SANTA MONICA BAY NATIONAL ESTUARY PROGRAM

Semi-Annual Report
1 October 2021 – 31 March 2022

Report Date: 30 April 2022

Prepared for the United States Environmental Protection Agency

SANTA MONICA BAY
NATIONAL ESTUARY PROGRAM

Common Report Acronyms

Army Corps	United States 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
CWMW	California Wetland Monitoring Workgroup
DDT	Dichlorodiphenyltrichloroethane
EMPA	Estuarine Marine Protected Area
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
HtB	Heal the Bay
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	Los Angeles County Sanitation Districts
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
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
WBMWD	West Basin Municipal Water District
WMP	Watershed Management Plans

Semi-Annual Report Overview and Structure

This semi-annual report outlines and provides an update for each of the Fiscal Year 2021 (FY22) Work Plan tasks for the time period 1 October 2021 through 31 March 2022, the first semi-annual reporting period for FY22. The FY22 Work Plan contains activities identified in the 2018 CCMP Action Plan and is focused on a subset of the identified Actions and Next Steps in the Action Plan. The top priorities of SMBNEP from the CCMP included improving water quality, conserving and rehabilitating natural resources, protecting the Bay's benefits and values to people, and understanding and addressing climate change impacts. Given the cross-cutting and multi-benefit nature of most of the projects and programs listed in the FY22 Work Plan and this semi-annual report, they are not arbitrarily separated and categorized into one of those four priority areas. These four priority areas should be thought of as integrated and supported throughout the semi-annual report. Many of the FY22 tasks continue past efforts.

Within these priority areas, seven goals were identified in the 2018 CCMP Action Plan and are listed below. All seven goals are to be addressed by the actions and next steps identified in the FY22 Work Plan and this semi-annual report. The goals are achieved through actions by many different entities, including public agencies, municipalities, and non-profit organizations that take the lead on specific projects.

Seven CCMP Action Plan 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

The main section of this semi-annual report follows the Work Plan structure, which is based on the CCMP Action Plan. Thus, it consists of a large table that is organized by Action number and next steps identified with that Action from the 2018 CCMP. The table is intended to provide current status and a synthesis of updates by next step or project on efforts undertaken during this reporting period. For some next steps that required more description, a narrative section follows the table (organized sequentially by Action number). Narratives for individual steps are categorized by Action. In some cases, the table identified that a next step did not have project activities during this time period; this was due to a combination of factors including but not limited to funding, partner prioritizations, or permitting delays.

The following table summarizes the primary work activities that occurred during this semi-annual reporting period. Additional information can be found on the SMBNEP website, the CCMP Action Plan, the Work Plan, and as part of individual products produced for each project. The table provides brief updates on each of the CCMP actions that were implemented during this reporting period. Additional information for 23 of the 44 actions are presented in the *Semi-Annual Report Narratives* subsequent to the table.

For quick reference:

The following Actions are summarized solely in the table: Actions 10-11, 14, 16, 19-20, 23, 25-31, 34, 37, 39-44

The following Actions are further informed by Report Narratives: 1-9, 12-13, 15, 17, 18, 21-22, 24, 32-33, 35-36, 38.

During this time period, the continued spread of the novel coronavirus and its associated disease (COVID-19) required implementing social distancing, some limitations on volunteer events, and other guidelines. SMBNEP continues to follow recommendations by the Center for Disease Control and Prevention as well as recommendations by local authorities such as Los Angeles County Department of Public Health. SMBNEP is responding to challenges and continues ongoing efforts to adapt to challenges.

#	CCMP Action	CCMP Next Step(s) / Project Activity Name	Objective(s)	Status	Semi-Annual Report Update
1	Acquire open space for preservation of habitat and ecological services	Support partners in identification and prioritization of key acquisition or conservation easement properties	To acquire and/or protect high priority properties that are at risk of development, or provide high diversity, include wildlife corridors, and/or provide local socio-economic benefits	Ongoing	No activities occurred during this semi-annual reporting period
2	Restore kelp forests in the Bay to improve the extent and condition of the habitat	Implement the rocky reef/kelp forest restoration project	To restore three acres of rocky reef kelp forest by reducing urchin density within barrens to the target two urchins per square meter to allow the reestablishment of giant kelp; to inform statewide restoration and management of kelp forest/rocky reefs	Ongoing	Partnered with commercial urchin harvesters to cull urchin densities within 0.44 acres of urchin barrens off White Point, Palos Verdes; TBF pre-monitored 4.18 acres of urchin barren, with culling activities in progress in 1.34 acres during this time period at White Point and Point Fermin in collaboration with SeaTrees and Force Blue
		Biological response monitoring of restoration areas	To track the response of the kelp forest community after restoration activities occur	Ongoing	Conducted all pre- and post-restoration monitoring for 0.44 acres cleared during this project period; annual biological response surveys will be conducted in summer 2022
		Develop recommendations for the deposition of materials from Rindge Dam or other suitable	To support scientific analyses, inform priorities, and assist with site evaluations and communications for material deposition	Ongoing	No activities occurred during this semi-annual reporting period

#	CCMP Action	CCMP Next Step(s) / Project Activity Name	Objective(s)	Status	Semi-Annual Report Update
		sources to augment sediment supply			
		Conduct carbon sequestration assessment of kelp restoration project	To assess carbon sequestration potential of kelp forest restoration	Ongoing	No activities occurred during this semi-annual reporting period
3	Recover abalone populations in the Santa Monica Bay and region to support rare species and socioeconomic	Establish abalone outplanting sites and conduct juvenile and larval outplanting	To reintroduce abalone, test effectiveness of outplanting methods, and assess habitat site suitability	Ongoing	Maintained temperature and dissolved oxygen logger deployments at outplanting site; SAFEs were stocked with 414 white abalone on 30 September and vaulted 28 October 2021; a second outplant site was established off Palos Verdes on 9 March 2022; additional site prep was completed deploying SAFE bases on 25 March 2022; SAFEs will be stocked with red abalone in May 2022
		Monitor abalone restoration and reference sites	To conduct SCUBA-based surveys within outplant sites to assess the survivability of outplanted abalone and suitability of the site for future outplanting efforts	Ongoing	Outplant monitoring occurred at scheduled intervals of one week, two weeks, and one month post SAFE opening, followed by quarterly site monitoring thereafter; during this reporting period, 37 live white abalone were observed on site and 255 white abalone shells were collected; during this reporting period, no live red abalone were observed on site and 38 red abalone shells were collected

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	benefits to people	Captive spawn abalone	To research captive spawning and larval culturing techniques, and raise abalone in aquaculture facility for outplanting	Ongoing	No captive abalone were spawn at SCMI during this semi-annual reporting period
		Maintain aquaculture facility for abalone	To facilitate captive spawning and rearing of red and white abalone in support of future restoration activities for outplanting in the wild; to serve as central staging facility for southern California outplant efforts	Ongoing	TBF and SCMI staff continued to operate and maintain two abalone laboratory spaces at SCMI, housing red and endangered white abalone; staff transferred ~6,900 juvenile white abalone from the Bodega Marine Lab on 13 January 2022 to The Cultured Abalone Farm, Southwest Fisheries Science Center, and SCMI
4	Assess and restore seagrass habitats in the Santa Monica Bay and nearshore environments to benefit marine ecosystems and improve coastal resilience	Survey the extent and condition of seagrasses in the Bay using R2Deep2, side-scan sonar, and SCUBA divers to inform the Comprehensive Monitoring Program	To survey the extent and condition of seagrasses in the Bay using SCUBA divers and side-scan sonar, to inform the CMP and restoration activities	Ongoing	TBF and project partners conducted numerous SCUBA-based surveys to monitor seagrass within the Bay at transplant and donor sites; quarterly surveys were conducted on 20 October 2021 and 4 February 2022; additional surveys conducted at transplant sites on 7 December 2021 and 17 February 2022 to collect sediment cores and deploy physical oceanographic sensors; surveys conducted at donor sites on 13 December 2021 and 14 February 2022 to deploy sensors; further assessment of donor bed conditions occurred on 3 November 2021 for annual surveys; TBF, Paua Marine Research Group, Vantuna Research Group, and Scripps

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					Institution of Oceanography procured CA State Proposition 50 funding to utilize SCUBA-based surveys, side-scan sonar, and deployment of biophysical oceanographic sensors to further elucidate key data gaps outlined in the CMP surrounding SAV and soft-bottom habitat within the Bay (see additional narrative)
		Develop restoration methods for eelgrass (*Zostera pacifica*) in the Santa Monica Bay	To improve understanding and probability of success for offshore eelgrass restoration using transplant methods	Ongoing	Continued collaboration with Paua Marine Research Group and partner agencies to improve understanding of eelgrass restoration methods to apply to the pilot project
		Conduct pilot restoration project(s) of offshore eelgrass in the Bay	To conduct a pilot restoration project of offshore eelgrass in the Bay within a one-acre footprint	Ongoing	TBF staff and partners implemented a pilot project *Z. pacifica* transplant effort in July 2021; during this reporting period, TBF and project partners conducted quarterly monitoring at the transplant sites on 20 October 2021 and 4 February 2022; transplanted eelgrass was observed at the sites 150+ days post-transplant activities (see additional narrative)
		Evaluate restoration potential of	To improve understanding and probability of success for seagrass restoration	Ongoing	Outreach to seagrass experts throughout CA was initiated through a TAC to inform transplant methods and monitoring protocols; genetics

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		seagrasses in the Bay, harbor, wetlands, and nearshore environments	projects		study continued with final sample processing expected during the upcoming reporting period; TBF staff continued participation on the regional Submerged Aquatic Vegetation Scientific Advisory Committee to inform regional standardization for seagrass monitoring; TBF staff also participated on the Estuarine MPA Management Advisory Committee and the Bight 2022 Submerged Aquatic Vegetation workgroup; quarterly monitoring of sites will continue through 2022 (see additional narrative)
5	Assess and implement offshore artificial reefs to benefit marine ecosystems and provide socioeconomic benefits to people	Implement rocky reef restoration project off Palos Verdes	To restore 69 acres of rocky reef habitat lost to landslides activity using high relief rocky modules that will resist future burial from sediment deposition	Ongoing	Palos Verdes Reef Restoration Project (funded by Prop. 12) continued to prepare the second-year monitoring report (see additional narrative)
		Annual monitoring with the use of side scan sonar and SCUBA based surveys	To assess nearshore coastal marine habitats using side-scan sonar and SCUBA to inform data gaps in the CMP and future restoration projects; to understand the movements, positions, and permanence of great white sharks, giant sea bass, and other species of interest in SMB	Ongoing	Communications between TBF, VRG, and SIO occurred during this reporting period resulting in submission of a Prop 50 grant proposal to seek funding for Santa Monica Bay, Catalina Island, and La Jolla soft bottom habitat and extant eelgrass bed surveys; proposal was accepted and is expected to elucidate gaps in knowledge. Acoustic Telemetry Sensor Array recorded 3,552 detections of seven individual juvenile white sharks; most detections occurred from

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					December 2021 to March 2022; data will inform the CMP; data provided by CSULB shark lab
		Preliminary work regarding the benefits of dynamic revetments and nearshore reefs	To preliminarily advance work towards understanding dynamic revetments and nearshore reefs, including feasibility of using recycled concrete for construction	Ongoing	Conversations and preliminary research occurred, including participation in some webinars and discussions about these adaptation strategies; some elements were incorporated into LCPs by coastal municipalities (e.g., City of Manhattan Beach); cobble placement by State Parks for protection of the Adamson House in Malibu is being considered
6	Restore coastal strand and foredune habitat to beaches and sandy shores to improve coastal resilience	Continue long-term monitoring of the Santa Monica Beach Restoration Pilot Project	To continue long-term monitoring to inform coastal resilience, ecosystem benefits, and adaptive management of the restoration area; to convert the site to a permanent feature of the coastline	Ongoing	Completed 5-year scientific monitoring program; Vegetation continues to expand, and dunes continue forming; data from southern portion of restoration area show over 0.5 meters of sand accretion, with dunes along fence lines of up to a meter in height; snowy plovers regularly recorded in monitoring data; since the original project permit was set to expire in 2021, City of Santa Monica opted to pursue a permit amendment to establish the site as a permanent feature of the coastline; TBF continued working with the City to draft a CDP amendment, including supplemental documents, such as the new Adaptive Management Plan; site checks and physical and biological surveys will continue at the frequency described in the Adaptive Management Plan set to be finalized in the

