Santa Monica Bay National Estuary Program

Fiscal Year 2022-2023
Bipartisan Infrastructure Law
Work Plan

15 September 2022

Final Approved by SMBNEP Management Conference Approval

SANTA MONICA BAY
NATIONAL ESTUARY PROGRAM

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Acronyms

BEACON	Beach Erosion Authority for Clean Oceans and Nourishment
BIL	Bipartisan Infrastructure Law
CCMP	Comprehensive Conservation and Management Plan
CMP	Comprehensive Monitoring Program
CSUCI	California University Channel Islands
FY	Fiscal year
Memorandum	National Estuary Program Bipartisan Infrastructure Law Funding Implementation Memorandum for Fiscal Years 2022-2026
MRCA	Mountains Restoration and Conservation Authority
NEP	National Estuary Program
NRHP	National Register of Historic Places
RCDSMM	Resource Conservation District of Santa Monica Mountains
SMBNEP	Santa Monica Bay National Estuary Program
SMBRC	Santa Monica Bay Restoration Commission
State Parks	California Department of Parks and Recreation
TBF	The Bay Foundation
USEPA	United States Environmental Protection Agency

I. Introduction

Santa Monica Bay National Estuary Program Entities

Section 320 of the federal Clean Water Act establishes the National Estuary Program (NEP), which is administered by the United States Environmental Protection Agency (USEPA). The Santa Monica Bay National Estuary Program (SMBNEP) promotes collaborative watershed-based partnerships to develop and implement the Comprehensive Conservation and Management Plan (CCMP) that addresses a range of environmental problems facing Santa Monica Bay, while recognizing and balancing the needs of the local community. The SMBNEP is comprised of two distinct entities: Santa Monica Bay Restoration Commission (SMBRC) serving as the Management Conference and The Bay Foundation (TBF) serving as the Host Entity.

SMBNEP CCMP Goals

SMBNEP recently completed a major CCMP revision in 2021, including a revised Action Plan in October 2018, a Finance Plan in December 2019, an amended Memorandum of Understanding of SMBRC in June 2020, an Introduction Chapter in February 2021, and a Comprehensive Monitoring Program (CMP) in April 2021 (all key components of the CCMP). In September 2021, USEPA reviewed and concurred that the revised SMBNEP CCMP meets USEPA requirements and is officially considered final.

The SMBNEP Management Conference and stakeholders, including members of the public, identified the four priorities of SMBNEP as improving water quality, conserving and rehabilitating natural resources, protecting the Bay's benefits and values to people, and understanding and adapting to climate change impacts. Within these four priority areas, the following seven overarching goals were identified in the CCMP Action Plan:

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 CMP provides a framework for monitoring data to inform managers, practitioners, and the public on conditions and trends to support actions identified in the CCMP Action Plan. The CMP also describes strategies to track and detect changes or improvements, assess effectiveness of CCMP implementation, and address key data gaps across seven major habitats in Santa Monica Bay and its watersheds.

Bipartisan Infrastructure Law Funding

On November 15, 2021, President Biden signed the Bipartisan Infrastructure Law (BIL). The law includes $50 billion to USEPA for water infrastructure, including $132 million in funding for the 28 NEPs to further CCMP implementation. The USEPA will evenly distribute funding among the NEPs, providing SMBNEP $909,800 annually for federal fiscal years 2022-2026 (FY22-26). On July 26, 2022, USEPA issued the National Estuary Program Bipartisan Infrastructure Law Funding Implementation Memorandum for Fiscal Years 2022-2026 ("Memorandum"). The Memorandum covers NEP BIL funding priorities, eligible uses, expectations for an Annual BIL Work Plan and a Long-Term Plan, award considerations, and reporting and tracking requirements.

The priorities for BIL funding include a core emphasis on acceleration of environmental and community restoration goals within the CCMP. Specifically, NEP BIL-funded projects should seek to:

- Accelerate and more extensively implement CCMPs;
- Ensure that benefits reach underserved communities with a target of at least 40% of project benefits flowing to underserved communities, as covered by the Justice40 Initiative;
- Build the adaptive capacity of ecosystems and communities through projects that advance climate resilience; and
- Leverage additional resources through collaboration, partnerships, and other funds as appropriate.

The BIL funds received must implement the Management Conference and USEPA-approved CCMP. Each NEP is also required to develop an Annual BIL Work Plan and a Long-Term Plan. A Management Conference-approved Annual BIL Work Plan must be submitted by June 1 each year with the exception of FY22. The FY22 BIL Work Plan should be submitted within 90 days of the issuance of the Memorandum. Each NEP must also develop a separate BIL Long-Term Plan describing the key activities to be pursued through all funding years (FY22-26), including an Equity Strategy detailing how the NEP will contribute to the goal of at least 40% of BIL funding benefits flowing to underserved communities. The BIL Long-Term Plan is due June 1, 2023.

II. SMBNEP BIL Work Plan Overview

Purpose

The purpose of this two-year FY22-23 BIL Work Plan is to:

- Identify projects and objectives to further CCMP implementation and NEP BIL priorities for BIL funding beginning in FY22 and continuing through FY23 (1 October 2021 to 30 September 2023); and
- Outline partners, outputs or deliverables, long-term outcomes, budget, and timeline of work to be implemented with FY22-26 BIL funds.

BIL Work Plans for FY24-26 will be developed with updated and refined project details consistent with USEPA's submission deadlines.

SMBNEP BIL Funding Priorities

Environmental justice and addressing climate change are key USEPA priorities reflected in the first two goals of the FY22-26 USEPA Strategic Plan. The USEPA is embedding these goals in its programs, policies, and activities, including implementation of the NEP BIL funds. Specifically, the NEP BIL funds are covered under the Justice40 Initiative with a target of ensuring that at least 40% of benefits from the BIL flow to underserved communities. Each NEP must also develop an Equity Strategy providing their plan to meet the NEP Justice40 target (see Bipartisan Infrastructure Law Funding section above).

The BIL funding opportunity is to be used to further implementation of the SMBNEP CCMP while meeting the priorities of addressing climate resilience and equity. These two priorities are integral components of the SMBNEP CCMP. Climate resilience is embedded in many of the 44 actions in the CCMP Action Plan and is identified as an overarching goal to mitigate impacts and increase resiliency to climate change. Equity is also embedded in many CCMP actions, but Action #28, Support Disadvantaged Communities, seeks to develop communication strategies and identify barriers facing underserved communities to achieve healthy habitats. This includes barrier removal and engagement in restoration, greening, and pollution reduction projects, and support of regional strategies that increase resilience of underserved communities.

The primary CCMP actions supported by the FY22-23 activities in this Work Plan are identified for each project in section III (SMBNEP BIL Work Plan Activities) and Appendix A (SMBNEP BIL Work Plan Activities summary table) and summarized in Appendix B (CCMP Action Descriptions). However, many other CCMP actions will be directly and indirectly furthered by the cross-cutting nature of the projects. The FY22-23 BIL Work Plan activities have been thoughtfully designed to factor in a broad array of equity and climate resilience benefits, while also addressing the SMBNEP CCMP top four priorities and seven overarching goals. Future SMBNEP BIL reporting will include metrics addressing implementation of equity and climate resilience goals, including the Justice40 targets.

SMBNEP BIL Work Plan Structure

The FY22-23 SMBNEP BIL Work Plan describes the projects expected to exhaust the FY22-26 BIL funding. Section III (SMBNEP BIL Work Plan Activities) provides project descriptions for eight projects selected to further CCMP implementation and address NEP BIL funding priorities. Project descriptions include a project summary; background; whether the project is new or ongoing; objectives; outcomes; project leads; partners; outputs and deliverables; connections to CCMP, CMP, and NEP BIL priorities; timelines; and funding amounts.

Section IV (Estimated Budget and SMBNEP Entities Staffing) provides a two-year budget and staffing breakdown per USEPA requirements for FY22 and FY23. Appendix A (SMBNEP BIL Work Plan Activities Summary Table) provides a snapshot of major project components. Appendix B (CCMP Action Descriptions) includes the primary SMBNEP CCMP actions supported by the FY22-23 BIL Work Plan activities.

III. SMBNEP BIL Work Plan Activities

This section describes eight projects for BIL funding beginning in FY22 and continuing through FY23 (1 October 2021 to 30 September 2023). Projects are listed in the order of CCMP actions that they implement (see Appendix A for the SMBNEP BIL Work Plan Activities summary table; see Appendix B for CCMP Action descriptions).

Projects indicated as “new” are those that are not currently underway, but which further the goals and actions of the CCMP Action Plan. “Ongoing” projects are those that are continuations of current activities explicitly identified in the CCMP Action Plan. Outcomes can be thought of as long-term environmental changes or other benefits, including benefits to underserved communities, resulting from such efforts. Outputs and deliverables refer to work products associated with an activity or effort that are produced over a specific period of time.

