



# Santa Monica Bay National Estuary Program's Action Plan for the Comprehensive Conservation and Management Plan

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Prepared by TBF and SMBRC staff for approval by SMBNEP's Management Conference



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## CCMP ACRONYM LIST

Army Corps	Army Corps of Engineers
ASBS	Areas of Special Biological Significance
BEP	Boater Education Program
BRP	Santa Monica Bay Restoration Plan
BWER	Ballona Wetlands Ecological Reserve
CalTrans	California Department of Transportation
CCMP	Comprehensive Conservation and Management Plan (formerly BRP)
CCVA	Climate Change Vulnerability Assessment
CDBW	California Department of Boating and Waterways
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CDWR	California Department of Water Resources
CMP	Santa Monica Bay Comprehensive Monitoring Program
CNRA	California Natural Resources Agency
CoSMoS	Coastal Storm Modelling System
CRAM	California Rapid Assessment Method
CRI	Loyola Marymount University's Coastal Research Institute
CVA	Clean Vessel Act
DDT	Dichlorodiphenyltrichloroethane
EWMP	Enhanced Watershed Management Plans
FMP	Fishery Management Plan
FOLD	Friends of the LAX Dunes
GB	Santa Monica Bay Restoration Commission Governing Board
GHG	Greenhouse Gases
GPRA	Government Performance and Results Act
HABs	Harmful Algal Blooms
HHW	Household Hazardous Waste
JWPCP	Joint Water Pollution Control Plant (Carson)
LACDBH	Los Angeles County Department of Beaches and Harbors
LACDPH	Los Angeles County Department of Public Health
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LACSD	Sanitation Districts of Los Angeles County
LADWP	Los Angeles Department of Water and Power
LARC	Los Angeles Regional Collaborative for Climate Action
LARWQCB	Los Angeles Regional Water Quality Control Board
LASAN	City of Los Angeles Sanitation
LCP	Local Coastal Plan
LVMWD	Las Virgenes Municipal Water District
MDRA	Marina Del Rey Anglers
MPA	Marine Protected Area
MRCA	Mountains Recreation and Conservation Authority

MWD	Metropolitan Water District of Southern California
NEP	National Estuary Program
NMFS	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Parks Service
NRC	Natural Resource Council
NZMS	New Zealand Mudsnails
OA	Ocean Acidification
OPC	Ocean Protection Council
OREHP	Ocean Resource Enhancement Hatchery Program
OWDS	On-site Wastewater Disposal Systems
PCB	Polychlorinated biphenyls
POTW	Public Owned Treatment Works
Prop.	Proposition Grant
PVPLC	Palos Verdes Peninsula Land Conservancy
RCDSMM	Resource Conservation District of the Santa Monica Mountains
SCC	California State Coastal Conservancy
SCCOOS	Southern California Ocean Observing Systems
SCCWRP	Southern California Coastal Water Research Project
SCMI	Southern California Marine Institute
SFEP	San Francisco Estuary Partnership
SLC	State Lands Commission
SLR	Sea Level Rise
SMBNEP	Santa Monica Bay National Estuary Program
SMBRA	Santa Monica Bay Restoration Authority
SMBRC	Santa Monica Bay Restoration Commission
SMMC	Santa Monica Mountains Conservancy
State Parks	California Department of Parks and Recreation
SWRCB	State Water Resources Control Board
TAC	Santa Monica Bay Restoration Commission Technical Advisory Committee
TBF	The Bay Foundation (also known as the Santa Monica Bay Restoration Foundation)
TMDL	Total Maximum Daily Load
UCD	University of California, Davis
UCLA	University of California, Los Angeles
UCSB	University of California, Santa Barbara
USC	University of Southern California
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAC	Santa Monica Bay Restoration Commission Watershed Advisory Council
WBMWD	West Basin Municipal Water District
WMP	Watershed Management Plans

Executive Summary Goal Matrix

		CCMP GOALS									
CCMP Action Category	CCMP ACTION	Protect, enhance, and improve ecosystems of Santa Monica bay and its watersheds	Improve water availability	Improve water quality	Enhance socio-economic benefits to the public	Enhance public engagement and education	Mitigate impacts and increase resiliency to climate change	Improve monitoring and ability to assess effectiveness of management actions		Lead Entity	SMBNEP Entity Role
1	Direct Management Actions	Acquire open space for preservation of habitat and ecological services								LAC, SMMC, MRCA, NPS, State Parks, MRT	Support
2	Direct Management Actions	Restore kelp forests in the Bay to improve the extent and condition of the habitat								TBF	Lead
3	Direct Management Actions	Recover abalone populations in the Santa Monica Bay and region to support rare species and socioeconomic benefits to people								TBF	Lead
4	Direct Management Actions	Assess and restore seagrass habitats in the Santa Monica Bay and nearshore environments to benefit marine ecosystems and improve coastal resilience								TBF, NOAA	Lead
5	Direct Management Actions	Assess and implement offshore artificial reefs to benefit marine ecosystems and provide socioeconomic benefits to people								SLC, CDFW, NMFS, SCC, SCMI, NOAA	Participate
6	Direct Management Actions	Restore coastal strand and foredune habitat to beaches and sandy shores to improve coastal resilience								TBF, Cities of Santa Monica, Malibu, Manhattan Beach, Los Angeles, LACDBH	Co-Lead
7	Direct Management Actions	Restore and maintain the entire LAX Dunes system to support native plants, wildlife, and rare species								LAWA, TBF	Co-Lead
8	Direct Management Actions	Restore coastal bluff habitats in the Bay watershed to support ecosystem services								CDFW, PVPLC, beach cities, USFWS, State Parks	Participate
9	Direct Management Actions	Implement Malibu Creek Ecosystem Restoration Project (Rindge Dam and other barrier removals) to support ecosystem restoration								State Parks, Army Corps	Participate
10	Direct Management Actions	Remove additional barriers to support fish migration and ecosystem services								State Parks, CalTrans, LACDBH, RCDSMM, municipalities	Support

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11	Direct Management Actions	Restore urban streams, including daylighting culverted streams, removing cement channels, and restoring riparian habitats							CalTrans, municipalities, State Parks, NPS	Support
12	Direct Management Actions	Restore smaller coastal lagoons and other wetland types to increase wetland habitat area and condition throughout the watershed							State Parks, RCDSMM, NPS, CalTrans, Army Corps, City of Malibu	Participate
13	Direct Management Actions	Restore Ballona Wetlands Ecological Reserve to enhance wetland habitats and benefits to people							CDFW, Army Corps	Participate
14	Direct Management Actions	Implement wildlife crossings and other innovative projects for benefits to wildlife and people							State Parks, CalTrans, SMMC, RCDSMM, NPS, SCC, MRCA, municipalities	Support
15	Direct Management Actions	Implement projects that improve understanding and/or enhance endangered and threatened species populations (e.g. habitat improvements for Western Snowy Plover, genetic banking)							CDFW, USFWS, NOAA, NPS, State Parks, RCDSMM	Participate
16	Direct Management Actions	Support the implementation of activities and projects such as those in Enhanced Watershed Management Plans (EWMPs) and activities identified in the TMDL implementation schedule to help achieve TMDL goals for 303d listed waterbodies in the Bay and its watershed							SWRCB, LARWQCB, USEPA, municipalities, NPDES and MS4 permit holders	Support
17	Direct Management Actions	Infiltrate, capture, and reuse stormwater and dry-weather runoff through green infrastructure, LID, and other multi-benefit projects and improve understanding of ecosystem services provided							City of LA, LAC, MS4 permit holders, municipalities, water agencies, businesses, others	Support
18	Direct Management Actions	Support installation and monitoring of additional sewage and bilge pumpout facilities in Southern California harbors							LACDBH, marina operators	Participate

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19	Governance and Policy	Support minimization of biological impacts of water intake and discharge from coastal power generation and desalination facilities, including public engagement and education								SWRCB	Support	
20	Governance and Policy	Support elimination of non-point pollution from onsite wastewater treatment systems								SWRCB, LARWQCB, municipalities	Support	
21	Governance and Policy	Support policies that promote reuse, recycling, and advanced wastewater treatment to reduce reliance on imported water sources								POTWs, LADWP, LASAN, LVMWD, WBMWD, LACSD	Support	
22	Governance and Policy	Support policies and implement projects that divert landfill waste and encourage composting to improve water quality and lower greenhouse gas emissions								Schools, municipalities, LA Zero Food Waste Task Force	Participate	
23	Governance and Policy	Facilitate development and adoption of natural stream and riparian protection policies, including restoration								LA County, LA City, other watershed cities	Support	
24	Governance and Policy	Support the inclusion of coastal resilience through natural means and softscape measures into local coastal plan updates								CCC, City of Manhattan Beach, coastal cities, LACDBH	Support	
25	Governance and Policy	Support best management practices, increased public access, and improved public facilities for beaches and other public trail systems to support both enhanced natural resources values and benefits to people								CCC, SCC, LACDBH, SMMC, RCDSMM, MRCA, coastal cities, State Parks, CalTrans, Metro	Support	
26	Stakeholder Education and Engagement	Participate in research, education, outreach, and policy on invasive species removal and control								CDFW, State Parks, NPS	Participate	
27	Stakeholder Education and Engagement	Produce educational resources and materials and conduct outreach to improve best management practices for Southern California boaters (e.g. fuel, sewage, and hazardous waste management)								TBF, CCC	Co-Lead	
28	Stakeholder Education and Engagement	Support efforts of disadvantaged communities to achieve healthy habitats, implement green infrastructure, and reduce pollution								municipalities	Support	

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29	Stakeholder Education and Engagement	Reduce health risks of swimming in contaminated waters and consuming contaminated seafoods through more comprehensive source control and, advanced monitoring and public notification								USEPA, OEHHA, LACDPH, LARWQCB, municipalities, Heal the Bay	Support
30	Stakeholder Education and Engagement	Conduct community engagement, education, and inform policies related to water conservation and reuse to reduce water demand and reliance on imported sources								LADWP, MWD	Participate
31	Stakeholder Education and Engagement	Achieve water quality benefits by businesses through community engagement and implementation of best management practices								TBF, municipalities	Co-Lead
32	Stakeholder Education and Engagement	Reduce marine debris by supporting bans on single-use items, conducting outreach, and participating in trash reduction programs								municipalities	Participate
33	Research and Monitoring	Monitor microplastics (including microfibers) and other marine debris in the Bay and coastal environments to inform management actions								TBF, CRI	Co-Lead
34	Research and Monitoring	Improve understanding of emerging contaminants through monitoring and research to inform source control and reduce loading (e.g. fire retardants), especially in the context of climate change								SCCWRP, SWRCB, LARWQCB	Participate
35	Research and Monitoring	Monitor and inform management actions for Harmful Algal Blooms (HABs)								SCCWRP, SCCOOS, NOAA, USC SeaGrant, LACSD	Participate
36	Research and Monitoring	Monitor chemical, physical, and biological characteristics in the Bay to inform climate change impacts such as ocean acidification								TBF, CRI, UCLA, SCCWRP	Co-Lead
37	Research and Monitoring	Increase understanding of deep water habitats such as submarine canyons, deep reefs, and outfall pipes								TBF, CRI, UCLA, SCCWRP	Co-Lead
38	Research and Monitoring	Monitor and improve understanding of rocky intertidal habitats to inform restoration actions								TBF, CRI, State Parks	Co-Lead
39	Research and Monitoring	Monitor and inform effective management of Marine Protected Areas, Fishery Management Plans, and local fisheries for recreational and commercially important species								CDFW, NMFS, OREHP, LACDBH, LA Waterkeeper, MPA Collaborative	Support

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40	Research and Monitoring	Research and inform best management and pollution reduction practices to address non-point source pollution and facilitate reduction							LARWQCB, SCCWRP, watershed municipalities, companies, others	Support
41	Research and Monitoring	Facilitate research, monitoring, and assessments that inform more accurate waste load allocations and development of new water, sediment, and biological objectives							SWRCB, LARWQCB, SCCWRP	Support
42	Research and Monitoring	Inform strategies to reduce greenhouse gas emissions and increase carbon sequestration in support of existing state actions and policies							TBF, CRI	Co-Lead
43	Develop Funding and/or Partnerships	Implement the County-wide Safe Clean Water Program to support stormwater pollution control projects (if approved by voters in 2018)							LACFCD	Support
44	Develop Funding and/or Partnerships	Support the development and implementation of a comprehensive regional sediment management plan for restoring natural hydrological functions of river systems and mitigating impacts from climate change							LACDBH, USGS, municipalities, USEPA, CCC, SLC, State Parks, SCC	Support

## **INTRODUCTION**

This Action Plan is one component of the Santa Monica Bay National Estuary Program's (SMBNEPs) Comprehensive Conservation and Management Plan (CCMP) with the goal of providing a long-term framework for action in the Santa Monica Bay (Bay) and its watersheds. This CCMP helps to further the goals of the Clean Water Act (CWA) Section 320. The CCMP is intended as a living document that undergoes an update every three to five years and a major revision approximately every 10 years, incorporating new information, new priorities and actions for our region, and efforts to include climate change such as incorporation of the Climate Change Vulnerability Assessment (CCVA) completed by SMBNEP in 2016. This revision incorporates significant regional efforts to accomplish previous actions and the inclusion of new data. This Action Plan is one component of the larger CCMP but can also be read as a stand-alone document. The Action Plan summary matrix (above) contains a list of each action, its broad category, and which of the seven major goals that it supports. Further details on implementing the Action Plan can be found in the annual Work Plans for SMBNEP. Additional CCMP components such as the Financial Plan and the evaluation of the NEP's structure and governance are ongoing and will be compiled into a full CCMP including this Action Plan upon completion.

## **MAJOR ACTION PLAN GOALS**

The first set of planning workshops at the end of 2017 focused on high level priorities and goals for this Action Plan. The management conference and public stakeholders all identified the need to retain the top priorities of SMBNEP from the previous Bay Restoration Plan (2013), which included improving water quality, conserving and rehabilitating natural resources, and protecting the Bay's benefits and values to people. Given the cross-cutting and multi-benefit nature of most of the projects and programs listed in this Action Plan, the management conference decided not to arbitrarily separate out projects based on categorizing them into one of those three priority areas. Instead, they are combined based on action categories (see section below). These three priority areas should be thought of as integrated and supported throughout the CCMP, along with a new priority area, understanding and adapting to climate change impacts. Many of the actions in this plan focus on improving our understanding through filling in data gaps, or helping the region adapt to climate change. Appendix A contains a crosswalk from the 2013 Bay Restoration Plan (objective-level) to the action level of this Action Plan as well as a categorical summary of which current management conference entity provided specific recommendations to support individual actions.

Additionally, the Technical Advisory Committee (TAC) helped to develop seven goals to guide the development of actions. Each action in this plan supports one or more of the following overarching goals:

1. Protect, enhance, and improve ecosystems of Santa Monica bay and its watersheds
2. Improve water availability
3. Improve water quality
4. Enhance socio-economic benefits to the public
5. Enhance public engagement and education
6. Mitigate impacts and increase resiliency to climate change
7. Improve monitoring and ability to assess effectiveness of management actions

## **DESCRIPTION OF ACTION CATEGORIES**

Actions included in the CCMP's Action Plan were combined into five major categories defined by the TAC to provide an additional level of organizational Action Plan structure below the goal level. This allowed for a higher level of standardization across the CCMP.