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					next reporting period
		Conduct Phase 1 (outreach and planning) and Phase 2 (implementation) of the Malibu Living Shoreline Project	To restore three acres of beach and dune habitat to improve coastal resilience and ecosystem benefits and improve public engagement	Ongoing	Coastal Development Permit (CDP) for the project was obtained in December 2020; through coordination with LACDBH, a Right of Entry (ROE) permit was obtained in December 2020; project implementation occurred in December 2020 through February 2021; through restoration actions, approximately 25 tons of invasive iceplant was removed; other implementation actions included planting of over 500 native plants, seeding, and installation of sand fencing and biomimicry stakes; the first two rounds of semi-annual post-restoration monitoring were completed in June 2021 and October-November 2021; TBF continued planning for sign installation; community and student restoration and stewardship events commenced in March 2022; adaptative management and site maintenance continued; in February 2022, TBF conducted supplemental seeding of the sites and planted an additional 245 plants at Point Dume and 99 plants at Zuma Beach; TBF began drafting the Year 1 Annual Report, which is expected to be finalized in April 2022

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		Find funding for and implement another beach and bluff restoration project	To restore 3.5 acres of bluff, beach, and eelgrass habitat as part of a living shoreline pilot project (Los Angeles Living Shoreline Project); restore dune habitats in Manhattan Beach through iceplant removal and revegetation with native plants	Ongoing	Continued work on the Manhattan Beach Dune Restoration project; obtained a Right of Entry Permit (ROE) to conduct scientific monitoring on-site in May 2021 and amended the permit in December 2021 to include implementation and post-restoration activities; the final Coastal Development Permit (CDP) application package, including the Restoration and Monitoring Plan (RMP), was submitted in August 2021 and CDP permit obtained January 2022; obtained LA County Flood Control District Permit in January 2022; obtained ROE permit from LACDBH in December 2021 Implementation commenced in January 2022 and thus far, nearly 16 tons of iceplant has been removed, 1,400 native dune plants have been planted, the project boundary and post and rope pathways have been delineated, and seeding is in progress; TBF coordinated with LACDBH to obtain Special Events Permits for community restoration and has hosted 15 events from January – March 2022
				Ongoing	Continued work on the Los Angeles Living Shoreline Project; CDP application package for the beach and bluff, including the Restoration and Monitoring Plan, was submitted in July 2022 and a Coastal Development Permit (CDP) Waiver was subsequently obtained in October 2021; obtained State Parks Scientific Collection

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					permit in November 2021; obtained a Right of Entry Permit (ROE) to conduct scientific monitoring on-site in May 2021 and amended the permit in December 2021 to include implementation and post-restoration activities; continued to coordinate with City of Los Angeles Bureau of Engineering on permitting for the bluff portion of the project, including submitting application packages for a Right of Way Permit and a local CDP; implementation of the beach portion of the project was initiated in January 2022 and completed in March 2022; implementation of the bluff restoration is expected to begin in Fall 2022 Submitted a Scope of Work for the Santa Monica Dune Restoration project, which was selected by a Trustee Council to receive mitigation funding from the Refugio Beach oil spill; coordinated with CDFW and NFWF to receive funding to begin implementation of the project in partnership with City of Santa Monica (see additional narrative)

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		Support efforts to standardize sandy beach monitoring and a regional approach to restoration	To continue efforts to standardize sandy beach monitoring and data collection for southern California through stakeholder partnerships and CMP implementation	Ongoing	Continued ongoing coordination with the Beach Ecology Coalition group, including presenting in January 2022 as part of the virtual winter meeting; continued stakeholder and agency communications; continued the Site Suitability Model analysis project in partnership with CRI, LACDBH, and State Parks; continued CRI beach characterization study, including work on a manuscript; TBF staff was elected to the Board of Directors of ASBPA in September 2021 and participated in several board meetings; TBF and partners applied for and were approved for a Proposition 50 grant to conduct sandy shore monitoring in the Bay, including filling CMP data gaps and developing research projects in support of indicator development
		Conduct community restoration events in the northern 48-acre dune area	To engage community through hands-on stewardship and habitat restoration through events held at the LAX Dunes	Ongoing	TBF halted public community events in March 2020 through September 2021 as required by LA County Public Health due to COVID-19; events reconvened in October 2021; from October 2021 through March 2022, TBF held six community restoration events, where a total of 102 volunteers removed approximately 7,460 lbs (237 bags) of non-native vegetation

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7	Restore and maintain the entire LAX Dunes system to support native plants, wildlife, and rare species	Support LAWA in long-term maintenance and adaptive management of the 48-acre northern dune area	To continue and strengthen partnership with LAWA to restore and maintain the LAX Dunes	Ongoing	Continued to coordinate and work with LAWA and project partners on seed collection, plant propagation, habitatrestoration, future restoration planning, and monitoring; conducted ongoing scientific monitoring; finalized and submitted the Revised Ecological Landscape Plan in April 2021 (approved by Coastal Commission); assisted LAWA in preparing a CDP amendment for submission for the Coastal Dune Improvement Project (CDIP) (see additional narrative); conducted non-native species removal, planting, and seeding along with project partners, LACC and IOEI, and in accordance with Revised Ecological Landscape Plan; in December 2021 through March 2022; in total, approximately 10,800 native plants were planted within the CDIP area
		Engage underserved students and volunteers and inland communities	To recruit underserved students and volunteers, particularly from inland communities, to participate in hand-on stewardship and restoration at the LAX Dunes	Ongoing	TBF halted public community events in March 2020 through September 2021 as required by LA County Public Health due to COVID-19; TBF reconvened community restoration events in October 2021; from October 2021 through March 2022, a total of 106 volunteers participated in community events; TBF continued planning internally to improve ability to connect with underserved communities, including discussions in its Justice, Environment, Diversity, and Inclusion (JEDI) Committee

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		Initiate planning for areas within the adjacent dunes, including baseline monitoring	To conduct baseline monitoring and develop recommendations for habitat management	Ongoing	Conducted several site visits with LAWA and project partners in the adjacent 52-acre dune area; project partner, California Botanic Garden, performed seed collection and vegetation monitoring in the adjacent dune areas; TBF consulted with LAWA on restoration planning actions in the entire 300-acre LAX Dunes, including reviewing the draft Replacement Plan, which identifies restoration priorities in the dunes; TBF continued monitoring planning for the adjacent 52-acre dune area
8	Restore coastal bluff habitats in the Bay watershed to support ecosystem services	Use Beach Bluff Restoration Master Plan to explore bluff restoration and continue recovery of El Segundo Blue Butterfly	To provide habitat and ecological benefits in support of the recovery and eventual delisting of the endangered El Segundo Blue Butterfly and to restore bluff habitats	Ongoing	TBF continues ongoing communications with LAWA to develop a restoration plan and enhance habitat for the El Segundo Blue Butterfly at the LAX Dunes, especially within the El Segundo Blue Butterfly Preserve (southern dunes); participated in several meetings with LAWA and Wildlands Conservation Science (WCS) related to future restoration planning for the Preserve and the entire LAX Dunes complex and reviewed and provided feedback for the draft Replacement Plan; continued ongoing participation and support for the El Segundo Blue Butterfly Coalition (ESB Coalition), a group of public stakeholders, organizations, and agencies dedicated to restoration for the butterfly; TBF supported efforts by LACDBH to conduct bluff and beach restoration associated with the RV Park

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					expansion at Dockweiler Beach; TBF included seacliff buckwheat (*Eriogonum parvifolium*), host plant for ESB, in the bluff restoration planting palette as a part of the Los Angeles Living Shoreline Project Restoration and Monitoring Plan (Action #6)
		Identify partners and funding to support bluff restoration projects	To establish project partners, project sites, and identify potential funding sources in support of bluff restoration	Ongoing	Continued to identify and coordinate with project partners, agencies, and stakeholders to prioritize project locations; continued work as part of ESB Coalition; continued discussions with LACDBH and City of Los Angeles for additional bluff restoration projects on Dockweiler Beach; see also updates as part of the Los Angeles Living Shoreline Project (Action #6)
		Initiate restoration of one bluff restoration project	To restore 13 acres of rare coastal bluff habitat to support threatened and endangered wildlife and plant species, reduce coastal erosion, improve water infiltration, and enhance public access	Ongoing	Implementation of the Abalone Cove Habitat Restoration Project (funded by Prop. 12) continued during this reporting period, including site preparation, plant installation, removal of invasive plants, restoration monitoring, and trail improvement planning (see additional narrative); see also the narrative for Action 6 for the Los Angeles Living Shoreline Project

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		Initiate Pt. Dume stair replacement and bluff restoration project to benefit people and wildlife	To replace a deteriorated beach access staircase and restore bluff habitat at Point Dume State Beach	Ongoing	Construction of the Point Dume State Beach staircase continued; due to winter storm damage, construction is anticipated to extend through Spring 2022, to be followed by restoration of native plant species impacted by the construction
9	Implement Malibu Creek Ecosystem Restoration Project (Rindge Dam and other barrier removals) to support ecosystem restoration	Support lead agencies in efforts to complete the design and engineering plans for the Malibu Creek Ecosystem Restoration Project	To develop design and engineering plans to remove Rindge Dam and additional barriers, to restore terrestrial and aquatic habitat connectivity and establish natural sediment transport regime	Ongoing	Wildlife Conservation Board approved $12.5 million to complete studies, develop engineering plans and specifications to a 90 percent level of completion, and all required permitting; a Notice of Exemption was filed for this project in February 2022 (see additional narrative)
10	Remove additional barriers to support fish migration and ecosystem services	Identify, prioritize, and acquire funding for barrier removal projects	To engage with partner entities to identify potential opportunities for fish barrier removal	Ongoing	No activities occurred during this semi-annual reporting period

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11	Restore urban streams, including daylighting culverted streams, removing cement channels, and restoring riparian habitats	Identify additional urban streams for restoration and prioritize actions	To engage with partner entities to identify potential opportunities for urban stream restoration	Ongoing	No activities occurred during this semi-annual reporting period
12	Restore smaller coastal lagoons and other wetland types to increase wetland habitat area and condition throughout the watershed	Finalize restoration planning and permitting for Topanga Lagoon restoration project and initiate project	To create a restored habitat that integrates fish passage barrier removal, wetland habitat restoration, visitor services, and recreational opportunities at Topanga Lagoon	Ongoing	Topanga Lagoon Restoration Planning project (funded by Prop. 12) continued Phase 1 implementation, including preparing for the next technical advisory committee and stakeholder meetings to finalize concept alternatives, anticipated for early 2022; TBF supported baseline assessment through deployment and management of a water quality sensor in partnership with RCDSMM (see additional narrative)

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		Complete land acquisition, feasibility analyses, and restoration design in coordination with bridge redevelopment for Trancas Lagoon	To restore habitats adjacent to Trancas Lagoon after CalTrans bridge expansion is completed	Ongoing	CalTrans initiated preliminary work to replace the Trancas Creek Bridge in March 2022, including fiber optic line relocation and vegetation clearing
		Conduct comprehensive monitoring of small lagoons in northern Bay to inform CMP and seek funding to continue Malibu Lagoon monitoring	To conduct comprehensive monitoring of the northern Bay lagoons, inform the Comprehensive Monitoring Program (wetlands chapter), and acquire funding to continue long-term monitoring and data collection at Malibu Lagoon	Ongoing	Continued conversations with partners such as CSULB, SCCWRP, UCLA, and RCDSMM to gain information on bar-built estuaries; continued participation on the Estuarine MPA Technical Advisory Committee, which includes Malibu Lagoon as a study site; continued coordination with EMPA monitoring, including deployment, management, and maintenance of one water quality sonde in Malibu Lagoon; SCCWRP, TBF, and CSULB applied for Proposition 50 money to conduct monitoring of the small lagoons in northern Bay to fill CMP data gaps
		Assess restoration options and priorities for other wetland types (e.g., freshwater systems)	To complete acquisition and planning to restore wetlands associated with the AES Power Plant redevelopment in Redondo Beach	Ongoing	No activities occurred during this semi-annual reporting period

