The California Ocean Litter Prevention Strategy

Accomplishments Report

January 2018 - August 2025

Sea Grant CALIFORNIA

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NOAA

CALIFORNIA OCEAN PROTECTION COUNCIL

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January 2018 - August 2025

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Acknowledgements & List of Partners

The California Ocean Litter Prevention Strategy Accomplishments Report is the result of a collaborative effort across the state of California. Thank you to all the partners who contributed to OLS implementation*. The OLS community is made up of a variety of partners from nongovernmental organizations (NGOs), academic and research institutions, private businesses, and local, state, and federal government agencies. This collaboration presented a unique opportunity to leverage a mixture of skill sets, knowledge bases, and resources to address marine debris in California communities and ecosystems. A total 111 organizations, listed below, have contributed to and engaged with the Ocean Litter Strategy throughout the last six years.

**For the purposes of this report, "implementation" includes any organization who served as an action lead or partner, submitted progress reports, and/or participated in goal-specific workgroup meetings.*

2NDNATURE
Algalita
Amcor Limited
American Chemistry Council
Bay Area Clean Water Agencies
Bay Area Stormwater Management Agencies Association
Blue Ocean Gear
Bureo Inc.
Cabrillo College
California Association of Sanitation Agencies
California Coastal Commission
California Coastkeeper Alliance
California Cooperative Oceanic Fisheries Investigation
California Department of Fish and Wildlife California Department of Resources Recycling and Recovery
California Department of Toxic Substances Control
California Department of Transportation
California Fish and Game Commission
California Lost Fishing Gear Recovery Project at UC Davis
California Ocean Protection Council
California Polytechnic State University
California Product Stewardship Council
California Sea Grant
California State Lands Commission
California State Parks
California State University Channel Islands Santa Rosa Island Research Station
California State University Council on Ocean Affairs, Science & Technology
California State University Dominguez Hills
California State University Long Beach
California State University Sacramento
California State University San Marcos
California State Water Resources Control Board
Californians Against Waste
City of Long Beach
City of Oakland
City of Pasadena
City of Santa Clara
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EOA, Inc.
Geosyntec
Global Ghost Gear Initiative
Heal the Bay
Hog Island Oyster Company
KCI Technologies
Larry Walker Associates
Litterati
Los Angeles County Sanitation Districts
Los Angeles Regional Water Quality Control Board
Materevolve
Michael Baker International
Monterey Bay Aquarium
Monterey Bay Fisheries Trust
Moore Institute for Plastic Pollution Research
Moss and Mollusk Consulting
National Marine Sanctuary Foundation
National Stewardship Action Council
Net Your Problem
NOAA Channel Islands National Marine Sanctuary
NOAA Marine Debris Program
NOAA Monterey Bay National Marine Sanctuary

Ocean Conservancy
One Cool Earth
Orange County Sanitation District
Pacific Marine Mammal Center
Paddle Out Plastic
Plastic Pollution Coalition
Plastic Recycling Corp. of California
Plastics Industry Association
Quest GeoSystems Management
San Diego River Park Foundation
San Diego State University
San Francisco Baykeeper
San Francisco Estuary Institute
San Francisco Public Utilities Commission
San Francisco State University
Save Our Shores
Save the Albatross Coalition
Save The Waves Coalition
Saving Ocean Wildlife
Southern California Alliance of Publicly Owned Treatment Works
Seabin Project
Sierra Club
Southern California Coastal Water Research Project
Stand Up To Trash
Stanford University
Stormwater Consultant
Surfrider Foundation San Diego Chapter
Surfrider Foundation San Clemente Chapter
Surfrider Foundation New York City Chapter
Surfrider Foundation San Francisco Chapter
Surfrider Foundation Seattle Chapter
Surfrider Foundation Arcata Chapter
The 5 Gyres Institute
The Bay Foundation
The Nature Conservancy
The Watershed Project
Think Beyond Plastic Foundation
U.S. Environmental Protection Agency
U.S. Geological Survey
University of California Merced
University of California Riverside
University of California Santa Barbara
UPSTREAM
WeTap
Zero Waste San Diego

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List of Acronyms

AB: Assembly Bill

ACC: American Chemistry Council

APES: Advanced Placement Environmental Science

BACWA: Bay Area Clean Water Agencies

BASMAA: Bay Area Stormwater Management Agencies Association

BMP: Best Management Practices

CAA: Circular Action Alliance

CalRecycle: California Department of Resources Recycling and Recovery

CARE: Carpet America Recovery Effort

CARP: California Artificial Reef Program

CASA: California Association of Sanitation Agencies

CASG: California Sea Grant

CCR: California Code of Regulations

CDFW: California Department of Fish and Wildlife

CDPH: California Department of Public Health

CFEE: California Foundation on the Environment and the Economy

CINMS: NOAA Channel Islands National Marine Sanctuary

COPA: California Ocean Protection Act

CPRP: Comprehensive Plastics Reduction Program

CPSC: California Product Stewardship Council

CSU: California State University

CTCP: California Tobacco Control Program

DGS: California Department of General Services

DOE: United States Department of Energy

DTSC: Department of Toxic Substances Control

ELAP: Environmental Laboratory Accreditation Program

EPA: Environmental Protection Agency

EPP: Environmentally Preferable Purchasing

EPR: Extended Producer Responsibility

ESRM: Environmental Science and Resource Management Program

FFP: Films and Flexible Plastic

FFRC: Film & Flexibles Recycling Coalition

FGC: California Fish and Game Commission

GESAMP: UN-sponsored Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection

LID BMPs: Low impact development best management practices

MBNMS: NOAA Monterey Bay National Marine Sanctuary

MDMAP: Marine Debris Monitoring and Assessment Project

MDP: Marine Debris Program

MDRP: Marine Debris Reduction Plan

MIPPR: Moore Institute for Plastic Pollution Research

NGO: nongovernmental organization

NGSS: Next Generation Science Standards

NIST: National Institute of Standards and Technology

NMFS: National Marine Fisheries Service

NMSF: National Marine Sanctuary Foundation

NOAA: National Oceanic and Atmospheric Administration

OFH: Ocean Friendly Hotels

OFR: Ocean Friendly Restaurants

OLS: Ocean Litter Strategy

OPC: Ocean Protection Council

OSU: Oregon State University

PRCC: Plastic Recycling Corporation of California

RAMP: Risk Assessment and Mitigation Program

SB: Senate Bill

SCAP: Southern California Alliance of Publicly Owned Treatment Works

SCCWRP: Southern California Coastal Water Research Project

SDRPF: San Diego River Park Foundation

SDSU: San Diego State University

SFEI: San Francisco Estuary Institute

SFSU: San Francisco State University

SOP: Standard Operating Procedure

SWRCB: State Water Resources Control Board

ToMEx: Toxicity of Microplastics Explorer

UC: University of California

UN: United Nations

USCSG: University of Southern California Sea Grant


Photo Credit: NOAA

Introduction

Background on the California Ocean Litter Strategy

California has long recognized marine debris as a problem for its communities, human and ecosystem health, and economy. In 2007, the California Ocean Protection Council (OPC) adopted a resolution on Reducing and Preventing Marine Debris and subsequently published An Implementation Strategy for the California Ocean Protection Council Resolution to Reduce and Prevent Ocean Litter. With the success of this Implementation Strategy and the need for additional research and action on marine debris in California, OPC partnered with the National Oceanic and Atmospheric Administration's Marine Debris Program (NOAA MDP) to lead the development of The 2018 California Ocean Litter Prevention Strategy: Addressing Marine Debris from Source to Sea (Ocean Litter Strategy). This document provided a framework and guidance for OPC, NOAA MDP, and stakeholders across California to effectively address this challenge in a coordinated fashion.

The 2018 Ocean Litter Strategy included **OPC Priorities** (herein OPC Goals) and stakeholder identified goals, objectives, and actions (herein OLS Stakeholder Goals) to address ocean litter. OPC goals were developed by state staff, reviewed by state partners and stakeholders, and implemented by several California state agencies. OPC's Priorities were meant to support and enhance many of the OLS Stakeholder Goals.

OPC Priorities were structured into three goals:

- **OPC Goal 1** – Land-based Ocean Litter: Protect marine ecosystems and the communities that rely on them by promoting policies to prevent litter from reaching the ocean.
- **OPC Goal 2** – Microplastics and Microfibers: Increase understanding of the scale and impact of microplastics and microfibers on the marine environment and develop solutions to address them.
- **OPC Goal 3** – Fishing and Aquaculture Gear: Reduce debris from fishing and aquaculture-related activities in the ocean.

The **OLS Stakeholder Goals** were developed by a wide range of stakeholders across California including grassroots organizations, fishermen, scientists, wastewater treatment managers, and the plastics industry. These goals were implemented by organizations that volunteered to lead or contribute to specific actions and others that joined in later during the implementation phase (see Acknowledgements & List of Partners). With an engaged ocean litter stakeholder community in California, the Ocean Litter Strategy offered organizations the opportunity to take on leadership roles for Action Items that matched their priorities and areas of expertise.

The stakeholder section of the Strategy was structured around six goals, five of which were dedicated to land-based litter, and one of which was dedicated to ocean-based debris. Nested under each of these goals were objectives, which outlined approaches for achieving the goals. Each objective included specific actions, concrete and measurable tasks that stakeholders could implement to contribute to an objective and prevent or

reduce ocean litter. The six **Stakeholder Goals** of this Strategy were:

Land-based Ocean Litter

- **Goal 1:** Reduce the use of common ocean litter items through mandates and incentives targeting public institutions and businesses.
- **Goal 2:** Reduce the prevalence of common ocean litter items through changes in product production, design, and management.
- **Goal 3:** Improve waste management and interception of litter on land before it enters the ocean.
- **Goal 4:** Conduct and communicate research on existing and emerging issues related to land-based ocean litter.
- **Goal 5:** Generate behavior change by educating and engaging communities and individuals to reduce ocean litter.

Ocean-based Marine Debris

- **Goal 6:** Reduce the sources of ocean-based debris and maximize the efficiency of ocean-based debris cleanup.

A partnership between OPC, NOAA MDP, and California Sea Grant (CASG) provided leadership and coordination in implementation of the Ocean Litter Strategy Stakeholder Goals by bringing entities together to collaboratively work towards the 64 actions, tracking progress, coordinating communication among partners, and keeping stakeholders informed though regular updates.

Accomplishments Report

This accomplishments report serves to highlight the collaborative and meaningful work California entities have done towards addressing ocean litter and plastic pollution in California. OPC and NOAA MDP are incredibly grateful for their contributions.

OPC documented state agency activities towards accomplishing the OPC Goals. Furthermore, OPC partnered with CASG and the University of Southern California Sea Grant (USCSG) to document what has been accomplished from the Ocean Litter Strategy Stakeholder Goals, Objectives, and Actions from January 2018 to August 2025. During implementation of the Ocean Litter Strategy, NOAA MDP and CASG solicited and synthesized voluntary bi-annual progress reports from lead and partner organizations on each action. In 2025, OPC and CASG solicited final action updates from lead partner organizations identified in the Ocean Litter Strategy. OPC, CASG, and USCSG synthesized this information to describe (a) what has been accomplished towards each goal, highlighting the work of partner organizations and (b) provide a status (e.g., completed, completed & continuous, in progress, on hold) for each goal to identify where ongoing and/or future efforts are potentially needed.

CALIFORNIA OCEAN LITTER STRATEGY & ACCOMPLISHMENTS REPORT LEAD ORGANIZATIONS

The **California Ocean Protection Council (OPC)**, created by the California Ocean Protection Act (COPA) in 2004, is a cabinet level body within the California Natural Resources Agency that implements policy; leads and promotes coordination among state agencies, tribes, etc.; provides funding for catalytic and innovative projects, and informs government decision making with the best available science. OPC's water quality program addresses marine debris and plastic pollution by coordinating with state/federal agencies and community patterns, and by supporting since that enables the state to take action on this issue.

California Sea Grant (CASG) is part of NOAA's National Sea Grant College Program, a network of 34 programs nationwide. CASG is a unique partnership that unites the resources of the federal government, the State of California and universities across the state to provide the information, tools, training and relationships needed to help California conserve and sustainably prosper from our coastal and marine environments. CASG has been involved with the California Ocean Litter Strategy since its development in 2017 and has since supported a variety of projects across the state focused on microplastics, coalition building, and agricultural plastics.