Action categories include:

1. Direct Management Actions
2. Governance and Policy
3. Stakeholder Education and Engagement
4. Research and Monitoring
5. Funding and/or Partnerships

Actions were assembled within the document based on the categories, and additional within-category compiling was also included to the extent possible. For example, if there are several actions that were considered to be "Direct Management Actions" that all related to the marine environment, they were likely listed in consecutive numerical order. Actions with lower numbers are not necessarily considered to be higher priorities; they are ordered based on the categories and similarity of action.

All actions begin with a verb describing the key activity associated with that action, e.g. "restore" or "monitor," and each action is intended to guide the development of the next steps for the next 10 or more years. The next steps included as part of each action are focused on feasible implementation measures that will be undertaken by SMBNEP and their partners over the course of the five-year period from 2019-2024. The steps are intended to reflect both the action category and priorities to achieve the action itself. Next steps may be implemented by an SMBNEP entity and/or their partners and will be tracked through SMBNEP's Annual Work Plans.

## **ACKNOWLEDGEMENTS**

SMBNEP would like to thank all of the groups that provided significant input to this Action Plan, without whom we would not be able to compile or implement the plan, including the Governing Board, Executive Committee, Watershed Advisory Council, Technical Advisory Committee, and interested members of the public and community stakeholders. Thank you for making this document possible.

## TEMPLATE AND STRUCTURE OF AN ACTION

**Action:** The language of the action itself, describing the type and purpose of action (such as protect, restore, support), the object of the action (such as habitats, monitoring programs, policies), and when appropriate any key qualifiers or targets (such as support for specific goals or services).

**Long-Term Environmental Result(s):** Long-term environmental results are focused on the significant outcomes that serve as quantitative (when possible) target(s) or goal(s) for the action. The term “outcome” means the result, effect, or consequence that will occur from carrying out an environmental program or activity that is related to an environmental or programmatic goal or objective. Outcomes may be environmental, behavioral, health-related or programmatic in nature. As the EPA annually quantifies acreage of habitat restored or protected by each National Estuary Program, this projected metric is estimated and used as the environmental result when possible. Environmental results are also informed by data collected within the study area.

**Action History and Summary:** The history and summary section provides supporting information to further explain the action, why it is a priority of SMBNEP, and how the next steps will serve to advance the action over the course of the next five years. It includes background information such as the planning context or scientific basis of the action, as well as its brief and recent history, and larger connections or relevance to other efforts, plans, or programs. It is intended to be a brief summary, rather than a full narrative history of an action.

**Lead Entity(ies):** The lead entity or entities are those organizations, agencies, or other bodies that are the key responsible parties for accomplishing the action. These entities are directly engaged in implementation and lead the progress of the action. This list is not intended to be comprehensive, rather it is focused on identifying leadership in responsibility for implementation of an action. The lead entity may vary based on which portion of the action or next steps are being referenced.

**Collaborating Partner(s):** Collaborating partner(s) is a list of key entities, in addition to the lead(s), who are directly engaged in accomplishing the action. Collaborating partners represent organizations that might implement, champion, permit, or provide scientific or technical expertise in support of the action and next steps. This list describes central partners but may not include all possible partners associated with a collaborative action and should not be interpreted as an exhaustive list of supporting entities for a particular action. There are often many additional supporters of a particular action. Common acronyms for partner entities are found in the acronym list above this section.

**SMBNEP Role:** This section categorically describes the role of the Santa Monica Bay National Estuary Program entity, i.e., SMBRC and/or TBF, which is involved in progress towards the completion of an action or specific “next step(s)” within the action. SMBNEP entities are supported in implementing this Action Plan by their collaborating partners (see above), the NEP’s management conference, and additional stakeholders. The role categories are similar to previous SMBNEP CCMP’s but streamlined to ease in interpretation and to best match USEPA’s funding guidance documents. The role is defined in the order of responsibility as: lead, participate, or support.

The categories are further defined as follows:

- **Lead:** SMBNEP entity is the lead sponsor and oversees completion of the project activity, and/or the entity carries out the projects directly. These tasks are priorities for SMBNEP over the next five years. The lead category is equivalent to the “primary” role identified in the USEPA funding guidance.
- **Participate:** SMBNEP entity contributes staff and/or other resources and actively engages in project activities. The participate category is equivalent to the “significant” role identified in the USEPA funding guidance.
- **Support:** SMBNEP entity assists to a lesser extent with coordination, communication, information exchange and dissemination, technical support, etc., for the associated activities. The support category is identified in a similar manner to the USEPA funding guidance “support” role, with SMBNEP playing a less significant or minor role in the implementation of the action.

**Next Step(s):** This describes the specific next steps to be accomplished over the next five years to support the implementation of the action. Next steps are intended to describe clear, concise “to do” items for the next five years and may reference the context in which the step should take place. Next steps also reflect consensus building and input from the management conference parties regarding details of action implementation. Most actions will require multiple steps. The steps are intended to be focused on the activities to be conducted within the time frame of this CCMP; whereas, the actions are based on a long-term timeframe of 20+ years, varying by action. The steps are intended to occur in a logical progression, from collecting data or information or conducting outreach to making a management decision or implementing a restoration project. Other actions may have multiple steps that address the variety of geographic areas or gaps in achieving a comprehensive action.

**Performance Measure(s):** The performance measure is a method of tracking progress towards achieving completion of an action. In some cases, this may be readily quantifiable such as for a restoration project that can record “X acres completed”, or a policy objective that has a completed and adopted policy in place. However, for some actions, the objective may be more difficult to quantify, such as increasing public engagement, or those difficult to assess through monitoring. In those cases, progress may be tracked through completion of steps within the action or completion of a specific deliverable related to that step. A subset of the CCMP actions and steps will be included in each annual Work Plan, based on the priorities, projects, and available funding for that fiscal year. The performance measures for that subset of actions and steps will be further evaluated and tracked via the performance measures in six-month intervals by SMBNEP through the production of semi-annual reports submitted to USEPA.

**Timeline:** This is the intended timeline associated with each step to effectively track progress towards completion of the action. The timeline reflects the planning horizon of the CCMP, from 2019-2024, and in most cases is identified as a year by which the step is intended to be completed. If funding has not yet been identified for a particular step, the timeline associated with that step is identified as “2024”, which in some cases may roll over to the next CCMP.

## ACTION #1 – ACQUIRE OPEN SPACE

**Action:** Acquire open space for preservation of habitat and ecological services

**Long-term Environmental Result(s):** Publicly acquire new open space as it becomes available throughout the watershed to promote connectivity, preserve habitat, and sustain ecological services

**Action History and Summary:** Acquisition of private lands (through purchase or conservation easements) in the Santa Monica Bay (Bay) watershed provides protection of habitat for sensitive plant and wildlife species, recreational opportunities, and enables better maintenance of coastal water quality by preventing conversion to impervious surfaces. The Santa Monica Mountains National Recreation Area, which encompasses more than 150,050 acres of public parkland and lands in other private or other government ownership, is the largest urban-adjacent park in the United States. Public access to the area and its recreational facilities is made possible primarily by more than 30 years of continuous land acquisition by federal, state, and local public agencies, but also through required access easements to mitigate the impacts of development on public access. Acquisition of habitat in the Santa Monica Mountains should be focused on lands with highest diversity or connect wildlife corridors and recreational trails and areas that are at risk of conversion to some other land use such as intensive agriculture or urban development.

The acquisition of private land in urbanized areas of the Bay watershed, especially in the context of managed retreat and climate change, will ensure that stream and habitat restoration is focused in the most important locales and increases proper land use practices in key areas, providing multiple benefits such as new land for parks, playing fields, infiltration basins, and constructed wetlands, etc. Private land acquisition will also better enable local agencies to advance watershed recovery initiatives. SMBNEP has played a role in the acquisition of many thousands of acres of open space either directly through bond funded grants like the 588-acre Soka University property, or indirectly through staff recommendations to the State Resource Agency’s California River Parkways and Urban Greening Programs as Technical Advisory Committee members.

**Lead Entity(ies):** LAC, SMMC, MRCA, NPS, State Parks, MRT

**Collaborating Partner(s):** SCC, CNRA

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Continued participation on resources agency Technical Advisory Committees	Acres acquired or protected as reported in NEPORT	Annually through 2024
Bond funded acquisitions (Prop 12)	Acres acquired or protected as reported in NEPORT	2022
Support partners in identification and prioritization of key acquisition or conservation easement properties	Acres acquired or protected as reported in NEPORT	Annually through 2024

## ACTION #2 – RESTORE KELP FORESTS

**Action:** Restore kelp forests in the Bay to improve the extent and condition of the habitat

**Long-term Environmental Result(s):** Restore 150 acres of kelp forest to improve habitat functions, local fisheries, and coastal resilience

**Action History and Summary:** The kelp forests of Santa Monica Bay are a highly biodiverse, productive ecosystem. Like tropical coral reefs, kelp beds are highly productive ecosystems that support a plethora of aquatic life. The health of underwater kelp forests is vital for the survival of many threatened animal species including giant sea bass and sea otters. Acreage of kelp forests in the Bay has declined from historical highs for many years. Potential contributors to this decline include pollution, change in ocean temperature and current (e.g. El Nino), and sedimentation (excessive erosion, deposition from landslides, or burial). Also contributing to the destabilizing of the kelp forest ecosystem is the over harvesting of key sea urchin predators like the spiny lobster and California sheephead. As a result of these anthropogenic stressors, sea urchins now dominate many of the rock beds where kelp was once plentiful.

Sea urchin removal and relocation have shown to be effective in restoring kelp forest in the affected areas. Such efforts should continue and expand as much as feasible. Mechanisms to restore kelp beds that are damaged by sedimentation should also be investigated and tested (e.g. artificial reefs, enhancement of nature reefs with quarried rock). Preliminary investigation has shown that a fair amount of material behind Rindge dam could be used for nearshore reef restoration (i.e. boulders cobbles and gravels). These materials placed in the nearshore environment would augment the supply of nonconsolidated material to the bay enhancing reefs and aid in reducing impacts from storm events and sea level rise. The development and implementation of a plan for the beneficial use of this natural sediment should be further pursued.

**Lead Entity(ies):** TBF

**Collaborating Partner(s):** SCMI, NOAA, Montrose Settlements Trustees, Occidental College Vantuna Research Group, California Sea Urchin Harvesters, CDFW

**SMBNEP Role:** Lead

Next Step(s):	Performance Measure(s):	Timeline:
Implement the rocky reef/kelp forest restoration project	Restore 20 acres of kelp forest	2019-2024
Biological response monitoring of restoration areas	Annual Report (5)	Annually through 2024
Develop recommendations for the deposition of materials from Rindge Dam or other suitable sources to augment sediment supply	Environmental review of Rindge Dam removal and nearshore placement of materials	2024
Conduct carbon sequestration assessment of kelp restoration project	Summary in annual report	2024

## ACTION #3 – RECOVER ABALONE POPULATIONS

**Action:** Recover abalone populations in the Santa Monica Bay and region to support rare species and socioeconomic benefits to people

**Long-term Environmental Result(s):** Establish 2-3 minimally viable green and red abalone populations (at least 2,000 abalone per hectare) and 1-2 minimally viable white abalone populations in the Bay

**Action History and Summary:** Once abundant within the kelp forests of the Santa Monica Bay, abalone (black, white, pink, red, pinto, threaded, and green) populations have declined rapidly and some of the species are now federally endangered. The causes of the decline are attributed to a combination of overharvesting, disease, and other environmental factors. As a result of the populations precipitous declines, abalone fisheries have been closed throughout Southern California since 1997. Unfortunately, the populations of abalone have yet to recover with abalone densities remaining low. Re-introduction and re-population of abalone may not only be feasible, but necessary to restore the local abalone populations. Abalone are density dependent broadcast spawners, which need individuals of both sexes within close proximity to have a successful fertilization.

Several projects have been developed to aid in the recovery and enhancement of abalone including: *Haliotis fulgens* (green), *H. rufescens* (red), and *H. sorenseni* (white). White abalone are a NOAA “Species in the Spotlight,” as one of eight species considered among the most at risk of extinction within the United States of America. The White Abalone Recovery Project developed by the National Marine Fisheries Service is part of a statewide collaboration dedicated to the restoration of federally endangered white abalone to the rocky reef habitats of southern California, with the habitat off the waters of Palos Verdes Peninsula as one of the prime locations. Green and red abalone are being used as proxies for white abalone, which allow researchers to develop and refine infrastructure, culturing, outplanting techniques, and evaluate habitat suitability. In addition, both green and red abalone are species of concern. Increasing densities of these species will help recover populations throughout southern California and further the kelp restoration efforts by providing competition for sea urchins. The revival of healthy abalone populations in the Bay has the long-term potential to one day reopen and support commercial and recreational fisheries of abalone.

**Lead Entity(ies):** TBF

**Collaborating Partner(s):** NOAA, NMFS, SCMI, CDFW, UC Davis

**SMBNEP Role:** Lead

Next Step(s):	Performance Measure(s):	Timeline:
Establish abalone outplanting sites and conduct juvenile and larval outplanting	Minimum of 4 sites; 2 outplants per year	Annually through 2024
Monitor abalone restoration and reference	2 surveys per year	Annually through 2024
Captive spawn abalone	2 captive spawns per year	Annually through 2024
Maintain aquaculture facility for abalone	# live abalone	Annually through 2024

## ACTION #4 – ASSESS AND RESTORE SEAGRASS HABITATS

**Action:** Assess and restore seagrass habitats in the Santa Monica Bay and nearshore environments to benefit marine ecosystems and improve coastal resilience

**Long-term Environmental Result(s):** Restore 2-5 acres of seagrasses to the Bay to improve habitat functions and coastal resilience

**Action History and Summary:** Seagrass habitats (such as eelgrass, surfgrass, and ditch grass) provide important ecological services, both biotic and abiotic, for marine and terrestrial systems. These ecosystem services support nursery habitat for marine fishes and invertebrates, improve sediment and water quality, stabilize and accrete sediments, and attenuate wave energy and shore erosion. More recently, the role seagrasses play in sequestering atmospheric carbon and combatting ‘greenhouse’ gas emissions has gained more recognition. Although seagrass ecosystems only cover approximately 0.1% of the ocean floor, they account for nearly 20% of the total oceanic carbon burial (48 to 112 Tg C / yr).

Our current understanding of the extent and condition of these habitats in the Bay is limited. TBF and partners will continue to deploy its remotely operated underwater vehicle (ROV), R2Deep2, alongside SCUBA divers to support the ongoing assessment of the extent and general condition of seagrasses in the Bay to inform the Comprehensive Monitoring Program. Identifying stressors to this habitat may also be an important component of understanding the condition. Additionally, a pilot restoration project for eelgrass is needed in our region to increase our understanding and to evaluate restoration methods, cost-effectiveness, and restoration suitability and survivorship in various areas of the Bay. Future research and assessments should evaluate the current extent and condition of multiple species of seagrasses to inform restoration, including eelgrasses, surfgrasses, and ditch grass in marine and estuarine environments.