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13	Restore Ballona Wetlands Ecological Reserve to enhance wetland habitats and benefits to people	Support the lead agencies by contributing technical information to the Final Environmental Impact Statement and Report and permitting	To support the lead agencies in completing permitting and a federal environmental review document	Ongoing	Continued to provide technical support and communicated with the lead agencies regarding BWER scientific information; the Final Environmental Impact Report for the Ballona Wetlands Restoration Project was certified in December 2020 by CDFW.
		Continue community engagement and hand-restoration within the Reserve with FBW	To restore four acres of degraded wetland and transition habitat at the Ballona Wetlands Ecological Reserve through community restoration	Ongoing	Continued to conduct frequent restoration maintenance, small partner events, and biological monitoring in accordance with permits (TBF and FBW); public community events were halted as required by LA County Public Health due to COVID-19 in March 2020 through July 2022; community restoration events reconvened in August 2021 with COVID-19 safety guidelines in place; from August 2021 through March 2022, a total of 148 volunteers removed approximately 30,000 lbs. of non-native vegetation over the duration of 12 events; continued restoration activities and associated monitoring in permitted areas as part of two projects funded by Prop 12 and NFWF, respectively; continued post-restoration site maintenance and monitoring (see additional

#	CCMP Action	CCMP Next Step(s) / Project Activity Name	Objective(s)	Status	Semi-Annual Report Update
					narrative)
		Support lead agencies to identify and obtain restoration funding	To support lead agencies in finding funding to implement the Ballona Wetlands Restoration Project	Ongoing	No activities occurred during this semi-annual reporting period
14	Implement wildlife crossings and other innovative projects for benefits to wildlife and people	Support lead agencies to find funding for Phase 2 of the Liberty Canyon Wildlife Crossing project	To implement Phase 2 of the Liberty Canyon Wildlife Crossing Project (Final/ 100% Design) in support of wildlife movement and safety and enhanced habitats	Ongoing	Governor's 2022-2023 budget allocated $10 million, and the Boeing Company donated $1 million to Liberty Canyon Wildlife Crossing Project (also known as the Wallis Annenberg Wildlife Crossing); project construction set to break ground in April 2022
		Support lead agencies in permitting and environmental review of Liberty Canyon Wildlife Crossing project	To complete implementation of the Liberty Canyon Wildlife Crossing Project in support of wildlife movement and safety and enhanced habitats	Ongoing	The project continued the final design and engineering phase during this reporting period; CalTrans held a virtual prebid conference on 14 February 2022; the groundbreaking ceremony was announced to take place on Earth Day (22 April 2022) to celebrate the start of construction, with project completion anticipated in 2023
15	Implement projects that improve understanding and/or enhance endangered and threatened	Support Southern California Steelhead Trout genetic banking study	To conduct the Southern California Steelhead Trout genetic banking study to inform population recovery	Ongoing	The project received funding to further the CEQA process and develop a genetic banking plan for steelhead trout to assess past monitoring efforts and inform future recovery efforts

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	species populations (e.g., habitat improvements for Western Snowy Plover, genetic banking)	Support restoration and monitoring activities to benefit California red legged frog populations	To improve riparian and stream habitats to support populations of California red legged frog	Ongoing	Implementation of the California Red-legged Frogs Project (funded by Prop. 12) continued egg mass surveys in the source population and translocation sites (see additional narrative)
		Support projects within western snowy plover critical habitat	To provide habitat and ecological benefits in support of the threatened Western Snowy Plover and to restore critical habitat	Ongoing	Continued beach and dune restoration projects and continued to inform management actions in support of ecological benefits to plovers; ongoing communications with USFWS regarding habitat enhancement projects; continued conversations with Audubon Society and plover monitoring teams and received summary plover reports monthly; ongoing communications with City of Santa Monica and PV Audubon about an additional beach restoration project in Santa Monica to support plovers; the project footprint for the recently approved Santa Monica Dune Restoration project encompasses an existing plover enclosure, which would be expanded and enhanced as part of the scope of the project (see Action #6) (see additional narrative)
16	Support the implementation of activities and projects such as those in Enhanced	Continue to support implementation of projects identified in EWMPs and WMPs	To allocate and oversee State Bond funding for implementation of projects identified in EWMPs and WMPs; support implementation of projects	Ongoing	Continued overseeing implementation of capital projects for storm water pollution reduction through multi-benefit solutions including two projects funded by Prop. 12 and four projects funded by Prop. 84 (see also Action #17); see Action #43 for efforts related to Measure W

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	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		made available under the Safe Clean Water Program		support
		Continue implementation of LA IRWMP	To facilitate and support coordination and allocation of IRWMP funding and implementation of projects identified in EWMPs and WMPs in the watershed	Ongoing	Continued to participate in activities of the Greater Los Angeles County IRWM Leadership Committee and IRWMP South Bay Steering Committee; in March 2022, Leadership Committee approved $5 million in Drought Funds Set-aside for DACIP Projects. In October 2021 Sub-region Steering Committees held two public stakeholder workshops for input on development of the LA County Water Plan, which establishes targets, strategies, and actions to increase water resilience in LA County; additional workshops are scheduled for April 2022 to collect feedback on preliminary strategies and actions and brainstorm near-term steps to accomplish these actions; SMBRC Governing Board approved the revisions to the MOU for IRWM Planning and Implementation for the Greater Los Angeles County Region in February 2021, renewing SMBRC's continued participation in the Leadership Committee
		Facilitate other sources of State funding	To facilitate and support allocation of funding from other State bond measures such as Prop. 1 and 65 for implementation of projects identified in EWMPs and	Ongoing	No activities occurred during this semi-annual reporting period

#	CCMP Action	CCMP Next Step(s) / Project Activity Name	Objective(s)	Status	Semi-Annual Report Update
			WMPs in the watershed		
17	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	Complete rain garden metal fate study with CRI	To assess the fate of sequestered or retained heavy metals in the Culver City Rain Garden	Ongoing	No activities occurred during this semi-annual reporting period
		Complete additional LID projects throughout the watershed	To complete more LID projects throughout the watershed to improve flood protection and water quality, and provide additional benefits	Ongoing	Continued to work with grantees to implement four previously funded Prop. 84 projects: Culver Boulevard Urban Stormwater Project, Westwood Neighborhood Greenway Project, Santa Monica Bay Catch Basin Insert Project, and Ladera Park Water Quality Enhancement Project; Continued to coordinate with SCC to oversee two Prop. 12 projects: Monteith Park and View Park Green Alley Stormwater Improvements Project and Beach Cities Green Streets (see additional narratives)
		Seek funding and partnerships to conduct a cost-benefit analysis of LID projects	To continue to inform regional assessments of LID projects and water quality benefits	Ongoing	No activities occurred during this semi-annual reporting period

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18	Support installation and monitoring of additional sewage and bilge pumpout facilities in Southern California harbors	Continue quarterly monitoring of public sewage pumpout stations	To assess the condition of public sewage pumpout and dump stations	Ongoing	Per statewide directive, monitoring is now occurring on a triannual basis and includes dump stations; conducted three triannual monitoring efforts of 72 public sewage pumpout and seven dump stations in Southern California harbors; finalized one triannual monitoring report; finalized Pumpout and Dump Station Performance Report 2021
		Support installation of sewage pumpouts in Marina del Rey or King Harbor	To provide the boating community with additional pollution prevention resources	Ongoing	City of Redondo Beach (King Harbor) submitted one CVA application for two new pumpout units
		Support installation of bilge pumpouts in Marina del Rey or King Harbor	To support installation of bilge pumpouts	Ongoing	No activities occurred during this semi-annual reporting period
		Support efforts of neighboring harbors in installation of bilge and sewage pumpouts in southern California	To provide the boating community with additional pollution prevention resources	Ongoing	Communicated with Port of San Diego and Huntington Harbor staff to promote CVA sewage management grants; City of Avalon applied for a CVA operations and maintenance grant to update their pumpout equipment
20	Support elimination of non-point pollution from	Complete sewer connections of residential properties to the	To improve water quality and reduce nutrient pollution through connecting residential		City of Malibu continued Phase 2 design and planning, including development of funding agreements, development of designs for wastewater collection and recycled water

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	onsite wastewater treatment systems	centralized wastewater treatment facility in the Malibu Civic Center area	properties to the centralized wastewater treatment facility	Ongoing	distribution systems; the bidding and award process is anticipated to be completed by April 2022 and Phase 2 by November 2024
		Continue the coordinated OWTS identification, permitting, and inspection system between the LARWQCB and the cities and counties in the watershed	To continue to support efforts by the LARWQCB and cities and counties to achieve full implementation of the statewide policy for siting design, operation, and maintenance of OWTSs	Ongoing	No activities occurred during this semi-annual reporting period
	Support policies that promote reuse, recycling, and advanced wastewater	Support recycled wastewater efforts by JWPCP of LACSD	To support expansion of wastewater effluent recycling by JWPCP of LACSD	Ongoing	In November 2021, the testing of the tertiary membrane bioreactor (MBR) treatment was completed at the demonstration facility and testing continued for the secondary MBR treatment; the CEQA process was initiated, with the Environmental Impact Report anticipated to be released in 2023

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21	treatment to reduce reliance on imported water sources	Hyperion Treatment Plant to implement pilot project for recycled water	To support timely completion of Hyperion's pilot project	Ongoing	At the February 2022 SMBRC Governing Board meeting, LASAN staff presented on the Hyperion 2035 Program and LA City's vision for 100% water recycling; a third-party assessment report of the 11 July 2021 Hyperion Water Reclamation Plant sewage discharge incident was presented to the LA City Board of Public Works to identify the causes of the incident and other conclusions regarding recovery, communications, costs, and recommendations to avoid recurrence of similar future incidents
		Support recycled wastewater efforts by Tapia Water Reclamation Facility and others through expansion of distribution system and regional partnerships	To support expansion of recycled wastewater distribution and reuse	Ongoing	The Pure Water Project (funded by Prop.12) completed in September 2020 (see additional narrative); City of Santa Monica continued construction of the Advanced Water Treatment Facility

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22	Support policies and implement projects that divert landfill waste and encourage composting to improve water quality and lower greenhouse gas emissions	Support continuation of Table to Farm compost hubs	To reduce food waste being sent to landfills, compost food waste, and apply compost to urban gardens to grow food	Ongoing	Continued Table to Farm community garden project funded by US EPA Environmental Justice Small Grants Program (2019) at Environmental Charter School (ECS) Inglewood; planted fall 2021 produce; engaged over 100 community members at ECS Inglewood's Harvest Festival; established project case study and press release; submitted grant final report; continued co-leading monthly volunteer community garden events; acquired funding via US EPA Environmental Justice Small Grants Program 2021 to revitalize three Table to Farm compost hubs at ECS Gardena, Lawndale, and Inglewood campuses

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		Support expansion, outreach and implementation for residential and commercial organics collection and recycling	To support greenhouse gas reduction by way of residential and commercial organics recycling implementation by city and state regulatory agencies	Ongoing	No activities occurred during this semi-annual reporting period
	Support the inclusion of coastal resilience through natural means and softscape measures into	Attend stakeholder meetings for local cities LCP development / updates / implementation	To continue involvement in stakeholder meetings for local cities LCP development and implementation	Ongoing	Attended and participated in stakeholder meetings and workshops related to LCPs to encourage inclusions of nature-based adaptation and living shoreline measures as coastal resilience strategies; supported AdaptLA in efforts to incorporated SLR resiliency into policy