The **University of Southern California Sea Grant (USCSG)** is also part of NOAA's National Sea Grant College Program. USCSG is a federal-state-university partnership that integrates research, education, and outreach with a specific focus on the "Urban Ocean" and solving issues arising out of managing people and natural resources in the intensely urban and developed coastline of Los Angeles. Ensuring that California's coastal waters are safe for both people and marine life has consistently been a priority research investment, supporting projects on marine debris, microplastics, and other emerging water quality pollutants.

The **NOAA Marine Debris Program** is the U.S. Government's lead for efforts to research, prevent, and reduce the impacts of marine debris. The NOAA Marine Debris Program works with organizations around the United States and globally to prevent marine debris from entering the environment, remove it from coastal areas, better understand the problem through research and shoreline monitoring, and respond to debris created by disasters. Its staff are positioned across the country to support marine debris projects in partnership with state and local agencies, tribes, non-governmental organizations, academia, and industry.

Photo Credit: Paddle Out Plastic

Ocean Litter Strategy Participation

With funding from the Bipartisan Infrastructure Law and technical support from OPC, CASG and USCSG conducted an analysis in 2023 to identify geographic and social gaps in participation in the statewide strategy, along with a pilot community needs assessment in Los Angeles, CA.[1]

The analysis found that between the establishment of the OLS in 2017 and its implementation through 2022, **542 individuals representing 331 organizations** from different sectors across the state were involved in the Strategy (**Figure 1**). Participants could engage with the OLS in a number of ways including attending the 2017 planning workshops, assisting in strategy drafting, providing public comment, signing up as Action Lead or Partner, submitting or contributing to bi-annual progress reports, attending bi-annual Webinars, or participating in Goal-specific Workgroup Meetings. Of all the engagement formats, webinars were the most highly attended form of participation and provided low-effort opportunities for people and groups to participate.

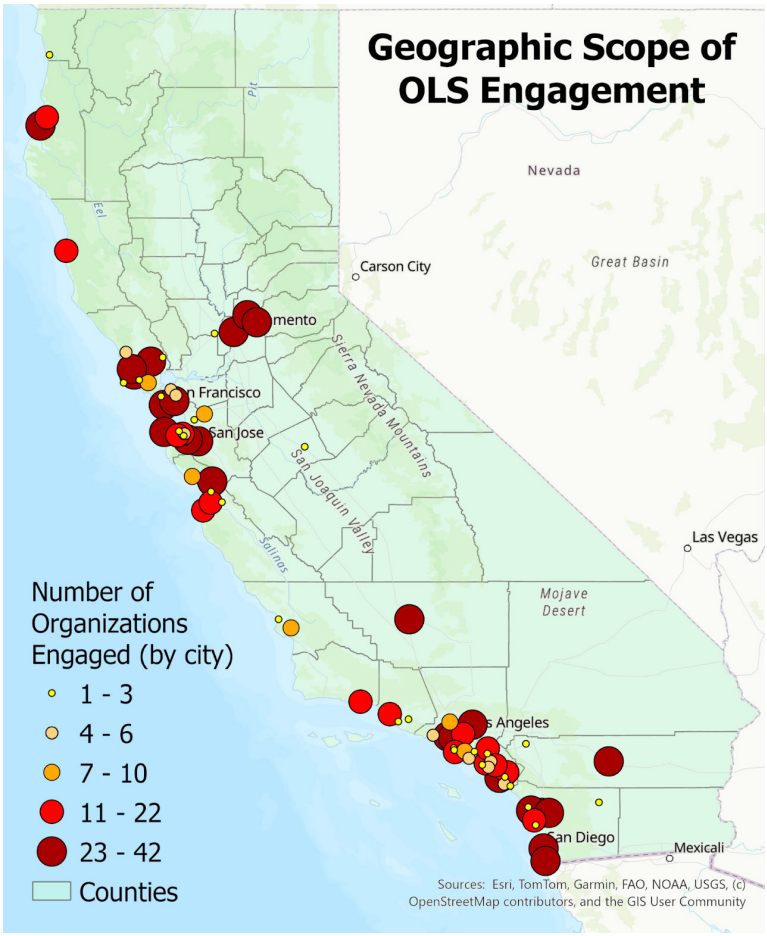


Figure 1: *Map of California depicting the number of organizations by city that participated in the Ocean Litter Strategy (OLS) activities between 2017 and 2022.*

Geographically, OLS engagement was statewide, primarily in coastal areas. The cities with the greatest engagement (highest numbers of organizations per city and highest participation events per city) were the most populous cities in California: Sacramento, San Francisco, Los Angeles, and San Diego (**Figure 1**), most likely due to these cities serving as headquarters for state agencies and other organizations. The analysis also revealed that sectors with the highest participation in the OLS (most groups per sector and most interactions per group), were non-profits, government, and industry, in particular those directly involved in addressing trash issues (**Figure 2**). However, implementation of most OLS actions was spearheaded by environmental non-profits.

1 Torres et al., 2025

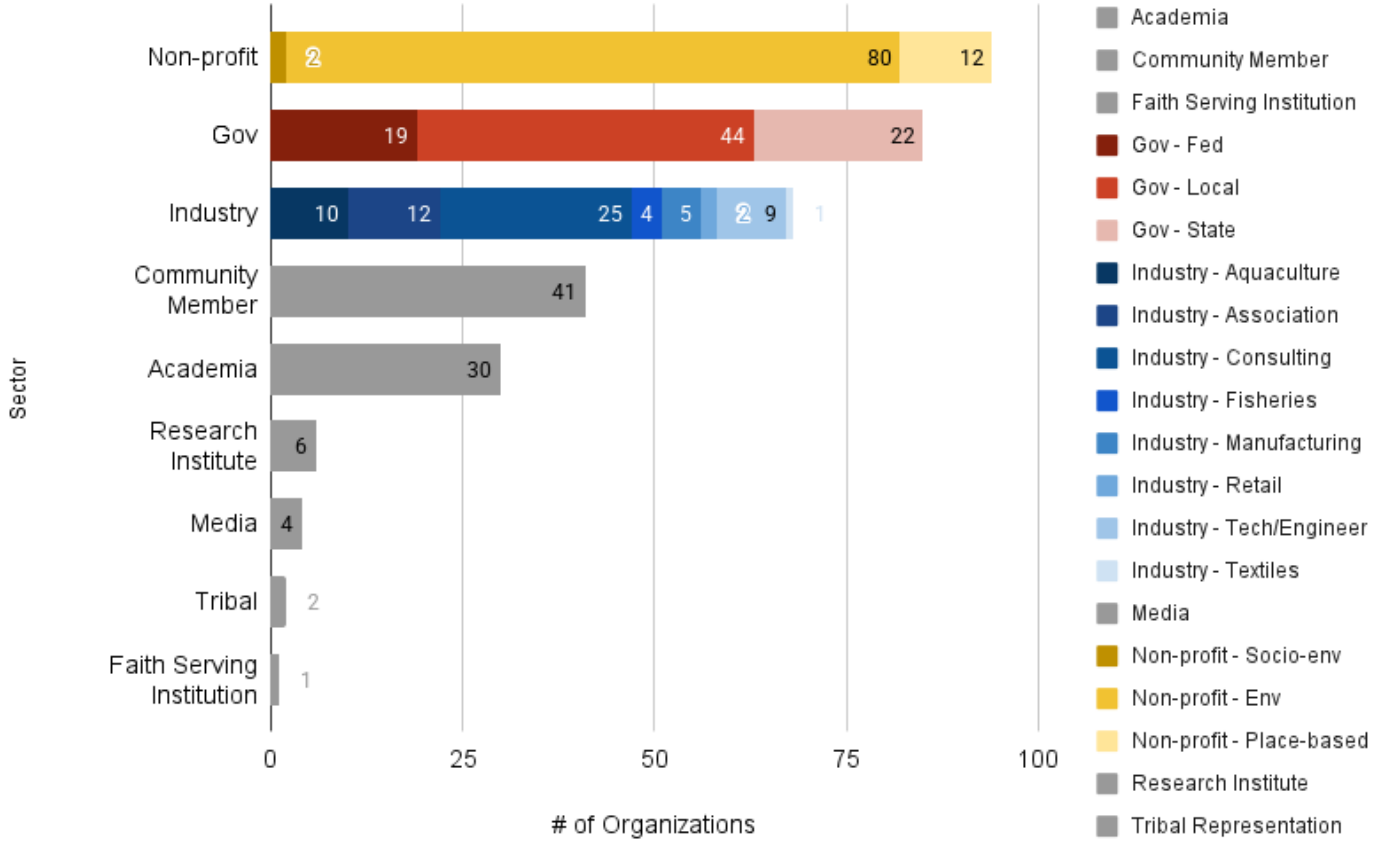


Figure 2: *The number of organizations that participated in Ocean Litter Strategy (OLS) activities between 2017 and 2022, grouped by sector and sub-sector. (Gov = Government, Fed = Federal, Socio-env = Socio-environmental, Env = Environmental).*

Notably, the least participation was from tribal governments and organizations, socio-environmental non-profits, and place-based (or community-based) non-profits (**Figure 2**). Lack of participation from these sectors are attributed to lack of awareness of the OLS, misaligned priorities, financial burden, or lack of capacity for engagement.[2] These results highlight a need for more widespread engagement, coordinated strategies, and sustained investment in California's coastal litter efforts to better reflect the priorities, needs, and strengths of impacted regions. Specific considerations for strengthening the effectiveness of the OLS include:

- Identifying and building connections with on the ground and under-engaged organizations (e.g., community-based organizations, socio-environmental groups, tribes, manufacturers, retailers)
- Providing consistent, frequent, and intentional engagement and outreach with communities to encourage meaningful, ongoing participation
- Building a shared understanding with communities to understand their current situations, priorities, and challenges to participation and implementation of solutions
- Reducing challenges and promoting widespread participation by providing financial support, resources, leadership roles, and mentorship
- Ensuring an adaptive process, by evaluating and adjusting the strategy throughout its implementation
- Supporting implementation of community-led program activities by providing professional development, technical assistance, and/or training opportunities (e.g., grant writing workshops)

The full analysis and more information can be found in the following resources:

- CASG Advancing Effective Coastal Litter Solutions through California's Ocean Litter Strategy
- USCSG Advancing Effective Ocean Litter Solutions for California

2 Torres et al., 2025


Photo Credit: NOAA

OPC Accomplishments

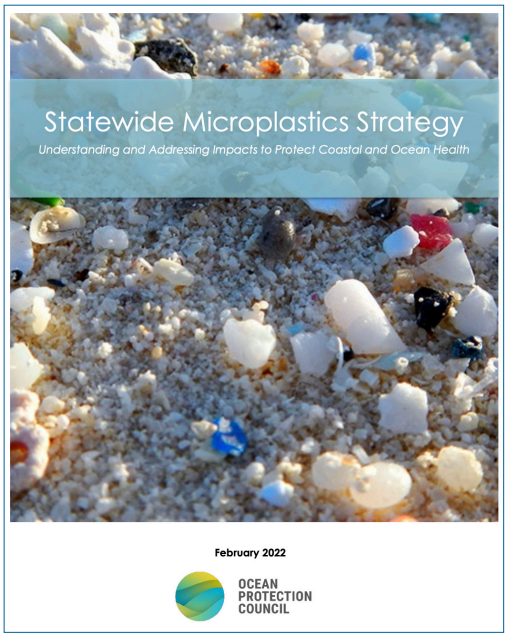
State agency accomplishments related to OPC Goals, Priority Objectives, and Actions are summarized below. For Goal 1, activities are organized into two subsections that support the priority objective: **policy implementation** and **research and funding**. The 2018 Ocean Litter Strategy provided examples of actions to support each goal's priority objectives. This Accomplishments Report details action updates from state agencies and their partners. In some cases, additional actions that advance the goal or objective are included.

OPC Goal 1 – LAND-BASED OCEAN LITTER: Protect marine ecosystems and the communities that rely on them by promoting policies to prevent litter from reaching the ocean.

Priority Objective: Advance source reduction efforts through policy, research, and funding to prevent the production and consumption of common ocean litter items by supporting policy implementation and research.

Policy Implementation: Develop and recommend a variety of policy tools to prevent the production and consumption of common ocean litter items at their source, including single-use food and beverage packaging and cigarette filters.

Update: In 2021, OPC developed and endorsed Top 10 Recommendations to Address Plastic Pollution in California's Coastal and Marine Ecosystem, building off actions within the California Ocean Litter Prevention Strategy. OPC subsequently adopted the Statewide Microplastics Policy in 2022, pursuant Senate Bill 1263 (Portantino, 2018), which integrates existing recommendations and priorities of both the Top 10 Recommendations to Address Plastic Pollution in California's Coastal and Marine Ecosystem and the California Ocean Litter Strategy.