Each project identifies the CCMP actions and NEP BIL priorities it implements as well as the CMP indicators the project informs, where applicable. Potential project partners, anticipated timelines, and funding amounts are identified and will be further refined in future BIL Work Plans.

The total funds identified in this Work Plan for BIL expenditure are in excess of the $4,549,000 available to the SMBNEP. The estimated costs associated with the projects are $4,875,000. The $326,000 overage will need to be developed from other funds or intangible changes in expenses may widen or narrow this gap for a given or across other projects. Annual BIL Work Plan budgets will specify costs for these projects and ensure the proper expenditure of the BIL funds to a cumulative value of no more than $4,549,000.

1. Palos Verdes Kelp Restoration Project

Giant kelp forests grow from rocky reefs, providing a three-dimensional structure that supports over 700 species of algae, invertebrates, fishes, mammals, and birds. Numerous stressors have reduced the extent and quality of the giant kelp forests in Santa Monica Bay, leading to loss of fishing, recreation, and ecological integrity. The cumulative impact of these stressors often results in the establishment of urchin barrens. Urchin barrens have greatly reduced productivity and diversity when compared to resilient kelp forests. Giant kelp forests strongly affect the ocean waters and the adjacent coast, locally mitigating climate change factors associated with ocean acidification, and coastal erosion from sea level rise and increased storminess.

The Palos Verdes Kelp Restoration Project is internationally recognized as one of the largest and most successful projects of its kind. A consortium of biologists, fishermen, and academic researchers have spent over 10,000 hours SCUBA diving to restore and study the resulting kelp forest off the Los Angeles coastline. Kelp forests deliver benefits to the entirety of our coast and coastal ocean. For more than 10,000 years, humans have relied on this often-forgotten forest for sustenance and inspiration. This project allows us to maintain this legacy.

Phase: Continuation of an ongoing project

Objectives:

- Restore stands of giant kelp, other macroalgae, and plants to rocky reefs off the Palos Verdes Peninsula by reducing sea urchin densities. Focal areas are White Point, Point Fermin, and Underwater Arch Cove.
- Indirectly benefit fishing and subsistence fishing in these locales through the increase in biomass of marine fishes and invertebrates.
- Mitigate climate change related stressors on local scales by elevating pH, reducing current velocities, reducing wave energy, and providing drift kelp and wrack to other coastal areas.
- Inform global coastal management efforts.

Anticipated Long-term Outcomes:

- Increases in biomass of algae, invertebrates, and fishes.
- Increase in individual condition of sea urchins.
- Increase in giant kelp canopy, and grazing opportunity.
- Expansion of carbon sequestration pathway via giant kelp growth.
- Increase in condition and extent of functioning giant kelp forest habitat.
- Increase in fishing and recreational opportunities.

Website: TBF Palos Verdes Kelp Forest Restoration

Article: National Geographic – California Critical Kelp Forest are Disappearing in a Warming World. Can They Be Saved?

Video: Veteran Special Forces Divers Restore Kelp with TBF and NFL

Project Component	Project Details
Lead	TBF
Potential Partners	Southern California Marine Institute, Montrose Settlements Trustees, Occidental College Vantuna Research Group, California Sea Urchin Harvesters, California Department of Fish and Wildlife, California Ocean Protection Council, Central Region Kelp Survey Consortium, SeaTrees, Smog City Brewery
Anticipated Outputs / Deliverables	• Identification and mapping of restoration site. • Pre-monitoring of restoration site. • Restoration of site. • Post-monitoring of restoration site, e.g., Kelp forest community surveys of restored site, and urchin gonad index, (conducted annually). • Production and distribution of annual report detailing efforts and results to date. These efforts applied to eight acres of rocky reef at Point Fermin that historically supported kelp forest. Related efforts at White Point and Underwater Arch Cove, approximately five acres.
Connection to CCMP Action Plan	Action #2 – Restore Kelp Forests
Connection to CMP	Rocky Reef Indicators: Kelp Canopy Coverage / Urchin Barren Extent, Fish Production, Water Temperature Change
Connection to NEP BIL Priorities	Restored kelp forests off Palos Verdes provide increased fishing opportunity and recreational benefits associated with fishing (sport, commercial, and subsistence), wildlife viewing, snorkeling, SCUBA diving, and tidepooling. Wrack accumulation in the rocky intertidal and sandy shores provides a valuable food source for intertidal organisms and migrating birds. The accumulation of wrack is a foundational component of beach foredune development. Once established these dunes can retain sediment, recover naturally from storm events, thereby reducing coastal erosion associated with wave runup while providing habitat.
Estimated Timeline	2022-2025
BIL Request	$500,000
Estimated Total Project Cost	$1,050,000

"I can only compare these great aquatic forests… with the terrestrial ones in the intertropical regions. Yet if in any country a forest was destroyed, I do not believe nearly so many species of animals would perish as would here from the destruction of the kelp."

Charles Darwin, Voyage of the Beagle. Tierra del Fuego 1834

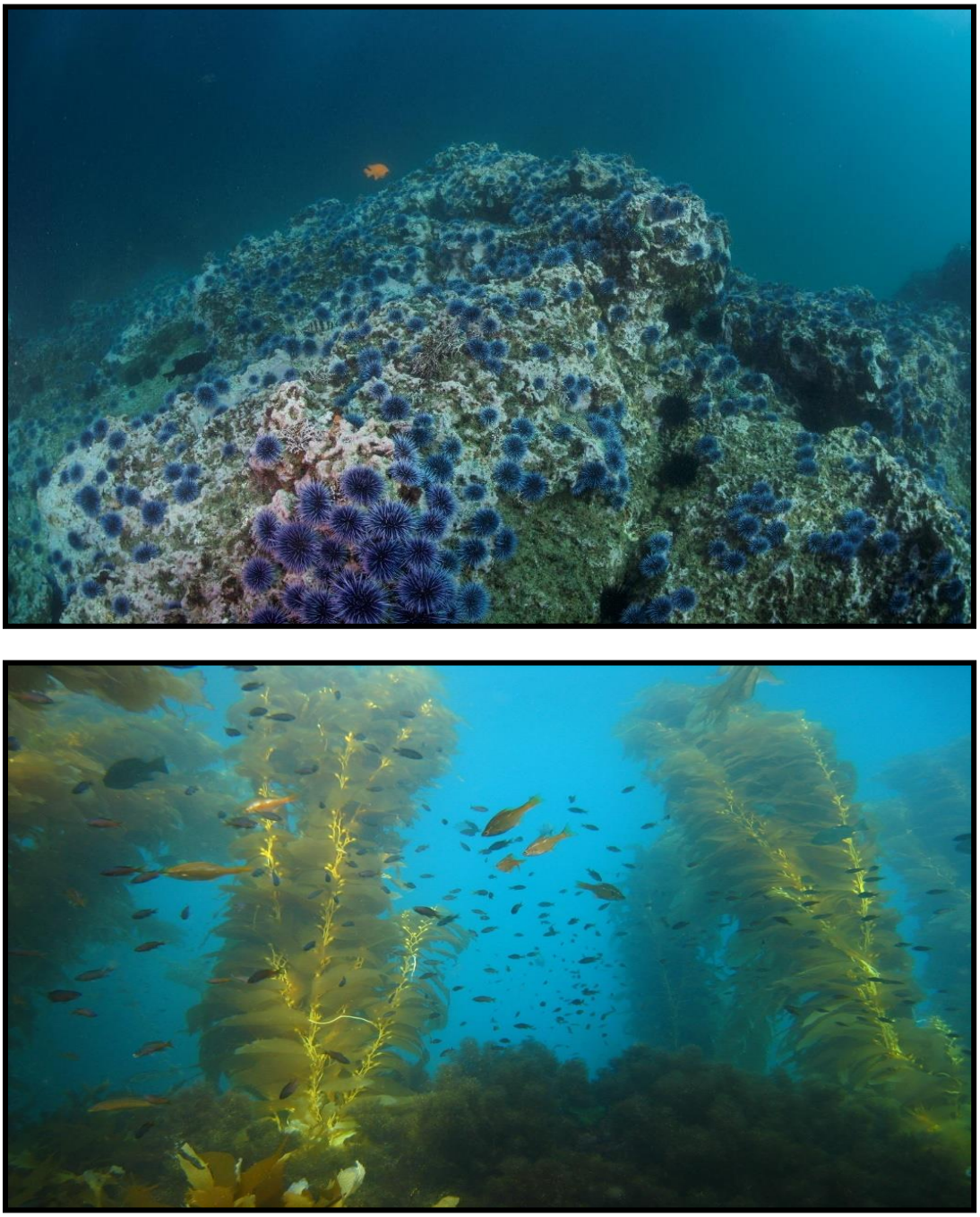

Figure 1. Rocky reef habitat as urchin barrens pre-restoration (top) and as kelp forests (bottom).