**Lead Entity(ies):** TBF, NOAA

**Collaborating Partner(s):** CDFW, Occidental College Vantuna Research Group, CRI, UCD

**SMBNEP Role:** Lead

Next Step(s):	Performance Measure(s):	Timeline:
Survey the extent and condition of seagrasses in the Bay using R2Deep2, side-scan sonar, and SCUBA divers to inform the Comprehensive Monitoring Program	5 surveys; summary report in State of the Bay	Annually through 2024
Develop restoration methods for eelgrass ( <i>Zostera pacifica</i> ) in the Santa Monica Bay	Project report from empirical study	2021
Conduct pilot restoration project(s) of offshore eelgrass in the Bay	Area of eelgrass restored	2024
Evaluate restoration potential of seagrasses in the Bay, harbor, wetlands, and nearshore environments	Summary report	2024
Contribute to better understanding of <i>Ruppia maritima</i> 's habitat requirements and functions	State of the Bay Report	2024

## ACTION #5 – ASSESS AND IMPLEMENT OFFSHORE ARTIFICIAL REEFS

**Action:** Assess and implement offshore artificial reefs to benefit marine ecosystems and provide socioeconomic benefits to people

**Long-term Environmental Result(s):** Implement artificial reef projects to achieve 69 new acres of rocky reef habitat of a similar condition as reference reef habitats

**Action History and Summary:** Vantuna Research Group at Occidental College has led efforts to map and understand the extent and condition of rocky reef complexes of the Santa Monica Bay for many years, expanding to a regional assessment since 2011, which has been included in a California-wide assessment of Marine Protected Areas (MPAs) throughout Southern California. These results, including quantification of regional standing stock biomass and production, have allowed an expansion of the management goals of the Bay and the Southern California Bight. These data have also allowed for an understanding of the importance and potential of artificial reefs, their design and construction, and the direct benefit these reefs may have for the management and sustainability of our fisheries and their associated economies.

Recently, TBF and Occidental College’s Vantuna Research Group have collaborated on the highly successful rocky reef restoration project to benefit local fisheries, with the first phase focused on natural reefs. The early results of this work, started in summer 2013 indicate increased production and species richness as indicted by sea urchin gonadosomatic indexes, finfish biomass, and fish species richness. The second phase involves the design and implementation of a 69-acre reef restoration project. These projects have gathered significant support from the fishing community. In the case of the kelp restoration project, fishermen have been involved in the direct implementation of the project and have become strong advocates for novel approaches to the enhancement of marine resources.

**Lead Entity(ies):** SLC, CDFW, NMFS, SCC, SCMI, NOAA

**Collaborating Partner(s):** TBF, Vantuna Research Group, Montrose Settlements Restoration Program Trustees

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Implement reef restoration project off Palos Verdes	69 acres of new rocky reef habitat	2020
Annual monitoring with the use of side scan sonar and SCUBA based surveys	Annual reports	Annually through 2024 and beyond
Preliminary work regarding the benefits of dynamic revetments and nearshore reefs	Data gathering and concept development	2023

## ACTION #6 – RESTORE HEALTHY BEACHES

**Action:** Restore coastal strand and foredune habitats to beaches and sandy shores to improve coastal resilience

**Long-term Environmental Result(s):** Restore 10 acres of ecologically functioning coastal strand and dune habitat along Bay beaches to increase coastal resilience and as habitat for rare species

**Action History and Summary:** Sandy beaches are the most extensive feature along the Santa Monica Bay coastline. Although sandy beaches traditionally have been, and continue to be managed primarily as recreation areas, they are also important natural ecosystems that link marine and terrestrial environments and are considered one of the seven major natural habitats in the Bay. Animals and plants, including many endemic species, depend on sandy beaches for critical periods of their lives. The habitat provides foraging and nesting grounds for many shore birds, fish, and marine invertebrate species, and is essential to the population recovery of two endangered species, the California Least Tern and Western Snowy Plover. The protection of sandy beaches and an understanding of their condition has become increasingly important because of the roles of beaches in addressing the impacts of sea level rise.

TBF and their partners are conducting several beach restoration projects in the area. In 2016, TBF, in partnership with the City of Santa Monica, implemented the Santa Monica Beach Restoration Pilot Project to restore three acres of coastal strand and foredune habitat and to benefit the federally threatened Western Snowy Plover. Long-term monitoring of this project to inform its potential to improve coastal resilience to sea level rise, wave erosion, and sediment accretion is ongoing. In 2017, TBF and City of Malibu initiated the Malibu Living Shoreline Project, which will design and implement a three-acre restoration project along Zuma Beach and Westward Beach, with support from SCC. TBF and partners are exploring ideas for future beach restoration projects.

**Lead Entity(ies):** TBF, Cities of Santa Monica, Malibu, Manhattan Beach, Los Angeles, LACDBH

**Collaborating Partner(s):** State Parks, USFWS, SCC, Audubon Society (multiple chapters), UCSB, CRI, other interested stakeholders, USGS

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Continue long-term monitoring of the Santa Monica Beach Restoration Pilot Project	Annual Reports	Annually through 2024
Conduct Phase 1 (outreach and planning) and Phase 2 (implementation) of the Malibu Living Shoreline Project	3 acres coastal strand and foredune habitat restored; Annual Reports	Phase 1 by 2019; Phase 2 by 2023
Find funding for and implement another beach and bluff restoration project	Funding acquired; Project initiated	2020; 2021
Support efforts to standardize sandy beach monitoring and a regional approach to restoration	Standardized protocol(s)	2024

## ACTION #7 – RESTORE LAX DUNES

**Action:** Restore and maintain the entire LAX Dunes system to support native plants, wildlife, and rare species

**Long-term Environmental Result(s):** Restore 48 acres of LAX Dune system and maintain larger 300-acre Preserve to improve native dune functions and provide habitat for rare species

**Action History and Summary:** The El Segundo/LAX Dunes (LAX Dunes) in the City of Los Angeles, at the Los Angeles World Airports (LAWA), is the largest remaining contiguous coastal dune system in Southern California. Covering a total area of over 300 acres, it is home to an estimated 900 species of plants, insects, and other wildlife. Set aside as a natural wildlife preserve by LAWA, native plants and animals that once seemed destined for extinction, including the El Segundo Blue Butterfly and the California legless lizard, are thriving once again, thanks to large-scale habitat restoration efforts by LAWA and partners. However, invasive species continue to encroach on the native plants, reducing the diversity and health of the ecosystem.

In 2013, LAWA began removing approximately 32,000 square feet of hardscape within the northern dune area, which included abandoned streets, curbs, gutters, sidewalks, retaining walls, foundations, and above-ground utilities from old residential development. LAWA and their partners subsequently seeded and planted native vegetation. TBF has been partnering with LAWA since 2015 to conduct community restoration activities within the northern 48 acres of the LAX Dunes, and in 2017, TBF began leading the scientific monitoring and ecological restoration assessment of the northern dune area. Opportunities to expand work into the whole dune complex will be explored.

**Lead Entity(ies):** LAWA, TBF

**Collaborating Partner(s):** FOLD, CRI, other stakeholders and volunteers

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Conduct community restoration events in the northern 48-acre dune area	12 events per year	Annually through 2024
Support LAWA in long-term maintenance and adaptive management of the 48-acre northern dune area	Summary of restoration and monitoring activities	Annually through 2024
Engage underserved students and volunteers and inland communities	30% of participants from DAC/SDAC; 50% of participants from inland communities	Annually through 2024
Initiate planning for areas within the adjacent dunes, including baseline monitoring	Engage responsible agencies and stakeholders; Monitoring report	2023; 2024

## ACTION #8 – RESTORE COASTAL BLUFFS

**Action:** Restore coastal bluff habitats in the Bay watershed to support ecosystem services

**Long-term Environmental Result(s):** Restore five acres of bluff habitat in the watershed to support ecosystem services

**Action History and Summary:** Remnant bluff habitats throughout the Bay watershed have been subject to erosion and invasive plants. Establishment of natural reserves and habitat mitigation requirements for new development have helped protect some of the remnant bluff habitats, especially in the South Bay watersheds. The Palos Verdes Land Conservancy has actively restored some of those areas.

The El Segundo blue butterfly was placed on the endangered species list in 1976, the first invertebrate to make the list. Once relegated to a few small and fragile reserves, the nearly extinct butterfly with bright blue wings has expanded its territory to include the bluffs along Redondo Beach, thanks to a pilot beach bluff restoration project in 2005, supported by SMBNEP. Additionally, a Beach Bluff Restoration Master Plan was developed which lays out a vision for the restoration of dune and bluff scrub along the southern portion of the Bay, from Ballona Creek to the Palos Verdes Peninsula. As laid out in the Master Plan, the objective of SMBNEP’s restoration effort is to increase the ecological values of bluffs and dunes. Restoration efforts shall: 1) contribute to the recovery of the El Segundo blue butterfly, 2) provide habitat for unique and rare plants, 3) increase biological connectivity, and 4) increase biodiversity. Priority sites for restoration are those that meet one or more of the above objectives, but are also technically feasible, cost-effective, and provide educational opportunities.

**Lead Entity(ies):** CDFW, PVPLC, beach cities, USFWS, State Parks

**Collaborating Partner(s):** TBF, SMBRC, CRI, LACDBH

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Use Beach Bluff Restoration Master Plan to explore bluff restoration and continue recovery of El Segundo blue butterfly	Prioritization of restoration areas	2024
Identify partners and funding to support bluff restoration projects	Partners identified; funding acquired	2024
Initiate restoration of one bluff restoration project	Initiation of project; permitting	2024
Initiate Pt. Dume stair replacement and bluff restoration project to benefit people and wildlife	Permits acquired; project initiated	2023

## **ACTION #9 – IMPLEMENT THE MALIBU CREEK ECOSYSTEM RESTORATION PROJECT**

**Action:** Implement Malibu Creek Ecosystem Restoration Project (Rindge Dam and other barrier removals) to support ecosystem restoration

**Long-term Environmental Result(s):** Complete implementation of the Malibu Creek Ecosystem Restoration Project including the removal of Rindge Dam and other barriers to improve stream and riparian habitats and to benefit steelhead trout

**Action History and Summary:** Rindge Dam is located on Malibu Creek in Malibu Creek State Park, three miles upstream from Surfrider Beach and the City of Malibu. This large dam is the “keystone” barrier within Malibu Creek, stopping the movement of endangered steelhead trout and other fish and wildlife species that require uninhibited movement through the watershed. Additionally, an estimated 780,000 cubic yards of sediment is trapped behind the dam, resulting in four miles of impaired waterways.

To date, SMBNEP has made \$625,000 available to support the U.S. Army Corps of Engineers (Army Corps) and the California Department of Parks and Recreation (State Parks) in the development of the Malibu Creek Ecosystem Restoration Feasibility Study (Study) since 2001. SMBNEP staff also serve on the project’s Technical Advisory Committee. The Draft Study was completed in 2017 and includes several alternatives for ecosystem restoration, which consider removal of Rindge Dam and additional human-made structures located upstream within the Malibu Creek watershed. The Study is currently undergoing review by Army Corps Civil Works Review Board and State Parks, with final approval and project authorization estimated in fall 2020.

**Lead Entity(ies):** State Parks, Army Corps

**Collaborating Partner(s):** TBF, SMBRC

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Support lead agencies in efforts to complete the design and engineering plans for the Malibu Creek Ecosystem Restoration Project	Completed & Approved Final Design and Engineering Plans	2024
Support lead agencies in identifying and obtaining funding for the project	Funding acquired or committed	2024

## ACTION #10 – REMOVE STREAM BARRIERS

**Action:** Remove additional barriers to support fish migration and ecosystem services

**Long-term Environmental Result(s):** Remove key barriers to improve three miles of riparian and stream habitat and to benefit the steelhead trout

**Action History and Summary:** Blocked access to steelhead spawning and rearing habitat is a major obstacle to the recovery of endangered steelhead trout in the northern Santa Monica Bay watershed. Restoration of steelhead trout to its historic range could serve as a key indicator of ecosystem health for the Bay and region at large. Steelhead populations in major creeks in the Santa Monica Mountains should be restored via removal of barriers to fish migration barriers, restoration of spawning and riparian habitat, and restoration of associated buffer habitat.

The “Santa Monica Mountains Steelhead Habitat Assessment” study completed by CalTrout in 2006 identified all migration barriers in the region and recommended major barriers that should be targeted for removal should funds become available. Similarly, the “Fish Migration Barrier Severity and Steelhead Habitat Quality in the Malibu Creek Watershed” report also prioritizes barrier removal based on the severity of the impacts to steelhead trout. Several migration barrier removal projects have also been successfully carried out, including the replacement of Arizona Crossings with bridges on lower Malibu Creek, Malibu Creek State Park, and Arroyo Sequit. Additional efforts such as those by the City of Calabasas to implement the Las Virgenes Creek Restoration Project (Phases I and II) further support this action through riparian restoration and stream barrier removal. However, many more barriers still remain.

**Lead Entity(ies):** State Parks, CalTrans, LACDBH, RCDSMM, municipalities

**Collaborating Partner(s):** SCC

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Identify, prioritize, and acquire funding for barrier removal projects	Funding acquired	2024
Implement priority barrier removal projects	Stream miles of steelhead habitat available	2024

## ACTION #11 – RESTORE URBAN STREAMS

**Action:** Restore urban streams, including daylighting culverted streams, removing cement channels, and restoring riparian habitats

**Long-term Environmental Result(s):** Restore at least two priority stream areas as defined by guiding documents such as the Ballona Creek Greenway Plan

**Action History and Summary:** Santa Monica Bay watersheds were at one time covered with a web of streams that were fed by natural springs and seasonal rains. Riparian zones, or the interface between land and flowing surface water, were once abundant along the banks of streams that flow into the Bay. These vital natural areas act as biofilters that protect bodies of water from runoff and erosion. Today most of those streams and riparian zones have been paved or channelized, which has resulted in the loss of their natural ability to cleanse water, recharge water supplies and store floodwater. Channelization and paving of most of the once abundant natural streams and associated riparian habitats have resulted in the loss and severe degradation of streams’ ecological functions in the Bay watershed. Functions include: habitat for wildlife, water filtration and cleansing, erosion control, water supply recharge, and floodwater storage. Restoring many of these lost streams will aid in the recovery of this habitat type. SMBNEP has funded and implemented several projects to restore urban streams including the removal of 500 feet of concrete channel in Las Virgenes Creek in Calabasas that was replaced with a stable, natural, revegetated channel, and the restoration of Stone Canyon Creek on the UCLA campus. SMBNEP will continue to seek opportunities for urban creek restoration, utilizing prioritization documents such as the Ballona Creek Greenway Plan, information from partners, proximity to natural resources for multi-benefit uses, and funding availability.

**Lead Entity(ies):** CalTrans, municipalities, State Parks, NPS

**Collaborating Partner(s):** SCC, CNRA, SWRCB, LACFCO

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Identify additional urban streams for restoration and prioritize	Develop partnerships with lead entities to develop plans for stream restoration	2021
Implement urban stream restoration projects	Linear extent of restored streams	2024

## ACTION #12 – RESTORE SMALL COASTAL LAGOONS

**Action:** Restore smaller coastal lagoons and other wetland types to increase wetland habitat area and condition throughout the watershed

**Long-term Environmental Result(s):** Restore and increase wetland and transition habitat acreages for small lagoons such as Topanga Lagoon and other wetland systems to improve ecological functions

**Action History and Summary:** Wetlands, streams and riparian zones are the lifeline of the Bay watershed ecosystem and their preservation and restoration is a high priority of SMBNEP. Wetlands are areas of transition between land and water, where soils, plants, and animals are adapted to periods of inundation and saturation. Wetlands are one of the most productive ecosystems in nature, providing essential habitat for a variety of species, including birds, fish, reptiles, invertebrates, and mammals.

While significant progress has been made in recent years towards the restoration of the larger wetlands and lagoons in the Bay area, such as the completion of the restoration of Malibu Lagoon in 2013, the Oxford Basin Multiuse Enhancement Project in 2016, and the Draft Environmental Impact Statement and Report for the Ballona Wetlands Ecological Reserve in 2017, there are also many small bar-built coastal lagoons in the northern portion of the Bay watershed that are currently degraded and prioritized for restoration by several agencies. Topanga Lagoon, historically 30 acres in size, has been severely reduced in size and function due to the development of Pacific Coast Highway and other impacts to an approximately two-acre area. State Parks is leading the restoration planning efforts for the lagoon and removing remnant fill and completing a restoration of this site remains a high priority. Similarly, other wetlands such as Del Rey Lagoon, Trancas Lagoon, and others provide additional opportunities for restoration and improved health of wetlands throughout the Bay watershed.