Cover of the Statewide Microplastics Strategy.

Action 1: Promote changes by 2020 in state purchasing and service contracts, to reduce the state's reliance on single-use food serviceware that typically becomes ocean litter.

Update: California State Parks developed a Reusable Foodware Purchasing Guide to encourage park concessionaires to reduce single use plastic waste. Furthermore, as of summer 2025, concessionaires

entering new contracts will be required to implement source reduction and recycling programs.

Action 2: Recommend state and local policies that encourage consumers to bring their own reusable food and beverage containers by charging for disposable packaging use for "to-go" food service by 2024.

Update: Over the course of the 2018-2024 Ocean Litter Strategy, OPC has funded local projects and technical assistance to advance reuse policies and programs:

- Funded by OPC, ReThink Disposable partnered with the City of Alameda to create a model for "unpackaging a city" through the project ReThink Disposable: Unpackaging Alameda. The project resulted in 80 newly ReThink Disposable-certified food businesses, with 21 of these businesses reporting nearly 2,500,000 pieces of packaging and 27,000 pounds of waste eliminated annually, resulting in over $50,000 in savings to businesses each year.
- The Reusable California Policy Playbook, an OPC-sponsored project by UPSTREAM, was released in November 2021 to inform local governments, policymakers, and businesses in developing foodware ordinances to reduce single-use plastics and support reuse goals in food service operations.
- OPC has provided funding for technical assistance and to support local implementation of Los Angeles County's Reduction of Waste from Single-Use Articles and Expanded Polystyrene Products Ordinance (2022) to reduce single-use plastics waste in foodservice facilities. This project includes outreach and training for over 2,600 impacted businesses as well as public outreach and education. Successful implementation of this ordinance will reduce the amount of polystyrene and other plastic that harms the environment and human health and has the potential to serve as a model statewide.

Surfrider's Ocean Friendly Restaurants Program helps transition restaurants away from single-use plastics.

See Stakeholder Actions 1.1.1 and 1.1.2 for local and state policies that encourage reusables in the food service industry, including AB 619, the 2018 City of San Francisco Reusable Foodware Ordinance, the 2022 Los Angeles County Reduction of Waste from Single-Use Articles and Expanded Polystyrene Products Waste Reduction Ordinance, among others.

Action 3: Promote comprehensive waste management approaches to prevent the production of common ocean litter items through California Department of Resources Recycling and Recovery's (CalRecycle) Packaging Reform efforts, and explore methods to share responsibility between producers and the public to fund the cleanup of beaches and inland waterways that are littered with these products.

Update: The Plastic Pollution Prevention and Packaging Producer Responsibility Act (SB 54, Allen 2022) was enacted to establish extended producer responsibility (EPR) for packaging and single-use plastic food serviceware. This legislation also established the Plastic Pollution Mitigation Fund (see Public Resources Code section 42064), which requires a producer responsibility organization (PRO) to pay $500 million to the state annually to address and mitigate the environmental impacts of plastic pollution, especially in overburdened and underserved communities.

Action 4: Support policies that reduce expanded polystyrene litter, such as the inclusion of expanded polystyrene as a priority product in CalRecycle's Packaging Reform efforts and the prohibition of expanded polystyrene in single-use food serviceware.

Update: The Plastic Pollution Prevention and Packaging Producer Responsibility Act (SB 54, Allen 2022) prohibits the import, sale, and distribution of expanded polystyrene foodservice ware (commonly known as foam or Styrofoam) in California, unless producers demonstrate a 25% recycling rate by 2025, 30% by 2028, and 50% by 2030. CalRecycle subsequently enacted regulations in January 2025 that restricts the sale, distribution, and importation of expanded polystyrene foodservice ware because producers of expanded polystyrene did not demonstrate to CalRecycle that the statutorily mandated recycling rates were met for all expanded polystyrene covered material as of January 1, 2025.

Action 5: Convene and foster innovative partnerships, use funding mechanisms, and recommend policies to redesign common ocean litter items such as connecting bottle caps to bottles.

Update: Consistent with the recommendations of the Statewide Microplastics Strategy, OPC hosted science-based, sector-specific workshops to collaboratively develop practical strategies for reducing microplastic pollution from key industries in California, including textiles and tires.

The California Legislature additionally introduced related legislation in 2024: SB 45 (Padilla – Recycling: beverage containers: tethered plastic caps). If enacted this bill would have required that plastic beverage container manufacturers attach caps to plastic bottles by 2027.

Action 6: Convene a working group to evaluate a ban on cigarette filters in California by 2020. The working group will investigate research and reports on cigarette filters, and the extent to which they impact human health. If the working group finds that cigarette filters provide no health protections to smokers, then OPC may make recommendations to the legislature to ban cigarette filters.

Update: The California Department of Public Health (CDPH) California Tobacco Control Program (CTCP) convened a working group, who evaluated and published Tobacco Product Waste in California: A White Paper. Findings from this white paper include that cellulose acetate cigarette filters are poorly degradable, the primary source of tobacco waste pollution and litter in the environment, and have no benefit in preventing the adverse health effects of smoking. The CDPH / CTCP have additionally launched several public education campaigns regarding the environmental harms of plastic pollution from cigarette filters, which have informed several local jurisdictional efforts to ban the sale of plastic-containing tobacco products. For example, Tiburon, California approved an ordinance in 2025 banning the sale of nicotine-containing tobacco products, and that same year the city of Santa Cruz banned filtered cigarettes. Earlier, in 2021, Manhattan Beach and Beverly Hills banned the sale of most tobacco products.

Research and Funding: Use research and funding to address knowledge gaps and better target policy efforts.

Action 1: Fund assessments of policy effectiveness to determine whether the policies are acting as intended and what, if any, changes need to be made to increase effectiveness. If local policies or ordinances are demonstrated to be effective, consider recommending for statewide implementation.

Update: Monitoring can provide information to assess the types and extent of ocean litter found in California's offshore environment and inland watersheds, and thereby the effectiveness of specific policies and ordinances.

Long-term data can be used to identify trends in the types of litter that enters the environment, inform product or material bans of prolific litter types, as well as track the effectiveness of specific management actions, identify hotspots, and evaluate pathways for pollution entering California waters. The annual California Coastal Cleanup Day, led by the California Coastal Commission, has both removed millions of pounds of debris and has provided one of the longest and largest data sets on debris in the world, including a list of top identified debris items each year.

To support implementation of the State Water Resource Control Board (SWRCB) Trash Amendments, which include a statewide trash prohibition in specific stormwater permits, OPC supported the development of the California Trash Monitoring Methods and Assessments Playbook (Trash Monitoring Playbook), prepared by the San Francisco Estuary Institute (SFEI) and SCCWRP to inform trash assessments and monitoring. OPC additionally funded a Synthesis of Microplastics Sources and Pathways in Urban Runoff by SFEI, completed in 2021, to inform research priorities to effectively address microplastic pollution based on available microplastics data and conceptual modeling.

In May 2022, the Southern California Coastal Water Research Project (SCCWRP) published results from the Southern California Bight 2018 Regional Monitoring Program: Trash & Marine Debris Technical Report, finding that the Santa Monica Bay watershed demonstrated a significant decrease in both trash and plastic abundance between 2013 and 2018, with the abundance of plastic bags significantly decreased between 2013 and 2018. A significant decrease was observed after 2016, suggesting initial efficacy statewide bag ban implemented in 2016.

OPC has continued to expand the collection of trash and plastics data, including the standardization of microplastics collection methods which were incorporated into the five-year Southern California Bight Regional Monitoring Program for the first time in 2023. OPC has additionally funded SFEI to develop the Statewide Plastics Monitoring Strategy and Planning Framework, which provides a framework for coordinated macro- and microplastic monitoring across the state. One of the goals of this Monitoring Strategy is to track and understand changes in amounts of plastic in the environment over time to support evaluation of efficacy of policies, ordinances, and other management actions intended to curb plastic pollution.

See also, Stakeholder Objective 4.4.2 regarding the efficacy of SB 270 (Padilla, 2014), which banned some stores from providing plastic bags in California.

Action 2: Fund a report synthesizing lessons learned from waste management policies and tools implementation in other countries, including policy recommendations for California, with a focus on source reduction by 2020.

Update: None reported.

Action 3: Fund research and partner with the Department of Toxic Substances Control (DTSC) to address chemical additives that are commonly associated with products found in ocean litter to determine their environmental impacts. Chemical additives may include, but will not be limited to fluorinated compounds, plasticizers, and antimicrobials.

Update: The Department of Toxic Substance Control (DTSC) initiated rulemaking to add microplastics to the Candidate Chemical List in 2025. Furthermore, DTSC's 2024-2026 Priority Product Work Plan included "products that contain or generate microplastics" for the first time as a product category currently under evaluation, allowing the agency to potentially identify priority products for regulation.

DTSC also hosted a public workshop on Candidate Chemicals in Artificial Turf for potential future regulation under the Safer Consumer Products Program and published a Background Document on Candidate Chemical in Artificial Turf, which includes microplastics. Finally, DTSC was involved in the Interstate Technology and Regulatory Council (ITRC) effort developing fact sheets and a technical and regulatory guidance document on the relationship between microplastics and perfluoroalkyl and polyfluoroalkyl substances (commonly referred to as PFAS).

Action 4: Fund a report compiling and synthesizing the use of plastics in agricultural practices, and the extent to which this use of plastics may contribute to watershed pollution and ocean litter by 2023.

Update: As outlined in the Statewide Microplastics Strategy, OPC intends to host a sector-specific workshop to identify voluntary solutions, as well as research and development needs, to reduce plastic pollution from the agriculture industry in California (see OPC Goal 1, Policy Implementation Action 5).

See Action Item 4.2.1 for work the Nature Conservancy is doing related to this Action.

Action 5: Fund innovative projects and programs that reduce the production and consumption of common ocean litter items, such as piloting the use of a reusable "to-go" container exchange at food service providers.

Update: See Goal 1, Policy Implementation Action 1 for specific projects funded to advance reusable food serviceware and to reduce single use plastic.

Additional research: OPC and CASG funded five researchers to address microplastics in California through two competitive research calls. The first call funded three projects focused on research that will improve understanding of the sources of aquatic microplastic contamination and areas of ecological sensitivity. The second call focused on research that evaluated and informed the design and use of low impact development best management practices (LID BMPs) to capture microplastics from stormwater runoff.

OPC GOAL 2 – MICROPLASTICS AND MICROFIBERS: Increase understanding of the scale and impact of microplastics and microfibers on the marine environment and develop solutions to address them.

Priority Objective: Advance research on the extent and impact of microplastics and microfibers in source waters and the ocean, assist in the development of technological solutions to reduce their prevalence in aquatic environments.

Action 1: Fund the development and validation of standardized monitoring methods in California, leveraging national and international resources and knowledge, where feasible, to assess the concentration and flux of microplastics by 2021. Methods are needed for several different environments where microplastics are found, including: wastewater effluent, ambient waters, stormwater, marine sediments, and tissues of fish, bivalves, and other organisms.

Update: See OPC Goal 1, Research and Funding Action 1 for further information regarding monitoring. OPC has supported the development and validation of standardized monitoring methods for microplastics in California,

specifically for microplastics found in wastewater effluent, ambient waters, stormwater, marine sediments, and biota (fish tissue, bivalves), following the completion of an interlaboratory study regarding microplastic laboratory analysis methods completed by SCCWRP. See Stakeholder Action 4.1.1 for more information regarding the SCCWRP's development of microplastic collection and analysis methods, supported by OPC.

The forthcoming Statewide Plastics Monitoring Strategy and Planning Framework will provide a statewide framework for quantifying the amount of plastic in the environment, how that changes over time, and identifying major sources and transport mechanisms of both micro- and macroplastics.

Action 2: Convene scientists and experts to develop a comprehensive research plan by 2024 to characterize microplastics' sources, pathways, ambient concentrations, risk assessments, and impacts.