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24	local coastal plan updates	Opportunistically assist cities in the development of sea level rise vulnerability studies	To identify and partner with cities to develop sea level rise vulnerability studies to strategically recommend coastal resilience strategies	Ongoing	Partnered with cities in the development of sea level rise vulnerability studies and recommend nature-based living shoreline measures be included as adaptation strategies; communicated with City of Manhattan Beach, City of Malibu, City of Hermosa Beach, City of Los Angeles, and others; explored ideas for LACDBH and other coastal management agencies need for a Beach Climate Adaptation Plan
		Use data collected from beach restoration “soft-scape” projects to inform and assist LCP development	To provide science-based data to inform LCP development and support beach restoration	Ongoing	Continued ongoing communications regarding TBF’s living shorelines projects with local municipalities, LACDBH, consulting firms, and other NGOs; continued outreach to universities and presentations to other scientists; TBF partnered with Cal Sea Grant, USC Sean Grant, and UCSB to form the California Dune Science Network, including a website summarizing beach restoration project information and co-hosted a workshop held in December 2021; completed a workshop synthesis report identifying major themes from the conference; see also Action #6

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25	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	Support implementation of identified actions within plans such as the LACDBH Sea Level Rise Vulnerability Assessment	To implement adaptation projects that will improve coastal resilience	Ongoing	Continued ongoing partnership with LACDBH and other coastal municipalities about opportunities to implement nature-based adaptation solutions to sea level rise; LACDBH and TBF continued discussions to prioritize infrastructure protection and reduce beach erosion through nature-based adaptation; continued ongoing conversations with City of Santa Monica and received approval for funding for the Santa Monica Dune Restoration project (see also Action's #6 and #24)
		Continue to advise BMPs for beaches that promote habitat condition improvements and support for unique species	To build upon and continue partnerships with groups and agencies to benefit beach habitat conditions	Ongoing	Continued partnerships and active participation with groups and agencies such as LACDBH, Audubon Society, Pepperdine, Beach Ecology Coalition, State Parks, USC Sea Grant, UCSB, Cal SeaGrant, Scripps, and USFWS to implement and provide recommendations for best management practices along beaches; conversations continued in conjunction with TBF's living shorelines projects; supported Beach Ecology Coalition in developing an agenda and presenting at the January meeting

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27	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)	Produce educational materials	To produce educational materials to increase awareness of boating best management practices to boaters	Ongoing	Produced and distributed Winter 2021 Changing Tide newsletter; produced 2022 Tide Calendars in Spanish and English; finalized "Marine Protected Area Boater Education Project Report"; finalized production of the "California Vessel Waste Disposal Plan" per CA State Parks Division of Boating and Waterways approval; assembled 2,300 Boater Kits for 2022
		Conduct outreach	To conduct outreach to increase awareness of boating best management practices to boaters	Ongoing	Distributed 2,700 California Boater Kits in 2021 to southern California Dockwalkers and individual recreational boaters; co-produced the 2021 Boater Kit Feedback Survey Report regarding boaters input on the pollution prevention toolkit and its materials; conducted outreach to the boating community via co-hosting four virtual events with California State Parks and California Coastal Commission: one Clean Boating Webinar with 17 total attendees, one California Clean Boating Network (CCBN) virtual event with 73 attendees, and two Dockwalker Trainings with 36 attendees;

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					produced and implemented an interactive Clean Boating Questionnaire for 2022 virtual engagement and Boater Kit distribution
		Manage Pumpout Nav app	Increase proper disposal of boater sewage	Ongoing	Continued to manage Pumpout Nav app via ensuring pumpout and dump station status are accurate and responding to ad hoc problems reported by southern California boaters; contributed to and supported app development and maintenance in partnership with SFEP
		Research public engagement metrics and specific engagement tools on reduction of pollutants to waterways	To optimize public engagement resources to increase impact of pollutant reduction strategies to waterways	Ongoing	Submitted Boater Sewage Disposal Survey Report draft to DBW, this report shares findings and insights from surveying over 400 recreational boaters on their sewage disposal habits
		Find funding and implement fuel spill prevention tools and outreach	To reduce fuel and oil pollution from the boating community	Ongoing	Assembled 2,300 Boater Kits, each with a fuel bib and two oil absorbent sheets for southern California boaters in partnership with California Boating Clean and Green Program; co-hosted one Clean Boating Webinar and two Dockwalker Trainings conducted in partnership with California State Parks and California Coastal Commission which includes information on oil recycling and oil pollution best management practices

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		Support and develop marine debris reduction and cleanup efforts	To reduce fishing line marine debris from the angling community	Ongoing	Promoted instruction collateral for do-it-yourself fishing line recycling instructions; produced 2022 Tide Calendars in English and Spanish which features fishing line recycling station locations within southern California harbors
28	Support efforts of disadvantaged communities to achieve healthy habitats, implement green infrastructure, and reduce pollution	Support IRWMP and similar programs to preferentially invest in disadvantaged communities	To support green infrastructure projects for IRWMP and Measure W funding in disadvantaged communities	Ongoing	See Action #16 for efforts related to IRWMP and Action #43 for efforts related to Measure W
29	Reduce health risks of swimming in contaminated waters and consuming contaminated seafoods through more comprehensive source control and, advanced monitoring and	Continue implementation and improvement of beach water quality monitoring and reporting system	To support SWRCB's collection and coordination of bacterial sampling results for beach water quality monitoring required under AB 411; to support Heal the Bay's efforts to standardize beach water quality monitoring and effectively disseminate the information to the public	Ongoing	HtB continued to provide public beach water quality grades for over 500 beaches across CA and maintain the NowCast system and interactive website to inform the public and to update grading methodology for the River Report Card; on 8 October 2021, AB1066 (introduced by Assemblymember Bloom in partnership with HtB) was signed into law, which aims to protect public health at freshwater swimming and recreation sites statewide, in part, through water quality monitoring using standardized protocols and metrics and public notification

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	public notification	Maintain and enhance the existing seafood contamination education and enforcement program	To support and facilitate the continuation and enhancement of the existing seafood contamination education and enforcement program	Ongoing	At the March 2022 Fish Contamination Education Collaborative meeting, partners discussed pier angler outreach, community outreach, and enforcement and results and recommendations from the 2020-2021 Annual Report; at the December 2021 Palos Verdes Shelf Technical Information Exchange Group meeting, partners discussed remediation alternatives and a new monitored natural recovery study including sediment, water, and fish tissue sampling, with the next meeting anticipated June 2022; at the 21 October 2021 SMBRC Governing Board meeting, USEPA presented an update on the Palos Verdes Shelf Superfund Site and the separate Ocean DDT Disposal Site
30	Conduct community engagement, education, and inform policies	Link water conservation with outreach events and social media	To opportunistically incorporate water conservation topics during outreach events and on social media	Ongoing	No activities occurred during this semi-annual reporting period

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	related to water conservation and reuse to reduce water demand and reliance on imported sources	Educate, engage communities, and provide resources that promote the importance of native plants	To promote the use of drought tolerant native plants	Ongoing	Continued to educate community and volunteers on the importance of using drought tolerant native plants in habitat restoration and residential landscaping through online communications such as social media; communicated and developed partnerships with local native plant nurseries; applied for grant opportunity to fund outreach to educate the community in water conservation (see above), including through use of drought tolerant plants
		Support efforts by water agencies to promote water conservation and reuse including dissemination of materials	To promote current information on water conservation and reuse efforts developed by water agencies	Ongoing	No activities occurred during this semi-annual reporting period
31	Achieve water quality benefits by businesses through community engagement and implementation of best management practices	Research contaminants, environ-mental laws, sustainability, pollution prevention standards, and BMPs for commercial businesses such as nurseries, landscapers,	To assess contaminants and pollution prevention impact from commercial businesses	Ongoing	No activities occurred during this semi-annual reporting period

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		restaurants, and horse stables			
		Distribute restaurant engagement tools	To reduce pollution from restaurants	Ongoing	See Action #32 for efforts related to restaurant source reduction
		Develop funding to support the expansion of best management practices to incorporate other business sectors	To contribute to source reduction of single-use disposable items from food service establishments	Ongoing	Conducted ReThink Disposable program at three LA yacht clubs with food service
32	Reduce marine debris by supporting bans on single-use items, conducting outreach, and participating in	Find funding for and continue ReThink Disposable LA	To contribute to source reduction of single-use disposable items from food service establishments	Ongoing	Worked with California Boating Clean and Green Program and Clean Water Action to implement ReThink Disposable at three LA County yacht clubs; produced a case study on the project and its results; applied for additional program funding

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	trash reduction programs	Support municipality bans of polystyrene, non-recyclable plastics, and single use items	To contribute to source reduction of polystyrene, non-recyclable plastics, and single use items	Ongoing	Participated in Reusable LA Coalition and co-led its restaurant engagement committee; contributed signatory to letters to LA County Board of Supervisors urging support for the LA County Reduction of Waste from Single-Use Articles and Expanded Polystyrene Products Ordinance and to Senator Padilla to support the Break Free from Plastic Pollution Act
33	Monitor microplastics (including microfibers) and other marine debris in the Bay and coastal environments to inform management actions	Complete the development of a microplastics in sediment extraction and analysis method	To complete the development of a microplastics in sediment extraction and analysis method	Ongoing	CRI continued work refining and drafting the microplastics extraction protocol with recovery studies, including development of a new component of the protocol with recommendation for spectroscopy mapping to reduce effort and assess type of plastic
		Publish a manuscript on the results of the Bay studies	To assist in characterizing microplastics in the Bay and nearshore environment and disseminate results	Ongoing	CRI continued analyses and drafting to inform a future manuscript
		Conduct additional studies to inform the transport, accumulation, and fate of microplastics in our marine and nearshore environments	To continue to collect data to inform the regional fate and transport model of microplastics in the nearshore marine environment	Ongoing	CRI continued analyses and drafting to inform a future manuscript, including assessments of intertidal invertebrate microplastic densities and types

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34	Improve understanding of emerging contaminants through monitoring andresearch to inform source control and reduce loading (e.g., fire retardants), especially in the context of climate change	Improve analytical methodology and standardize monitoring of more emerging contaminants	To improve availability, sensitivity, and repeatability of analytical methods for emerging contaminants to improve data quality for monitoring emerging contaminants in aquatic ecosystems	Ongoing	No activities occurred during this semi-annual reporting period
35	Monitor and inform management actions for Harmful Algal Blooms (HABs)	Continue to support research and monitoring efforts for HABs, especially in context of climate change and CMP implementation	To support research and monitoring efforts that fill data gaps in our region for HAB occurrences, frequencies, causes, and impacts, especially in the context of climate change	Ongoing	CRI continued work to assist in filling harmful algal bloom research gaps for our region; water samples collected last year were analyzed for phytoplankton species identification and quantification using a FlowCam; analyses of samples are ongoing, with a draft manuscript in progress

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		Conduct monthly maintenance of SCCOOS shore station at Santa Monica Pier and seek support for additional sensors	To collect data on oceanographic conditions in the nearshore environment and potentially inform long-term changes related to environmental factors, including climate change	Ongoing	SCCOOS and California State University North Ridge, Professor Kerry Nichols continued maintenance of the SCCOOS Santa Monica Pier Shore Station; thisincluded approximately monthly maintenance, calibration, and water sampling to support an interactive data web portal for the SCCOOS Santa Monica Pier Shore Station
		Improve public outreach and education on HABs	To improve public understanding of harmful algal blooms, causes, and impacts	Ongoing	No activities occurred during this reporting period
36	Monitor chemical, physical, and biological characteristics in the Bay to inform climate change impacts such as ocean acidification	Implement the Kelp Forest Hydrodynamic Study	To assess sediment transport, alteration of advective currents, and wave attenuation within kelp forests	Ongoing	Submitted a draft manuscript based upon the results of the study. Lead author Kristen Elsmore, Ph.D. UC Davis.
		Support OA sensor array maintenance, calibration, and data downloads in accordance with SOP	To continue using high-frequency, high-resolution OA sensors to characterize OAH conditions in Santa Monica Bay	Ongoing	Wirewalker mooring system was removed from the water on 7 October 2021; the dissolved oxygen probe and logging system were sent to the manufacturer for assessment; repairs of all instruments (including pH probe) were completed, and the system was returned to LACSD in February 2022; Wirewalker and stationary OA sensors were deployed into the water off Palos Verdes on 23 March 2022; data collection is anticipated to be completed by July 2022