**Lead Entity(ies):** State Parks, RCDSMM, NPS, CalTrans, Army Corps, City of Malibu

**Collaborating Partner(s):** SCC, TBF, SMBRC, CRI

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Complete the final post-restoration assessment of the Malibu Lagoon Restoration and Enhancement Project	Final Post-Restoration Report	2019
Finalize restoration planning and permitting for Topanga Lagoon restoration project and initiate project	Approved permits; Final design plans; project started	2022; 2024
Complete land acquisition, feasibility analyses, and restoration design in coordination with bridge redevelopment for Trancas Lagoon	Acquired land in acres; Final Feasibility Study	2023 2024
Conduct comprehensive monitoring of small lagoons in northern Bay to inform CMP and seek funding to continue Malibu Lagoon monitoring	Information included in State of the Bay Report	2024
Assess restoration options and priorities for other wetland types (e.g. freshwater systems)	Complete planning for one wetland site	2024

## ACTION #13 – RESTORE BALLONA WETLANDS ECOLOGICAL RESERVE

**Action:** Restore Ballona Wetlands Ecological Reserve to enhance wetland habitats and benefits to people

**Long-term Environmental Result(s):** Restore 577-acre Ballona Wetlands Ecological Reserve to improve wetland, transition, and upland habitats, functions, and services; and create public access trails and bike paths to encourage recreation and stewardship at the Ballona Wetlands Ecological Reserve

**Action History and Summary:** Over 96% of the vegetated estuarine wetlands have been lost over the past 150 years in the Los Angeles region. Thus, restoration to bring back higher-level ecosystem functions and services of wetlands is of the utmost importance in our area. The largest coastal wetland remaining in the Los Angeles region is part of the Ballona Wetlands Ecological Reserve (Reserve), once over 2,100 estuarine acres (near present-day Marina del Rey) rich in biological diversity and abundance. The Reserve has suffered over a century of degradation, including the dumping of millions of cubic yards of fill from the excavation of Ballona Creek in the 1930’s and Marina del Rey in the 1950’s, and the continued encroachment of habitat-altering invasive species. In 1998, the Ballona Wetlands were included on California’s 303(d) list of impaired water bodies due to excessive sediment dumping, hydrological impairments, and exotic vegetation.

In 2003 and subsequent years, the Reserve was purchased by the State of California for the purposes of restoration and public access, and the current approximately 577-acre Reserve is now managed by CDFW. In 2012, USEPA completed a Total Maximum Daily Load for the Reserve, including recommendations for restoration. TBF and many partners completed an extensive baseline monitoring program to inform the restoration process including comprehensive biological, chemical, and physical monitoring parameters between the years of 2009-2015. Restoration of the Reserve has been a multi-year process initiated in 2012 with the release of the Notice of Intent / Preparation. In September 2017, the lead agencies, Army Corps and CDFW, released a joint Draft Environmental Impact Statement and Report, which went out for public comment for 133 days and received thousands of public comments, highlighting its regional importance. Small-scale community restoration has been conducted by Friends of Ballona Wetlands (FBW) for 40 years, and TBF since 2016.

**Lead Entity(ies):** CDFW, Army Corps

**Collaborating Partner(s):** TBF, FBW, Heal the Bay, SMBRC

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Support the lead agencies by contributing technical information to the Final Environmental Impact Statement and Report and permitting	Completed FEIS/R and permits	2022
Continue community engagement and hand-restoration within the Reserve with FBW	3-acre restoration footprint	2024

Support lead agencies to identify and obtain restoration funding	Funding acquired	2024
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## ACTION #14 – IMPLEMENT WILDLIFE CROSSINGS

**Action:** Implement wildlife crossings and other innovative projects for benefits to wildlife and people

**Long-term Environmental Result(s):** Complete construction and implementation of two major freeway wildlife crossing projects to benefit wildlife, genetic diversity, and people

**Action History and Summary:** Malibu Creek State Park extends across the crest of the Santa Monica Mountains, encompassing thousands of scenic acres filled with craggy canyons, gorges, and meadows. Divided by a section of 14-mile-long Malibu Creek, the park has been a popular recreation and relaxation venue for visitors since it opened in 1976. Habitat fragmentation is an ongoing concern for the plant and animal species of the Santa Monica Mountains. Human development hinders the ability of species to move between natural areas and obtain the resources needed to survive. Roadways are a major source of wildlife mortality and present a safety issue for drivers. Wildlife crossing structures are an important tool to allow safe passage for wildlife across roadways, including enhanced habitat connectivity. It is critical that wildlife corridors are established and maintained between the Santa Monica Mountains, including Malibu Creek State Park, Simi Hills, and the Santa Susana Mountains.

In the first of its kind in California, a proposed wildlife crossing over the 101 Freeway at Liberty Canyon would allow mountain lions and other wildlife to safely cross the 101 Freeway, increasing genetic diversity, and reduce wildlife-related automobile accidents. SMBNEP has helped the lead agencies, State Parks and RCDSMM, in the design of the proposed overpass-crossing and the construction of a temporary corridor under the existing Liberty Canyon overpass. SMBNEP will continue to work with Caltrans, National Park Service, and watershed stakeholders to implement the 101 Freeway crossing and identify additional locations such as underpasses and culverts, that can be retrofitted to support wildlife movement.

**Lead Entity(ies):** State Parks, CalTrans, SMMC, RCDSMM, NPS, SCC, MRCA, municipalities

**Collaborating Partner(s):** Others depending on location

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Support lead agencies to find funding for Phase 2 of the Liberty Canyon Wildlife Crossing project	Funding acquired	2022
Support lead agencies in permitting and environmental review of Liberty Canyon Wildlife Crossing project	Completed permitting and environmental review	2024
Identify additional locations for wildlife crossings	Identify five locations for wildlife passage retrofit	2022

## ACTION #15 – ENHANCE POPULATIONS OF RARE SPECIES

**Action:** Implement projects that improve understanding and/or enhance endangered and threatened species populations (e.g. habitat improvements for Western Snowy Plover, genetic banking)

**Long-term Environmental Result(s):** Improved extent and condition of habitats for rare species throughout the Bay and its watershed

**Action History and Summary:** Habitats throughout Santa Monica Bay have the potential to support rare species, including those restoration efforts that have already been successful such as the LAX Dunes supporting El Segundo blue butterflies, California legless lizard, and California gnatcatcher; the beaches of the Bay supporting western snowy plover, California least tern, and the potential for rare vegetation; subtidal kelp forests protecting white abalone; streams of the Santa Monica Mountains supporting Southern California steelhead trout and California red legged frog; and many other examples. The Comprehensive Monitoring Program tracks many of these groups of species as indicators of particular habitats, but additional efforts for broader habitat improvements would support these species and many others. This action in particular is tied to many others, including restoration projects, critical habitat identified by agencies, municipalities, and other partners, outreach efforts, etc.

**Lead Entity(ies):** CDFW, USFWS, NOAA, NPS, State Parks, RCDSMM

**Collaborating Partner(s):** TBF, CRI, Audubon Society, many, depending on species

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Support Southern California Steelhead Trout genetic banking study	Completed study	2024
Support restoration and monitoring activities to benefit California red legged frog populations	Successful wild breeding population	2024
Support projects within western snowy plover critical habitat	Restoration acres within critical habitat	2024

## ACTION #16 – SUPPORT ACTIVITIES TO ACHIEVE TMDLS

**Action:** Support the implementation of activities and projects such as those in Enhanced Watershed Management Plans (EWMPs) and activities identified in the TMDL implementation schedule to help achieve TMDL goals for 303d listed waterbodies in the Bay and its watershed

**Long-term Environmental Result(s):** Assist in achieving constituent percentage load reduction targets for waterbodies in the Bay according to TMDL compliance timeline

**Action History and Summary:** One primary goal of SMBNEP is to improve water quality through reduction or elimination of pollution from storm water (including urban runoff) and point and nonpoint (including on-site wastewater disposal) sources. Despite significant improvement achieved over the last 30 years, Santa Monica Bay and many waterbodies in the Bay watershed are still listed as impaired due to pollutant loading (i.e. 303d listed). To continue improving condition of the listed waterbodies, water quality regulatory agencies established total maximum daily loads (TMDLs) that require dischargers to achieve pollutant load reduction targets through various means, including implementation of projects identified in the Watershed Management Plans (WMPs) and Enhanced Watershed Management Plans (EWMPs) under the storm water discharge (MS4) permits. There are also collaborative and integrated watershed-wide planning and implementation efforts, such as the Storm Water Strategy, an effort led by SWRCB to sustainably manage and utilize storm water in California to support water quality and water availability, and Integrated Water Resource Management Plan (IRWMP) for the Los Angeles Metropolitan region, including the availability and allocation of bond funding to facilitate and contribute to water quality improvement planning and implementation efforts in the region.

Programs and projects implemented under the current TMDL-based regulatory framework have been and will continue to be the main driver for achieving the improvement of impaired water bodies. Federal and state water quality regulatory agencies and discharge permit holders will continue to be the lead entities in these efforts. SMBNEP will continue to contribute by facilitating regional integrated water resource management and quality improvement planning, by recommending awards and overseeing implementation of State bond funding (e.g., Prop. 50 and 84) for stormwater pollution reduction projects, and by facilitating other sources of State funding. Nature-based and multi-benefit solutions should be prioritized as well as consideration given for the distribution of these projects throughout the watershed.

**Lead Entity(ies):** SWRCB, LARWQCB, USEPA, municipalities, NPDES and MS4 permit holders

**Collaborating Partner(s):** SCC, SMBRC

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Continue to support implementation of projects identified in EWMPs and WMPs	# and percentage of projects completed	See EWMP deadlines
Continue implementation of LA IRWMP	# of projects and funding amount implemented	Annually
Facilitate other sources of State funding	Amount of state funded received	Annually

## ACTION #17 – IMPLEMENT AND STUDY RUNOFF CAPTURE PROJECTS

**Action:** Infiltrate, capture, and reuse stormwater and dry-weather runoff through green infrastructure, LID, and other multi-benefit projects and improve understanding of ecosystem services provided

**Long-term Environmental Result(s):** Assist in achieving constituent percentage load reduction targets for waterbodies in the Bay according to TMDL compliance timeline

**Action History and Summary:** Green infrastructure and low impact development (LID) practices are increasingly used as an effective tool to capture, treat, and infiltrate stormwater and dry weather runoff. In addition to improving surface water quality, these practices also provide multiple benefits including creation of native habitat, beautification of the urban landscape, and reduction of outdoor water use for irrigation, etc. SMBNEP has given priority to green infrastructure projects when recommending the allocation of state bond funding (e.g., Prop. 50, 84) and seeking grants to implement LID projects directly. Additionally, several large-scale commercial projects such as the Ballona Creek Rain Garden (BCRG) have been implemented since 2010. Future requirements through local ordinances and additional implementation of LID by agencies, businesses, and private landowners is recommended. In 2018, two new capital projects were in the planning stages, including the Ladera Park Stormwater Improvements Project and the Westwood Neighborhood Greenway Project. The Technical Advisory Committee reviewed their draft monitoring plans in September 2018.

While it is largely understood that these LID projects produce multiple benefits, the quantification of some of those services remains a significant data gap for our region. From 2016-2018, TBF and LMU partnered on a study to evaluate how stormwater is retained by BCRG, as well as the quantification through loading of several constituents of concern across two storm seasons. The garden retained up to 100% of all storms surveyed, and average pollutant retention between 80-90%. Constructed biofilters and bioswales have been shown to significantly reduce pollutant load by mimicking natural processes and filtering out pollutants; however, their fate within the biofilter itself is largely unknown. Future studies should address these data gaps, as well as designing LID projects with monitoring and assessment in mind.

**Lead Entity(ies):** City of LA, LAC, MS4 permit holders, municipalities, water agencies, businesses, others

**Collaborating Partner(s):** TBF, CRI, many others depending on location

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Complete rain garden metal fate study with CRI	Completed Master’s Thesis	2020
Complete additional LID projects throughout the watershed	3 new commercial-scale LID projects completed	2024
Promote adoption of local ordinances to require projects in public right-of-way to mitigate stormwater	New ordinances adopted by City of LA	2020
Seek funding and partnerships to conduct a cost-benefit analysis of LID projects	Funding acquired or report completed	2024

## ACTION #18 – INSTALL AND MONITOR PUMPOUT FACILITIES

**Action:** Support installation and monitoring of additional sewage and bilge pumpout facilities in Southern California harbors

**Long-term Environmental Result(s):** Meet 86-100% annual average usability percentage (based on analysis of equipment performance) for all publicly funded sewage pumpout stations throughout Southern California

**Action History and Summary:** California has one of the highest levels of recreational boating activity in the nation with approximately two million recreational boats. To reduce the potential discharge of boat-based pollution sewage, bilge pumpouts have been installed and are maintained and monitored by project partners. Santa Monica Bay’s Marina del Rey and King Harbors are home to approximately 7,500 berths and many more boats launched on a day-use basis.

Since 1996, SMBNEP has implemented a successful Southern California Boater Education Program with major accomplishments that include installing the third bilge pumpout in southern California, regular sewage pumpout monitoring, publication of a Boating Guide which directs boaters to sewage and bilge pumpout facilities, and release of the Pumpout Nav application. The app is the first of its kind nationwide and is used for data collection as well as an outreach tool. Other programs educate while providing free access to sewage pumpouts and oil absorbent exchange. Several opportunities to further advance the reduction of boat-based pollution in southern California and the Bay have been identified. These include necessary maintenance and monitoring of existing as well as the development and installation of additional infrastructure. Continued community engagement and outreach are central to build awareness and encourage clean boating practices.

**Lead Entity(ies):** LACDBH, marina operators

**Collaborating Partner(s):** TBF, CCC, CDBW, CalRecycle, SFEP, City of Redondo Beach

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Continue quarterly monitoring of public sewage pumpout stations	Annual Reports (5)	Annually through 2024
Update CA Vessel Waste Disposal Plan	Updated plan document	2020
Support installation of sewage pumpouts in Marina del Rey or King Harbor	1 new sewage pumpout installed	2024
Support installation of bilge pumpouts in Marina del Rey or King Harbor	1 new bilge pumpout installed	2024
Support efforts of neighboring harbors in installation of bilge and sewage pumpouts in southern California	Number of planned pumpouts	2024

## **ACTION #19 – MINIMIZE BIOLOGICAL IMPACTS FROM WATER INTAKE FACILITIES**

**Action:** Support minimization of biological impacts of water intake and discharge from coastal power generation and desalination facilities, including public engagement and education

**Long-term Environmental Result(s):** Achieve no impacts from seawater intake of desalination facilities and ultimately no seawater intake

**Action History and Summary:** The once-through cooling system used by coastal power generation facilities negatively impacts the ocean environment on both the intake and discharge side in the form of impingement (the entrapment and death of large marine organisms on cooling system intake screens), entrainment (the death of small plants and animals that pass through the intake into the plant’s heat exchanger), and the discharge of heated ocean water back into the Bay (thermal pollution). In compliance with the new policy adopted by the SWRCB in 2010, all power generation facilities in the Bay have developed a plan and timeline to permanently end all ocean water intake, with the Scattergood Generation Station achieving the goal by the end of 2024 at the latest.

