above.
20) Staff has made changes in response to your comments. Also, please see Overall response and General Response number 1 above.

**6. Carisa Harris-Adamson, Treasure Island Sailing Center, received August 14, 2020**

1) Thank you very much for taking the time to comment, and staff appreciates this information regarding marinas. Marinas and boat slips are not meant to be a proxy for public access and use of the Bay. These topics were highlighted because the strategy is intended to resolve existing management challenges, and marina closures/shifting configurations were raised by stakeholders to BCDC as a potential management challenge. Staff recognizes that there are many additional facets of boating and recreation on the Bay.
2) Staff agrees that frequency and duration of boat use would be a good measure of public access and use of the Bay. Researching these metrics has been added to "Research Needs and Gaps" in the "Coastal and Estuarine Resources" Phase II Assessment. Staff plans to assess these trends and more in implementation of Strategy 2.
3) Thank you for this information – staff agrees this is an important growing sector of boating.

4) Thank you for these detailed statistics. Staff agrees that optimizing the use of boats parked in marinas is an important consideration. Language has been added to the Assessment and Strategy to that effect, and Strategy 2 will aim to optimize use of boats parked in marinas.
5) Comment noted, and staff agrees.
6) Thank you for your clear articulation of the management challenge. Staff has incorporated this statement into the description of "Management Priority 2 – Assessing changing needs for recreational boating in the Bay" in the "Coastal and Estuarine Resources" Phase II Assessment.
7) Staff appreciates these statistics and has incorporated this information into the Phase I Assessment on Coastal and Estuarine Resources. Staff has incorporated the need to consider community sailing centers and boat share programs in management updates throughout the Assessment and Strategy.

**7. Howard Strassner, received August 19, 2020**

1) Staff appreciates the recommendation, and language has been added to the "Coastal and Estuarine Resources" Phase I and Phase II Assessments to highlight the need to consider dry storage in the discussion of equitable boating access to the Bay. Staff will consider whether policy changes are necessary to facilitate dry storage through the research and collaborative discussions involved in implementation of Strategy 2.
2) Staff appreciates the concern that public funds should not subsidize Bay access for a limited number of boaters/individuals, and will consider whether policy changes are necessary to address this concern through the implementation of Strategy 2.

**Oral Comments received at Public Hearing on August 20, 2020**

**1. Hunter Cutting, San Francisco Sierra Club**

1) Oral comments reiterated concerns raised through Mr. Cutting's written comments. Please see responses to written comments above.

**2. Arthur Feinstein, Sierra Club Statewide Conservation Committee**

2) Staff appreciates the concern that hard shoreline protection structures built in the Bay would reduce the surface area and volume of the Bay, and also likely impact natural resources. This issue would be explored in more detail through the Bay Plan Amendment on shoreline protection, and possibly through the Bay Adapt joint platform, both part of Strategy 1. Understanding how to optimize placement of hardened shoreline protection (when this kind of shoreline protection is necessary) was added to the "Coastal Hazards" Phase II Assessment as an "Emerging Issue of Concern" and "Priority Need/Information Gap".