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		Support inclusion of climate change impacts into CMP, especially through new models and data	To implement monitoring associated with new climate change indicators in the CMP; to seek funding and implement the CMP; to complete and release the State of the Bay Report	Ongoing	Following the SMBRC Governing Board's approval of the revised CMP at the 15 April 2021 meeting, USEPA reviewed and concurred that the full revised CCMP package is final; TBF released a call for proposals for a State of the Bay Report consultant team and through a competitive process hired 3Lane Marketing to work with the TAC to draft a State of the Bay Report; 3Lane contract was finalized in this reporting period.
		Convene technical advisors to prioritize actions based on information from CMP	To prioritize monitoring and data collection needs based on the revised CMP for major habitats in the Bay and implement the prioritized monitoring protocols	Ongoing	At its December 2021 meeting, SMBRC Governing Board approved seven projects recommended for funding and one standby project for the Proposition 50 grant program, which prioritizes projects that fulfill monitoring needs identified in the CMP; on 3 February 2022, State Water Board's Division of Financial Assistance approved the projects, initiating grant agreement negotiations for the seven projects on the Project List; the grant agreements are anticipated to be executed by October 2022 (see additional narrative)
37	Increase understanding of deep water habitats such as submarine canyons, deep reefs, and outfall pipes	Conduct ROV surveys to collect physical, chemical, and visual data	To use the ROV to conduct underwater surveys to supplement monitoring	Ongoing	CRI graduate student continued work on a literature review and completed building a nearshore Remotely Operated Vehicle to conduct single-scan sonar surveys as well as help fill other data gaps; TBF's ROV, R2Deep2, is being updated for use by VRG to help fill CMP data gaps. VRG staff have been training and working with the ROV in

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					preparation for field deployments.
		Identify and apply emerging technology and techniques to better characterize Bay habitats, including recommendations	To utilize cutting edge advancements in remote sensing, and remote platforms to better characterize the condition of the Bay's habitats	Ongoing	TBF is working with NOAA and Marauder Robotics to advance design of remote sensing and remote platforms to collect data in nearshore coastal environments.
38	Monitor and improve understanding of rocky intertidal habitats to inform restoration actions	Support study recommendations and outreach efforts for improved protection	To improve understanding of rocky intertidal habitats to fill CMP data gaps and inform restoration activities	Ongoing	CRI marine invertebrate mussel study assessing physiological impacts of temperature and other climate stressors was temporarily halted due to COVID-19 and lack of access to LMU's campus; study resumed remotely in spring 2021 collecting mussels throughout the West Coast to assess potential range shifts associated with temperature and climate change, the study will have regional implications for Santa Monica Bay and the CMP; study resumed in person laboratory experiments in summer 2021 and completed and submitted a manuscript for review by a scientific journal in January 2022

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39	Monitor and inform effective management of Marine Protected Areas, Fishery Management Plans, and local fisheries for recreational and commercially important species	Support MDRA in their implementation of the youth and veteran fishing program	To provide disadvantaged youth and veterans the opportunity to experience nature, boating, fishing, and healthy lifestyles	Ongoing	MDRA planned four summer trips for the Veterans Fishing Programs, with over 100 anticipated participants; plans for the Youth Fishing Program's summer trips were delayed due to staffing shortages
		Support MDRA in the completion of a halibut FMP	To provide technical and outreach support to MDRA in participating and tracking the development of a halibut FMP by CDFW and promotion of sustainable fisheries	Ongoing	Communications between TBF and MDRA continued during this reporting period
		Continue opportunistic aerial surveys to track boating and vessel activity	To continue to track ocean vessels and fishing trends within the South Coast MPA Network	Ongoing	No aerial surveys conducted during this reporting some communications occurred between TBF and LightHawk to determine need a readiness for future surveys.
		Conduct MPA Watch to monitor and inform use of MPAs in the Bay	To implement a community-science based program to monitor activities in MPAs and encourage appropriate enforcement and regulation activities	Ongoing	HtB conducted trainings for MPA Watch volunteers, conduct shore-based surveys, and shared data with local enforcement agencies; participated in LA MPA Collaborative meetings; see Action #27 for additional MPA outreach efforts

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40	Research and inform best management and pollution reduction practices to address non-point source pollution and facilitate reduction	Identify partners and identify funding sources for long-term monitoring efforts for LID and water conservation efforts	To establish project partners and identify potential funding sources in support of long-term monitoring for LID and water conservation efforts	Ongoing	See Action #36 for efforts related to CMP implementation
		Implement monitoring programs for long-term monitoring and to inform effectiveness of LID/BMP implementation projects	To fill data gaps and inform LID/BMP effectiveness in reducing non-point source pollution, especially nutrient pollution	Ongoing	Submitted a CRI manuscript to assess the effectiveness of the Culver City Rain Gardens for stormwater pollution retention
42	Inform strategies to reduce greenhouse gas emissions and increase carbon	Research landfill diversion's reduction on greenhouse gas emissions and carbon sequestration due to compost application	To conduct research on landfill diversion to obtain quantifiable GHG reduction metrics	Ongoing	No activities occurred during this semi-annualreporting period

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	sequestration in support of existing state actions and policies	Conduct research to establish rate of carbon sequestration associated with key habitats in the Santa Monica Bay and its watershed	To conduct research to identify processes and metrics to further understand rates of carbon sequestration within key habitats in Santa Monica Bay and its watershed	Ongoing	No activities occurred during this semi-annual reporting period
43	Implement the County-wide Safe Clean Water Program to support stormwater pollution control projects (if approved by voters in 2018)	Participate in advisory board and support implementation of projects from the new funding mechanism	To improve stormwater management in urban areas, protect water quality within our communities, provide new sources of water for current and future generations, and reduce stormwater pollution through attainment of water quality objectives, increased stormwater retention, increased service to disadvantaged communities, and coordination of efforts across the County	Ongoing	Continued to support the efforts of agencies to utilize funds made available under Measure W for stormwater improvement and LID projects throughout the watershed by serving as member of the Safe Clean Water Program's South Santa Monica Bay Watershed Area Steering Committee (WASC); Each WASC extended their respective Watershed Coordinator contracts for another year; LACFCD extended the public review on the draft guidance for Water Supply and Community Outreach and Engagement to 27 March 2022; WASC members submitted preliminary project rankings in March 2022; respective Fiscal Year 2022-2023 Stormwater Investment Plans were finalized by the North Santa Monica Bay WASC on 14 April 2022, South Santa Monica Bay WASC on 20 April 2022, and Central Santa Monica Bay WASC on 26 April 2022, recommending funding for eight infrastructure projects, three special studies, and two technical resources projects; the

#	CCMP Action	CCMP Next Step(s) / Project Activity Name	Objective(s)	Status	Semi-Annual Report Update
					deadline for consideration in Fiscal Year 2023-2024 Stormwater Investment Plans is 31 July 2022.
44	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	Build capacity and conduct pilot projects to inform future actions and advance program development / design	To utilize pilot level projects to test assumptions and develop preferred methods for sediment transport and/or placement	Ongoing	No activities occurred during this semi-annual reporting period

Semi-Annual Report Narratives

The following section contains summary supplemental narratives for programs or projects within a subset of CCMP Actions. No additional narrative was determined to be needed for the following Actions during this reporting period, (as the necessary detail was contained in the table preceding this section): Actions 10-11, 14, 16, 19-20, 23, 25-31, 34, 37, 39-44. The following Actions are further informed by Report Narratives below: 1-9, 12-13, 15, 17, 18, 21-22, 24, 32-33, 35-36, and 38.

SMBNEP Program Activity Updates

SMBRC staff and TBF staff worked to develop the first draft of the Fiscal Year 2023 (FY23) Work Plan with input from SMBRC Governing Board members and stakeholders, including members of the public. This involved producing a preliminary draft of planned activities and providing an overview and copy of the preliminary draft to the SMBRC Governing Board and stakeholders. Opportunities for stakeholders to provide input on the preliminary draft included the February 2022 Governing Board meeting, the written public comment period, and at the 24 February 2022 virtual Santa Monica Bay Stakeholders public workshop. SMBRC staff and TBF staff continued to consider all comments received, prepare a response to comments document, incorporate comments, and prepare the final draft FY23 Work Plan. The SMBRC Governing Board is anticipated to consider approval of the final draft FY23 Work Plan at its 21 April 2022 meeting.

ACTION #1 – Acquire Open Space

The Carbon Canyon Acquisition Project received $350,000 in Prop. 12 funds and was managed by SCC. The project was completed in November 2020. The project entailed the acquisition in fee of 91 acres of undeveloped land in Carbon Canyon, outside of Malibu. MRCA now owns and operates the land in perpetuity, permanently protecting 91 acres of open space and habitat in the Santa Monica Mountains, preserving habitat and wildlife corridors, preventing development, preserving the scenic viewshed, and increasing public access to recreation.

ACTION #2 – Restore Kelp Forests

Teams of restoration divers (via SCUBA) have been clearing the ocean floor of excess purple sea urchins (*Strongylocentrotus purpuratus*), thereby reducing herbivory and allowing for the natural recruitment and development of giant kelp (*Macrocystis pyrifera*). During the reporting period of 1 October 2021 through 31 March 2022, 4.18 acres were pre-monitored, and 0.44 acres of reef were cleared of excess urchins off White Point and Pt. Fermin. Restoration activities at Pt. Fermin occurred in collaboration with Force Blue and NFL Green with the goal of restoring a “football-field” area of kelp. This event used veteran combat divers to reduce urchin density, while local aquariums and TBF staff hosted educational and trash cleanup programs on the beach. The event was far-reaching and televised throughout the country. These sites continue to contain very high urchin densities with little to no macroalgae. Additional efforts will continue to be conducted to further work at White Point and Point Fermin.

A total of 56.97 acres of reef have been restored along Palos Verdes since the beginning of the project in July 2013. In that time, TBF and partners documented the development of a variety of macroalgae communities occurring on the reefs, higher densities and biomass of kelp bass (*Paralabrax clathratus)* and other fish species within restoration sites, increased density of CA spiny lobster (*Panulirus interruptus)*, higher algal and invertebrate diversity at all restoration sites, and increased *Strongylocentrotus* spp. gonadosomatic indices. These increases are comparable to reference site values. Focusing on kelp restoration areas where *S. purpuratus* suppression had occurred, canopy percent cover and kelp acreage increased in the completed restoration sites.

ACTION #3 – Recover Abalone Populations

TBF operates and maintains two mariculture facilities located at SCMI. These spaces serve as a wet lab and hatchery for abalone rearing, experimentation, and long-term housing of broodstock. The facility is a registered aquaculture facility and has been certified as “sabellid free” by CDFW. For the fall 2021 outplant event, a total of 414 white abalone were selected and tagged for outplanting off Palos Verdes using SAFE (Short-term Abalone Fixed Enclosure) modules on 30 September 2021. On 28 October 2021, stocked abalone were released from the SAFE modules. A second transplant site was established off Palos Verdes on 9 March 2022. Fourteen SAFE bases and four BARTs (CDFW) were deployed and will be stocked with red abalone in spring 2022.

Site monitoring follows this schedule after SAFEs have been opened, allowing abalone to egress onto the reef: one week, two weeks, one month, and quarterly. Site monitoring is not performed if weather or ocean conditions do not permit a safe or productive day of diving. For assessment, the site is broken into ten 4 x 30-meter surveys and the divers will survey that area in approximately 40 minutes. Divers use flashlights to investigate crevices and carefully look under small rocks for abalone. When a diver encounters an abalone, its location, length (if able to measure), tag ID, and any other notes are recorded.

TBF visited the site eight times during this reporting period. During those visits a total of 37 live white abalone were observed. As the outplanted abalone are juvenile, their behavior is to retreat deep into the cracks and hide to avoid predation. A meaningful assessment of the success of these outplants is appropriate following three to five years, based upon work conducted in the Puget Sound, when these individuals are likely to achieve adult size. At that time these adult abalone will be resilient to most predators and position themselves on open faces of the reef.

In addition, 255 white abalone shells and 38 red abalone shells have been collected from individuals that were depredated or died. Many of the shells collected showed growth following outplant; meaning some of the individuals survived for a period of time and the habitat is providing sufficient foraging opportunities for the abalone to grow.