Update: OPC, in partnership with the State Water Resources Control Board, and other external partners, completed a series of workshops and publications to inform the development of the nation's first Statewide Microplastics Strategy, pursuant to Senate Bill 1263 (Portantino, 2018), which includes both early recommendations and comprehensive research priorities to reduce microplastic pollution in California's marine environment:

- In 2021, OPC funded the Ocean Science Trust to convene scientific experts to develop a risk assessment framework for microplastic pollution in California's marine environment and provide science-based guidance for addressing microplastic pollution, focused on source reduction activities.
- In coordination with OPC and SWRCB – SFEI, SCCWRP, and the University of Toronto hosted a workshop in 2021 to summarize the state of the science on human and ecological health effects of microplastics in water, providing scientific foundation for implementation of SB 1263 and SB 1422 and management actions (see Appendix B).
- OPC funded SCCWRP to quantify microplastics removal efficiency of wastewater treatment processes and estimate the amount entering the environment. Findings demonstrated that wastewater treatment plants remove 95.3, 99.1, and 99.9% of microplastics with primary, secondary, and tertiary treatment processes (respectively). Microplastics removed from the aqueous stream are largely transferred to biosolids.
- OPC additionally funded a Synthesis of Microplastics Sources and Pathways in Urban Runoff by SFEI, completed in 2021, to inform research priorities to effectively address microplastic pollution based on available microplastics data and conceptual modeling.

OPC and CASG have since funded five projects to address microplastics in California and advance the research priorities of the Statewide Microplastics Strategy through two competitive research calls. The first call funded three projects focused on research that will improve understanding of the sources of aquatic microplastic contamination and areas of ecological sensitivity. The second call focused on research that evaluated and informed the design and use of low impact development best management practices (LID BMPs) to capture microplastics from stormwater runoff.

OPC has additionally held two sector-specific workshops to identify additional research and development needs for specific industries: textiles and vehicle tires (see OPC Goal 1, Policy Implementation Action 5). In 2025, OPC and Materevolve convened microfiber and textile experts across academia, industry, government, and NGOs to identify research and development needs to address microfiber and associated chemical pollution from the textiles industry, including recommendations related to reformulation and the impacts of chemical additives. Separately, OPC partnered with the Ocean Science Trust in 2025 to host a technical convening focused on tire wear particles, engaging specialists from academia, industry, government, and NGOs to define research needs specific to vehicle tires.

OPC GOAL 3 – FISHING AND AQUACULTURE: Reduce debris from fishing and aquaculture-related activities in the ocean.

Priority Objective: Promote improved fishing and aquaculture gear management and sustainable innovation to reduce the potential for lost gear; remove lost gear and legacy infrastructure from the ocean.

Action 1: Provide best-available science and information to the California Department of Fish and Wildlife (CDFW) and the California Fish and Game Commission (FGC) as they work to develop improved fishing and aquaculture gear management, and maintain two-way information exchange between the CDFW, FGC, and OPC for data sharing and interagency staff coordination.

Update: OPC convenes the Statewide Aquaculture Leadership Team, which is made up of eight other state agencies, including CDFW and FGC, and collaborates closely with these state partners on aquaculture gear management.

OPC staff engages with CDFW and FGC staff, and collaborates closely on fishing gear issues, particularly in the Dungeness crab fishery. OPC also collaborates with Dungeness crab fishermen through the Dungeness Crab Task Force and the Dungeness Crab Working Group.

Action 2: Promote fixed-gear best practices, including how to minimize losing traps, in partnership with CDFW.

Update: The Dungeness Crab Fishing Gear Working Group – facilitated by CDFW and comprised of commercial and recreational fishermen, NGO reps, members of disentanglement network, and state and federal agencies – maintains a Best Practices Guide for avoiding marine life entanglement in the Dungeness crab fishery (last update October 2023), which includes practices to reduce gear loss.

Crab pot full of Dungeness crabs.

Action 3: Promote the development and implementation of regulations requiring best management practice (BMP) plans for shellfish aquaculture in California by 2020, in partnership with CDFW, FGC, and the California Coastal Commission. The BMP plans should reduce the potential for loss of aquaculture gear and require the cleanup and recovery of lost gear.

Update: OPC, in collaboration with the Aquaculture Statewide Leadership Team, released the Guiding Principles for Sustainable Marine Aquaculture, encouraging the use of best practices to minimize detrimental environmental impacts of aquaculture.

OPC is collaborating with the Aquaculture Statewide Leadership Team to develop an Aquaculture Action Plan for California, which aims to maximize environmental sustainability and protect public health. The final Action

Plan will include actions to develop BMPs and address the cleanup of legacy aquaculture gear.

CDFW leads the development of BMPs for aquaculture in California (see Stakeholder Goal 6, Action 6.2.1). Though efforts are currently on pause, they are expected to resume in 2026.

Action 4: Develop and promote fishery-funded gear retrieval programs through industry education and collaborations with non-governmental organizations, port and harbor districts and associations, and other partners.

Update: In 2024, OPC funded the Nature Conservancy and the Pacific Coast Federation of Fishermen's association to expand an industry-led collaboration of California Dungeness crab fishermen to retrieve lost fishing gear. The Fishermen's Gear Recovery Network expanded statewide in 2025 and developed an online reporting form for ocean users, which will help them to locate and recover more gear than ever before.

Action 5: Fund sustainable innovation in fishing and aquaculture gear to reduce the potential for lost gear, including new technologies, and ensure that any new and effective fishing and aquaculture gear innovation is an allowable technology in legislation and regulations.

Update: In March 2025, OPC supported the Resources Legacy Fund to conduct an electronic reporting and electronic monitoring pilot project in collaboration with CDFW for four California fisheries, including Commercial Dungeness crab. These funds will support the development of an electronic logbook which, when paired with existing electronic monitoring devices, will enable better entanglement risk mitigation.

OPC supported the development and expansion of the National Marine Sanctuary Foundation's (NMSF) Innovative Gear Library (more information here), allowing fishermen to trial pop-up gear for California's fixed gear at no cost, while collecting data on the pop-up gear performance and feedback from fishermen.

In 2024, OPC supported the development of a Ropeless Gear Portal. This portal will allow fishermen and resource managers to track ropeless gear on the seafloor, thereby improving fishermen's ability to make decisions about where to fish while also supporting enforcement and lost gear recovery efforts. This portal will allow fishermen to report location data of alternative fishing gear to CDFW, a requirement of RAMP regulations.

Marine debris made up of mostly fishing gear found in Santa Barbara.

Electronic vessel position monitoring was required for all participants in the California commercial Dungeness crab fishery as of the 2023-2024 fishing season. This requirement provides near real-time information on fleet dynamics and allows CDFW to track fleet-wide trends, identify hot spots of gear usage and vessel activity, observe individual vessel trajectories, and verify harvest location by matching vessel tracks to landing receipts.

In 2020, OPC supported the Pacific States Marine Fisheries Commission to support the

implementation of the drift gillnet transition program. This program allowed permittees to voluntarily surrender their drift gillnet shark and swordfish permit and large mesh drift gillnet(s) to CDFW ahead of the sunset date prescribed by FGC Section 8561 in exchange for a one-time payment prescribed by FGC Section 8583. The fishery has now transitioned to using deep-set buoy gear which reduces entanglement risk, is less likely to be lost, and uses less material than traditional gillnets.

Action 6: Recommend the development and implementation of regulatory tools to allow for retrieval of lost gear or traps that belong to other fishermen.

Update: In 2024, CDFW amended regulations to expand retrieval of lost or abandoned commercial Dungeness crab traps (Section 132.2, Title 14, CCR), allowing any permitted Dungeness crab fishermen to retrieve up to 6 lost traps per trip during the season.

In 2020, CDFW implemented the Trap Gear Retrieval Program (Section 132.7, Title 14, CCR) which allows for retrieval of lost or abandoned commercial Dungeness crab fishing gear following the close of the commercial season.

Action 7: Fund removal of fishing gear and abandoned aquaculture materials, disused creosote pilings, and illegal artificial reefs, where liable owners and responsible parties cannot be identified.

Update: In 2024, OPC funded CASG to support the development of a California Artificial Reef Program (CARP) Plan in collaboration with CDFW.

A tangled pile of derelict fishing gear on the shoreline.


Photo Credit: Paddle Out Plastic

OLS Stakeholder Accomplishments

OLS Stakeholder Goals, Objectives, and Actions

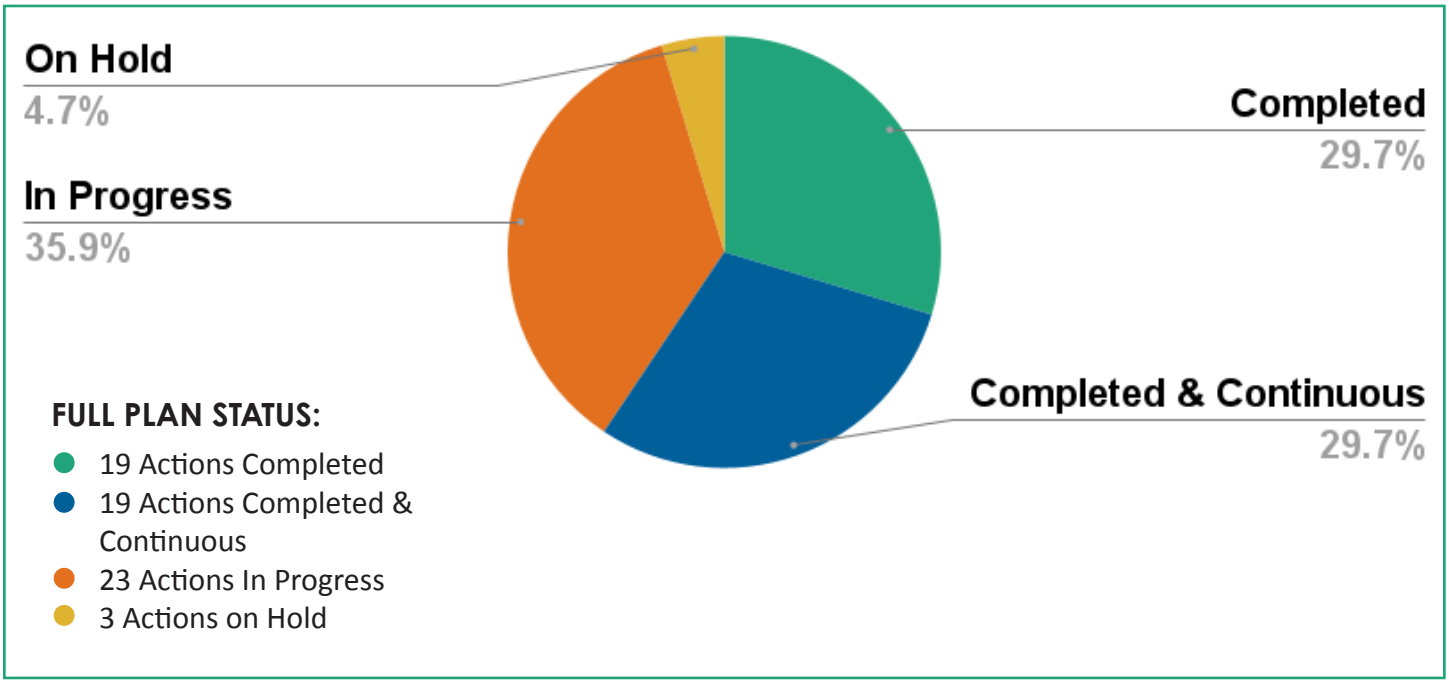
Below, actions are grouped under broader goals and objectives, each with the most recent progress updates and a list of known organizations involved. Definitions of the information listed for each are as follows:

- **Action:** Outlines the task intended to be implemented during the duration of the OLS in order to prevent or reduce ocean litter.
- **Organizations involved:** Identifies the organization(s) that volunteered to implement the action.
    - **Lead organizations** are **bolded** and listed alphabetically, before partner organizations, next to each action. Lead organizations were committed to implementing the action, given organizational and funding constraints. Lead organizations served as the point of contact for NOAA and OPC progress reports and check-ins throughout the Strategy's six-year timeframe, and took a leadership role in communicating and coordinating with other collaborators/partner organizations on the action.
    - **Partner organizations** are unbolded and listed alphabetically, after lead organizations, next to each action. Partner organizations served a supporting role in implementing the action, in collaboration with lead and other partner organizations.
    - *It is important to note that the list of organizations included here is non-exhaustive and additional organizations may have contributed to actions over the lifetime of the Strategy.*
- **Status:** Describes degree of completion for each action.
    - **Completed** – intended outcome had been achieved or the general intention of the action has been met.
    - **Completed & Continuous** – the intended outcome had been achieved, but efforts continue beyond the timeframe of the OLS.
    - **In Progress** – efforts are still underway but not yet finished.
    - **On Hold** – efforts are not currently being pursued.