Like coastal power plants, desalination plants also take up ocean water and may even use the intake water from adjacent coastal power plants. New policies have been adopted by the SWRCB since 2015 to address the potential impacts of such intake as well as issues associated with the disposal of brine discharges from desalination facilities. The new state-wide policy supports the use of ocean water as a reliable supplement to traditional water supplies while protecting marine life and water quality and at the same time requires new or expanded seawater desalination plants to use the best available, site, design, technology, and mitigation measures feasible to minimize intake and mortality of all forms of marine life. Additionally, mitigation measures are required to address harmful impacts on marine life that occur after a desalination facility uses the best available site, design, and technology feasible.

**Lead Entity(ies):** SWRCB

**Collaborating Partner(s):** Local water districts, LADWP, power generation companies

**SMBNEP Role:** Support

<b>Next Step(s):</b>	<b>Performance Measure(s):</b>	<b>Timeline:</b>
Educate and increase public support of the state-wide desalination policy	Increased public awareness	Annually through 2024
Support development of alternative and advanced mitigation measures to minimize seawater intake by desalination	Amount of seawater intake prevented/reduced	2024

## ACTION #20 – ELIMINATE OWTS NON-POINT POLLUTION

**Action:** Support elimination of non-point pollution from onsite wastewater treatment systems

**Long-term Environmental Result(s):** Achieve level of performance and water quality protection set by state policy for all OWTS in the Bay watershed

**Action History and Summary:** Onsite wastewater treatment systems (OWTS), also commonly known as septic systems are still prevalent in many coastal areas in northern Santa Monica Bay, due to the lack of a connection to a centralized sewer system. Though each system is designed according to site conditions to ensure proper treatment, inadequate design and/or maintenance can lead to wastewater leakage and contamination of groundwater or surface waters. Progress has been made in recent years. The most significant step is the enacted Prohibition of OWTS by LARWQCB, and the resulting construction of a centralized wastewater treatment facility that will eliminate the use of septic systems in the commercial Civic Center area of Malibu. Permitting and inspection of the remaining OWTS have also been improved through the collaborated implementation by LARWQCB and municipalities of an Integrated Wastewater Management Action Plan.

To allow the continued use of OWTSs, while protecting water quality and public health, the SWRCB adopted in June 2012 a statewide policy for siting design, operation, and maintenance of OWTSs. This Policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements and sets the level of performance and protection expected from OWTS. Implementation of the OWTS Policy will be overseen by the State Water Board and the regional water quality control boards, and local agencies (e.g., county and city departments and independent districts) through local management programs.

**Lead Entity(ies):** SWRCB, LARWQCB, municipalities

**Collaborating Partner(s):** SMBRC

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Complete sewer connections of residential properties to the centralized wastewater treatment facility in the Malibu Civic Center area	Establishment of the local assessment district and progress in # of sewer connection	2024
Continue the coordinated OWTS identification, permitting, and inspection system between the LARWQCB and the cities and Counties in the watershed	Number of permits and inspections	Annually through 2024

## **ACTION #21 – SUPPORT POLICIES TO REDUCE RELIANCE ON IMPORTED WATER**

**Action:** Support policies that promote reuse, recycling, and advanced wastewater treatment to reduce reliance on imported water sources

**Long-term Environmental Result(s):** Help reduce dependence of the Los Angeles region on imported water and lower the percentage of imported water use by water agencies

**Action History and Summary:** Much of the water consumed in Southern California is imported from hundreds of miles away. However, with the significant upgrading in the level of wastewater treatment, reclamation and recycling of treated wastewater has become more feasible and an important alternative source of water supply for non-potable and potable uses. Recycled water, which has undergone tertiary treatment, is currently used for a variety of purposes: landscape and agricultural irrigation, industrial uses such as cooling water supply, recreational and landscape impoundments, and environmental benefits such as re-establishing water-related habitat areas. Highly treated reclaimed water can also be injected into a groundwater basin to replenish water that has been removed through pumping or to create a seawater intrusion barrier. All allowable uses of reclaimed/recycled water are subject to strict water quality regulations overseen by the LARWQCB and the California Department of Public Health (CDPH).

The two major POTWs with ocean outfalls in the Bay now have ambitious programs and have teamed-up with local water districts to significantly increase the amount of wastewater reclamation and recycling. Both the City of Los Angeles and Los Angeles County Sanitation Districts have formulated ambitious targets for their recycling efforts. In addition, the LADWP is implementing a Recycled Water Master Plan adopted in 2010 that will identify uses and projects to further expand and maximize recycled water use from available Hyperion Treatment Plant effluent. While of modest size, the Tapia Wastewater Reclamation Facility in the Malibu Creek watershed achieved 100 percent recycling – zero discharge - of its effluent in the summer by focusing its efforts on irrigated landscape at public parks, schools and road medians in this important watershed in the north portion of the Bay.

**Lead Entity(ies):** POTWs, LADWP, LASAN, LVMWD, WBMWD, LACSD

**Collaborating Partner(s):** SWRCB, LARWQCB, CDPH, SMBNEP, coastal cities

**SMBNEP Role:** Support

<b>Next Step(s):</b>	<b>Performance Measure(s):</b>	<b>Timeline:</b>
Support recycled wastewater efforts by JWPCP of LACSD	Project approval by board (167,000 acre-feet recycled per year by 2031)	2020
Hyperion Treatment Plant to implement pilot project for recycled water	9 million gallons per day with advanced purification	2019
Support recycled wastewater efforts by Tapia Water Reclamation Facility and others through expansion of distribution system and regional partnerships	Improved percent use of recycled water	2024

## ACTION #22 – IMPLEMENT COMPOSTING AND LANDFILL DIVERSION PROJECTS

**Action:** Support policies and implement projects that divert landfill waste and encourage composting to improve water quality and lower greenhouse gas emissions

**Long-term Environmental Result(s):** Establish 10 local community based compost hubs and divert food waste from 20 food service establishments; and distribute compost among community support agriculture, gardens, and restoration projects

**Action History and Summary:** Approximately seven percent of all global greenhouse gases (GHG) come from food waste decomposing in landfills. To reduce GHG generation resulting from food waste, local composting of these materials is preferential as it aerobically degrades and reduces transport related emissions. Additional benefits of food waste diversion to compost is its application to soils which improves soil quality and water retention. These improvements lead to improved water quality in groundwater and surface waters, and ultimately to increased food security and decreased negative impacts to ecosystems. The Table to Farm Composting program is a diversion program that collects food waste from restaurants to enrich local compost facilities and supplies Community Supported Agriculture (CSA) with needed nutrients and organics.

TBF will partner with local community groups and schools on a “Table to Farm” composting program. TBF will work with these groups to install and manage community composting sites and assist restaurants with source reductions, organics recovery, and food donations. In addition to addressing air quality and healthy soil issues, TBF will raise awareness about CSA programs and the benefits to restaurants of buying from local CSAs.

**Lead Entity(ies):** Schools, municipalities, LA Zero Food Waste Task Force

**Collaborating Partner(s):** Social Justice Learning Institute, municipalities, restaurants, LA Compost, LA Food Policy Council, LA Food Waste Prevention and Rescue Working Group

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Support continuation of Table to Farm compost hubs	15,000 lbs of food waste diverted	2020
Find funding for and implement an additional community composting hub in Santa Monica Bay watershed	Funding acquired; One new compost hub installed	2022 2024
Support expansion, outreach and implementation for residential and commercial organics collection and recycling	Legislation mandating residential collection	2024

## ACTION #23 – DEVELOP AND ADOPT STREAM PROTECTION POLICIES

**Action:** Facilitate development and adoption of natural stream and riparian protection policies, including restoration

**Long-term Environmental Result(s):** Assist a minimum of one municipality in the watershed in the adoption of a stream protection policy

**Action History and Summary:** The lack of enforceable regulations and/or conservation policies is a major cause of the loss of land-based habitats, such as riparian corridors and wetlands, due primarily to land encroachment. Therefore, new policies should be developed and executed to prevent further loss of the remaining habitat areas and living resources within the watershed and Bay. Adoption of policies must be supported by information on the geological, hydrological, and ecological characterization of the subject area. Therefore, it is important to ensure that studies and assessments are carried out to provide information on historical ecology, water budget, fish population density, etc. Collection and compilation of existing information is an expected and necessary first step in development of strategies and policies to address emerging issues such as climate change.

Rivers, creeks, and streams are an integral part of the watershed and provide multiple benefits including water supply, pollutant removal, flood water drainage, wildlife habitat, as well as the beautification of the neighborhood. However, it is estimated that as much as 80 percent of the natural streams in the watershed have been either paved over, culverted, or channelized. Many of the remaining natural streams are also at risk from encroachment of urbanization. The fact that most existing municipal codes of watershed cities do not provide sufficient protections to streams only exacerbates the situation. To protect the remaining benefits, it is vital that a buffer zone adjacent to a steam system be preserved. In 2009, the LA City Department of Public Works spent several years working on a stream protection ordinance for areas within LA City. Based on Watershed Protection Division analysis, there are approximately 462 miles of riparian habitat that would receive some level of protection under the draft ordinance. Additionally, SWRCB has lead ongoing efforts in multiple phases to create a wetland and riparian area protection policy. Local governments will need to adopt and enforce stream protection policies that establish minimal acceptable requirements for stream buffers and prohibiting impactful development.

**Lead Entity(ies):** LA County, LA City, other watershed cities

**Collaborating Partner(s):** Heal the Bay

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Complete and adopt LA City stream protection policy	Adopted policy	2024
Inform other regional ordinances	Adopted policy(ies)	2024

## ACTION #24 – INCLUDE COASTAL RESILIENCE INTO LCP UPDATES

**Action:** Support the inclusion of coastal resilience through natural means and softscape measures into local coastal plan updates

**Long-term Environmental Result(s):** Inclusion of climate change adaptation measures in at least half of the 12 local coastal jurisdictions updated general plan (or equivalent) amendments

**Action History and Summary:** Local Coastal Programs (LCPs) govern land use and development in the coastal zone and once an LCP’s certification becomes effective, the local government becomes responsible for reviewing most Coastal Development Permit (CDP) applications. LCPs include a Land Use Plan (LUP) and an Implementation Plan (IP), and are required to be prepared and submitted to the California Coastal Commission for review for consistency with Coastal Act requirements. With models like the USGS Coastal Storm Modeling System (CoSMoS) and new hazard and coastal resource analyses being released, SMBNEP and TBF will continue to support the integration of implementing sea level rise adaptation efforts and natural soft-scape alternatives into new and future amended LCPs. Living shoreline approaches incorporating different habitats across elevational gradients are worthy of further development and implementation as they sequester carbon, provide ecosystem services, and create resilient biogenic structure. These approaches are a means to address the cause of and locally respond to the manifestation of climate change stressors. Additional alternatives should also be considered as part of this action such as implementing a program to acquire coastal land to expand natural open spaces, especially in the face of sea level rise and coastal erosion.

**Lead Entity(ies):** CCC, City of Manhattan Beach, coastal cities, LACDBH

**Collaborating Partner(s):** TBF, USGS, Heal the Bay

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Attend stakeholder meetings for local cities LCP development / updates / implementation	Attend or present at two meetings	Annually through 2024
Opportunistically assist cities in the development of sea level rise vulnerability studies	Attend or present at two meetings	Annually through 2024
Use data collected from beach restoration “soft-scape” projects to inform and assist LCP development	Attend or present at two meetings	Annually through 2024

## **ACTION #25 – SUPPORT BMPS, PUBLIC ACCESS, AND IMPROVED TRAIL SYSTEMS**

**Action:** Support best management practices, increased public access, and improved public facilities for beaches and other public trail systems to support both enhanced natural resources values and benefits to people

**Long-term Environmental Result(s):** Improve access to the coast and enhance coastal experiences through linking and expanding the California Coastal Trail; and develop partnerships that support the implementation of natural infrastructure throughout the Bay watershed

**Action History and Summary:** In 2016, TBF implemented the Santa Monica Beach Restoration Pilot Project which provides an enhanced beach experience for the community through educational opportunities, interpretive signage, and ecotourism. Community restoration events in otherwise non-accessible locations like the BWER and LAWA El Segundo Dunes also provide opportunities for public access. This action supports best management practices that promote natural habitat values while providing benefits to people. This action also supports programs like the Coastal Conservancy’s Explore the Coast Program which aims to improve public access to beaches, promote and expand the California Coastal Trail, and create pathways for inland and underserved communities to experience the coast.

Trail systems and increased outreach are central components of these efforts. There is growing recognition that increased access to coastal areas with natural features support improved public health via reduced stress, anxiety and depression, and improved mental health. In context to increasing temperatures associated with anthropogenic climate change, cooler areas neighboring the coast of Los Angeles will become increasingly important as a thermal refuge for people. The development of sufficient nature-based infrastructure will be needed to meet this increasing demand. Public transport and related services will need to be maintained or increased to meet demand. Concordantly, sea level rise and increased storminess will require the creation of new infrastructure including bathrooms and other facilities further from the current shoreline.

**Lead Entity(ies):** CCC, SCC, LACDBH, SMMC, RCDSMM, MRCA, coastal cities, State Parks, CalTrans, Metro

**Collaborating Partner(s):** TBF, CRI

**SMBNEP Role:** Support

<b>Next Step(s):</b>	<b>Performance Measure(s):</b>	<b>Timeline:</b>
Support implementation of identified actions within plans such as the LACDBH Sea Level Rise Vulnerability Assessment	Actions implemented	2024
Support creation of increased public transit to and from beaches to enable access	Public transit improvements	2024
Continue to advise BMPs for beaches that promote habitat condition improvements and support for unique species	BMPs adopted and implemented; acres protected	2024

## ACTION #26 – CONDUCT INVASIVE SPECIES RESEARCH AND OUTREACH

**Action:** Participate in research, education, outreach, and policy on invasive species removal and control

**Long-term Environmental Result(s):** Reduce impact of invasive species in critical habitats throughout the Bay and its watershed as measured by the Comprehensive Monitoring Program

**Action History and Summary:** Invasive plants and animals have become recognized in recent years as a major threat to the integrity of natural resources in the Bay watershed. These species can invade natural systems and proliferate, often dominating a community to the detriment and sometimes the exclusion of native species. Introduced species may also compete directly with native species for nutrients, sunlight, and space, and indirectly by altering the food web or physical environment. Invasive species may also prey on or hybridize with natives. Native species with limited population size or ecological range are particularly susceptible to displacement by aggressive exotic or translocated species.

Major invasive species of concern in the Bay watershed include plant species such as *Arundo donax*, pampas grass, iceplant, and animal species such as crayfish, bullfrogs, and New Zealand mudsnails (NZMS). An adequate prevention strategy must rely on a diverse set of tools and methods including regulations and policies banning import, use, and disposal of invasive species, and public outreach that increases the awareness of the issue and reduce the chance of unintentional introduction and spread of invasive species. SMBNEP will continue to participate in invasive species research and control efforts, including NZMS surveys, funding invasive species control projects, and participating in statewide leadership efforts to control invasive species. Invasive species will also continue to be tracked within several habitat types as part of informing the CMP.