On 13 January 2022, TBF staff transferred over 6,900 juvenile white abalone from the Bodega Marine Lab to The Cultured Abalone Farm, South West Fisheries Science Center, and SCMI. Approximately 1,500 animals from this transfer have been selected for outplating in spring 2022, and the remaining animals will be held and cared for in southern California partner facilities until they grow large enough to be outplanted.

ACTION #4 – Assess and Restore Seagrass Habitats

Santa Monica Bay Subtidal Eelgrass Restoration: This innovative project, funded by State Coastal Conservancy (LA Living Shoreline Project), Honda Marine Science Foundation, and NEP Coastal Watershed Grants Program, incorporates the experimental establishment of subtidal eelgrass offshore of Dockweiler Beach, Redondo Canyon, and Malaga Cove within Santa Monica Bay. TBF staff participated on a regional Submerged Aquatic Vegetation Technical Advisory Committee, led by SCCWRP. This group provided external scientific input and recommendations to the subtidal components of the restoration project, while concurrently spreading awareness of the importance of open coast eelgrass transplants. Further, TBF staff convened preeminent SAV researchers in California to establish the “Santa Monica Bay Subtidal Eelgrass Restoration Project Technical Advisory Committee” (TAC), comprised of researchers from academic institutions, governmental agencies, and environmental consultants. This group proved invaluable in refining the approach of the project and providing essential recommendations and insights into transplanting and monitoring processes. The members of the TAC expressed overwhelming support for the project and highlighted the importance of conducting this work.

Baseline monitoring surveys of extant *Z. pacifica* donor sites were conducted by project partners in October 2020 at donor sites off Catalina Island, including deploying a physical oceanographic sensor tracking wave characterization. Further baseline monitoring occurred in April, May, June, and August 2021, including side-scan sonar mapping and SCUBA-based surveys. The Scientific Collection Permit application required to harvest *Z. pacifica* from identified donor sites and the subsequent transplant to restoration sites was approved by CDFW on 28 May 2021. The CDP waiver application was approved on 8 July 2021 and development and approval of the QAPP (Quality Assurance Project Plan) by EPA occurred on 7 June 2021.

The project harvested *Z. pacifica* material from two donor beds on the backside of Catalina Island, Palisades and East End, to utilize for three transplants within Santa Monica Bay due to the extant bed stability, size, high turion density, and selected depth range. The overall size of both the Palisades (97 acres) and East End (21 acres) were expansive. Transplant material was harvested on three separate cruises and transplanted the same day into soft bottom substrate 35-40 feet in depth. This occurred on 20, 22, and 27 July 2021 to three distinct transplant sites off Redondo Beach, Malaga Cove, and Dockweiler Beach, respectively. Each site received roughly 500 turions, shoot-like structures supporting the blades of the eelgrass. Two methods were utilized: one used a single turion placed into holes excavated by divers, and the second bundled 8-10 turions together. Thus far, post-transplant monitoring was conducted at 24 hours, 1-week, 2-weeks, 1 month, and two quarterly surveys after transplant activities to inform survivability; quarterly monitoring will continue through 2022.

Survivability varied from site to site and by method. In general, survivability at 24 hours was 100% across all sites and methods, except for the single shoot method at Dockweiler which had a survivorship of 91%. At the one-month interval survivorship at Redondo (85% single and 85% bundle) and Malaga (86% single and 77% bundle) outperformed Dockweiler (74% single to 26% bundle). At the 20 October 2021, quarterly survey survivorship at Redondo (80% single and 61% bundle) and Malaga (83% single and 60% bundle) outperformed Dockweiler (60% single to 11% bundle). At the 4 February 2022, quarterly survey survivorship at Malaga (36% single and 27% bundle) outperformed Redondo (0% single and 0% bundle) and Dockweiler (0% single to 0% bundle). Future data collected via oceanographic sensors, biological surveys, and site suitability considerations will influence future outplanting efforts to increase survivability.

During this reporting period, TBF and project partners conducted numerous SCUBA-based surveys to monitor seagrass within the Bay, both transplant and donor sites. Quarterly monitoring events occurred on 20 October 2021 and 4 February 2022. Additional transplant site visits to deploy sensors and collect cores occurred on 7 December 2021 and 17 February 2022, and donor site visits to deploy sensors on 13 December 2021 and 14 February 2022. Additional visits to transplant and donor sites are scheduled for the upcoming reporting period for both biological monitoring surveys and to retrieve and deploy additional sensors.

Relatedly, TBF, alongside Paua Marine Research Group, Vantuna Research Group, and Scripps Institution of Oceanography, procured CA State Proposition 50 funding to utilize SCUBA-based surveys, side-scan sonar, and the deployment of a suite of biophysical oceanographic sensors (light, temperature, dissolved oxygen, among others) to further elucidate key data gaps outlined in the CCMP surrounding SAV and soft-bottom habitat within the Bay. Project partners will deploy sensors at nine sites to acquire a suite of environmental data metrics. A three-pronged data acquisition program will address the central scientific problem of determining key physical environmental drivers influencing the realized niche of *Z. pacifica* and enhance applied restoration efforts from local to regional scales with significant potential benefits for southern California coastal shelf habitats. Among a variety of deliverables include a side-scan sonar map of ~1000 acres of soft-bottom habitat in multiple discrete locations within SMB, encompassing areas spanning east and west of Point Dume in Malibu, as well as the Redondo canyon, the establishment of a comprehensive baseline census for *Z. pacifica* at nine geographically distinct sites, and creation of a novel *Z. pacifica* environmental monitoring program aimed at elucidating data gaps.

ACTION #5 – Assess and Implement Offshore Artificial Reefs

SMBRC staff continued to coordinate with SCC in overseeing implementation of the Palos Verdes Reef Restoration Project, which received $1,409,000 in Prop. 12 funds for construction and post-construction monitoring for Year 1. Vantuna Research Group and Southern California Marine Institute completed construction of an artificial reef in September 2020 to restore rocky reef habitat near Bunker Point off the Palos Verdes Peninsula, which involved strategically placing 57,000 tons of quarry rock in a 42-acre area. The Project aims to restore the nearshoreecological rocky-reef community, support an estimated six tons of reef fishes and a proportional amount of invertebrates, and

increase the abundance of commercial and recreational species, offsetting historical losses to ecosystem services. During this reporting period, the project leads prepared the Year 2 post-construction monitoring report, anticipated to be completed in May 2022. Preliminary results indicate that the reef is maturing at a faster rate than expected. Giant kelp was observed on all project sites and kelp canopy on shallow sites. Also, fish biomass was at or above the biomass for comparable reefs on the Palos Verdes Peninsula.

Four acoustic receivers were purchased by TBF in 2016 to improve the coverage of the Southern California Acoustic Telemetry Network, led by Dr. Chris Lowe at CSU Long Beach. Three receivers were first deployed in May 2017 to sites in the northern Santa Monica Bay, with the fourth subsequently included within the network. Currently, there are eight receivers deployed throughout the Santa Monica Bay to inform SMBNEP of the movements, positions, and permanence of great white sharks, giant sea bass, and other species of interest. Data generated by this expansion of the network will improve protection and understanding for these species and contribute to the CMP. The receivers were downloaded bi-monthly, cleaned, and redeployed to their moorings. During this reporting period, the receivers detected two Giant Sea Bass (*Stereolepsis gigas*) and two shovelnose guitarfish (*Rhinobatos productus*). Additionally, twelve individual white sharks (ten juveniles and two adults) (*Carcharodon carcharias*), were detected throughout the Bay in the last year. Semi-annual species count updates are provided to TBF by Dr. Lowe's lab at CSULB.

ACTION #6 – Restore Healthy Beaches

Malibu Living Shoreline Project: This project, in partnership with the City of Malibu, Los Angeles County Department of Beaches and Harbors (LACDBH), and State Coastal Conservancy (SCC) aims to restore approximately three acres of sandy beach and dune habitats at Zuma Beach and Point Dume Beach to improve coastal resilience and increase the health of the beach systems through a living shoreline approach. All permits, including ROE and CDP, were obtained in winter 2020. Implementation was conducted in winter 2020-21 and resulted in removal of approximately 25 tons of invasive iceplant and other non-native vegetation from the project area. Implementation also included planting of over 500 native plants, seeding, and installation of post and rope fencing to delineate the project boundary and pathways, and sand fence segments and biomimicry stakes to promote dune growth. Project documents are publicly available on the project's webpage.

During this time period, work focused on post-restoration monitoring, adaptative management and site maintenance, and continued outreach and community engagement. The first two rounds of post-restoration scientific monitoring were conducted in June 2021 and October-November 2021. TBF also continued site maintenance to remove non-native vegetation, remove trash from the site, and repair post and rope fencing and sand fencing segments. Results from a special research study by CRI found that the biomimicry stakes were effective at accreting sand. The biomimicry stakes were removed in November 2021. In February 2022, TBF performed supplemental seeding of the sites and planted an additional 245 plants at Point Dume Beach and 99 plants at Zuma Beach. Plants and seed were manually watered due to lack of natural rainfall. In addition, coordination for interpretive signage is ongoing and

the fabrication and installation subcontractor, Third Floor North, was selected in November 2021. Signage is expected to be installed in spring 2022. TBF began drafting the Year 1 Annual Report, which is expected to be finalized in April 2022.

TBF also continues to present at conferences and to other groups about this project, including the Beach Ecology Coalition and others. Additionally, TBF had frequent communications with the City of Malibu and LACDBH for outreach and event planning. TBF coordinated with LACDBH to secure special events permits for community and student restoration events. The first community and student restoration event was held in March 2022 and resulted in removal of approximately 360 lbs of non-native vegetation. The next community restoration event is scheduled for April 2022.

Los Angeles Living Shoreline Project: This innovative project, in partnership with LACDBH, State Parks, SCC, and Honda Marine Science Foundation, aims to implement a multi-habitat approach to restore approximately 3.5 acres of beach and coastal bluff habitat. This project at Dockweiler Beach directly supports a disadvantaged community and adds to SMBNEP's efforts to improve coastal resilience in Los Angeles County. It also incorporates the experimental establishment of offshore eelgrass within a one-acre footprint (see Action #4 – eelgrass).

Significant progress was made during this reporting period, including permitting, coordinating and finalizing logistics for implementation, continued outreach and monitoring, and project implementation. Significant collaboration occurred through communications with various agencies such as SCC, California Coastal Commission, LACDBH, LA County Public Works, City of Los Angeles, California Department of Parks and Recreation, LA County Lifeguards, US Fish and Wildlife Service, CDFW, US Environmental Protection Agency, and others. TBF continues to present at conferences and to other groups about this project (e.g., El Segundo Blue Butterfly Coalition, Beach Ecology Coalition).

For the beach and bluff components of the project, TBF coordinated with LACDBH to amend the existing ROE permit to include implementation and post-restoration activities. In addition, a CDP Waiver for the project was issued by the Coastal Commission in October 2021. A Scientific Collecting Permit through State Parks was also obtained in November 2021. TBF implemented the beach portion of the project in January through March 2022. As part of implementation activities, TBF and LACC removed the old existing plover enclosure fence and replaced with symbolic post and rope fencing. The outer project perimeter was also delineated with post and rope fencing and single sided post and rope was installed to create several pathways to help guide beach visitors through the site. In addition, non-native sea rocket was hand pulled, and the project area was subsequently seeded with native dune species. Approximately 200 native plants were planted in the project area outside of the plover enclosure. Sand fencing segments were also installed in this area to help promote dune growth. Lastly, several seeding plots were set up to track the germination of various dune species.

For the bluff portion of the project, additional coordination and permitting with the City of Los Angeles Bureau of Engineering was necessary. TBF submitted a Right of Way permit application to the City in December 2021 and a local CDP application in January

2022. Implementation of the bluff is anticipated for fall 2022.

Manhattan Beach Dune Restoration: This project aims to restore approximately three acres of dune habitat along the beach in the City of Manhattan Beach to provide infrastructure protection and increase coastal resilience, while improving habitat quality through invasive plant removal and native plant establishment. The project is located on existing back dunes along the coast of Manhattan Beach, adjacent to Bruce's Beach, from approximately 36th Street to 23rd Street, within approximately 0.6 miles of coastline. The restoration project involves the removal of non-native vegetation, seeding / planting of native vegetation, strategic installation of sand fencing and other features to help establish vegetation, installation ofsymbolic fencing, and installation of educational features like interpretive signage.