Photo Credit: California Sea Grant

San Diego youth conduct beach cleanup.

Full Plan Status



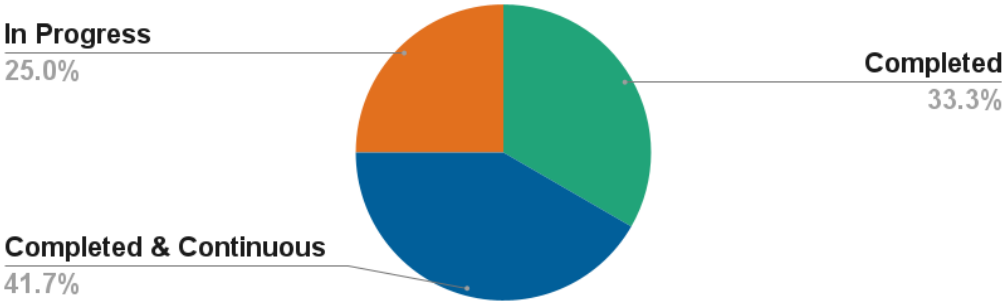
From January 2018 through August 2025, the strategy achieved meaningful and sustained progress. During this period, 19 actions were successfully completed, 19 additional actions were completed and continue to advance as ongoing efforts, 23 actions are actively moving forward, and only 3 actions are on hold. Together, these results reflect the collective commitment, resilience, and momentum of partners working to translate the strategy into lasting impact.

Trash capture at Ballona Creek in Los Angeles County.


Photo Credit: USC Sea Grant

Goal 1: Reduce the use of common ocean litter items through mandates and incentives targeting public institutions and businesses

Goal 1 Status



Various members of the OLS Community were instrumental in shaping and supporting numerous legislation at the local and state levels (Action 1.1.1 and 1.1.2). The lists below are non-exhaustive.

Objective 1.1: Prohibit or discourage common ocean litter items in public institutions, retail, and food service establishments through government policies or mandates.

Action 1.1.1: Pass and implement policies that prohibit or discourage common ocean litter items at the local level and consider these policies for effectiveness assessment as described under Objective 4.4. (Objective 4.4. Assess the effectiveness of existing bans, policies, and programs).
Organizations involved: California Product Stewardship Council (CPSC), The Albatros Coalition, Zero Waste Coalition San Diego, Bay Area Stormwater Management Agencies Association (BASMAA), Clean Water Action/Clean Water Fund, Heal the Bay, Plastic Recycling Corp. of California (PRCC), Sierra Club, Stand up to Trash, Surfrider Foundation, UPSTREAM
Status: Completed & Continuous

Action 1.1.1 Continued

Update: Since 2018, the following policies have been passed at the local level (this list is non-exhaustive). More detail on each ordinance, action, or policy can be found in Appendix A.

In 2018…

- The City of San Francisco passed a law requiring food establishments to allow customers to bring their own reusable containers

In 2019…

- The City of Berkeley passed the Disposable Foodware and Litter Reduction Ordinance
- The City of Beverly Hills passed the Ban on the Sale of All Tobacco Products Ordinance
- The County of Santa Cruz passed the Single-Use Cup Tax Ordinance
- The City of Pacific Grove passed the Reusable Food Service Ware or Dine-in Ordinance

In 2021…

- UPSTREAM Solutions' #SkipTheStuff campaign was enacted in the following California cities: Atherton, Arcata, Carpenteria, Del Mar, El Segundo, Encinitas, Fairfax, Hermosa Beach, Long Beach, Los Angeles, Malibu, Manhattan Beach, Oakland, Palo Alto, Redondo Beach, Richmond, San Anselmo, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Cruz, Santa, Monica, Solana Beach, South Lake Tahoe
- The City of Carlsbad passed the Single-Use Plastics Ban
- The cities of Solana Beach and Encinitas passed a Balloon Ban

In 2022…

- The City of Los Angeles:
    - Expanded the Single-Use Carryout Bag Ordinance
    - Expanded the Available Upon Request Ordinance
    - Passed the Expanded Polystyrene Ban Ordinance
    - Passed the Zero Waste at City Facilities & Events Ordinance
    - Developed a Comprehensive Plastics Reduction Program (CPRP)
- The County of Los Angeles passed a Waste Reduction Ordinance

In 2023…

- The City of Encinitas passed the Smoking Ordinance

In 2024…

- The City of Del Mar passed the Balloon Ban Ordinance
- The City of Oceanside passed the Marine Debris Reduction Ordinance

In 2025…

- The City of Coronado passed the Plastic Reduction Ordinance

Action 1.1.2: Pass and implement legislation that prohibits or discourages common ocean litter items at the state level and consider these policies for effectiveness assessment as described under Objective 4.4 (Assess the effectiveness of existing bans, policies, and programs).

Organizations involved: CPSC, The Albatross Coalition, Zero Waste San Diego, Californians Against Waste, Clean Water Action/Clean Water Fund, PRCC, Surfrider Foundation, UPSTREAM

Status: Completed & Continuous

Update: Since 2018, the following legislation has been enacted at the state level (this list is non-exhaustive). More detail on each ordinance, action, or policy can be found in Appendix B.

- SB 212 (Jackson, 2018) Pharmaceutical and Sharps Waste Stewardship Program
- SB 1263 (Portantino, 2018) Ocean Protection Council Statewide Microplastics Strategy
- SB 1335 (Allen, 2018) Sustainable Packaging for the State of California
- SB 1422 (Portantino, 2018) Microplastics in Drinking Water
- AB 619 (Chiu, 2019) Bring-Your-Own Reusable Food and Beverage Containers - From 2019-2023 the amount of forks, knives, and spoons found during Coastal Clean Up Day has decreased by about 33%
- SB 8 (Levine, 2020) Smoking Ban for State Parks and Beaches - From 2019-2023 the amount of cigarette butts found during Coastal Clean Up Day has decreased by 36%
- AB 793 (Ting, 2020) Minimum Recycled Content
- AB 1583 (Eggman, 2020) The California Recycling Market Development Act
- AB 2287 (Eggman, 2020) Solid Waste
- SB 343 (Allen, 2021) Truth in Labeling/Recycling
- AB 818 (Bloom, 2021) Do Not Flush Wipes
- AB 881 (Gonzalez, 2021) Plastic Waste Exports
- AB 962 (Kamlager, 2021) Refillable Glass Beverage Containers
- AB 1162 (Kalra, 2021) Single Use Hotel Toiletries
- AB 1201 (Ting, 2021) Compostable Product Standards
- AB 1276 (Carillo, 2021) Unnecessary Food Service Ware
- SB 54 (Allen, 2022) Plastic Pollution Producer Responsibility Act
- SB 1013 (Atkins, 2022) Adding Wine and Distilled Spirits to the California Bottle Bill
- SB 1046 (Eggman & Gonzalez, 2022) Pre-Checkout Plastic Bag Ban
- SB 353 (Dodd, 2023) Expanding California Bottle Bill
- SB 1053 (Blakespear and Bauer-Kahan, 2024) Phasing Out Plastic Bags at Check Stands
- AB 2236 (Bauer-Kahan and Blakespear, 2024) California Plastic Bag Ban Law
- AB 762 (Irwin & Wilson, 2025) Banning Disposable Vapes

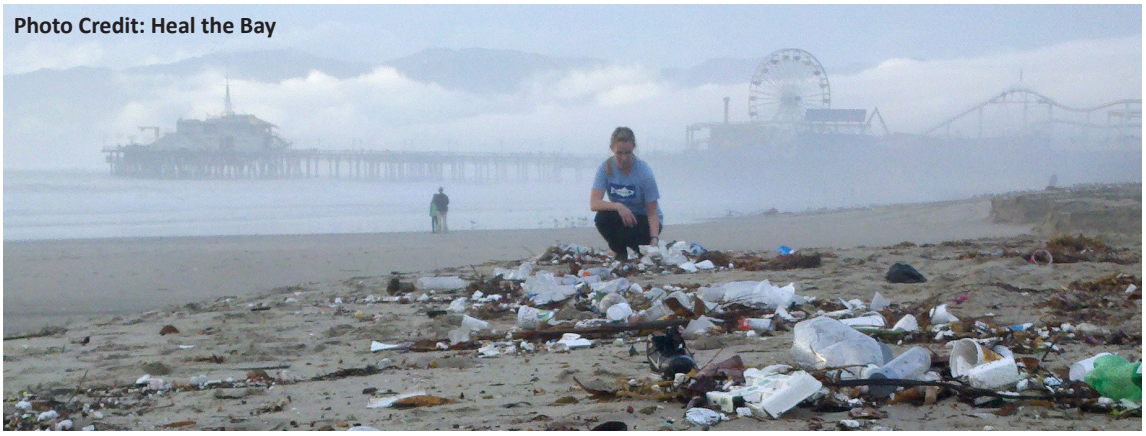


Photo Credit: Heal the Bay

Litter on Santa Monica beach after a flush event.

Action 1.1.3: Expand the single-use plastic carryout bag ban to apply to retail stores, restaurants, and food delivery, and amend the state's criteria for reusable bags to exclude bags made from plastic film.

Organizations involved: Californians Against Waste, Surfrider Foundation

Status: In Progress

Update: SB 1053 (Blakespear and Bauer-Kahan) Phasing Out Plastic Bags at Check Stands passed in 2024 (Appendix B). This bill expanded California's bag ban (SB 270, Padilla 2014) by banning all plastic bags at covered stores regardless of thickness. Covered stores include supermarkets, large retailers with pharmacies, and convenience stores. There continues to be interest locally in expanding the bag ban to retail stores, restaurants, and food delivery.

Action 1.1.4: Promote reusable and refillable food and beverage packaging in the state bottle bill, and state and local packaging policies.

Organizations involved: CPSC, The Albatross Coalition, Zero Waste San Diego, Californians Against Waste, UPSTREAM, PRCC

Status: Completed & Continuous

Update: Since 2019, the following legislation and policy has been enacted at the state and local level. More detail on each ordinance, action, or policy can be found in Appendices A and B.

- AB 619 (Chiu, 2019) Bring-Your-Own Reusable Food and Beverage Containers
- UPSTREAM Solutions' model ordinances aimed at increasing reuse for onsite dining and take-out and delivery of prepared meals were adopted by the following cities and counties: Arcata, Berkeley, Fairfax, Half Moon Bay, San Anselmo, San Francisco, Santa Cruz, Santa Cruz, Sebastopol, and Watsonville
- AB 962 (Kamlager, 2021) Refillable Glass Beverage Containers
- The City of Los Angeles launched their Reusable Foodware Microgrant Program

Action 1.1.5: Change procurement of common ocean litter items on UC and CSU campuses, and share lessons learned with other learning institutions (e.g., community colleges, K-12).

Organizations involved: Clean Water Action/Clean Water Fund, CPSC, California State University (CSU), University of California (UC)

Status: Completed

Update: In December 2018, the CSU system approved a phase-out of the procurement and use of single-use plastics across all of its campuses, with the ultimate goal of prioritizing reusable alternatives.

The UC system announced a phase-out of single-use plastics in August 2020. The policy calls for phasing out plastic bags, then eliminating single-use plastic food service items and bottles across all 10 campuses. The goal is to replace them with reusable or compostable alternatives and encourage more water refill stations.

Action 1.1.6: Change procurement to minimize the use of common ocean litter items in local and state government buildings and events, and share lessons learned with other public institutions (e.g., federal facilities, jails, hospitals).

Organizations involved: OPC, BASMAA, CalRecycle, Californians Against Waste, Clean Water Action/Clean Water Fund, CPSC, California Department of General Services (DGS), UPSTREAM

Status: Completed

Update: SB 1335 (Allen, 2018) Sustainable Packaging for the State of California requires the CalRecycle to maintain a List of Approved Food Service Packaging Items eligible for use by state food service facilities (Appendix B). The List was published on April 29, 2022. Additionally, DGS created guidance on reusable, recyclable, or compostable foodservice packaging in its Environmentally Preferable Purchasing (EPP) program, specifically through the EPP Best Practices Manual. While the DGS is guided by regulations from CalRecycle, the manual provides the purchasing standards and resources for state-operated or contracted food service facilities.

Action 1.1.7: Require permits for new construction of dine-in restaurants to include dishwashing facilities on-site to accommodate reusable food ware.