**Lead Entity(ies):** CDFW, State Parks, NPS

**Collaborating Partner(s):** UCSB, MRT, MRCA, State Parks, TBF, SMBRC, Cal-IPC, others

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Conduct New Zealand mudsnail surveys	Biennial Report for NZMS	2020; 2022; 2024
Attend and participate in Invasive Species Council of California and regional meetings focused on management of invasive species	Attend or present at one meeting	Annually through 2024
Conduct additional studies and outreach efforts to control impacts of, manage, or reduce the sale of invasive species	Species targeted and actions taken	2024

## ACTION #27 – CONDUCT BOATER OUTREACH TO IMPROVE BMPS

**Action:** Produce educational resources and materials and conduct outreach to improve best management practices for Southern California boaters (e.g. fuel, sewage, and hazardous waste management)

**Long-term Environmental Result(s):** Increase understanding and adoption of sustainable boating habits to reduce boating related pollutants entering waterways (e.g. boat sewage, used oil, antifreeze, bilge water, batteries, copper, trash, and aquatic invasive species)

**Action History and Summary:** California has one of the highest levels of recreational boating activity in the nation with approximately 2 million recreational boats. Santa Monica Bay’s Marina del Rey Harbor and King Harbor are home to approximately 7,500 berths and many more boats launched on a day-use basis. Boating related pollution can directly impact water quality.

Since 1996, the SMBNEP has implemented a successful Southern California Boater Education Program. Major accomplishments include establishing four new household hazardous waste drop off facilities, hosting four annual stakeholder trainings on boating BMPs, and developing successful educational materials, including an instructional Y-valve video, and the popular Southern California Boater’s Guide. However, the on-going outreach effort needs to be sustained, improved, and expanded, for there is evidence that a large proportion of boaters still do not dispose of their boating wastes properly, and remain unaware of some clean boating practices.

**Lead Entity(ies):** TBF, CCC

**Collaborating Partner(s):** CDBW, marina operators, SFEP

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Produce educational materials	3 Changing Tide newsletters; 4000 Tide calendars; 3000 Boater Kits;	Annually through 2024
Conduct outreach	5 events and 5 presentations; 4 Dockwalker trainings	Annually through 2024
Manage Pumpout Nav app	Number of downloads	Annually through 2024
Research public engagement metrics and specific engagement tools on reduction of pollutants to waterways	Literature Review	2021
Find funding and implement fuel spill prevention tools and outreach	Funding acquired; Project initiated	2022
Support and develop marine debris reduction and cleanup efforts	295 fishing line collection bins statewide; 70 boating facilities participating in CCD statewide	2024

## ACTION #28 – SUPPORT DISADVANTAGED COMMUNITIES

**Action:** Support efforts of disadvantaged communities to achieve healthy habitats, implement green infrastructure, and reduce pollution

**Long-term Environmental Result(s):** Develop communication strategies and identify barriers facing disadvantaged communities to achieve healthy habitats, including language barriers; promote participation of disadvantaged communities in restoration, greening, and pollution reduction projects; and support regional strategies that increase resilience of underserved communities

**Action History and Summary:** This action supports efforts to promote environmental equity and justice for the underserved, including disadvantaged communities, persons with disabilities, tribes, and others, through work to restore habitats and watersheds, provide public access and recreational opportunities, and increase resilience to climate change. Projects and partnerships can be prioritized as part of this action to support acquisition of funding, allocation of resources, indirect benefits, education, and / or implementation of projects within disadvantaged communities.

The need to increase park land and other greenspace in vast areas of Los Angeles, coupled with the needs to capture, treat, and infiltrate stormwater and urban runoff to attain TMDL’s and increase local water supplies create a powerful nexus to achieve this action. State and County programs exist or are in process to develop and fund projects that will accomplish these complimentary environmental services. These greenspaces, if thoughtfully designed, could also enable biodiversity and connectivity for wildlife in the urban environment. Consideration should also be given to the inclusion and engagement of non-English speaking communities.

**Lead Entity(ies):** municipalities

**Collaborating Partner(s):** TBF, LACDPW, City of LA, LARWQCB, MRCA, Food and Water Watch LA, Heal the Bay

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Support WMPs and EWMPs to prioritize projects that produce multi-benefits	% of funding from LA County Safe Clean Water Program and other sources; % of projects in DACs	2024
Utilize the Ballona Creek Greenway Plan to identify parcels in disadvantaged communities for implementation	Projects implemented	2024
Support IRWMP and similar programs to preferentially invest in disadvantaged communities	% of funding and projects in DACs	2024
Support research efforts to quantify multi-benefits of green spaces to communities	Completed research project on multi-benefit projects in DACs	2024

## ACTION #29 – REDUCE HEALTH RISKS TO PEOPLE

**Action:** Reduce health risks of swimming in contaminated waters and consuming contaminated seafoods through more comprehensive source control and, advanced monitoring and public notification

**Long-term Environmental Result(s):** Achieve no elevated health risks associated with swimming and seafood consumption through source control, monitoring, and public notification

**Action History and Summary:** Primary sources of health risks associated with swimming in the surfzone can be traced to both dry weather urban runoff and wet-weather stormwater that convey pathogens (pathogenic bacteria and viruses) and other pollutants (human- and animal-caused) to the coast. The completion of the Santa Monica Bay Epidemiological Study in 1995 established causation between increased illnesses in swimmers and surfers and proximity to areas with contaminated runoff. Extensive efforts involving the investment of billions of dollars to reduce sewage spills, divert runoff, and awareness campaigns have improved the water quality along most Bay beaches over the past several decades and new efforts are being undertaken through WMPs and EWMPs. Risk assessments conducted by the State and USEPA indicate that there are still health risks associated with consuming seafood contaminated with historical dumping and deposition of DDT and PCBs on Palos Verdes Shelf. Several important steps have been taken to address the seafood contamination issues, including fish consumption advisories, white croaker commercial fishery closures, and public outreach and enforcement efforts. USEPA has also been investigating engineering options to remediate the DDT and PCB contamination on the Palos Verdes shelf. Major challenges lay ahead despite the progress made and several steps should be taken to ensure public health is protected from these risks. More coordinated efforts should be made to address runoff through integration across jurisdictional boundaries. Meanwhile, more technical investigations and evaluations should be conducted to identify the sources of pollutants and alternative control measures for the few remaining chronically affected areas. For seafood contamination, a comprehensive approach should be undertaken that builds and improves upon existing efforts in risk assessment, risk communication, risk reduction BMPs, monitoring, and enforcement.

**Lead Entity(ies):** USEPA, OEHHA, LAC-DPH, LARWQCB, municipalities, Heal the Bay

**Collaborating Partner(s):** SMBRC, LA Waterkeeper

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Continue implementation and improvement of beach water quality monitoring and reporting system (e.g. Heal the Bay’s NowCast system)	Publication of beach water quality report	Annually through 2024
Update fish contamination advisory and associated public education materials based on new data	Publication of new fish advisory	2024
Maintain and enhance the existing seafood contamination education and enforcement program	# of health inspections and outreach materials	Annually through 2024
Develop NowCast for freshwater systems to inform recreation (e.g. swimming holes)	Completed online freshwater NowCast system	2024

## **ACTION #30 – ENGAGE COMMUNITY IN WATER CONSERVATION AND REUSE**

**Action:** Conduct community engagement, education, and inform policies related to water conservation and reuse to reduce water demand and reliance on imported sources

**Long-term Environmental Result(s):** Help reduce dependence of the Los Angeles region on imported water and lower the percentage of imported water use by water agencies

**Action History and Summary:** The importance of adequate water supply to residents in the arid Southern California region cannot be overstated and has gained more urgency amid one of the worst drought periods in the state’s recent history. Drought, increasing threats due to climate change, cost of importation, and increasing water use, mean that the region should continue efforts striving towards water independence and reducing our reliance on imported sources.

Since 2014, a diverse array of water conservation outreach strategies have been designed, developed, and implemented. Methods of community engagement included the production of high-quality PSAs, numerous tabling events which distributed LADWP conservation devices and rebate information, a social media campaign, newsletters, and press releases. Water conservation education for students has included the production of a water and energy conservation video for kids; water, energy, and climate change infographics; and an engaging at-home or classroom activity packet with conservation games and home assessment tools. Finally, to demonstrate water conservation and stormwater capture methods, rain gardens have been installed on multiple properties throughout the watershed after lawns and irrigation systems were removed. Recontouring created bioswales to capture stormwater, and drought-tolerant, California native vegetation were planted throughout the sites. Based on data collected as part of a grant from MWD, homeowners reduced potable water usage by up to 94% (through reduced irrigation) and captured over 700 gallons of stormwater for each 1-inch storm. Through social media, videos, and public events, hundreds of thousands of residents have been engaged. Future engagement should also include non-English speaking communities.

**Lead Entity(ies):** LADWP, MWD

**Collaborating Partner(s):** TBF, CRI, LASAN, WBMWD, Heal the Bay

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Link water conservation with outreach events and social media	At least 1 event	Annually through 2024
Educate, engage communities, and provide resources that promote the importance of native plants	At least 1 event; multiple social media posts	Annually through 2024
Support efforts by water agencies to promote water conservation and reuse including dissemination of materials	Event notices; cross-promotion efforts	Annually through 2024

## ACTION #31 – ENGAGE BUSINESSES IN WATER QUALITY IMPROVEMENTS

**Action:** Achieve water quality benefits by businesses through community engagement and implementation of best management practices

**Long-term Environmental Result(s):** Achieve Clean Bay Certified adoption by 100% of Bay watershed cities; develop and distribute BMP materials to food service establishments and marine fuel docks

**Action History and Summary:** Activities in commercial and other high-density areas in the watershed may contribute significantly to polluted stormwater runoff because of the concentration of businesses such as restaurants and the large volume of vehicular and foot traffic. Potential sources of pollutant loading can range from improper waste disposal and cleaning practices by restaurants, excessive landscape irrigation from commercial businesses, and more. Efforts should be made to reduce pollutant loading from these sources through engagement as well as best management practices (BMPs) that can be rather simple but effective.

TBF’s Clean Bay Certified program has worked with hundreds of restaurants over the years to improve compliance with urban runoff and stormwater management techniques. Inspections of participating restaurants conducted by municipalities are subject to criteria that target best management practices to reduce trash, organic and non-organic pollutants. Clean Bay Certified has expanded to include source reduction, sustainable seafood, and other environmental factors related to restaurants. Other commercial operations could benefit from a similar program.

**Lead Entity(ies):** TBF, municipalities

**Collaborating Partner(s):** commercial businesses, LARWQCB, other stakeholders

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Research contaminants, environmental laws, sustainability, pollution prevention standards, and BMPs for commercial businesses such as nurseries, landscapers, restaurants, and horse stables.	Literature review	2024
Distribute restaurant engagement tools	# of restaurants reached, # of each tool distributed	2024
Develop funding to support the expansion of best management practices to incorporate other business sectors	Annual submission of proposals and industry support	Annually through 2024

## ACTION #32 – REDUCE MARINE DEBRIS

**Action:** Reduce marine debris by supporting bans on single-use items, conducting outreach, and participating in trash reduction programs

**Long-term Environmental Result(s):** Implement ban on single use disposable plastics in Los Angeles County and 100% of cities throughout watershed; and engage 30 food service establishments as ReThink Disposable participants

**Action History and Summary:** Evidence indicates that quantities and impacts of marine debris are significant and increasing. Investigation of plastic in the North Pacific Central Gyre of the Pacific Ocean showed that the mass of plastic pieces were six times greater than the mass of zooplankton floating on the water’s surface. Plastic pieces photodegrade into smaller plastic particles. Zooplankton are ingesting these plastic particles, posing a serious threat to the marine animals that consume them and the subsequent food chain.

The majority of marine debris is comprised of plastic materials. Most of this debris comes from land-based sources which are transported to oceans via storm water runoff. The main sources of plastic found in stormwater runoff include litter (mostly cigarette butts, food wrappers, lids, bags, cups/plates/utensils, straws, beverage bottles). Much of this debris is a result of disposable products, the result of convenient ‘to go’ items that have a short useful life span and then are quickly disposed. The most effective measure that can reverse the trend and ultimately prevent disposal of plastics into the ocean is to reduce at the source and reduce or entirely stop using single-use disposable plastic products. In 2018, TBF in partnership with Clean Water Action, implemented ReThink Disposable LA: a technical assistance program for food service businesses targeting the reduction of single-use disposable items used on-site. Efforts of coastal cities to incorporate plastic reduction ordinances has been increasing in recent years. Additional efforts should be evaluated to reduce other forms of marine debris such as ‘ghost gear’. Commercial retailers such as REI and Bass Pro Shops have monofilament retrieval programs; CDBW and State Parks have container placement initiatives; opportunities to engage or build on these efforts should be explored.

**Lead Entity(ies):** municipalities

**Collaborating Partner(s):** TBF, Surfrider Foundation, Heal the Bay, City of Culver City, City of Malibu, City of Santa Monica, City of Manhattan Beach, LA County, Clean Water Action / Clean Water Fund, commercial businesses, 5 Gyres, Algalita, OPC, NOAA, USEPA, other stakeholders

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Find funding for and continue ReThink Disposable LA	Funding acquired; Project initiated	2020
Support municipality bans of polystyrene, non-recyclable plastics, and single use items	# Watershed cities with ordinances; LA County ordinance; CA statewide ban	2024; 2024; 2024

## ACTION #33 – MONITOR MICROPLASTICS AND OTHER MARINE DEBRIS

**Action:** Monitor microplastics (including microfibers) and other marine debris in the Bay and coastal environments to inform management actions

**Long-term Environmental Result(s):** Use microplastics data analyses and identified trends to inform source reduction management strategies in the Bay

**Action History and Summary:** Microplastics are small plastic pieces less than five millimeters long which can be harmful to our ocean and aquatic life. Plastic is the most prevalent type of marine debris found in our oceans, and microplastics are considered an emerging constituent of concern due to their ubiquitous presence in the environment, danger to marine life when ingested, and potential to bioaccumulate chemicals up the food web. Microplastics result from degrading macroplastics or are manufactured for areas like the cosmetic industry. A pilot study led by Loyola Marymount University’s Coastal Research Institute (CRI) in 2017 analyzed microplastics from the Santa Monica Bay beaches; however, the method used yielded a low percent recovery for microplastic seeded sand samples and allowed sand to be carried over from samples. This protocol has been further refined by CRI in 2018 and pilot studies conducted. Further research is necessary to establish trends for this constituent throughout the Bay as well as improve our understanding of long-term impacts. This action also supports the implementation of the Comprehensive Monitoring Program.

**Lead Entity(ies):** TBF, CRI

**Collaborating Partner(s):** USEPA, UCLA, SCCWRP, SCCOOS

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Complete the development of a microplastics in sediment extraction and analysis method	Completed method protocol	2019
Publish a manuscript on the results of the Bay studies	Completed manuscript	2021
Conduct additional studies to inform the transport, accumulation, and fate of microplastics in our marine and nearshore environments	# research projects; # students engaged; manuscripts published	2024

## ACTION #34 – IMPROVE UNDERSTANDING OF EMERGING CONTAMINANTS

**Action:** Improve understanding of emerging contaminants through monitoring and research to inform source control and reduce loading (e.g. fire retardants), especially in the context of climate change

**Long-term Environmental Result(s):** Reduce impacts of emerging contaminants on key habitats in the Bay and its watershed

**Action History and Summary:** While existing water quality improvement programs, especially the program for controlling point source pollution from POTWs, has achieved significant reduction of loading for pollutants such as DDT, PCBs, and heavy metals, many new contaminants are emerging and causing concern due to their potential detrimental impacts on the marine ecosystem and human health. The so-called emerging contaminants include, but are not limited to, polybrominated diphenyl ethers (PBDEs), which are used primarily as flame retardants, perfluorinated chemicals that are used as stain repellants, and other pharmaceuticals or other personal care products that may harm aquatic life or the environment.