2. Palos Verdes Abalone Restoration Project

Seven species of abalone, black, white, pink, red, pinto/threaded, flat and green persist in southern California despite precipitous declines due to overharvest, disease, and other factors. Fisheries for these species were closed in southern California in 1997. Two of these species are federally listed as endangered, requiring active management to support their recovery within their natural range. These abalone live on rocky reefs and in the rocky intertidal where they graze on algae while hiding from predators and sometimes the sun, in crevices.

Abalone are ecosystem engineers that compete for food and space with sea urchins and other benthic life forms. When present in significant numbers the reefs they inhabit are more diverse, support less sediment and resultantly lead to improved water quality. Actively outplanting abalone to the rocky reefs off Palos Verdes will aid in long term resilience of our kelp forest-rocky reef systems. Long term goals include, reestablishing the millennia old traditions of sustainable harvest of abalone for food, ceremony, and to reacquire lost cultural connections.

Partners involved in this project will continue to develop and test improved methodologies for raising, and spawning abalone to increase their numbers in commercial abalone farms and within research facilities. Thousands of abalone will be produced, grown, transported, and conditioned for their outplanting to the ocean. Once placed onto the reefs off our shores these abalone will be protected while they acclimate to their natural environment and eventually released. Scientific monitoring will continue to inform the success of these efforts, to adapt and maximize their effectiveness.

Phase: Continuation of an ongoing project

Objectives:

- Restore populations of red and white abalone to the Palos Verdes peninsula.
- Generate thousands of viable abalone for outplant.
- Maintain and provide excellent captive environments for the growth and development of the abalone.
- Establish and maintain needed infrastructure, on the sea floor, to transition the abalone to life in the wild.

Anticipated Long-term Outcomes:

- Improve ecosystem structure and function of kelp-rocky reef systems off the Palos Verdes Peninsula through the establishment of viable populations of abalone.
- Apply findings of the efforts to refine and create best practices for the rearing, spawning and growth of white abalone in order save them from extinction.
- Reestablish fisheries for abalone in Santa Monica Bay and elsewhere in the Southern California Bight.

Website: TBF Abalone Restoration Program

Articles: [Los Angeles Times – Can the long-lost abalone make a comeback in California?]

[OC Register – 11,000 baby abalone will be planted at a secret spot off the Southern California coast]

Video: [Los Angeles Times – Saving White Abalone is a Scientific Puzzle]

Project Component	Project Details
Lead	TBF
Potential Partners	National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Southern California Marine Institute, California Department of Fish and Wildlife, Paua Marine Research Group, Aquarium of the Pacific, Cabrillo Marine Aquarium, Bodega Marine Lab UC Davis, The Cultured Abalone Farm, Native American Tribal Organizations
Anticipated Outputs / Deliverables	• Establish outplant site, conduct biological monitoring, deploy, maintain and download sensors for physical and chemical parameters i.e., temperature and dissolved oxygen. • Purchase, construct and deploy outplant modules and time series cameras. • Purchase and cultivate red abalone for outplant. • Support abalone during one-month adaptation period. • One to two outplants annually for two to four years. 6,500 to 10,000 abalone outplanted over the entirety of the project.
Connection to CCMP Action Plan	Action #3 – Recover Abalone Populations
Connection to CMP	Rocky Reef Indicators: Invertebrate Indicator Species, Landslides and Sedimentation, Turbidity / Light Penetration, Water Temperature Change, Invertebrate Recruitment
Connection to NEP BIL Priorities	Several climate change related factors can impact kelp forest-rocky reef systems. Data collected from this effort will help inform changes in water temperature and pH. Abalone, as ecosystem engineers when in sufficient abundance, aid in the ecosystem structure and function of the kelp forest-rocky reef system. This ecological lift leads to increased resiliency in the face of climate change related stressors.
Estimated Timeline	2022-2026
BIL Request	$300,000

Project Component	Project Details
Estimated Total Project Cost	$350,000

Figure 2. Abalone in rocky reef habitat (top left) and an outplanting enclosure (top right). A diver surveys abalone (bottom left). Microscopic development of abalone (bottom right).

3. Santa Monica Breakwater Rocky Intertidal Preserve

This project creates an adaptable intertidal system and neighboring subtidal habitat that will provide refuge from existing stressors, allow for the study of rocky intertidal dynamics, as well as testing and trials of materials, aspects, and design for intertidal / subtidal enhancement. Results of these efforts will help inform the creation of living breakwaters along other exposed sections of the southern California coastline.

This program would provide protection for the Santa Monica Pier and coastal infrastructure from sea level rise and storm events. The pier is a prominent and highly valued coastal asset, used by communities throughout Los Angeles and the world, receiving millions of visitors annually. The pier supports tourism, education, and sport and subsistence fishing. This project would enhance the natural resources neighboring the pier adding to the recreational/educational landscape and contribute to increased fishing opportunity for fishers.

Rocky Intertidal: The rocky intertidal is a dynamic habitat dominated by marine organisms that is variably submerged, washed, splashed, sprayed, or left to dry depending on the exposure, elevation, tides, waves, and storms. The rocky intertidal is often recognized by tidepools, mussel colonies, and expanses of a diversity of life that attracts many visitors. “An incredibly high number of local-residents and tourists flock to these locations for the opportunity to see marine life in its natural state.” Peter Raimondi et al., 2022, Assessment *of Rocky Intertidal habitats for the California Marine Protected Area Monitoring Program*. In the same report, Dr. Raimondi reminds us of the impacts of this intense visitorship including overexploitation, pollution, and habitat alteration. Climate change related stressors include warmer waters and temperatures, sea level rise, increased storminess, and ocean acidification. In addition, extensive mapping by the MARINe, (Multi Agency Rocky Intertidal Network) defines the extent of rocky intertidal habitat for the entire state of California to be roughly five square kilometers. In summary the rocky intertidal is loved, vulnerable and one of the rarest habitats in the state.

Phase: New project

Objectives:

- Provide conservation for rocky intertidal organisms from current stressors related to trampling and picking (overexploitation).
- Provide current and ongoing protection to rocky intertidal organisms from climate change related stressors i.e., warmer temperatures, warmer water, increasing storminess, and sea level rise.
- Increase extent of rocky intertidal habitat in Santa Monica Bay.
- Increase the height and structure of the breakwater to better protect nearshore resources e.g., the pier, parking lots, lifeguard headquarters, muscle beach, volleyball courts, sandy beach, restaurants, amusement park, fishing decks, and public aquarium.
- Develop an adaptable intertidal landscape/platform for monitoring, experimentation, research, and education.

Anticipated Long-term Outcomes:

- Conservation of rocky intertidal organisms.
- Coastal protection from sea level rise, increased storminess and coastal flooding.
- Enhanced wildlife viewing, research, education, and fishing opportunity.

Video: [Santa Monica Pier Collapse News Coverage, 1983]

Project Component	Project Details
Lead(s)	TBF, City of Santa Monica,
Potential Partners	Vantuna Research Group, Southern California Marine Institute, State Coastal Conservancy, California Coastal Commission, California State Parks, MARINe, UCLA, LMU, Cal Poly Pomona, Ocean Protection Council, California Department of Fish and Wildlife
Anticipated Outputs / Deliverables	• Conduct outreach and develop partners. • Conduct environmental monitoring to inform design, engineering, and environmental planning. • Identify lead agency and support development of EIR and associated processes for permitting. • Contract for materials and construction. • Monitor establishment and trends of the resulting intertidal community.
Connection to CCMP Action Plan	Actions #5 – Assess and Implement Offshore Artificial Reefs; #38 – Monitor Rocky Intertidal Habitats
Connection to CMP	Rocky Intertidal Indicators: Area of Rocky Intertidal Habitats, Response to Human Disturbance, Biodiversity Survey, Invasive Species, Presence of Disease, Habitat Change Due to Sea Level Rise, Temperature change, Increased Storminess
Connection to NEP BIL Priorities	Underserved community members benefit from the increased sustainability of the pier structure, increased opportunity for wildlife viewing, and access for fishing. The breakwater would provide protection for the Santa Monica Pier and coastal infrastructure from sea level rise and storm events.
Estimated Timeline	2022-2027
BIL Request	$1,400,000
Estimated Total Project Cost	$5,600,000

Figure 3. Breakwater protecting Santa Monica Pier (top; courtesy of Calisphere, October 24, 1936). The proposed project would enhance the poorly maintained breakwater to better protect Santa Monica Pier from storm damage, such as that from a 1983 storm (bottom; credit: Santa Monica Pier Collapse News Coverage, 1983).

4. Venice - Marina Del Rey - Playa del Rey Foredune Beach Restoration Project

Several beach dune projects have been created in the past years along the Los Angeles coastline. These projects serve to create small dunes using native vegetation, increasing the ability of the project site to retain sand, captured by the leaves, branches and roots of the plants. These living shorelines benefit wildlife and enhance the visitor experience while forming a beach ecosystem that is resistant to erosion and sea level rise.

This adaptation to rising sea levels and stormier oceans will protect key infrastructure for beach visitors from across the world and across Los Angeles. The sites proposed in this project are some of the more vulnerable to sea level rise and erosion based upon widely applied models for coastal flooding.