Organizations involved: Californians Against Waste, California Coastal Commission, Clean Water Action/ Clean Water Fund, UPSTREAM

Status: In Progress

Update: The California Coastal Commission has published guidance for achieving plastic pollution reduction in Coastal Development permits, Local Coastal Programs, and other planning documents. Though the guidance does not specifically target dishwashers for dine-in restaurants, the document articulates that the most effective way to avoid plastic pollution is to reduce reliance on single-use items and promote reuse in any future restaurant developments.

Action 1.1.8: Develop a toolkit with materials and strategies to share with local and out-of-state advocates to a) aid in the process of banning common ocean litter items, and b) to aid in the process of switching local governments and communities to reusable items.

Organizations involved: Plastic Pollution Coalition, UPSTREAM

Status: Completed

Update: In 2022, UPSTREAM Solutions developed a *Roadmap to Reuse* toolkit with actions to promote a transition to reusable and refillable packaging. The toolkit helps local and state decision makers enact and community organizers implement foodware policies by providing resources, training, and an outreach hub. The toolkit includes:

1. Reuse policies, supporting resources, and a training program for getting them enacted;
2. List of preferred, environmentally friendly single-use and reusable packaging items;
3. Directory of reuse businesses and service models; and
4. Restaurant outreach toolkit for communities.

Objective 1.2: Incentivize institutions, businesses, and events to transition away from common ocean litter items.

Action 1.2.1: Perform audits before and after institutions implement efforts to minimize the use of common ocean litter items.

Organizations involved: Clean Water Action/Clean Water Fund

Status: Completed & Continuous

Update: Clean Water Fund uses their packaging audit process to analyze environmental and economic impacts (i.e., number of disposable items reduced, weight of trash avoided, annual net cost savings, etc.) of a subset of businesses that receive their technical assistance to switch to reusable foodware. The results of a few of these data-tracked businesses are described through case studies, which include annual net cost savings, so that their work may inspire others to prioritize reuse.

Action 1.2.2: Incentivize businesses and corporations to transition to reusables (e.g., film industry craft services, corporate dining, water refill stations) through sharing case studies and demonstrating cost-savings.

Organizations involved: Amcor Limited, Clean Water Action/Clean Water Fund, Surfrider Foundation, UPSTREAM

Status: Completed

Update: Clean Water Fund actively engages businesses to promote reusables for food service utilizing their Foodware Guide and accompanying Cost Calculator. In 2022, ~3,200 food facilities received information about switching to reusable foodware and ~450 businesses participated in the Clean Water Fund's ReThink Disposable technical assistance program, which provided free technical assistance and $300-$500 in prebates. Clean Water Fund also launched a disposable foodware pilot in 2022 with Berkeley Unified School District.

As of 2025, Surfrider Foundation's Ocean Friendly Restaurants Program now has over 600 restaurants participating in 32 states and territories, including California. They estimate that collectively they serve over 41 million single-use plastic-free meals a year. They've published two new case studies that showcase staggering cost savings by reducing unnecessary single-use plastic and switching to reusables. For example, in San Diego, California Mitch's Seafood saved over $4,000 annually by switching from plastic ramekins and plastic wine glasses to reusable options.

UPSTREAM Solutions also has resources with information, solutions, and a case study database to help businesses make the switch from single-use to reusable options.

Action 1.2.3: Promote certification for events (e.g., music festivals, concerts, sports competitions, film production) that achieve zero waste principles.

Organizations involved: The Albatross Coalition, Zero Waste San Diego, Clean Water Action/Clean Water Fund, SD Zero, Surfrider Foundation

Status: In Progress

Update: In 2021, SD Zero (winners of the Scripps-Rady Ocean Plastic Pollution Challenge) launched their website with resources for zero waste events and a draft model ordinance leveraging the city permitting process to prohibit single use plastics in city permitted events.

In 2024, the Surfrider Foundation launched the Ocean Friendly Hotels (OFH) Program with 29 hotels participating in six states. Collectively they estimate they save one million plastic water bottles and 1.6 million mini toiletry bottles every year. The program includes a wide range of hotels, including bed and breakfasts, inns, resorts, luxury hotels, campgrounds, lodges, boutique hotels, and more.

Action 1.2.4: Engage with companies that are already using alternative products and materials to help advocate for transition away from common ocean litter items.

Organizations involved: PRCC, Surfrider Foundation, UPSTREAM

Status: Completed & Continuous

Update: In 2024, Surfrider Foundation released their Ocean Friendly Foodware Guide 2.0 which includes updated definitions of common labels and buzzwords, a decision matrix to help consumers review products and avoid greenwashing, case studies of Ocean Friendly Restaurants (OFR), and a buying guide with new products categorized as 'best choice,' 'good alternative' and 'what to avoid.' This guide was featured in UPSTREAM Solutions' Reuse for Dine-in Library and Yelp's Sustainability Resource Hub. Surfrider Foundation also launched a collaboration with EcoRate, a sustainability ratings platform that helps people easily locate cafes, restaurants, refill stores, and other venues that participate in waste-prevention initiatives.

In 2025, Surfrider Foundation exhibited at the National Restaurant Association Show where they educated new audiences about their OFR program, warned businesses about misleading marketing tactics such as greenwashing, and recruited new restaurants and partners. In 2022, and again in 2025, 29 and then 44 California OFRs (respectively) coordinated support for SB 54 regulations (Appendix B).

Additionally, some OFR participants have become Break Free From Plastic Champions of Change for a Global Plastics Treaty. Surfrider Foundation continues to work closely with brands such as Plaine Products, Open Water, Holy City Straw, O-Town Compost, Klean Kanteen, and more to provide exclusive discounts on sustainable items as incentives for participating in their Ocean Friendly Restaurants and Hotels programs to keep momentum going.


Photo Credit: NOAA

Goal 2: Reduce the prevalence of common ocean litter items through changes in product production, design, and management.

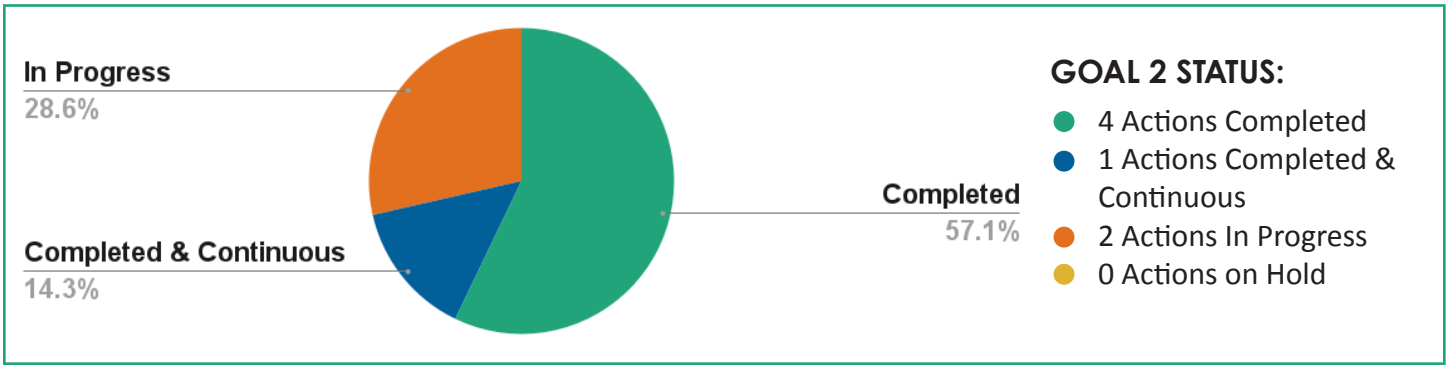
Photo Credit: Surfrider Foundation

Surfrider's Ocean Friendly Restaurants Program helps transition restaurants away from single-use plastics.

Photo Credit: Surfrider Foundation

Surfrider's Ocean Friendly Hotels Program celebrates hotels moving away from single-use plastics.

Goal 2 Status



Objective 2.1: Support and promote extended producer responsibility (EPR) and other waste management strategies to reduce the generation of common ocean litter items, and create a mechanism for producers to fund common ocean litter item capture, cleanup, and recycling infrastructure.

Action 2.1.1: Promote EPR as a policy to consider as part of CalRecycle Packaging Reform efforts, and support giving CalRecycle legislative authority to create mandatory packaging reform policies.

Organizations involved: OPC, CalRecycle, Californians Against Waste, CPSC, PRCC, Save Our Shores, UPSTREAM

Status: Completed

Update: SB 54 (Allen) Plastic Pollution Producer Responsibility Act was passed in 2022 (Appendix B). It creates a statewide EPR framework for packaging and single-use plastic food service ware, where producers are held responsible for managing the end-of-life of their products. The law tasks CalRecycle with implementing regulations, defining "covered material categories," setting recycling and composting targets, approving producer responsibility organization plans, and enforcing compliance. While SB 54 sets the framework and gives CalRecycle authority, many of the specifics (regulations, definitions of covered materials, compliance mechanisms) are still being developed in the rule-making phase.

Action 2.1.2: Create a report synthesizing lessons learned from waste management policy and tool implementation in other countries, including recommendations for California with a focus on source reduction.

Organizations involved: CPSC, California Foundation on the Environment and the Economy (CFEE), UPSTREAM

Status: Completed

Update: Although the CPSC has not released a single comprehensive report, the organization has produced and contributed to numerous articles and white papers on waste reduction and ocean litter prevention. CPSC has published international case studies on EPR policies for medicine and sharps; actively monitors global EPR initiatives in Canada, Southeast Asia, and Europe; and continues to strengthen international partnerships to share best practices for protecting the environment.

Since 2019, CPSC and CFEE have led research tours to Vancouver, British Columbia; Washington State; and Toronto, Ontario, to study leading materials-management and recycling systems. These tours brought California policymakers and key stakeholders together with government, industry, and NGO leaders, along with visits to advanced collection and processing facilities, to explore strategies for reducing waste at the source and expanding in-state recycling infrastructure. The delegations examined EPR and product stewardship across plastics, paper, beverage containers, pharmaceuticals and sharps, organics, and more, returning with lessons to inform California policy. These international efforts have helped drive CPSC's leadership on battery and textile EPR initiatives, among others, in the state.

Action 2.1.3: Include performance measures in EPR programs for both prevention and recycling of common ocean litter items, with prevention being a higher priority.

Organizations involved: CPSC, Californians Against Waste, PRCC, Save Our Shores, UPSTREAM

Status: Completed

Update: The following four initiatives included performance measures that will help the state evaluate effectiveness of these EPR programs. Specific performance measures can be found in Appendix C.

- SB 212 (Jackson, 2018) Pharmaceutical and Sharps Waste Stewardship Program performance measures
- SB 54 (Allen, 2022) Plastic Pollution Prevention and Packaging Product Responsibility Act performance measures
- Mattress Recycling Council's Used Mattress Recovery and Recycling Plan performance measures
- The Carpet America Recovery Effort (CARE) 2023-2027 Carpet Stewardship Plan performance measures

Single-use plastic bags.

Action 2.1.4: Ensure that all film and wrap plastics eligible for recycling (plasticfilmrecycling.org) are accepted at all drop-off locations (e.g., grocery stores), and enforce the recycling requirements that are part of the single-use plastic carryout bag ban.

Organizations involved: American Chemistry Council (ACC)

Status: In Progress

Update: The Recycling Partnership's Film & Flexibles Recycling Coalition (FFRC), which includes OLS participants from ACC, launched a multiyear CalFFlex Initiative to build scalable recycling pathways for film and flexible packaging in compliance with California's SB 54, the Plastic Pollution Prevention and Packaging Producer Responsibility Act (Appendix B). Working with the Circular Action Alliance (CAA), CalRecycle, and key leaders in California, their goal is to prove the viability of increased films and flexible plastic (FFP) capture, validate the capacity of end markets, and stimulate the demand for recycled FFP products. FFRC is partnering and aligning efforts on film recycling with the following groups: Alliance to End Plastic Waste, ACC, Association of Plastic Recyclers, Closed Loop Partners, Delterra, Flexible Film Recycling Alliance, Flexible Packaging Association, GreenBlue, U.S. Plastics Pact, among others.

Objective 2.2: Support product redesign with the aim of preventing ocean litter through design changes and avoiding harmful substitutions.

Action 2.2.1: Engage corporations in common ocean litter item redesign by implementing design challenges, and creating a venue for sharing innovative designs with brands and corporations.