The project design incorporated input from partners, experts, and public stakeholders through an innovative outreach and community engagement strategy that utilized virtual workshop, stakeholder meetings, and an outreach video submission to solicit feedback. In addition, TBF consulted with a Native American representative who engaged in the project as a cultural advisor. The project garnered widespread support from local stakeholder groups and community members. TBF continues to present at conferences and to other groups about this project.

Substantial progress was made during this reporting period including completing restoration planning, securing final permits, commencing implementation and community restoration events, and continuing engagement with stakeholders and news outlets. TBF obtained a ROE permit to conduct scientific monitoring on-site in May 2021 and amended the permit in December 2021 to include implementation and post-restoration activities. The final CDP application package, including the Restoration and Monitoring Plan, was submitted in August 2021 and subsequently approved in January 2022. TBF drafted the application for the LACFCD permit in October 2021 and received and secured the Flood Construction Permit in January 2022.

Restoration implementation commenced in January 2022 and is ongoing. With support from LACC, community volunteers, and project partners, TBF has removed and disposed of nearly 16 tons of iceplant and planted 1,400 native dune plants and work is ongoing. The post and rope pathways and project boundary have also been delineated, and seeding is in progress. TBF coordinated with LACDBH to obtain Special Events Permits for community restoration events to support implementation. In coordination with City of Manhattan Beach project partners, TBF has hosted 15 community restoration events from January – March 2022 and has subsequent events planned through May 2022. The project has been featured by several local news outlets, including a story by Spectrum News, and TBF continues to promote the project and associated community restoration and stewardship events.

Lastly, TBF worked with City of Manhattan Beach and others to prepare a pre-proposal for another dune restoration project in conjunction with a stormwater water quality proposal led by the City.

Santa Monica Dune Restoration: This project is being planned in partnership with City of Santa Monica, California State Parks, Audubon Society, and public stakeholders and

will include restoration of approximately 4.5 acres of beach habitat on Santa Monica Beach, including the area with the current snowy plover enclosure. This project was approved to receive funding by the Refugio Beach Oil Spill Trustee Committee in September 2021 through the National Fish and Wildlife Foundation. The project is anticipated to officially begin in mid-2022; however, substantial planning and coordination with the City of Santa Monica has already occurred along with some outreach. In this reporting period, TBF continued coordination with the city and worked on grant administrative process in partnership with NOAA, CDFW, and NFWF.

Beach Monitoring: In partnership with Loyola Marymount University's Coastal Research Institute (CRI), this research program is conducting a beach characterization study and informing a Site Suitability Model (SSM) analysis to determine potential areas for beach restoration, evaluating factors such as coastal infrastructure, sea level rise vulnerability, and physical and biological characteristics, while contributing information to SMBNEP's Comprehensive Monitoring Program. These research projects serve to evaluate existing conditions, assess the potential threats faced by these beaches, as well to determine which sites have the highest probability of being successfully restored with a high adaptive capacity.

During this reporting period, existing data continued to be compiled and analyzed, with work continuing a draft manuscript started in partnership with TBF, CRI, and Morro Bay National Estuary Program. Data were analyzed from public databases such as wind data from National Weather Service to inform the beach characterization work and SSM; other multivariate and spatial analyses were also performed. Summary results were presented to the winter Beach Ecology Coalition meeting in January 2022, and other venues, with a presentation in development for the April SETAC meeting (Dr. John Dorsey is an invited speaker). Work continued evaluating and combining GIS layers for the site suitability analysis and discussions with coastal municipalities and agencies will serve to inform its future use. Lastly, a Proposition 50 grant application package was approved by SMBRC and waterboards to fill data gaps for the sandy shore chapter of the CMP. TBF was the lead, in partnership with UCSB, CRI, USC Sea Grant, Pepperdine, and the Center for Urban Resilience.

ACTION #7 – Restore LAX Dunes

The LAX Dunes are the largest remaining remnant contiguous coastal dune system in southern California. The 302-acre dune site is owned and managed by Los Angeles World Airports (LAWA). The site provides habitat for over 900 species, including the beautiful and delicate federally endangered El Segundo Blue Butterfly. During this period, TBF assisted LAWA in obtaining a Coastal Development Permit (CDP) amendment for the Coastal Dunes Improvement Project (CDIP) to reflect the inclusion of the Revised Ecological Landscape Plan (2021). TBF also continued coordination and work with LAWA and partners on revegetation efforts, habitat restoration, future restoration planning, and scientific monitoring of the LAX Dunes.

Lead botanist project partner, California Botanic Garden (CalBG), conducted seed bulking and plant propagation; project ornithologist, Cooper Ecological Monitoring performed an avian survey of the site; scientific consulting partner and restoration ecologists, Coastal Restoration Consultants,advised ongoing restoration and planning for

future restoration activities; LACC and IO Environmental and Infrastructure (IOEI) conducted non-native vegetation removal and native seeding and planting. In total, TBF, LACC, and IOEI, planted approximately 10,800 native plants in December 2021 through March 2022.

Public community events were halted starting March 2020 through September 2021 as required by LA County Public Health due to COVID-19. Events reconvened in October 2021. From October 2021 through March 2022, TBF held six community restoration events, where a total of 102 volunteers removed approximately 7,460 lbs (237 bags) of non-native vegetation.

LMU's Coastal Research Institute and Dr. Michelle Lum's laboratory also continued work on identifying plant growth promoting bacteria of California native plants that can be used as an inoculum to enhance restoration efforts. Preliminary analysis showed a number of bacteria isolates are plant growth promoting bacteria and appear to enhance the germination and/or growth of native plant species. Dr. Lum and her research student implemented an experimental inoculated seed germination project at the LAX Dunes in December 2020 and monitored through summer 2021. Seeds of both species being evaluated had germinated beginning in March 2021, data analyses are still being undertaken.

ACTION #8 – Restore Coastal Bluffs

SMBRC staff continued to coordinate with SCC in overseeing implementation of the Abalone Cove Habitat Restoration funded by Prop. 12. The project involves habitat restoration of 13-acres at Abalone Cove Reserve. The restoration includes the removal of invasive trees, shrubs, and herbaceous plants; the propagation of native plant species; irrigation and planting specifications; maintenance schedule; and monitoring and reporting protocols. During this reporting period, the project continued site preparation and trail improvement planning and completed irrigation installation. Additionally, approximately 4,500 coastal sage scrub and southern cactus scrub plant species are in the process of being planted, over 13 acres of habitat continue to have invasive species removed, and hundreds of acacia seedlings were removed by staff and volunteers. Qualitative data to monitor the Year 1 (2021) restoration success was processed and compiled in January 2022. Preliminary results indicate about 26% native plant cover and 20% non-native cover. Additional monitoring is anticipated to begin in May 2022.

Additional coordination between TBF and LACDBH continues regarding potential bluff restoration projects adjacent to County beaches, including several sites at Dockweiler Beach, and one being led by LACDBH. Several bluff restoration projects are being conducted in the SMBNEP study area by partners such as Palos Verdes Peninsula Land Conservancy, Los Angeles Conservation Corps, City of Redondo, and South Bay Parkland Conservancy. Projects are removing invasive species, planting natives, and providing habitat for the federally endangered El Segundo Blue Butterfly. Additional work continues through a stakeholder engagement group known as the El Segundo Blue Butterfly Coalition (ESB Coalition), bringing together partners from many different non-profit groups, agencies, and representatives from municipalities.

The ESB Coalition is working on several projects, including updates to their new website, a mapping tool to track restoration efforts, and coordination of project updates and discussions from many partners.

ACTION #9 – Implement the Malibu Creek Ecosystem Restoration Project

The lead agencies for the Malibu Creek Ecosystem Restoration Project are the US Army Corps of Engineers (federal) and the California Department of Parks and Recreation (state). The primary purpose of the project is to restore aquatic habitat connectivity along Malibu Creek and its tributaries, establish a more natural sediment regime from the watershed to the shoreline, and restore aquatic habitat of sufficient quality along Malibu Creek and tributaries to sustain or enhance indigenous populationsof aquatic species within the next several decades, allowing for migratory opportunities to about 15 miles of aquatic habitat that have been unreachable for many decades in this watershed. The project report signed by the Army Corps, Final Environmental Impact Statement, and other documents are publicly available on the Army Corps website. At its 24 February 2022 meeting, the Wildlife Conservation Board approved $12.5 million to complete the engineering plans and specifications to a 90 percent level of completion. On 25 February 2022, the Notice of Exemption was filed for this project.

ACTION #12 – Restore Small Coastal Lagoons

SMBRC staff continued to coordinate with SCC in overseeing implementation of the Topanga Lagoon Restoration Planning project funded by Prop. 12. The project aims to advance the planning effort for the restoration of Topanga Lagoon to improve habitat for the endangered steelhead trout and tidewater goby, be resilient to sea level rise and climate change, as well as improve visitor experience and enhance recreational opportunities. During this reporting period, the project continued Phase 1 implementation, including preparing for the next technical advisory committee and stakeholder meetings to finalize concept alternatives, anticipated for early 2022. TBF worked with RCDSMM to coordinate, deploy, and manage a water quality sensor in the lagoon. The 30% conceptual plans are anticipated to be completed by late 2022.

TBF continued coordination with SCCWRP and Moss Landing Marine Laboratory for the Estuarine Marine Protected Area, (EMPA) monitoring program, which includes Malibu Lagoon as a study site. TBF partnered with CSULB to coordinate, deploy, and manage one water quality sensor in the lagoon. CSULB and partners implemented the first round of EMPA monitoring in the lagoon in March and April 2021 and another in fall 2021, including fish traps, nutrients, and other metrics. SCCWRP led a Proposition 50 proposal in partnership with TBF and CSULB to fill CMP data gaps for the small northern Bay wetland lagoon systems, which was approved.

Additionally, a proposal led by SCC to the EPA Wetland Program Development Grant (including TBF and many other partners) to help take the next steps in standardizing regional wetland monitoring for southern California. This proposal was preliminarily accepted, with additional work towards a Scope of Work by SCC and partners.

ACTION #13 – Restore Ballona Wetlands Ecological Reserve

Ballona Reserve Community Stewardship Project: TBF, in partnership with California Department of Fish and Wildlife (CDFW), Friends of Ballona Wetlands (FBW), and community volunteers are conducting a project to remove invasive vegetation while broadening public involvement and stewardship at the Ballona Wetlands Ecological Reserve (Reserve), in Area B, south of Culver Boulevard. During this period, TBF continued maintaining and expanding the community restoration site at the Reserve. TBF staff, partners, and interns continued restoration efforts through frequent site maintenance days. Community events were halted starting in March 2020 through July 2021 as required by LA County Public Health due to COVID-19; however, events reconvened in August 2021 with COVID safety measures in place. From August 2021 through March 2022, a total of 148 volunteers removed approximately 30,000 lbs of non-native vegetation over the duration of 12 community restoration events. Ongoing scientific monitoring and maintenance continued in accordance with the Implementation and Monitoring Plan.

ACTION #15 – Enhance Populations of Rare Species

SMBRC staff continued to coordinate with SCC in overseeing implementation of the reestablishment of California red-legged frogs (CRLF) project funded by Prop. 12. The project builds on an earlier effort by National Park Service (NPS) to reintroduce the CRLF to the Santa Monica Mountains and consists of actions to establish self- sustaining populations of CRLF in Santa Monica Mountain streams and to address impacts from the Woolsey fire. During this reporting period, egg mass surveys started in early February 2022. As of 23 March 2022, 47 egg masses were observed in the source population and four new egg masses in one of the translocation sites (Solstice). Six egg masses were transferred to four reintroduction sites in Santa Monica Mountains with improved habitat quality. All egg masses have hatched and are being fed twice weekly by NPS staff and partners at the Santa Barbara Zoo.

See also Action #3 in support of white abalone enhancement, Action #6 in support of western snowy plover habitat enhancement, and other Actions throughout this document.