Foredune Beach Restoration: Plants specially adapted to the intense wind, salt spray and sunshine naturally inhabit the shoreline, often just above high tide. These project(s) would involve seeding the beach with these native plants and keeping trucks, other vehicles and limiting human presence while these plants germinate and mature. The methods are very direct with the installation of post and rope and / or sand fencing to delineate the boundary followed by seeding. Project sites can be established within a few weeks. Throughout the creation process research, monitoring and education can occur to elucidate the many changes to the beach from the growth and expansion of the plants.

Phase: New project

Objectives:

- Work with community members to determine potential sites.
- Conduct pre-restoration surveys.
- Install post and rope / sand fencing.
- Seed the area to grow an assemblage of native foredune plants.
- Monitor the site post restoration to quantify the changes and presence of species of interest.
- Inform adaptive management.
- Create and implement an educational program.

Anticipated Long-term Outcomes:

- Volumetric increase in sand captured and retained within and neighboring the project footprint.
- Vertical height increases and small foredune establishment.
- Attraction of wildlife to the project site for roosting, foraging, nesting.
- Elevated awareness for need and approach to coastal adaptation for sea level rise, increased storminess, and coastal erosion.

Website: ***Our Beautiful Planet-Saving Our Shores*** USGS Scientists on why we need to act now to address sea level rise

Project Component	Project Details
Lead	TBF
Potential Partners	Los Angeles County Department of Beaches and Harbors, Los Angeles County Lifeguards, The Venice Oceanarium, Los Angeles Audubon Society, LA Conservation Corps, local schools, Boys and Girls Club, Surfrider Foundation
Anticipated Outputs / Deliverables	• Establish partners. • Conduct outreach. • Define scope and scale of the project. • Contract for seed and plant propagation. • Conduct baseline site characterization. • Install and maintain site infrastructure to allow for germination and growth of the plants. • Conduct annual monitoring and maintenance of the site.
Connection to CCMP Action Plan	Action #6 – Restore Healthy Beaches
Connection to CMP	Sandy Shores Indicators: Habitat Protection, Beach Management Practices, Shoreline Erosion / Topography Change, Coastal Flooding, Hazard / Disturbance Response
Connection to NEP BIL Priorities	Protection of coastal access to the Venice Fishing Pier, ADA access to the pier, surf breaks to the north and south of the pier, beach parking lots, and first responder access along the southern aspect of Venice beach. Provides climate resilience through adaptation to rising sea levels and stormier oceans at sites vulnerable to sea level rise and erosion.
Estimated Timeline	2023-2026
BIL Request	$350,000
Estimated Total Project Cost	$500,000

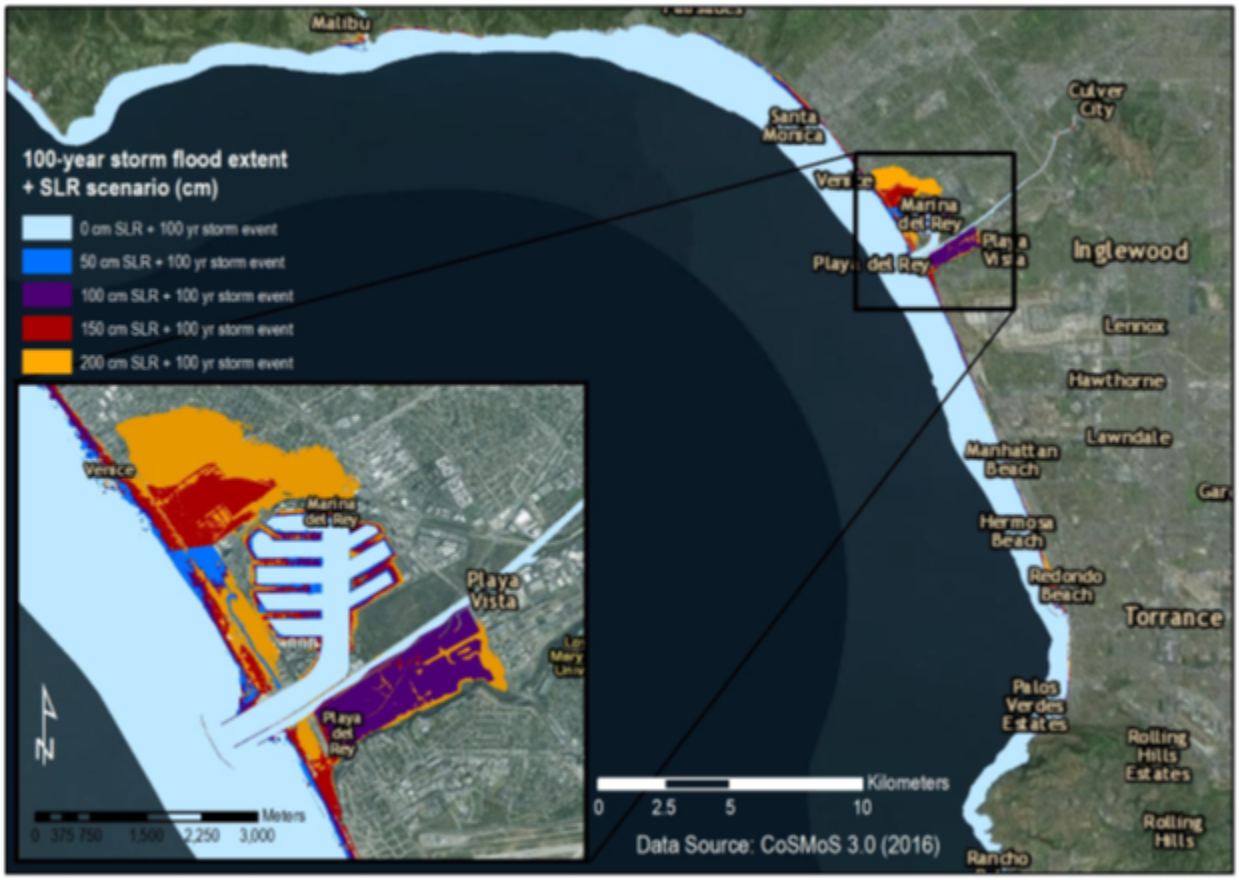

Figure 4. 100-year storm flood extent and sea level rise scenarios for Santa Monica Bay region from the 2016 Climate Change Vulnerability Assessment of the SMBNEP (Data Source: CoSMoS 3.0 2016).

5. Adamson House Living Shoreline Project

The Adamson House at Malibu State Beach is listed on the National Register of Historic Places (NRHP) and designated as a California State Historical Landmark No. 966, and the property is situated upon the separately listed NRHP ethnographic Chumash village of Humaliwo. Due to changing watershed, lagoon, and beach dynamics, both of these historical and culturally significant properties have been facing increasing erosion since 2018. This has resulted in the loss of portions of the estate, exposure of archaeological midden deposits and underlying infrastructure, and has degraded ecosystem services in the greater area. The risk of further damage is now imminent.

This proposed project would implement and construct a “living shoreline” along Malibu Lagoon State Beach and the Adamson House, using drift logs, cobble and sand that is native to the Santa Monica mountains and found on site (see attached draft design to address the fluvial and coastal erosion). The goal of this project is to address both fluvial and coastal erosion, protect cultural resources, enhance coastal recreation, and buy time for the next crucial phase of adaptation planning (removing Rindge Dam to restore natural sediment transport). This proposed project aligns well with several State and Federal Strategic Plans and would advance the objectives to fund and promote feasible nature-based solutions through innovative and transferable pilot projects and demonstrate the efficacy of proactive adaptation measures across the state.

Since 2019, State Parks, working with Integral Consulting, has been developing designs, technical reports, and meeting with regulatory agencies to complete the necessary environmental review to receive permits through the full regulatory process. Permit applications have been filed with the City of Malibu as the lead permitting agency in March of 2022, and this project already has support and buy-in from key community constituents and stakeholders. This project to date has been funded by State Parks through support of the Adamson House Foundation and is currently under contract through the State Coastal Conservancy to begin moving through the permitting process. However additional funding for permitting, environmental review and construction is necessary. Pending funding and upon the completion of technical studies and ongoing outreach, this project is expected to be “shovel ready” in early 2024 if funding is secured. Adding value to the State, this proposed project will also leverage partner collaborations with SMBNEP and Cal State University Channel Islands (CSUCI) to develop a monitoring program to track the performance of this living shoreline construction, providing a valuable blueprint for adaptation project implementation throughout the Country.

Dynamic Cobble Berm: Cobble berms are natural features of many beaches and during high wave events these cobble berms dissipate wave energy and drain wave wash through the relatively large gaps between the cobbles. These complimentary effects reduce the frequency of wave overtopping, and erosion of beach sand seaward of the berm. Design and construction of a cobble berm at the Adamson House will help diffuse seawater across a slope, reducing wave energy that is currently unimpeded. The complimentary processes of diffusion and low energy return will better protect and promote existing features and future use of the site.