A comprehensive strategy should be developed and implemented to address the issues of emerging contaminants. First, more monitoring and studies need to be conducted to estimate the scale of the contamination and determine the environmental risk of many of these and other compounds. For emerging contaminants known to pose high environmental risk, standard and routine monitoring should be conducted. Meanwhile, actions such as outreach and education should be taken to reduce the loading of emerging contaminants for which the risks are better known. Finally, new technology and methodology need to be developed to identify new, potential emerging contaminants and verify their damaging effects.

**Lead Entity(ies):** SCCWRP, SWRCB, LARWQCB

**Collaborating Partner(s):** POTWs, TBF, CRI

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Conduct more studies to assess the effects of emerging contaminants on riparian and marine ecosystems and human health	Study findings and reports	2024
Improve analytical methodology and standardize monitoring of more emerging contaminants	Expanded list of contaminants monitored and monitoring reports; description of lab methods to analyze CECs	2024
Enhance and expand existing educational programs and enforcement efforts to reduce the use and dispersal of emerging contaminants	Program implementation progress reports	2024

## ACTION #35 – MONITOR HARMFUL ALGAL BLOOMS

**Action:** Monitor and inform management actions for Harmful Algal Blooms (HABs)

**Long-term Environmental Result(s):** Reduce prevalence of HABs in the Bay and its waterbodies as measured by the Comprehensive Monitoring Program

**Action History and Summary:** Harmful Algal Blooms (HABs) can occur when certain types of microscopic algae grow quickly in water, forming visible patches of algae that may harm the health of the environment, plants, or animals. Some species of these algae can produce the potent neurotoxins domoic acid and saxitoxin. While these toxins cause no direct harm to shellfish, the shellfish serve as vectors that transfer the toxins to humans and animals. Bioaccumulation of algal toxins through vector organisms (such as krill and filter feeding fish) in the food web has been linked to erratic behavior in birds and marine mammals, as well as marine animal mortality events. Large scale persistent HABs have the potential to absorb light, shading out and impacting other photosynthetic organisms, e.g. kelp forests or eelgrass habitats. HABs also have the potential to lower dissolved oxygen levels in coastal waters impacting aquatic life.

Awareness of the occurrence of harmful algal blooms along the coastline of the greater Los Angeles area of the Southern California Bight has increased significantly in recent years. There is also evidence that HAB occurs more often and are more widely spread and may further increase with increases in climate change stressors such as warmer waters. Additionally, inland aquatic water bodies may also experience HABs, e.g. Echo Park lake. More research is needed to understand the timing, geographical distributions and types of harmful blooms, the environmental forcing factors leading to toxic blooms and toxin production, and to link harmful/toxic events with impacts on populations of marine organisms and potential threats to human health. These are important information needed by public health managers, resource managers, and water quality managers for decision-making purposes.

**Lead Entity(ies):** SCCWRP, SCCOOS, NOAA, USC SeaGrant, LACSD

**Collaborating Partner(s):** UCLA, TBF, LA Waterkeeper, City of LA EMD, Heal the Bay

**SMBNEP Role:** Participate

Next Step(s):	Performance Measure(s):	Timeline:
Continue to support research and monitoring efforts for HABs, especially in context of climate change and CMP implementation	Monitoring data acquired	2024
Conduct monthly maintenance of SCCOOS shore station at Santa Monica Pier and seek support for additional sensors	Functioning monitoring station throughout year; new sensor additions	Monthly through 2024; 2024
Improve public outreach and education on HABs	# stakeholder meetings or outreach tools	2024

## ACTION #36 – MONITOR CLIMATE CHANGE IMPACTS AND OCEAN ACIDIFICATION

**Action:** Monitor chemical, physical, and biological characteristics in the Bay to inform climate change impacts such as ocean acidification

**Long-term Environmental Result(s):** Develop and implement adaptation strategies addressing impacts of ocean acidification in the Bay

**Action History and Summary:** Santa Monica Bay is an integral part of the Southern California Bight and its watershed provides habitat for more than five thousand species of plants, fish, birds, mammals, and other wildlife. There has been a broad consensus that climate change has, and will have, significant effects on these habitats. As the effects continue to occur, natural community responses are inevitable. Monitoring this change is crucial for understanding the impacts they will have on local communities. In 2016, SMBNEP conducted a broad, risk-based, Climate Change Vulnerability Assessment (CCVA) of the objectives in SMBNEP’s 2013 Bay Restoration Plan (BRP). The CCVA identified risks, vulnerability, and the potential for objectives within the BRP to adapt to the impacts of climate change.

Climate change stressors adopted from the USEPA Workbook included warmer temperatures, warmer waters, increasing drought, increasing storminess, sea level rise, and ocean acidification, which can all be directly or indirectly surveyed through chemical, physical, and biological characteristics in the Bay. This monitoring can be used to inform and prioritize future restoration projects, identify stressors, and to highlight potential adaptive management scenarios. An additional consideration is invasion by non-native species, and what that may mean in habitats that continue to experience significant changes. This action also is meant to inform and fill data gaps in the Comprehensive Monitoring Program.

**Lead Entity(ies):** TBF, CRI, UCLA, SCCWRP, USGS, Scripps

**Collaborating Partner(s):** SCCOOS, UC Davis, LACSD, City of LA EMD, CSUN, others

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Implement the Kelp Forest Hydrodynamic Study	Instruments deployed at 2 new sites	2020
Support OA sensor array maintenance, calibration, and data downloads in accordance with SOP	Quarterly data downloads and annual calibration	Annually through 2024
Support inclusion of climate change impacts into CMP, especially through new models and data	CMP implementation report	Annually through 2024
Convene technical advisors to prioritize actions based on information from CMP	TAC subcommittee meeting recommendations	2020

## ACTION #37 – RESEARCH AND MONITOR DEEP WATER HABITATS

**Action:** Increase understanding of deep water habitats such as submarine canyons, deep reefs, and outfall pipes

**Long-term Environmental Result(s):** Enhance functions and conditions of deep marine environments (e.g. deep reefs) in the Bay

**Action History and Summary:** The 306 square miles of open ocean in Santa Monica Bay provides three types of marine habitats: pelagic, soft-bottom, and hard-bottom. The pelagic habitat, or open waters community, is the most obvious habitat in the Bay, extending from the surface to depths of 1,640 feet and having a total water volume of about 6,840 billion gallons. The pelagic environment supports a wide range of organisms of all trophic levels including planktonic (e.g. bacteria, phytoplankton, and zooplankton) or nektonic (e.g. fish, sharks, and whales). Major threats to the health of the pelagic habitats include overfishing, pollutant loading, impingement and entrainment, climate change, and harmful algal bloom. Strategies to deal with some of these threats are laid out in other sections of this plan. Except for Short Bank, which is the only naturally occurring deep rocky area in the Bay, most of the deep seafloor in the Bay consists of soft sediments, which are a mixture of sand, silt and clay. Over 100 species of bottom-dwelling (demersal) fish utilize this habitat, including Pacific sanddab, rockfish, white croaker, surfperches, and California halibut. Over the last 70 years, a large part of this habitat (10-20%) was degraded by wastewater discharges from the two ocean wastewater outfalls operated by the Hyperion Treatment Plant and JWPCP. One of the most severely damaged areas was around the JWPCP outfall where deposits of sludge and contaminated sediments with high levels of DDTs, PCBs, and other pollutants had at one time created a dead zone, and resulted in contamination of sportfish, marine birds and mammals through bioaccumulation and biomagnifications.

However, in recent years, there has been evidence that marine habitats surrounding the outfalls have improved, especially after both POTWs achieved full upgrading to secondary level for their wastewater treatment. Aside from bathymetry, much of the sea floor of the Bay is unexplored, despite its proximity. Advancements in remote technologies and environmental monitoring have removed or reduced the barriers to the exploration of these habitats. In the coming years, TBF and partners will advance the understanding of these habitats through innovative technologies.

**Lead Entity(ies):** TBF, CRI, UCLA, SCCWRP

**Collaborating Partner(s):** Blue Robotics

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Conduct ROV surveys to collect physical, chemical, and visual data	Two deployments per year; Protocol development	Annually through 2024
Identify and apply emerging technology and techniques to better characterize Bay habitats, including recommendations	Data collection and recommendations	2024

## ACTION #38 – MONITOR ROCKY INTERTIDAL HABITATS

**Action:** Monitor and improve understanding of rocky intertidal habitats to inform restoration actions

**Long-term Environmental Result(s):** Implementation of the Comprehensive Monitoring Program to achieve a better understanding of the extent and condition of habitats in the Bay and its watershed

**Action History and Summary:** A continuing threat to rocky intertidal habitats and the associated biological communities is direct human disturbance in the form of trampling, rock turning, and collecting by the many visitors to these areas. Two protected areas have been established on the PV Peninsula, and State Parks oversees the rocky intertidal areas at Leo Carillo State Beach. In all cases, the educational materials are intended to inform visitors and protect to help save rocky intertidal habitat from these visitor impacts. The two PV areas, one at Abalone Cove and the other at Point Fermin, are designated as Ecological Reserves by CDFW. Restrictions in these areas include: no taking or disturbing of any plant or animal; no commercial fishing; no pets without a leash; and no fires. However, without active enforcement, the protection afforded by these areas is limited.

In 2005, SMBRC completed a feasibility study for the restoration of natural resources in rocky intertidal habitats in the Bay. The study shows that high levels of human use have negatively impacted many intertidal species and current management practices are not effective in protecting the intertidal communities. In response to the study findings, recommendations support a set of management measures including signs and/or information displays at rocky intertidal habitats, development and distribution of brochures at parking lot entrances, development and/or enhancement of existing docent programs, implementation of educational programs for park rangers and lifeguards, and expansion of existing protected areas. In 2017, CRI monitored rocky intertidal habitat at Point Fermin to inform potential sea level rise impacts on physical and biological conditions. Greater understanding of these habitats is vital to their protection and improvement.

**Lead Entity(ies):** TBF, CRI, State Parks

**Collaborating Partner(s):** UCLA

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Support study recommendations and outreach efforts for improved protection	New signs and materials distributed	2024
Develop mitigation measures for rocky intertidal habitats, including restoration and enhancement of physical structure	Measures produced	2024

## **ACTION #39 – MONITOR AND INFORM MPAS, FMPS, AND LOCAL FISHERIES**

**Action:** Monitor and inform effective management of Marine Protected Areas, Fishery Management Plans, and local fisheries for recreational and commercially important species

**Long-term Environmental Result(s):** Inform agency enforcement plans and long-term adaptive management of MPAs, assist with fishery related public health advisories

**Action History and Summary:** Declines in fisheries and degradation of vital marine habitats have led to a growing demand for ecosystem-based and spatially-based approaches to fisheries management, including marine protected areas (MPAs). MPAs are discrete geographic marine or estuarine areas designed to protect or conserve marine life and habitat. When designed and managed effectively, MPAs can help to preserve biological diversity, protect habitats, aid in the recovery of depleted fisheries, and promote recreational, scientific, and educational opportunities. In 2012, the state created a network of MPAs for southern California, including four in the Santa Monica Bay: Point Dume State Marine Conservation Area, Point Dume State Marine Reserve, Point Vicente State Marine Conservation Area, and Abalone Cove State Marine Conservation Area.

The creation of MPAs affords protection to some marine life, but the decline of fishery resources in and around the Bay will continue to remain a risk until effective management measures are implemented, such as state fishery management plans (FMPs). Additionally, these MPAs and FMPs need to be informed by reliable information which is critical to their effective management (e.g. populations, take information, and life-history data). Local fisheries have also been supported by data and efforts of the Marina Del Rey Anglers, including an FMP for white seabass and a draft FMP for halibut. Additional efforts by groups like TBF, Heal the Bay, and LA Waterkeeper continue to inform MPA use and management.

**Lead Entity(ies):** CDFW, NMFS, OREHP, LACDBH, LA Waterkeeper, MPA Collaborative

**Collaborating Partner(s):** Marina Del Rey Anglers, Heal the Bay

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Support MDRA in their implementation of the youth and veteran fishing program	# of boat trips and participants	Annually through 2024
Support MDRA in the completion of a halibut FMP	Completed FMP	2024
Continue opportunistic aerial surveys to track boating and vessel activity	Reporting as possible or funded	2024
Conduct MPA Watch to monitor and inform use of MPAs in the Bay	Summary data provided to MPA Collaborative	Annually through 2024

## ACTION #40 – INFORM NON-POINT SOURCE POLLUTION

**Action:** Research and inform best management and pollution reduction practices to address non-point source pollution and facilitate reduction

**Long-term Environmental Result(s):** Assist in achieving constituent percentage load reduction targets for waterbodies in the Bay according to TMDL compliance timeline

**Action History and Summary:** Non-point Source (NPS) pollution is generally defined as pollution that occurs when rainfall picks up pollutants as it runs over the land, then carries the pollutants into rivers, lakes, coastal waters, or groundwater. Careless or uninformed household use of water, pesticides and chemicals also adds to the problem. Excessive landscape irrigation, sidewalk and driveway rinsing, fire hydrant testing, etc. by residential, industrial, and commercial properties in the watershed are a major source of NPS dry weather runoff which contributes to pollutant loading to the Bay. Some of these pollutants are visible such as sediment, motor oil and trash, and others that are not easily visible such as dissolved metals, nutrients, oxygen demanding substances, and organic chemicals. Source control and awareness for non-point source pollution can greatly reduce loading. Within the Bay watershed, these efforts work in conjunction with infrastructure intended to further limit or treat the water before releasing back to the environment.

Green infrastructure and low impact development (LID) practices are increasingly used as a tool to capture, treat, and infiltrate stormwater and dry weather runoff. In addition to improving surface water quality, these practices can also provide multiple benefits including creation of native habitat, beautification of the urban landscape, and groundwater recharge. Green infrastructure and LID practices are still relatively new methods of controlling NPS pollution and need additional research and monitoring to document the efficacy of these technologies. SMBNEP has facilitated monitoring at the Ballona Creek Rain Garden, but this program should be expanded to additional projects such as Milton Green Street, University Park Rain Gardens, Torrance Stormwater Basin Enhancements, Oxford Basin in Marina del Rey, and other capital projects receiving Proposition funds. Additionally, TBF and SMBRC will seek new partnership and funding opportunities for new rain garden, water conservation, and other LID project monitoring efforts.

**Lead Entity(ies):** LARWQCB, SCCWRP, watershed municipalities, companies, others

**Collaborating Partner(s):** SWRCB, SMBRC, TBF

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Identify partners and identify funding sources for long-term monitoring efforts for LID and water conservation efforts	MOUs or other agreements with partners	2019
Implement monitoring programs for long-term monitoring and to inform effectiveness of LID/BMP implementation projects	Monitoring Reports and publications	2024

## **ACTION #41 – INFORM NEW WATER, SEDIMENT, AND BIOLOGICAL OBJECTIVES**

**Action:** Facilitate research, monitoring, and assessments that inform more accurate waste load allocations and development of new water, sediment, and biological objectives

**Long-term Environmental Result(s):** Assist in achieving constituent percentage load reduction targets for waterbodies in the Bay according to TMDL compliance timeline

**Action History and Summary:** The current water quality regulatory framework has been credited as the primary force in bringing significant improvement in water quality over the last decades and should be strengthened to ensure continued progress. The central pieces of this system are federal (NPDES) and state (WDR) wastewater discharge permitting requirements to ensure attainment of TMDL waste load allocations, and ultimately the objectives established for water, sediment, and biological conditions. The consent decree reached in 1999 for compliance with TMDL requirements in federal law was a major breakthrough and as a result, development of TMDLs had been scheduled for nearly all pollutants of concern. At the local level, LARWQCB is the primary state agency responsible for implementing these programs. Meanwhile, the ultimate attainment of water quality standards must rely on the joint efforts of the regulators and the regulated communities through collaborative, integrated watershed-wide planning and implementation activities. The 2012 MS4 permit created a new, watershed-focused process for compliance. The permit encourages the use of Green Infrastructure, Low Impact Development (LID), and multi-benefit regional projects. The spatial scale of this water quality program captures the entirety of the Bay watershed. Effective monitoring to demonstrate results of these efforts will be necessary to inform adaptive management of the MS4 and other TMDL’s.