ACTION #17 – Implement and Study Runoff Capture Projects

SMBRC staff continued overseeing implementation for the following previously funded Prop. 84 projects:

Culver Boulevard Realignment and Urban Stormwater Project: SMBRC staff continued to coordinate with SWRCB staff in overseeing implementation of this stormwater pollution reduction project. This project, carried out by the City of Culver City, consists of capturing and treating dry-weather runoff and storm runoff from a drainage area of 800 acres for local irrigation and using a belowground infiltration basin to recharge groundwater. During this reporting period, the grantee continued electrification, system testing, and landscaping. In March 2022, the grantee requested to extend the work completion date from May 2022 to July 2022.

***Westwood Neighborhood Greenway Project*:** SMBRC staff worked with the grantee, City of Los Angeles, to continue to implement the Westwood Neighborhood Greenway Project, which will clean and conserve water while providing native habitat for wildlife and opportunities for public engagement. This project aims to improve water quality by diverting and capturing runoff from 2,400 acres of drainage area into two bioswales. Construction was completed in September 2020. A one-year time extension for the project was approved to allow for project performance monitoring, water quality data analysis, and continued maintenance of the established vegetation and mechanical components. During this reporting period, the grantee prepared to conduct post-construction monitoring.

***Santa Monica Bay Catch Basin Insert Project*:** $589,386 in Prop. 84 funds were allocated to this project. SMBRC staff worked with the grantee, City of Rancho Palos Verdes, to finalize remaining deliverables for this project, which retrofitted and installed 1,112 connector pipe screen (CPS) units in all suitable catch basins across the Palos Verdes Peninsula (PVP) watershed draining to Santa Monica Bay, spanning approximately 14 sq. miles. This project aims to help mitigate trash and marine debris and assist cities in the PVP watershed in implementing the requirements for stormwater permits. During this reporting period, the grantee continued development of the final project report.

***Ladera Park Water Quality Enhancement Project*:** SMBRC staff continued to coordinate with SWRCB staff in overseeing implementation of the Ladera Park Water Quality Enhancement Project by the Los Angeles County Department of Public Works. This project aims to treat, store, and infiltrate runoff from a 110-acre tributary area through a combination of pre-treatment, retention, and infiltration facilities. A one-year time extension for the project was approved to allow completion of construction and monitoring, which were delayed due to contractor issues. The grantee is exploring the need for another time extension to account for these delays.

SMBRC staff continued to coordinate with SCC in overseeing implementation of previously funded Prop. 12 projects:

***Monteith Park and View Park Green Alley Stormwater Capture*:** The project consists of constructing an infiltration system and recreational and aesthetic improvements at Monteith Park and at View Park alley. Stormwater will be diverted into the infiltration system and be allowed to percolate into the ground. The project will prevent potentially polluted runoff from being discharged downstream thus improving the water quality in the Ballona Creek Watershed. During this reporting period, construction of this project was delayed due to unanticipated right-of-way and utilities issues. Construction is anticipated to be completed in late 2022. The grant agreement was amended to extend the project completion date to 2025.

***Beach Cities Green Streets Project*:** This project consists of designing and constructing Green Street infrastructure to help meet water quality objectives set for the Santa Monica Bay beaches. The Beach Cities will retrofit existing impervious areas within the public parkways and right-of-ways using green infrastructure technologies such as porous pavement, catch basin trash screens, bio-filtration / bio-retention systems and dry wells. During this reporting period, the preliminary designs were

modified as a result of public outreach to relocate and modify several best management practices (BMPs), resulting in the need for additional survey work and 84 more potholes for utilities. The project completion date was extended from February 2022 to February 2025.

***Paramount Ranch Storm Flow and Sediment Reduction*:** The proposed project was canceled due to Woolsey Fire impacts and the Prop. 12 funds were reallocated to the Topanga Lagoon Restoration Planning project and the Palos Verdes Restoration Reef project.

ACTION #18 – Install and Monitor Pumpout Facilities

TBF's Boater Education Program works to provide the boating community with the tools and resources they need to prevent pollution, including functional sewage and bilge pumpouts. The program monitors public sewage pumpout and dump stations to ensure they are operating at peak efficiency. Monitoring utilizes the Pumpout Nav app for surveying and additionally provides technical assistance for facility managers to support maintenance and part replacements such as nozzles and banjo valves. A collaborative approach to proper sewage disposal monitoring allows statewide consistency; is conducted in partnership with San Francisco Estuary Partnership and Morro Bay National Estuary Program supported by the federal Clean Vessel Act Education and Outreach grant administered through California State Parks Division of Boating and Waterways. Pumpout Nav's data is maintained by monitoring agencies and app updates are developed and published regularly. During this semi-annual reporting period, monitoring of pumpout units found an average 74% usability (based on analysis of equipment performance), and 100% of the units tested with biodegradable dye tablets were leak-free.

ACTION #21 – Support Policies to Reduce Reliance on Imported Water

SMBRC staff continued to coordinate with SCC in overseeing implementation of the Pure Water Project Las Virgenes-Triunfo (Pure Water Project), which received $925,720 in Prop. 12 funds. The project involves constructing a 100 gallon-per-minute, indirect potable water reuse demonstration project for reservoir augmentation that will produce up to six million gallons of local, drought resistant water supply per day, while improving in-stream habitat. The demonstration facility is needed to test the advanced microfiltration, reverse osmosis, ultraviolet light disinfection, and oxidation components of a Pure Water advanced treatment facility prior to implementation of a full-scale project. Construction of the demonstration facility was completed. LVMWD staff anticipate providing a presentation and host an in-person tour of the demonstration facility accompanying the June 2022 SMBRC Governing Board meeting.

ACTION #22 – Implement Composting and Landfill Diversion Projects

The Table to Farm program, initiated in 2016, is a partnership between Environmental Charter Schools (ECS), TBF, and the community at large working collaboratively to reduce greenhouse gas emissions by recycling organic food waste and growing local produce. Between 2016 and 2019, three compost hubs were established at ECS Inglewood, Gardena, and Lawndale. In 2020, a community garden was established

outside of ECS Inglewood's gates. The garden continues to thrive and has monthly volunteer events to support the upkeep of planting, harvesting, and maintenance. During this semi-annual period, a case study flyer was produced that snapshots the community garden's development, and funding was awarded to revitalize ECS campuses compost bins and its organic waste collection participation.

ACTION #24 – Include Coastal Resilience into LCP Updates

TBF continued to work with coastal municipalities such as LACDBH, City of Malibu, City of Santa Monica, City of Manhattan Beach, City of Hermosa Beach, City of Los Angeles (Venice Beach) and others to incorporate coastal resilience planning into Local Coastal Program updates / revisions and other policies and actions. TBF continued to support and inform City of Manhattan Beach's and other cities' climate resilience efforts, participate on stakeholder committees, and support inclusion of dune restoration into other multi-benefit projects. TBF continues conversations with Coastal Commission and other state agencies about their inclusion of coastal resilience into state documents and reports. A TBF staff member was also elected to the American Shore and Beach Preservation Association Board of Directors and participated in several meetings, including a focus on incorporation of nature-based resilience planning at a national level.

ACTION #32 – Reduce Marine Debris

Most marine debris come from land-based sources which are transported to oceans via storm water runoff. Much of this debris is from of single-use disposable products, the result of convenient 'to go' items that have a short useful life span and then are quickly disposed. It has become evident that source reduction of plastic is the only viable solution to solving the world's plastic pollution issue. In 2018, TBF partnered with Clean Water Action to bring ReThink Disposable to Los Angeles, a technical assistance program for food service businesses targeting the reduction of single-use disposable items used on-site. By implementing ReThink Disposable, quantitative results of reduced single use disposables and restaurant cost savings have been measured, documented, and utilized by TBF to further TBF's long standing support of municipal efforts to adopt plastic reduction ordinances.

TBF is continuing to implement ReThink Disposable and during this semi-annual period, implemented the program at three LA county yacht clubs with food service. In all, the three clubs' efforts annually eliminate 58,799 single-use disposable items, 845 pounds of trash prevented from entering landfills, and $2,726.30 in total net savings. TBF also works collaboratively as part of the Reusable LA coalition to pass comprehensive bans on single-use disposable plastics. In 2021, Reusable LA was awarded a National Reuse Award for "Most Impactful Community Leadership Award" as a result of its leadership role in advancing reusables through policy advocacy, community engagement, and fruitful collaboration. During this reporting period, TBF signed on to two letters to government officials urging the passing of several source reduction policies.

ACTION #33 – Monitor Microplastics and Other Marine Debris

LMU's Coastal Research Institute and Dr. James Landry's laboratory continued work on microplastics research in support of this action. Dr. Landry's lab is completing a protocol to extract microplastics effectively from sediments (especially sand), analyzing them using infrared spectroscopy, and quantifying results. Dr. Landry's lab, through CRI, is also working on initiating methods and studies to identify microplastics in nearshore marine invertebrates such as sand crabs, amphipods, and mussels. CRI microplastics research processing sediment and invertebrates for microplastics was halted in March 2020 due to COVID-19 and LMU access restrictions but resumed work again in December 2020 once on campus activities were allowed to continue in a restricted manner by LA County Department of Public Health. Work on this project continues, including planning for a manuscript.

ACTION #35 – Monitor Harmful Algal Blooms

CRI and Dr. Amber Bratcher-Covino continued research on Harmful Algal Blooms (HABs) to fill data gaps in the Santa Monica Bay region. Dr. Bratcher-Covino conducted three survey fieldwork days in October 2020, March 2021, and June 2021, including the collection and processing of ocean surface water samples from 12 stations throughout Santa Monica Bay. Additional work on modeling OAH and HABs continues by SCCWRP, with efforts to expand the model. Dr. Bratcher-Covino also completed efforts to use equipment to better facilitate algae speciation and quantification. A FlowCam microscope made by Yokogawa Fluid Imaging Technologies was used to analyze samples by Dr. Bratcher-Covino and student interns through July 2021 and a database of species was produced. Further analyses using these data are ongoing and Dr. Bratcher-Covino aims to submit a manuscript based on her research during the next reporting period.

ACTION #36 – Monitor Climate Change Impacts and Ocean Acidification

SMBRC Proposition 50 Grant Program: At its 14 December 2021 meeting, the SMBRC Governing Board approved seven projects recommended for funding and one standby project for the Proposition 50 grant program, which prioritizes projects that fulfill monitoring needs identified in the CMP. On 3 February 2022, the State Water Board's Division of Financial Assistance approved the projects, initiating grant agreement negotiations for the seven projects on the Project List. These projects fill many data gaps identified in the CMP covering a range of habitats in the Santa Monica Bay and its watersheds, including chaparral, riparian, wetlands, rocky reefs, rocky intertidal, sandy beaches, and soft bottom. The grant agreements are anticipated to be executed by October 2022. The seven projects are:

- *Support of CMP Wetlands Evaluation through Monitoring and Assessment of Santa Monica Bay Estuaries* (SCCWRP)
- *Monitoring rocky intertidal habitats in the Santa Monica Bay to support habitat assessments* (CSU Fullerton Auxiliary Services Corporation)
- *Collaborative Sandy Beach Monitoring and Assessment in Santa Monica Bay* (TBF)
- *Establishing a baseline census and ecological monitoring program for Zostera pacifica habitats in coastal Southern California* (TBF)
- *Assessment of the Nearshore Rocky Reef Resources of Santa Monica Bay*

(Occidental College)
- *Looking Back to See Ahead: Using long-term monitoring data to predict species persistence across the NSMBW* (Pepperdine University)
- *Citywide Bioretention Basin Project* (City of Culver City)

ACTION #38 – Monitor Rocky Intertidal Habitats

CRI and Dr. M. Christina Vasquez's laboratory continued research on physiological stress in rocky intertidal marine invertebrates, particularly mussels. Her research seeks to inform physiological reactions in mussels to stressors such as temperature and oxygen change. Dr. Vasquez's research was significantly impacted by the virus pandemic, and her experiments were halted due to the closure of LMU's campus in compliance with LA County Public Health policies regarding COVID-19. Once campus restrictions were lifted, Dr. Vasquez redirected her research to inform temperature stress on mussels and to support filling a data gap in the CMP. Dr. Vasquez and several students submitted a manuscript in January 2022 based on the CRI research.