Phase: New project

Objectives:

- Design and install a dynamic cobble berm and associated tree sections to provide resiliency to Surfrider beach and the back beach area abutting the Adamson House property.
- Monitor and inform the installation over several years to understand the changes resulting from the creation of the berm and its features.
- Conduct outreach to the public, interested groups and stakeholders to establish a regional appreciation for cobble berms as an adaptation to sea level rise, coastal erosion, and coastal flooding.

Anticipated Long-term Outcomes:

- Address fluvial and coastal erosion, protect cultural resources, and enhance coastal restoration.

Appendix C: **Similar Projects Completed by Integral Consulting, Inc.**

Project Component	Project Details
Lead(s)	State Parks, TBF, Integral Consulting Inc.
Potential Partners	City of Malibu, Native American Tribal Organizations, Surfrider Foundation, RCDSMM, Sea of Clouds, Save the Waves, Adamson House Foundation, Malibu Surfing Association, Los Angeles County Department of Beaches and Harbors, California Coastal Commission, State Coastal Conservancy
Anticipated Outputs / Deliverables	• Establish partnerships. • Conduct outreach. • Inform environmental design, engineering, and monitoring. • Support environmental planning and permitting. • Source and purchase materials for site modification, e.g., cobbles, trees, plants. • Support contracting and construction.
Connection to CCMP Action Plan	Actions #6 – Restore Healthy Beaches; #12 – Restore Small Coastal Lagoons
Connection to CMP	Sandy Shores Indicators: Anthropogenic Infrastructure / Beach Hardening, Habitat Protection, Beach Management Practices, Shoreline Erosion / Topography Change, Coastal Flooding, and Hazard / Disturbance Response

Project Component	Project Details
Connection to NEP BIL Priorities	This project will protect valuable artifacts associated with the midden deposits of the Chumash Village of Humaliwo and enhance beach access for millions of people annually from many communities in the Los Angeles region as well as visitors from around the world. This protection from coastal erosion will provide increased climate resilience for the future.
Estimated Timeline	2022-2025
BIL Request	$750,000
Estimated Total Project Cost	$1,200,000

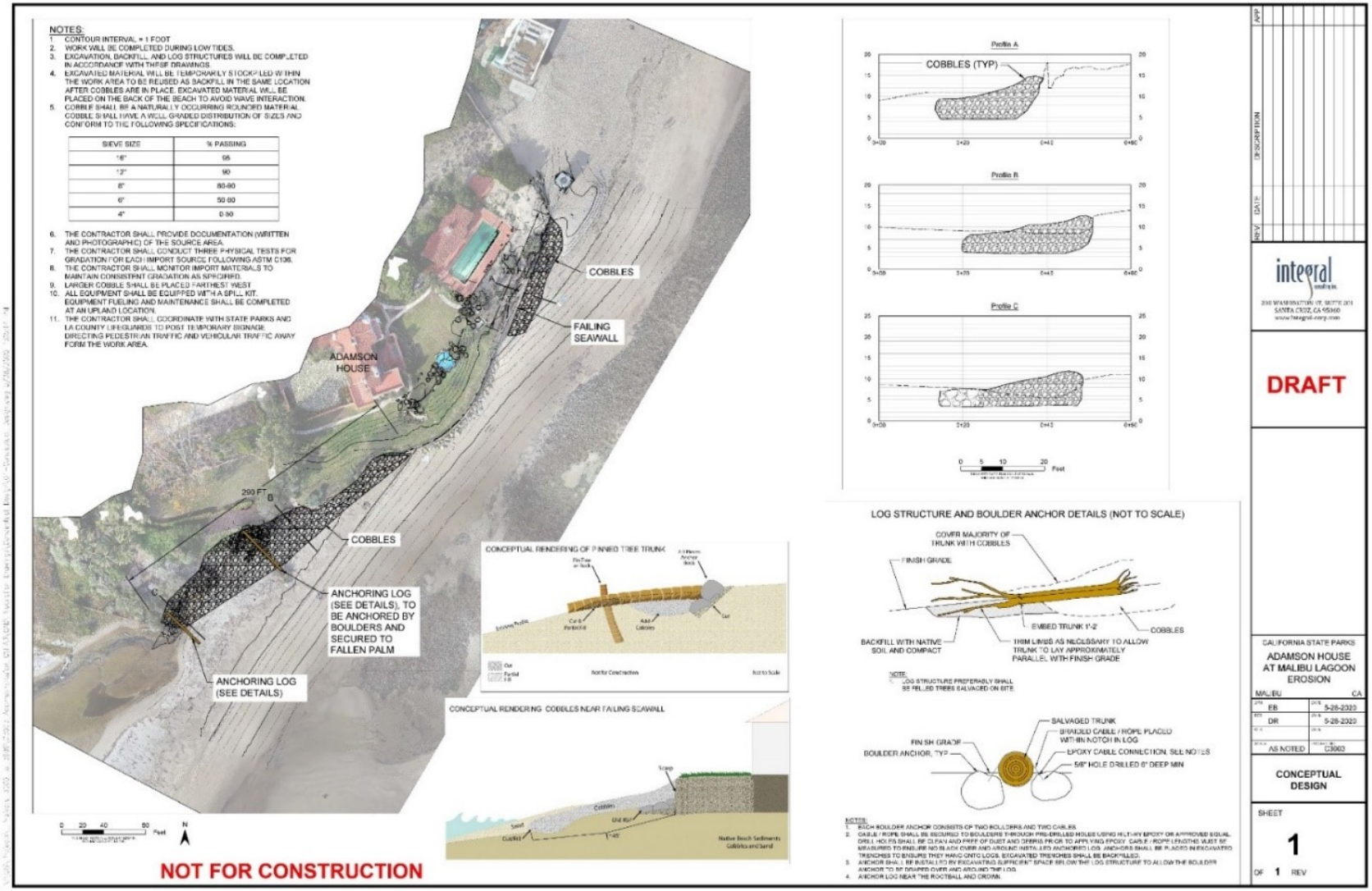

Figure 5. Draft conceptual design of a cobble berm at the Adamson House

6. Beach Management Certification Project

The direct and indirect impacts of beach management practices can result in deleterious effects to coastal ecosystems. Heavy equipment is often used to manage beaches in southern California, and beyond, to enhance the visitor experience and protect coastal infrastructure. These practices include but are not limited to, beach grooming, the placement and service of waste receptacles, formation and maintenance of seasonal berms, construction and maintenance of coastal access features, lighting, sweeping, parking lots, and infrastructure utilized by first responders.

This project will provide web-based materials, training modules, and testimonials to inform current and prospective beach managers and practitioners to identify, understand and operate in an ecologically contextual approach to coastal management. This effort will be directly supported by the decades of partnership building, research, and resultant best practices recommended of the Beach Ecology Coalition.

These recommendations are the result of extensive information exchange and research. Many coastal mangers utilize and further refine these preferred approaches to maintain highly acceptable experiences for the public visitors to southern California beaches. This effort would seek to further institutionalize the best practices of beach managers to ensure public safety, ecological integrity, and create a coastal landscape resilient to climate change.

Phase: New project

Objectives:

- Capture and catalyze the work of the Beach Ecology Coalition to generate an online interactive certification program to promote ecologically and climatologically appropriate approaches to beach and coastal management.

Anticipated Long-term Outcomes:

- Maintain high quality experiences for coastal visitors.
- Increase the adaptive capacity of beaches and other prominent coastal features to withstand climate change stressors associated with sea level rise and increased storminess.
- Reduce the likelihood of pervasive and damaging coastal erosion while increasing ecological services through the institutionalization of best practices to enhance living shoreline infrastructure.

Website: beachecologycoalition.org

Project Component	Project Details
Lead(s)	Beach Ecology Coalition, TBF
Potential Partners	State Parks, Los Angeles County Department of Beaches and Harbors, American Shore and Beach Preservation Association, Pepperdine University, Loyola Marymount University, Local municipalities
Anticipated Outputs / Deliverables	• Establish partners. • Identify and organize advisory team. • Establish memorandum of understanding. • Define and create curricula. • Support website design. • Host website.
Connection to CCMP Action Plan	Actions #6 – Restore Healthy Beaches; #25 – Support BMPs, Public Access, and Improved Trail Systems
Connection to CMP	Sandy Shores Indicators: Anthropogenic Infrastructure / Beach Hardening, Habitat Protection, Beach Management Practices, Shoreline Erosion / Topography Change, Coastal Flooding, and Hazard / Disturbance Response
Connection to NEP BIL Priorities	Refine best beach management approaches to increase the adaptive capacity of beaches in the Los Angeles region to respond to climate change.
Estimated Timeline	2023-2026
BIL Request	$175,000
Estimated Total Project Cost	$325,000

7. Black Surfers Collective: Diversity in the Line Up

"Look, anytime you try to talk about diversity in surfing, it all boils down to access." "Sure, there could be more welcoming attitudes at the beach itself, but also just getting to the beach is expensive. Surf equipment is expensive. Lunch at the beach is expensive. But once we get minority and inner-city kids to the beach and get them in the water they have fun. They're hooked." Jeff Williams, co-president Black Surfers Collective (BSC; Stirring the Melting Pot, Surfer Magazine June 2, 2018).