Organizations involved: The Albatross Coalition, Think Beyond Plastic, Zero Waste San Diego, ACC, Amcor Limited, PRCC

Status: Completed

Update: Think Beyond Plastic has launched innovation challenges to redesign agricultural plastics, create bio-benign fabrics and packaging from agricultural waste, and develop smart packaging with natural coatings, catalyzing over 200 startups in the process.

The ACC co-administers Operation Clean Sweep (OCS), a global, industry-led plastic resin stewardship program focused on preventing resin loss throughout all stages of plastic resin handling operations. As a frontline defense against microplastics, OCS engages material suppliers, processors, and logistics providers through required data reporting and third-party verification of any release events. This existing corporate network and accountability framework provides a strong platform to engage brands and corporations in addressing supply chain challenges and provides a shared venue for advancing innovative solutions.

Action 2.2.2: Redesign and produce bottles with caps attached ("connect the cap"), and ensure that all components of these products are recyclable at all facilities in California.

Organizations involved: Save the Albatross Coalition, Zero Waste San Diego, ACC, Californians Against Waste, PRCC, Surfrider Foundation, Think Beyond Plastic, UPSTREAM

Status: In Progress

Update: In 2021, Save the Albatross Coalition wrote a letter to the Sustainability Directors of Coca Cola, PepsiCo, Nestle Waters, and Crystal Geyser, asking to work with them on the redesign of their products, but received no response. From there, Save the Albatross Coalition created three letter writing campaigns:

1. Letter from nonprofits and businesses to the companies asking for the redesign;
2. Grassroots letter from the consumers to the companies demanding for a redesign; and
3. Letter from nonprofits, businesses, and consumers to a select few legislators to adopt legislation around bottle design, like in Europe.

In 2025, Californians Against Waste sponsored and Surfrider Foundation supported SB 45 (Padilla), which would require plastic beverage bottles under two liters to use tethered caps—caps that remain attached to their bottles throughout their lifecycle—by 2027 (Appendix B). The bill passed the Senate Environmental Quality Committee and is currently in the Senate Appropriations Committee during the 2025 legislative session.

Action 2.2.3: Redesign plastic products to be circular and entirely recyclable in California, through voluntary or legislative action.

Organizations involved: CPSC, The Albatross Coalition, Zero Waste San Diego, Aquafil, Californians Against Waste, PRCC

Status: Completed & Continuous

Update: In 2019, AB 1583 (Eggman) established the Statewide Commission on Recycling Markets and Curbside Recycling to identify policy solutions and promote circular product redesign, while AB 729 (Chu) introduced the state's first eco-modulated fee structure to incentivize recyclable design—beginning with carpets (Appendix B). In 2020, nylon recycler Aquafil invested in San Diego-based Genomatica (now Geno) to produce bio-based nylon-6 from plant sugars and acquired Planet Recycling to expand post-consumer carpet recovery. In 2021, REPSCO Inc. earned CPSC's Golden Arrow Award for its 100% recycled plastic slipsheets and voluntary take-back program, while CPSC launched four textile recovery pilots to build circular fiber systems and test sorting technologies for large-scale textile recycling. In 2023, CPSC's Make the Electronic Marine Flare Switch campaign replaced over 5,500 single-use marine flares with reusable electronic devices, and its ReFuel Your Fun & $ave!™ program continued to promote reusable propane cylinders over single-use models, further advancing California's shift toward circular, recyclable product systems.

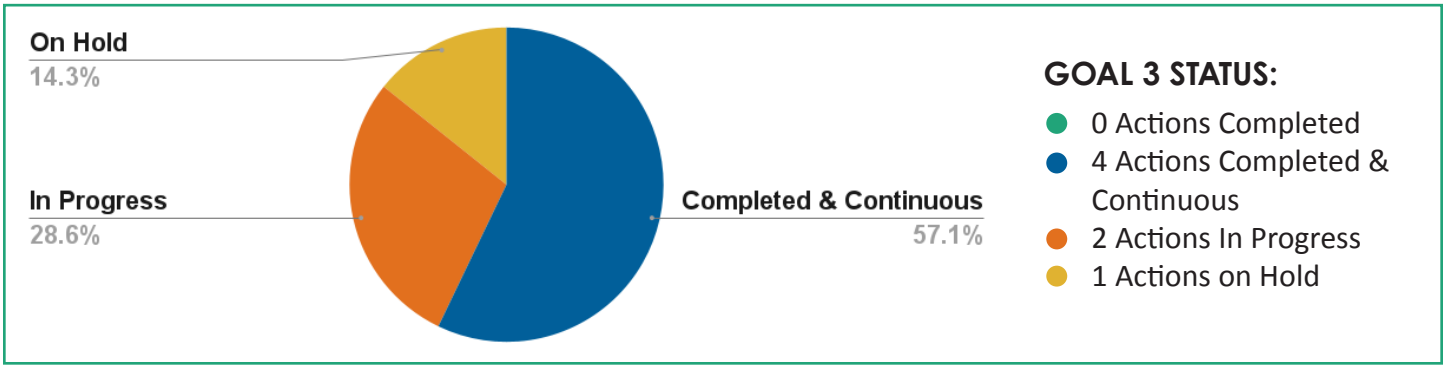
The ACC strongly supports the US EPA's National Recycling Strategy aimed to boost the U.S. recycling rate to 50% by 2030 by creating a more resilient, cost-effective, and circular municipal solid waste management system. It focuses on five objectives: improving recycling markets, increasing collection infrastructure, reducing contamination, enhancing policies, and standardizing data measurement. The ACC also supported the bipartisan "Accelerating a Circular Economy for Plastics and Recycling Innovation Act of 2024" in Congress which aimed at reducing plastic waste by modernizing US recycling infrastructure. If passed it would have directed the EPA to set national plastic recycling standards, requires 30% recycled content in packaging by 2030, and legalizes advanced/chemical recycling.

Pressed textile waste packed in bales in a storehouse.


Photo Credit: NOAA

Goal 3: Improve waste management and interception of litter on land before it enters the ocean.

Goal 3 Status



Objective 3.1: Support the State Water Resources Control Board's Trash Amendments.

Action 3.1.1: Create a mechanism for local governments to fund stormwater trash programs through public or private sources.
Organizations involved: ACC, BASMAA, Clean Water Action/Clean Water Fund, OPC, PRCC, Save Our Shores, UPSTREAM
Status: Completed & Continuous
Update: The Safe, Clean Water Program was approved by the Los Angeles Board of Supervisors in July 2019 to fund stormwater infrastructure, research, and education in collaboration with cities, community organizations, and individuals. As of September 2025, $513.5 million has been allocated to regional initiatives (126+ projects). Similarly, in 2008 the City of Santa Cruz passed Measure E to reduce stormwater pollution through a Clean River, Beaches and Ocean Tax (Appendix A). Efforts supported by Measure E continue through 2025, with entities such as Save Our Shores receiving funding for storm drain marking and surveys, beach and river community cleanups, and outreach and education on stormwater pollution prevention.

Action 3.1.2: Implement a statewide Adopt-A-Storm Drain program.
Organizations involved: City of Oakland, PRCC, Save Our Shores
Status: On Hold
Update: While the City of Oakland has not yet had the capacity to expand their Adopt a Storm Drain program Statewide, they continue to focus efforts on their own program and have developed a template of this program for other municipalities to adopt. Additionally, Save our Shores has contracted with the City of Santa Cruz to conduct storm drain surveys and mark drains with "Drains to Bay" decals in an effort to educate community members on where drains lead (see Action 3.1.1).

Litter on a storm drain leading to the ocean.

Action 3.1.3: Educate the public about the Trash Amendments.
Organizations involved: BASMAA, California Coastkeeper Alliance, Clean Water Action/Clean Water Fund, CPSC, CSU, Heal the Bay, Sierra Club, Surfrider Foundation, Waterkeeper
Status: Completed & Continuous
Update: California Coastkeeper Alliance, Waterkeeper, Heal the Bay, Surfrider Foundation, and Sierra Club have worked to educate and empower other NGOs, enabling them to more effectively engage municipalities and the public, while also conducting direct outreach themselves. The California Stormwater Quality Association published *Trash Control Measure Implementation Guidance* to help communities understand and successfully implement trash reduction requirements under the Trash Amendments. CSU Sacramento, supported by the U.S. EPA, is working with trash-data collection groups to improve understanding of compliance tracking and reporting. Additionally, the publication of the *Trash True Source Controls* white paper provides a comprehensive summary of source-control strategies used in the San Francisco Bay Area, helping the public and local governments better understand actions that can reduce trash pollution at its origin.

Objective 3.2: Improve waste management in public places.

Action 3.2.1: Establish and improve management of trash, recycling, and compost receptacles in high-use areas.

Organizations involved: Amcor Limited, ACC, California Coastal Commission, OPC, PRCC, Save Our Shores, California State Parks

Status: Completed & Continuous

Update: Since 2019, the following efforts have been made to improve waste management in public places:

- In 2019, AB 827 (McCarthy) Solid Waste: Commercial and Organic Waste: Recycling Bins was passed and required businesses to make composting and recycling bins accessible to customers at restaurants, malls, and other businesses (Appendix B).
- In 2022, NOAA MDP funded California State Parks to upgrade their waste-capturing devices in the Tijuana River, an area that receives a high volume of debris during the rainy season.
- In 2024, the County of Santa Cruz released the North Coast Facilities Management Plan which lists needed improvements to high traffic coastal areas including the placement of trash receptacles at certain locations. Some projects are in the works (e.g., Panther State Beach as part of the Coastal Rail Trail), while others await funding.
- Establishing adequate waste management measures is a key part of the 2025 California Coastal Commission's Guidelines for Addressing Plastic Pollution in Coastal Development Permits and Local Coastal Programs, which formalizes plastic pollution reduction measures in coastal planning and regulatory work.

Action 3.2.2: Increase industry investment in infrastructure improvements to address waste management at schools and other public areas.

Organizations involved: ACC, One Cool Earth

Status: In Progress

Update: One Cool Earth has developed a Marine Debris Prevention Best Practices Manual for K-12 school administrators, staff, and teachers to help change institutional waste practices through source reduction, reuse, and diversion. This manual provides case studies, achievable actions that schools can take to prevent marine debris, as well as links to classroom activities that involve students in campus waste prevention.

Landfill, compost and recycle only bins.

Action 3.2.3: Support packaging policies that develop and expand infrastructure for recycling in California.

Organizations involved: ACC, Californians Against Waste, CPSC, PRCC

Status: Completed & Continuous

Update: OLS partners have supported several packaging policies (see details in Appendix B). Examples include, but are not limited to:

- AB 793 (Ting, 2020) Minimum Recycled Content
- AB 2287 (Eggman, 2020) Solid Waste
- AB 962 (Kamlager, 2021) Refillable Glass Beverage Containers
- SB 343 (Allen, 2021) Truth in Labeling/Recycling
- SB 1013 (Atkins, 2022) Adding Wine and Distilled Spirits to the California Bottle Bill
- SB 54 (Allen, 2022) Plastic Pollution Producer Responsibility Act
- SB 353 (Dodd, 2023) Expanding California Bottle Bill
- AB 2511 (Berman, 2024) Beverage Container Recycling Market Development

Action 3.2.4: Engage with municipalities and social programs to assess how to reduce ocean litter from encampments, as one strategy to improve the health, wellbeing, and safety of homeless communities.

Organizations involved: BASMAA, California Coastkeeper Alliance, San Diego River Park Foundation, San Diego State University (SDSU)

Status: In Progress

Update: In 2020, the California Coastkeeper Alliance published an overview of encampment cleanup efforts, helping local governments and service providers better navigate the challenges and needs associated with these sites.

The California Water Quality Monitoring Council's Trash Monitoring Workgroup Encampments Subcommittee has contributed data and guidance to the SWRCB to quantify trash generated by encampments and identify effective practices, resource needs, and programs for managing and reducing debris while supporting unhoused individuals.

Complementing these statewide efforts, SDSU conducted a study on debris fate and transport in the San Diego River, examining the connections between illegal dumping, stormwater management, environmental conditions, and encampments. As part of this work, the San Diego River Park Foundation collaborates with People Assisting the Homeless during trash surveys to directly connect unhoused residents along the river with services and housing, demonstrating a model that integrates environmental stewardship with human-centered support.