As of October 2018, 13 TMDLs have been adopted and become effective at targeting loading of trash, bacteria, metals, toxics, nutrients, sediment, and invasive vegetation for various waterbodies in the Bay watershed. To assist in TMDL implementation, SMBNEP will conduct or support additional monitoring and technical studies to better characterize pollutant loading including both natural and anthropogenic sources, understand pollutant impacts, evaluate effectiveness of pollutant control measures, and fill other data gaps. SMBRC will also play a supporting role in the attainment of water quality goals in adopted TMDLs by implementing the CCMP.

**Lead Entity(ies):** SWRCB, LARWQCB, SCCWRP

**Collaborating Partner(s):** watershed municipalities, SMBRC, TBF

**SMBNEP Role:** Support

<b>Next Step(s):</b>	<b>Performance Measure(s):</b>	<b>Timeline:</b>
Conduct or support monitoring and technical studies to characterize pollutant loading, impacts and effectiveness of pollutant control measures	Study findings and reports	2024
Conduct or support data collection for water quality objective development	Water quality objectives or TMDLs updated	2024

## ACTION #42 – INFORM GREENHOUSE GAS EMISSIONS / CARBON SEQUESTRATION

**Action:** Inform strategies to reduce greenhouse gas emissions and increase carbon sequestration in support of existing state actions and policies

**Long-term Environmental Result(s):** Implement and support carbon sequestration/cycle monitoring, research, and quantification as part of projects to inform or prioritize efforts

**Action History and Summary:** Greenhouse gases (GHGs) trap heat in the atmosphere and are a leading cause of climate change. The gases produced by industrial processes, burning of fossil fuels, agriculture, and decay of organic wastes in landfills are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and fluorinated gases. In 2016, USEPA determined CO<sub>2</sub> accounts for 81% of the greenhouse gases emitted into the atmosphere. Carbon dioxide is removed from the atmosphere when it is absorbed by plants, sequestered in sediments, and incorporated into plant or animal tissue as part of the biological carbon cycle. It is scientifically recognized that many of the Bay’s habitats, including kelp forests, wetlands, dunes, and others provide natural carbon sequestration mechanisms.

Investments in ecological restoration or enhancement of habitats that increase biological production are a means to increase carbon sequestration. California recognizes this benefit and directs funds to projects that increase carbon sequestration often in conjunction with related benefits to people and wildlife. This is a potentially significant source of funding for coastal restoration projects like those identified elsewhere in this plan. Further literature review and research conducted locally will increase our knowledge for the rate(s) and pathways of carbon moving through our natural systems. This concept will generate access to funding and advance project implementation (to achieve other actions in this plan) while reducing GHG concentrations in the atmosphere and surface waters. Additionally, TBF’s Table to Farm Composting for Clean Air program connects restaurants with compost hubs, urban farms, and community gardens in an effort to mitigate methane generation from landfills and increase the production of organics recycling and healthy soils.

**Lead Entity(ies):** TBF, CRI

**Collaborating Partner(s):** UCLA, USC SeaGrant, SMMC, others

**SMBNEP Role:** Co-Lead

Next Step(s):	Performance Measure(s):	Timeline:
Research landfill diversion’s reduction on greenhouse gas emissions and carbon sequestration due to compost application	Literature review	2024
Conduct research to establish rate of carbon sequestration associated with key habitats in the Santa Monica Bay and its watershed	Literature review	2024
Identify projects or programs that will prioritize carbon sequestration and resilience	Summary of priority projects	2024

Explore innovative concepts like sinking whale carcasses as potential opportunities for carbon sinks	Review existing literature	2024
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## **ACTION #43 – SUPPORT AND IMPLEMENT SAFE CLEAN WATER PROGRAM**

**Action:** Implement the County-wide Safe Clean Water Program to support stormwater pollution control projects (if approved by voters in 2018)

**Long-term Environmental Result(s):** Assist in achieving constituent percentage load reduction targets for waterbodies in the Bay according to TMDL compliance timeline

**Action History and Summary:** Lack of stable funding resources has been a substantial obstacle for carrying out storm water pollution control programs in the Region. While a few municipalities in the watershed have been successful in securing funding from voter-approved property assessment fees to meet the need for storm water pollution control, the County and most municipalities in the watershed have not made or succeeded in similar efforts. A concerted effort by LACFCD, with support from environmental organizations, municipalities, and businesses, and other community stakeholders obtained the County Board of Supervisor’s approval to place the a measure on the November 2018 ballot to raise money for the Safe Clean Water Program..

The measure would allow the county to levy a tax of 2.5 cents per square foot of impermeable surfaces on private property within the boundaries of LACFCD. Revenue from the tax, estimated to be approximately \$300 million annually, would fund projects that capture, clean, and conserve storm water, increasing local water supplies, improving water quality, and creating opportunities for new recreational green space and habitat. It would also enable the County and cities across the county to comply with federal clean water regulations as well as increase the local water supply.

**Lead Entity(ies):** LACFCD

**Collaborating Partner(s):** LACDPW, cities within LACFCD, SMBRC, Heal the Bay, LA Waterkeeper

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Support passage of Measure W, the Safe Clean Water parcel tax	Passage of the funding measure	2018
Participate in advisory board and support implementation of projects from the new funding mechanism	# of projects completed; amount of funding; benefits to water quality	2024

## **ACTION #44 – SUPPORT COMPREHENSIVE SEDIMENT MANAGEMENT PLAN**

**Action:** Support the development and implementation of a comprehensive regional sediment management plan for restoring natural hydrological functions of river systems and mitigating impacts from climate change

**Long-term Environmental Result(s):** Implement a comprehensive regional sediment management plan to restore natural functions where possible and mitigate impacts of climate change

**Action History and Summary:** Nearly one hundred years of flood control and coastal development have attenuated the delivery of sediment to the coast of Santa Monica Bay. Roads, culverts, bridges, sea walls, dams and detention basins all intended to promote commerce and protect the public have done so at the cost of sediment supply or transport. With recognition that sea level rise will continue, the beaches and flood plains of coastal wetlands will need sediment to keep pace with the ocean’s rise. Developing plans and programs that will encourage the deposition and retention of sediments along the coast will protect public health and commerce.

Surf culture and going to the beach with family and friends is a characteristic of life in Los Angeles. With increased warming the need for people to escape the heat and find relief at the beach or in the water will become increasingly important. The enhancement and ecological restoration of beaches and wetlands will promote wildlife and improve water quality while increasing flood protection for public and private infrastructure. To advance this concept an analysis involving the hydrodynamics of the Los Angeles Basin would need to be undertaken, identifying opportunities and limitations to enhanced sediment transport. Sea level rise scenarios and areas particularly vulnerable to coastal squeeze would need to be similarly analyzed and management actions developed. Coastal wetlands and adjacent uplands should be managed with sea level rise incorporated into the design and implementation of future development, restoration or management actions. In 2013, Los Angeles County completed a Sediment Management Strategic Plan identifying challenges and opportunities for the following 20 years. As a living document, the plan may be revised with new information or adaptive management strategies.

**Lead Entity(ies):** LACDBH, USGS, municipalities, USEPA, CCC, SLC, State Parks, SCC

**Collaborating Partner(s):** LACFCD, TBF

**SMBNEP Role:** Support

Next Step(s):	Performance Measure(s):	Timeline:
Convene meetings to initiate program development and identify opportunities	Meeting summaries	Annually through 2024
Develop plans and/or update existing plans to promote sediment transport and deposition along the coast based on hydrodynamic modeling and analyses	Final plans	2024
Build capacity and conduct pilot projects to inform future actions and advance program development/design	Summary of recommendations	2024

Appendix A - Management Conference Input and 2013 Bay Restoration Plan Crosswalk

Action Number	CCMP Action Category	CCMP Action	GB	WAC	TAC	Crosswalk to 2013 BRP
1	Direct Management Actions	Acquire open space for preservation of habitat and ecological services				Obj. 5.1, 5.2, 13.1
2	Direct Management Actions	Restore kelp forests in the Bay to improve the extent and condition of the habitat				Obj. 9.1
3	Direct Management Actions	Recover abalone populations in the Santa Monica Bay and region to support rare species and socioeconomic benefits to people				Obj. 9.3
4	Direct Management Actions	Assess and restore seagrass habitats in the Santa Monica Bay and nearshore environments to benefit marine ecosystems and improve coastal resilience				Obj. 9.4
5	Direct Management Actions	Assess and implement offshore artificial reefs to benefit marine ecosystems and provide socioeconomic benefits to people				----
6	Direct Management Actions	Restore coastal strand and foredune habitat to beaches and sandy shores to improve coastal resilience				Obj. 8.2
7	Direct Management Actions	Restore and maintain the entire LAX Dunes system to support native plants, wildlife, and rare species				Obj. 8.1
8	Direct Management Actions	Restore coastal bluff habitats in the Bay watershed to support ecosystem services				Obj. 8.1
9	Direct Management Actions	Implement Malibu Creek Ecosystem Restoration Project (Rindge Dam and other barrier removals) to support ecosystem restoration				Obj. 7.3
10	Direct Management Actions	Remove additional barriers to support fish migration and ecosystem services				Obj. 7.3
11	Direct Management Actions	Restore urban streams, including daylighting culverted streams, removing cement channels, and restoring riparian habitats				Obj. 7.4
12	Direct Management Actions	Restore smaller coastal lagoons and other wetland types to increase wetland habitat area and condition throughout the watershed				Obj. 7.5, 7.7, 7.8, 12.1
13	Direct Management Actions	Restore Ballona Wetlands Ecological Reserve to enhance wetland habitats and benefits to people				Obj. 7.1, 13.3
14	Direct Management Actions	Implement wildlife crossings and other innovative projects for benefits to wildlife and people				----
15	Direct Management Actions	Implement projects that improve understanding and/or enhance endangered and threatened species populations (e.g. habitat improvements for Western Snowy Plover, genetic banking)				Obj. 4.3, 8.1, 8.2, 9.3, others
16	Direct Management Actions	Support the implementation of activities and projects such as those in Enhanced Watershed Management Plans (EWMPs) and activities identified in the TMDL implementation schedule to help achieve TMDL goals for 303d listed waterbodies in the Bay and its watershed				Obj. 1.1, 4.6
17	Direct Management Actions	Infiltrate, capture, and reuse stormwater and dry-weather runoff through green infrastructure, LID, and other multi-benefit projects and improve understanding of ecosystem services provided				Obj. 2.1, 14.2

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Action Number	CCMP Action Category	CCMP Action	GB	WAC	TAC	Crosswalk to 2013 BRP
18	Direct Management Actions	Support installation and monitoring of additional sewage and bilge pumpout facilities in Southern California harbors				Obj. 2.4
19	Governance and Policy	Support minimization of biological impacts of water intake and discharge from coastal power generation and desalination facilities, including public engagement and education				Obj. 1.3
20	Governance and Policy	Support elimination of non-point pollution from onsite wastewater treatment systems				Obj. 1.7
21	Governance and Policy	Support policies that promote reuse, recycling, and advanced wastewater treatment to reduce reliance on imported water sources				Obj. 14.1, 14.2
22	Governance and Policy	Support policies and implement projects that divert landfill waste and encourage composting to improve water quality and lower greenhouse gas emissions				----
23	Governance and Policy	Facilitate development and adoption of natural stream and riparian protection policies, including restoration				Obj. 4.1
24	Governance and Policy	Support the inclusion of coastal resilience through natural means and softscape measures into local coastal plan updates				Obj. 4.5
25	Governance and Policy	Support best management practices, increased public access, and improved public facilities for beaches and other public trail systems to support both enhanced natural resources values and benefits to people				Obj. 8.2, 11.1, 13.4
26	Stakeholder Education and Engagement	Participate in research, education, outreach, and policy on invasive species removal and control				Obj. 6.1, 6.2, 6.3, 6.4, 6.5
27	Stakeholder Education and Engagement	Produce educational resources and materials and conduct outreach to improve best management practices for Southern California boaters (e.g. fuel, sewage, and hazardous waste management)				Obj. 2.4
28	Stakeholder Education and Engagement	Support efforts of disadvantaged communities to achieve healthy habitats, implement green infrastructure, and reduce pollution				Obj. 2.5, 2.7, 4.6, 13.2
29	Stakeholder Education and Engagement	Reduce health risks of swimming in contaminated waters and consuming contaminated seafoods through more comprehensive source control and, advanced monitoring and public notification				Obj. 11.3, 11.4, 11.5
30	Stakeholder Education and Engagement	Conduct community engagement, education, and inform policies related to water conservation and reuse to reduce water demand and reliance on imported sources				Obj. 2.1, 2.7, 14.2, 14.3
31	Stakeholder Education and Engagement	Achieve water quality benefits by businesses through community engagement and implementation of best management practices				Obj. 1.6, 2.5
32	Stakeholder Education and Engagement	Reduce marine debris by supporting bans on single-use items, conducting outreach, and participating in trash reduction programs				Obj. 2.2
33	Research and Monitoring	Monitor microplastics (including microfibers) and other marine debris in the Bay and coastal environments to inform management actions				Obj. 3.1

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Action Number	CCMP Action Category	CCMP Action	GB	WAC	TAC	Crosswalk to 2013 BRP
34	Research and Monitoring	Improve understanding of emerging contaminants through monitoring and research to inform source control and reduce loading (e.g. fire retardants), especially in the context of climate change				Obj. 3.1, 3.2, 11.2
35	Research and Monitoring	Monitor and inform management actions for Harmful Algal Blooms (HABs)				Obj. 10.2
36	Research and Monitoring	Monitor chemical, physical, and biological characteristics in the Bay to inform climate change impacts such as ocean acidification				Obj. 4.5
37	Research and Monitoring	Increase understanding of deep water habitats such as submarine canyons, deep reefs, and outfall pipes				Obj. 10.1
38	Research and Monitoring	Monitor and improve understanding of rocky intertidal habitats to inform restoration actions				Obj. 9.2
39	Research and Monitoring	Monitor and inform effective management of Marine Protected Areas, Fishery Management Plans, and local fisheries for recreational and commercially important species				Obj. 4.2, 4.3, 4.4
40	Research and Monitoring	Research and inform best management and pollution reduction practices to address non-point source pollution and facilitate reduction				Obj. 1.1, 1.2, 1.4, 1.6, 2.3
41	Research and Monitoring	Facilitate research, monitoring, and assessments that inform more accurate waste load allocations and development of new water, sediment, and biological objectives				Obj. 1.1
42	Research and Monitoring	Inform strategies to reduce greenhouse gas emissions and increase carbon sequestration in support of existing state actions and policies				Obj. 2.2
43	Develop Funding and/or Partnerships	Implement the County-wide Safe Clean Water Program to support stormwater pollution control projects (if approved by voters in 2018)				Obj. 1.5
44	Develop Funding and/or Partnerships	Support the development and implementation of a comprehensive regional sediment management plan for restoring natural hydrological functions of river systems and mitigating impacts from climate change				Obj. 12.2