The programs and services provided by the BSC directly remove barriers that limit beach visitorship for underserved community members. Through their network of partners BSC supports swim lessons, water safety, and cultural and environmental awareness. BSC acknowledges, by leveraging swim lessons for families to swim together and by providing transportation in the neighborhoods where our target demographic resides, we create an atmosphere of safe, fun, water exploration. With this newly founded appreciation for water-based recreation we are grooming future generations of stewards willing to protect what they have come to love and feel welcome in coastal settings.

In 1976 the California State Legislature recognized, in the precedent setting Coastal Act, that: "The California coastal zone is a distinct and valuable natural resource of vital and enduring interest to all the people and exists as a delicately balanced ecosystem." The Act further states in two of five basic goals to: "Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state." And "Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resources conservation principles and constitutionally protected rights of private property owners."

Phase: New project

Objectives:

- Remove barriers to coastal access for underserved community members by providing, swim, and surf lessons, and transportation.
- Develop and implement environmental and cultural awareness for surfing BIPOC community.
- Advance fulfillment of goals of the California Coastal Act.

Anticipated Long-term Outcomes:

- Increase acceptance of surfing with BIPOC communities.
- Get kids "hooked" on going to the beach.

Websites: **BSC**, **The Surf Bus Foundation**

Project Component	Project Details
Lead(s)	BSC, Surf Bus Foundation
Potential Partners	Color the Water, Heal the Bay, E-tech Surfboards
Anticipated Outputs / Deliverables	• Contract with BSC to provide and support swimming and surfing lessons, transportation, educational materials, and website development. • Support summer camp programs for underserved youth from Los Angeles.
Connection to CCMP Action Plan	Actions #25 – Support BMPs, Public Access, and Improved Trail Systems; #28 – Support Disadvantaged Communities
Connection to CMP	NA
Connection to NEP BIL Priorities	Create and enhance visitorship experiences for underserved community members and provide educational opportunities to explore coastal resilience.
Estimated Timeline	2022-2026
BIL Request	$1,000,000
Estimated Total Project Cost	$1,000,000

Figure 6. Left image: Jeff Williams (left) and Greg Rachal (right), co-presidents of Black Surfers Collective (BSC), in 2013 testifying on AB 976 regarding the California Coastal Act of 1976. Right image: Logo for BSC.

8. Coastal Access and Beach Visitor User Data Study

Local, regional, state, and federal managers must better understand public beach use by underserved and underrepresented communities and the barriers and constraints that prevent full access to develop equitable coastal beach access programs, projects, sites, and facilities. TBF, working with several local and regional partners, including Los Angeles County Department of Beaches and Harbors, the Mountains Restoration and Conservation Authority (MRCA), CSUCI, and the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON), and other cooperating agency partners, have initiated efforts to collect contemporary data on beach use which can fill an important data and research gap, focusing on cell phone location data.

The data can help planners and stakeholders alike to better understand public use of the beach by visitors. TBF, and its partners, are requesting funding to acquire, analyze, validate, and report on cell phone location data for all beach access locations within Los Angeles County, this effort captures data on all users, with a specific focus of the work to identify areas and sites that are frequented by residents of underserved communities.

The methodology and approach to this work is being adapted from efforts by the Narragansett Bay National Estuary Program, and USEPA Office of Research and Development. TBF and its partners are currently completing an initial pilot scale analysis of data applied to 50 selected points of interest along the coastline of Santa Barbara County, Ventura County, and a selected portion of Santa Monica Bay. Importantly, we have partnered with USEPA staff who proved this concept for the Narragansett Bay Estuary Program (story map here).

This project will enable us to understand where visitors call home and begin to decipher, through survey, the barriers and constraints that prevent fuller public access to the coast. The COVID experience in Los Angeles and surrounding counties within greater southern California has already shown the importance of the beach as a center of community life. Projected climate change impacts for inland areas of Los Angeles County describe increases in heat which will increase the need for refuge along the coast. This study will provide clarity of the region's needs and capacity to support fuller access to the coast in an equitable manner.

Phase: New project

Objectives:

- Acquire multi-year cell phone location data sets, capturing the coastline of Los Angeles County.
- Analyze data illustrating barriers and constraints to full coastal access.
- Design and refine information dissemination pathway(s) i.e., public interface dashboard, to facilitate community planning and support investment.

Anticipated Long-term Outcomes:

- Provide a better understanding of beach and coastal use.
- Inform policy, planning, and decision-making, focused on equitable access, to the coast for underserved and underrepresented communities within the larger Los Angeles Basin and greater Los Angeles region.
- Contribute to data collection, research, analysis, and monitoring efforts.
- Analyze socio-economic information and data focused on coastal public beach access and use by underserved and underrepresented communities.
- Provide and host public interface dashboard for use by public, coastal managers, and related interests.
- Be used to inform requirements related to other investments responsive to the Biden administration Justice40 Initiative.

Project Component	Project Details
Lead	TBF
Potential Partners	BEACON, CSUCI, MRCA, University of California Sea Grant, State Parks, Los Angeles County Department of Beaches and Harbors, City of Los Angeles, Palos Verdes Estates, Rancho Palos Verdes, City of Torrance, City of Redondo Beach, City of Hermosa Beach, City of Manhattan Beach, City of El Segundo, City of Santa Monica, City of Malibu
Anticipated Outputs / Deliverables	• Purchase cell phone data encompassing the coast of Los Angeles County. • Conduct analysis of the data. • Create an online data user interface to allow for public utilization of the dataset. • Conduct social surveys to further inform drivers of beach and coastal user patterns and preferences.
Connection to CCMP Action Plan	Actions #25 –Support BMPs, Public Access, and Improved Trail Systems; #28 – Support Disadvantaged Communities
Connection to CMP	NA
Connection to NEP BIL Priorities	Quantify the use of coastal access and beach locations and other features by members of underserved communities, identify barriers and constraints to fuller use to assist strategies to increase coastal benefits and access for underserved communities.
Estimated Timeline	2022-2024
BIL Request	$400,000
Estimated Total Project Cost	$400,000

IV. Estimated Budget and SMBNEP Entities Staffing

A. Estimated FY22-23 Budget and Scope

This section contains the estimated BIL Work Plan budget and scope for the SMBNEP FY22-23 BIL funds. The budget and scope are associated with a suite of work across eight projects from October 1, 2021 through September 30, 2024. Each of the following eight projects were included in the BIL Work Plan approved by the Management Conference of the SMBNEP in August 2022. Each project addresses at least one of the 44 SMBNEP CCMP Actions.

Submittals for future Annual BIL Work Plans will be generated on an annual basis due before June 1st of a given year. Several of these projects are expected to be ongoing efforts with other costs and deliverables that will be developed during the coming months for consideration and approval by the SMBNEP Management Conference. An Annual BIL Work Plan for FY24 and the BIL Long-Term Plan for the SMBNEP are to be approved no later than June 1, 2023. In addition, an Equity Strategy is to be developed as a central element of the BIL Long-Term Plan.

The needs and requirements of the BIL funding made available to SMBNEP require staffing to support the generation of the program-specific Equity Strategy. The Equity Strategy ensures that each NEP considers how BIL funds are used through the lens of equitable and fair access to project benefits and is required to include the following elements per US EPA's Memorandum:

- Strategy detailing how the NEP will contribute to the goal of at least 40% of BIL funding benefits and investments flow to underserved communities.
- Definition of underserved communities, using the definition in US EPA's Memorandum or an alternative definition developed in collaboration with and approved by US EPA (for details see the US EPA's Memorandum, Defining Disadvantaged Communities, p. 6).
- Baseline (pre-BIL) percentage of NEP funds flowing to projects that benefit underserved communities.
- Analysis of underserved communities that may benefit from NEP projects to identify where additional investments can be made while the implementing CCMP.
- Numeric target for activities supporting underserved communities that contribute to achieving at least 40% of BIL funding benefits to such communities.
- Outline of the path to achieve the goal, which may include projects, locations of activity, milestones, training and outreach needs, capacity building, and interim goals.
- Methods to track benefits to underserved communities, such as expanding adaptive capacity of underserved communities to be resilient to climate change; improving wildlife habitat, addressing water quality challenges or reducing nonpoint source pollution affecting underserved communities; increasing underserved communities' access to recreation; and expanding education and deepened engagement or representation of underserved communities.

PALOS VERDES KELP RESTORATION PROJECT

FY22-FY23 Funding Request (October 1, 2021 through September 30, 2024)	Estimated Costs
Salaries	$103,152.44
Supplies	$3,300.00
Equipment	$0.00
Travel	$15,561.88
Contractors	$97,500.00
Indirect Costs	$31,299.48
Estimated Total	**$250,813.80**

PALOS VERDES ABALONE RESTORATION PROJECT

FY22-FY23 Funding Request (October 1, 2021 through September 30, 2024)	Estimated Costs
Salaries	$27,898.64
Supplies	$11,050.00
Equipment	$25,000.00
Travel	$750.00
Contractors	$26,600.00
Indirect Costs	$13,694.80
Estimated Total	**$104,993.44**

SANTA MONICA BREAKWATER ROCKY INTERTIDAL PRESERVE

FY22-FY23 Funding Request (October 1, 2021 through September 30, 2024)	Estimated Costs
Salaries	$12,500.00
Supplies	$0.00
Equipment	$0.00
Travel	$3,250.00
Contractors	$70,192.50
Indirect Costs	$9,159.37
Estimated Total	**$95,101.87**

VENICE - MARINA DEL REY – PLAYA DEL REY FOREDUNE BEACH RESTORATION PROJECT

FY22-FY23 Funding Request (October 1, 2021 – September 30, 2024)	Estimated Costs
Salaries	$69,926.50
Supplies	$35,381.50
Equipment	$0
Travel	$850.00
Contractors	$46,160.00
Indirect Costs	$22,847.70
Estimated Total	**$175,165.70**

ADAMSON HOUSE LIVING SHORELINE PROJECT

FY22-FY23 Funding Request (October 1, 2021 – September 30, 2024)	Estimated Costs
Salaries	$20,625.00
Supplies	$0.00
Equipment	$0.00
Travel	$0.00
Contractors	$318,750.00
Indirect Costs	$35,625.00
Estimated Total	**$375,000.00**

BEACH MANAGEMENT CERTIFICATION PROGRAM

FY22-FY23 Funding Request (October 1, 2021 – September 30, 2024)	Estimated Costs
Salaries	$28,200.00
Supplies	$6,640.00
Equipment	$0.00
Travel	$4,620.50
Contractors	$115,050.00
Indirect Costs	$34,017.88
Estimated Total	**$188,528.38**

BLACK SURFERS COLLECTIVE: DIVERSITY IN THE LINE UP

FY22-FY23 Funding Request (October 1, 2021 – September 30, 2024)	Estimated Costs
Salaries	$10,000.00
Supplies	$15,000.00
Equipment	$0.00
Travel	$3156.25
Contractors	$125,000.00
Indirect Costs	$22,973.44
Estimated Total	**$176,129.69**

COASTAL ACCESS AND BEACH VISITOR USER DATA STUDY

FY22-FY23 Funding Request (October 1, 2021 – September 30, 2024)	Estimated Costs
Salaries	$30,000.00
Supplies	$175,000.00
Equipment	$0.00
Travel	$0.00
Contractors	$155,000.00
Indirect Costs	$33,750.00
Estimated Total	**$393,750.00**

EQUITY STRATEGY

FY22-FY23 Funding Request (October 1, 2021 – September 30, 2024)	Estimated Costs
Salaries	$8,000.00
Supplies	$0.00
Equipment	$0.00
Travel	$0.00
Contractors	$25,000.00
Indirect Costs	$4,800.00
Estimated Total	**$37,800.00**

B. SMBNEP Entities Staffing

SMBNEP works as a collaborative partnership staffed by The Bay Foundation (TBF) and Santa Monica Bay Restoration Commission (SMBRC) to implement the 2018 CCMP Action Plan via BIL Work Plan implementation. The following section describes the entity affiliations and key responsibilities of each staff member. Staff responsibilities subject to change based on periodic evaluations, organizational needs, professional development, and other considerations.

TBF staff as of 1 September 2022:

Title	Key Responsibilities
Chief Executive Officer	Facilitates the implementation of the CCMP and is responsible for the production of workplans and other documents to implement the CCMP. Oversees NEP budget and staffing supporting and implementing NEP activities. Serves as the director of SMBNEP and as the liaison to the USEPA for the SMBNEP. Leads and contributes to the design and implementation of projects, programs, partnerships, research, and communications to implement the actions and goals of the SMBNEP CCMP / CMP. Informs and develops strategies, policies, and priorities to support SMBNEP and the furtherance of SMBNEP's CCMP, the National NEP program, US EPA Region 9, and EPA Headquarters. Leads the diversification and enhancement of funding streams for TBF. Leads the strategic development of programs, partnerships, and projects; oversees and directs staffing; executes contracts, policies, and management practices; oversees audits and compliance; develops, informs, and implements programs of CRI.
Director of Programs	Supports program development and assists in operational management of TBF programs. Develops projects and programs that advance research, monitoring, and ecological restoration in support of CCMP / CMP implementation. Directs and supports the authorship of technical documents, grant applications, and publications. Supports audits and compliance.
Program and Administrative Assistant	Assists TBF programmatically and administratively. Maintains files and databases. Plans and coordinates administrative processes. Supports meetings and communications. Conducts field work and outreach

Title	Key Responsibilities
Environmental Engagement Program Director	Directs planning and implementation of Environmental Engagement Program. Supervises staff, interns, students and / or volunteers. Oversees production of educational and engagement materials. Manages field work, technical report writing, and outreach. Facilitates stakeholder meetings, trainings, and workshops. Manages organization's social media strategy and stakeholder engagement and communications. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Develops new funding opportunities.
Environmental Engagement Program Coordinator	Coordinates Environmental Engagement Program projects. Supports program development, grant writing, and facilitation of and presentations at stakeholder events/trainings. Develops, designs, and distributes engagement materials and reports. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Supports development of funding opportunities.
Environmental Engagement Program Coordinator	Coordinates Environmental Engagement Program projects. Supports program development, grant writing, and facilitation of and presentations at stakeholder events/trainings. Develops, designs, and distributes engagement materials and reports. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Supports development of funding opportunities.
Ocean Resilience Program Manager	Manages Ocean Resilience Program research, monitoring, and planning. Oversees aquaculture facility operations. Supervises SCUBA and boat based field work. Recruits and supervises staff, interns, students and / or volunteers. Supports the Director of Programs in authorship of technical documents, grant applications, and publications. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Develops new funding opportunities.

Title	Key Responsibilities
Ocean Resilience Project Manager	Manages Ocean Resilience Program research and monitoring efforts, supports aquaculture facility operations, supervises SCUBA and boat based fieldwork; supports recruiting and supervising interns, students and / or volunteers. Supports the program in authorship of technical documents, grant applications, and publications. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Develops new funding opportunities.
Ocean Resilience Program Coordinator	Coordinates Ocean Resilience Program research and monitoring efforts, supports aquaculture facility operations, supervises SCUBA and boat based fieldwork; supports recruiting and supervising interns, students and / or volunteers. Supports the program in authorship of technical documents, grant applications, and publications. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Supports development of funding opportunities.
Ocean Resilience Program Coordinator	Coordinates Ocean Resilience Program research and monitoring efforts, supports aquaculture facility operations, supervises SCUBA and boat based fieldwork; supports recruiting and supervising interns, students and / or volunteers. Supports the program in authorship of technical documents, grant applications, and publications. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Supports development of funding opportunities.
Ocean Resilience Field Technician	Conducts SCUBA and boat based field work. Supports managers with data entry, quality control/assurance, permit notifications, and reporting. Recruits and coordinates scientific diver volunteers. Maintains and enhances aquatic life support systems and performs daily husbandry tasks. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting.

Title	Key Responsibilities
Ocean Resilience Field Technician	Conducts SCUBA and boat based field work. Supports managers with data entry, quality control/assurance, permit notifications, and reporting. Recruits and coordinates scientific diver volunteers. Maintains and enhances aquatic life support systems and performs daily husbandry tasks. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting.
Ocean Resilience Aquarist Technician	Maintains and enhances aquatic life support systems and performs daily husbandry tasks. Monitors water quality and collects data related to animal health. Coordinates with partners to inform, establish, and implement best practices for mariculture operations. Contributes to EPA reporting.
Coastal Adaptation Program Manager	Manages mid and long-term planning of Coastal Adaptation Program. Oversees projects including research, monitoring, and ecological restoration for watershed program activities. Manages field work, lab work, report and technical document writing, outreach, and related tasks. Supervises staff, interns, students and / or volunteers. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Develops new funding opportunities.
Coastal Adaptation Program Manager	Manages mid and long-term planning of Coastal Adaptation Program. Oversees research, monitoring, restoration operations. Manages field work, lab work, report and technical document writing, outreach, and related tasks. Supervises staff, interns, students and / or volunteers. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Develops new funding opportunities.

Title	Key Responsibilities
Coastal Adaptation Program Coordinator	Coordinates Coastal Adaptation Program research, monitoring and restoration activities. Supports managers with data collection, quality control/assurance, and data analyses. Recruits and coordinates interns, students and / or volunteers. Supports the Watershed Program Manager in authorship of technical documents, grant applications, community engagement, and publications. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting. Supports development of funding opportunities. Contributes to EPA reporting.
Coastal Adaptation Program Field Technician	Conducts Coastal Adaptation Program research, monitoring and restoration activities. Supports managers with data collection, quality control/assurance, and data analyses. Supports research / CRI. Contributes to partnership development. Contributes to EPA reporting.

SMBRC staff as of 1 September 2022:

Title	Key Responsibilities
Chief Administrative Director	Coordinate and execute meetings of the Governing Board, Executive Committee, Technical Advisory Committee, and Santa Monica Bay Stakeholders; perform administrative functions associated with SMBRC; oversee grant management of state bond-funded projects; support and collaborate on SMBNEP efforts; coordinate with TBF and SMBNEP partners on reporting, monitoring, and implementation of the CCMP; coordinate with TBF on SMBNEP work plan development, implementation, and progress reporting.
Environmental Scientist	Support the Chief Administrative Director in preparing and executing SMBRC meetings and workshops; track and assist in scheduling presentations related to issues in Santa Monica Bay and its watersheds; conduct grant oversight and management for state bond-funded projects; coordinate with TBF on SMBNEP work plan development, implementation, and progress reporting; and update the SMBRC website with meeting materials and SMBNEP work plans and reports.

Appendix A. SMBNEP BIL Work Plan Activities Summary Table

Project Title	CCMP Action	Timeline	Requested BIL Funds
1. Palos Verdes Kelp Restoration Project	Action #2 – Restore Kelp Forests	2022-2025	$500,000
2. Palos Verdes Abalone Restoration Project	Action #3 – Recover Abalone Populations	2022-2026	$300,000
3. Santa Monica Breakwater Rocky Intertidal Preserve	Action #5 – Assess and Implement Offshore Artificial Reefs Action #38 – Monitor Rocky Intertidal Habitats	2022-2027	$1,400,000
4. Venice - Marina Del Rey - Playa del Rey Foredune Beach Restoration Project	Action #6 – Restore Healthy Beaches	2023-2026	$350,000
5. Adamson House Living Shoreline Project	Action #6 – Restore Healthy Beaches Action #12 – Restore Small Coastal Lagoons	2022-2025	$750,000
6. Beach Management Certification Program	Action #6 – Restore Healthy Beaches Action #25 – Support BMPs, Public Access, and Improved Trail Systems	2023-2026	$175,000
7. Black Surfers Collective: Diversity in the Lineup	Action #25 – Support BMPs, Public Access, and Improved Trail Systems Action #28 – Support Disadvantaged Communities	2022-2026	$1,000,000
8. Coastal Access and Beach Visitor User Data Study	Action #25 – Support BMPs, Public Access, and Improved Trail Systems Action #28 – Support Disadvantaged Communities	2022-2024	$400,000

Appendix B. CCMP Action Descriptions

This section includes the descriptions from the CCMP Action Plan for the following actions supported by the FY22-23 activities in this Work Plan:

- Action #2 – Restore Kelp Forests
- Action #3 – Recover Abalone Populations
- Action #5 – Assess and Implement Offshore Artificial Reefs
- Action #6 – Restore Healthy Beaches
- Action #12 – Restore Small Coastal Lagoons
- Action #25 – Support BMPs, Public Access, and Improved Trail Systems
- Action #28 – Support Disadvantaged Communities
- Action #38 – Monitor Rocky Intertidal Habitats

ACTION #2 – RESTORE KELP FORESTS

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

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

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

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

Lead Entity(ies): TBF
Collaborating Partner(s): SCMI, NOAA, Montrose Settlements Trustees, Occidental College Vantuna Research Group, California Sea Urchin Harvesters, CDFW
SMBNEP Role: Lead

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

ACTION #3 – RECOVER ABALONE POPULATIONS

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

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

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

Several projects have been developed to aid in the recovery and enhancement of abalone including: *Haliotis fulgens* (green), *H. rufescens* (red), and *H. sorenseni* (white). White abalone are a NO!! "Species in the Spotlight," as one of eight species considered among the most at risk of extinction within the United States of America. The White Abalone Recovery Project developed by the National Marine Fisheries Service is part of a statewide collaboration dedicated to the restoration of federally endangered white abalone to the rocky reef habitats of southern California, with the habitat off the waters of Palos Verdes Peninsula as one of the prime locations. Green and red abalone are being used as proxies for white abalone, which allow researchers to develop and refine infrastructure, culturing, outplanting techniques, and evaluate habitat suitability. In addition, both green and red abalone are species of concern. Increasing densities of these species will help recover populations throughout southern California and further the kelp restoration efforts by providing competition for sea urchins. The revival of healthy abalone populations in the Bay has the long-term potential to one day reopen and support commercial and recreational fisheries of abalone.

Lead Entity(ies): TBF
Collaborating Partner(s): NOAA, NMFS, SCMI, CDFW, UC Davis
SMBNEP Role: Lead

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

ACTION #5 – ASSESS AND IMPLEMENT OFFSHORE ARTIFICIAL REEFS

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

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

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

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

Lead Entity(ies): SLC, CDFW, NMFS, SCC, SCMI, NOAA
Collaborating Partner(s): TBF, Vantuna Research Group, Montrose Settlements Restoration Program Trustees
SMBNEP Role: Participate

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

ACTION #6 – RESTORE HEALTHY BEACHES

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

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

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

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

Lead Entity(ies): TBF, Cities of Santa Monica, Malibu, Manhattan Beach, Los Angeles, LACDBH
Collaborating Partner(s): State Parks, USFWS, SCC, Audubon Society (multiple chapters), UCSB, CRI, other interested stakeholders, USGS
SMBNEP Role: Co-Lead

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

ACTION #12 – RESTORE SMALL COASTAL LAGOONS

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

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

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

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

Lead Entity(ies): State Parks, RCDSMM, NPS, CalTrans, Army Corps, City of Malibu
Collaborating Partner(s): SCC, TBF, SMBRC, CRI
SMBNEP Role: Participate

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

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

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

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

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

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

Lead Entity(ies): CCC, SCC, LACDBH, SMMC, RCDSMM, MRCA, coastal cities, State Parks, CalTrans, Metro
Collaborating Partner(s): TBF, CRI
SMBNEP Role: Support

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

ACTION #28 – SUPPORT DISADVANTAGED COMMUNITIES

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

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

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

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

Lead Entity(ies): municipalities
Collaborating Partner(s): TBF, LACDPW, City of LA, LARWQCB, MRCA, Food and Water Watch LA, Heal the Bay
SMBNEP Role: Support

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

ACTION #38 – MONITOR ROCKY INTERTIDAL HABITATS

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

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

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

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

Lead Entity(ies): TBF, CRI, State Parks
Collaborating Partner(s): UCLA
SMBNEP Role: Co-Lead

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

Appendix C. Similar Projects Completed by Integral Consulting, Inc.

Rio Del Mar State Beach Living Shoreline Project – Santa Cruz, CA

Integral working for California State Parks has designed nature-based adaptation strategies to reduce coastal erosion hazards. At Rio Del Mar State Beach in Santa Cruz, CA fluvial processes that reduce the natural buffering capacity of the beach and wave processes were driving coastal erosion that threatened a public restroom and critical sewage pump station. Using a unique approach, Integral guided State Parks away from an expensive emergency revetment into using native materials found along the beach to provide natural protection. The design utilized large driftwood that had accumulated across the State Beach and carefully placed it into an engineered log jam to form the core of a sand dune. Design considerations included public viewsheds, beach access, and easily implemented monitoring elements.

Articles: https://www.santacruzsentinel.com/2022/02/19/living-shoreline-project-launches-at-rio-del-mar-beach/

https://www.integral-corp.com/david-revell-at-forefront-of-nature-based-solutions-in-california/

Surfer's Point Managed Retreat, Ventura, California

Dr. Revell as part of the engineering team provided geomorphic evaluation of the site, input on the engineering and design quantities, and developed the monitoring plan for the Surfer's Point Managed Retreat project, which included the removal of a public parking lot, nourishment of 50,000 cubic yards of cobbles, construction and planting of native dunes, and subsequent monitoring. Actively coordinating with the City of Ventura (on a volunteer basis) to ensure that sand augmentation and monitoring results are consistent with the original design concepts.

Hybrid Cobble and Dune Restoration Project, Cape Lookout State Park, Oregon

Dr. Revell developed an erosion response plan that incorporated dune historical shoreline change analysis, El Niño changes, and geomorphological interpretation for a living shoreline hybrid cobble and dune restoration project to protect Cape Lookout State Park. The project included conceptual design, coastal processes analysis, modeling, construction management, and project monitoring. Led the coastal analysis, modeling, and conceptual design as well as provided onsite construction management of prison labor and developed the initial monitoring plan for construction in 2000. Following completion, the monitoring program was funded by the U.S. Army Corps of Engineers as part of the Section 227 Innovative Shoreline Protection program and the Oregon Department of Geology and Mineral Industries. The living shoreline project remains effective to present day with only small maintenance actions since construction.