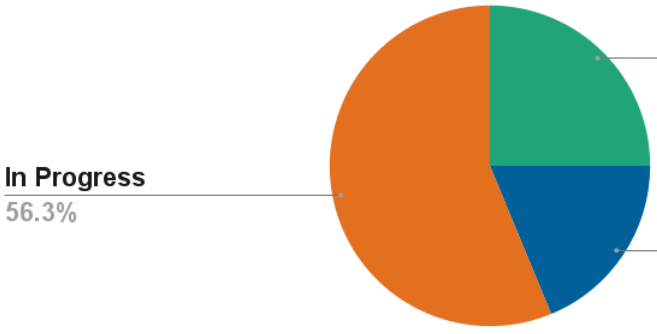

Photo Credit: NOAA

Goal 4: Conduct and communicate research on existing and emerging issues related to land-based ocean litter.


Photo Credit: USC Sea Grant

Volunteers count and sort marine debris on California's Coastal Cleanup Day in Laguna Beach, CA.

Goal 4 Status



GOAL 4 STATUS:

- 4 Actions Completed
- 3 Actions Completed & Continuous
- 9 Actions In Progress
- 0 Actions on Hold

Objective 4.1: Conduct a comprehensive characterization of microplastics and macro debris.

Action 4.1.1: Convene an expert workgroup to develop a matrix of standard sample collection, processing, and characterization methods for measuring temporal changes in microplastics and macro-debris in different environments.

Organizations involved: Algalita, SCCWRP, SFEI, 5 Gyres Institute, ACC, California Association of Sanitation Agencies (CASA), BACWA, Southern California Alliance of Publicly Owned Treatment Works (SCAP), Clean Water Action/Clean Water Fund, Dr. Andrew Gray's Laboratory at UC Riverside, Dr. Erika Holland at CSU Long Beach, Environmental Science and Resource Management Program (ESRM) at CSU Channel Islands (including Dr. Clare Steele), NOAA MDP, PRCC, Surfrider Foundation

Status: In Progress

Update: In 2021, the California Water Quality Monitoring Council's Trash Monitoring Workgroup established a Microplastic Subcommittee to scope and develop the Microplastics Monitoring Playbook, designed to share best practices for sample collection, data reporting, analysis, and reproducibility. However, this effort is currently on hold.

In 2021, the SCCWRP led a collaborative intercalibration study with 40 organizations to evaluate five major analytical methods for quantifying microplastics in drinking water, biological tissue, sediment, and environmental water. Results were used to develop standard operating procedures (SOPs) for the best-performing methods, which informed the SWRCB's two-phase Microplastics in Drinking Water Policy Handbook. For this drinking water method, accreditation was obtained through the Environmental Laboratory Accreditation Program (ELAP). As of August 2025, three laboratories have been accredited.

In 2023, SCCWRP with funding from OPC, convened an expert workgroup to standardize collection methods across sediment, biota, environmental water, and stormwater. Guidance and SOPs for sediment and biota have been published, and Dr. Andrew Gray's lab is leading the stormwater component (completion expected 2026).

Complementary efforts include SFEI's ongoing evaluation of microplastic sampling and analysis approaches for urban stormwater runoff, and Surfrider Foundation's development and field testing of a community-based microplastic sampling method, completed in 2024, with plans to expand to additional chapters and launch a public-facing toolkit and data visualization platform.

The SWRCB, in partnership with SCCWRP and the University of Toronto, also evaluated drinking water collection methods and held two training workshops in early 2025.

Finally, SCCWRP compared two sampling methods for characterizing occurrences of microplastics in effluents from California wastewater treatment plants (report expected 2026).

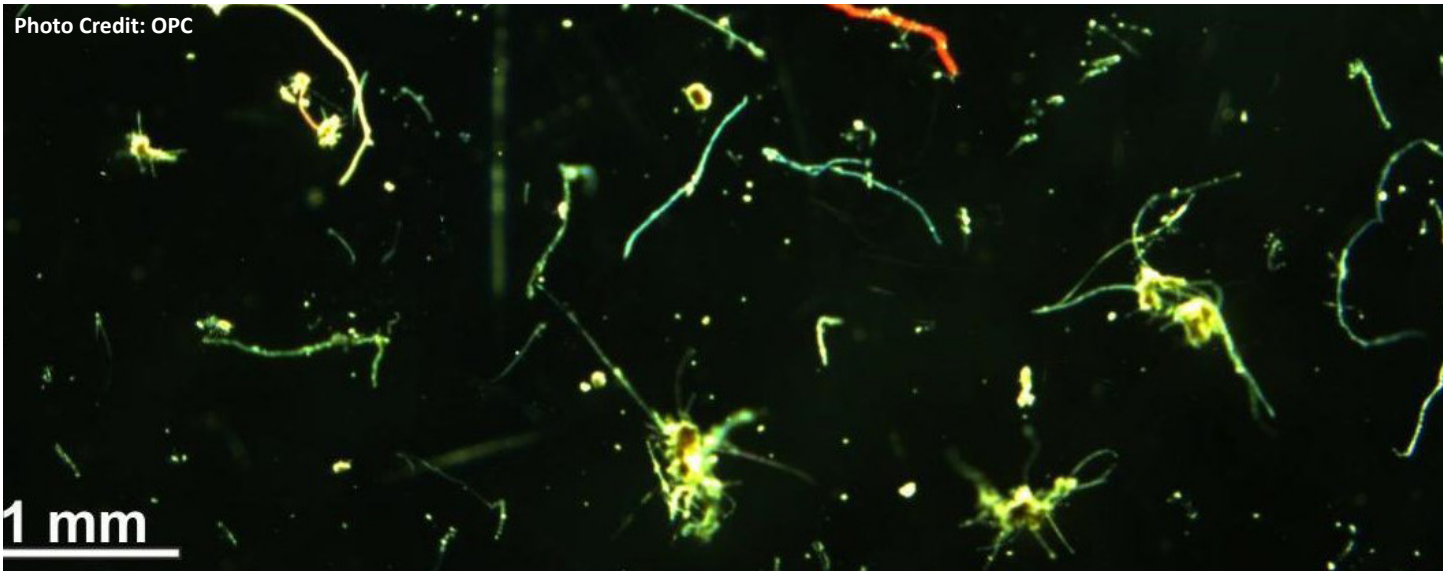
Action 4.1.2: Develop and test laboratory methods to identify the most common macro- and micro-plastic debris polymer types through molecular techniques (e.g., FTIR, Raman, forensics).

Organizations involved: Dr. Andrew Gray's Laboratory at UC Riverside, ESRM Program at CSU Channel Islands (including Dr. Clare Steele), ACC, CASA, BACWA, SCAP, Dr. Erika Holland at CSU Long Beach, Dr. Gerardo Dominguez's lab at CSU San Marcos

Status: In Progress

Update: Significant progress has been made in advancing and testing laboratory methods to identify macro- and microplastic polymer types using molecular and forensic techniques. Research groups across the state have advanced specialized analytical capabilities:

- Dr. Gerardo Dominguez's lab at CSU San Marcos, demonstrated that AFM-IR can detect and quantify nanoplastics in snow (Belontz et al. Env.Sci.Tech, 2025).
- Dr. Andrew Gray's lab at UC Riverside, among others, released and continues to expand Open Specy, an open source tool for processing, identifying and sharing data to enhance microplastic spectral identification accuracy and automate hyperspectral microimage analysis for microplastics detection and characterization.
- Dr. Andrew Gray's lab is further refining polymer identification through new high-throughput instrumentation, software improvements, collaborations on tire-wear particle forensics, and work on NOAA- and SWRCB–funded microplastics projects.
- To support standardization, ACC, National Institute of Standards and Technology (NIST), and the Hawai'i Pacific University Center for Marine Debris Research developed Polymer Kits 1.0 and 2.0, providing rigorously characterized polyethylene reference materials analyzed using ATR-FTIR, µFTIR, µRaman, DSC, py-GCMS, and HT-SEC to improve calibration, method validation, and cross-laboratory comparability in microplastic research.
- During the Bight 2023 Regional Monitoring Program, SCCWRP applied newly standardized collection methods (see Action 4.1.1) to obtain sediment and shellfish samples that are now being analyzed by five participating laboratories (Brander lab at Oregon State University [OSU], Gray lab at UC Riverside, Holland lab at CSU Long Beach, and McNeish lab at CSU Bakersfield) using FTIR, Raman, and related methods, with results expected in 2026.



Microscopy photo of microfibers at 1mm.

Action 4.1.3: Develop a watershed-scale program to model and monitor microplastics and macro-debris flux, transport, degradation, and fate according to a variety of endpoints (e.g., street litter, stormwater, wastewater, and direct discharges).

Organizations involved: SFEI, 5 Gyres Institute, ACC, California Coastkeeper Alliance, CASA, BACWA, SCAP, Dr. Andrew Gray's Laboratory at UC Riverside, Dr. Natalie Mladenov at SDSU

Status: In Progress

Update: California research institutions continue to build a watershed-scale understanding of microplastics and macro-debris flux, transport, degradation, and fate across multiple pathways. SFEI published a synthesis of microplastic sources and pathways to urban runoff; developed conceptual models for tires, fibers, and single-use foodware; and identified key data gaps to inform management. They also estimated statewide and Bay Area tire-wear particle emissions and are leading a study with the Moore Institute for Plastic Pollution Research (MIPPR) and WSP Consulting to evaluate whether trash capture devices generate or capture microplastics in stormwater.

SDSU, with funding from the NOAA MDP, quantified plastic loads from riparian zones and examined fate and transport processes.[3]

Dr. Andrew Gray's research group is advancing observation- and modeling-based investigations of plastic transport from watersheds to coastal waters, supported by federal, state, and local partners, and in collaboration with SCCWRP, MIPPR, multiple universities and national laboratories (Louisiana State University, Virginia Institute of Marine Science, United States Department of Energy [DOE] National Renewable Energy Laboratory, Professor Jay Gan's research group at UC Riverside, the Karlsruhe Institute of Technology Germany, and Wageningen University).[4]


Photo Credit: Heal the Bay

First flush event in Ballona Creek washing debris onto the beach after heavy rains.

3 Bagheri et al. 2024, Jack et al. 2025, Palmer et al., 2025, Mladenov et al. in review

4 Cowger et al., 2021; Cowger et al., 2022; Cowger et al., 2024; Karapetrova et al., 2024; Murphy-Hagan et al., 2025a; Murphy-Hagan et al., 2025b; Singh et al., 2025

Action 4.1.4: Create a comprehensive litter dataset to identify the most common item types according to volume, weight, flux, material, product, source, brand, and other units of importance.

Organizations involved: Dr. Andrew Gray's Laboratory at UC Riverside, Surfrider Foundation, California Coastal Commission, Clean Water Action/Clean Water Fund, NOAA National Marine Sanctuaries Monterey Bay National Marine Sanctuary (MBNMS)

Status: In Progress

Update:

- Surfrider Foundation produces regional reports (including San Diego, Los Angeles and Ventura County) and national reports (which include California highlights) that track 81 item types by material or product category, with 2024 analyses linking cleanup data to plastic legislation.
- MBNMS, in collaboration with California Marine Sanctuary Foundation and funded by NOAA MDP, compiled citizen science and partner data from 2017-2021 to develop a shoreline debris distribution report, incorporating datasets from Surfrider Foundation, Save Our Shores, Downtown Streets, the NOAA Marine Debris Monitoring and Assessment Project, and Ocean Conservancy.
- The California Coastal Commission continues to maintain long-term statewide cleanup records dating back to 1988 through California Coastal Cleanup Day (results from 1988 to 2023) and other cleanup activities throughout the year.
- Dr. Andrew Gray's research group has conducted extensive street-level trash surveys, developed data harmonization tools such as the Trash Taxonomy Tool[5] and MaTCH[6], and—together with affiliated scholar Win Cowger—continues to advance watershed trash monitoring and data integration through MIPPR.

Photo Credit: NOAA

Data collection spreadsheet.

Action 4.1.5: Work with Ocean Conservancy to capture brand data during Coastal Cleanup Day.

Organizations involved: California Coastal Commission, Save our Shores, Ocean Conservancy

Status: In Progress

Update: Brand data is not currently collected during Coastal Cleanup Day. Although Ocean Conservancy explored incorporating brand auditing into the Clean Swell app, the approach proved infeasible at a statewide scale. Some local coordinators, such as Save Our Shores in Monterey Bay, have implemented brand audits using the #breakfreefromplastic method, demonstrating that smaller-scale efforts are more manageable. OLS participants continue to evaluate options for integrating brand audit data into future Coastal Cleanup Day events.

5 Cowger et al., 2022b
6 Hapich et al., 2022; 2024

Objective 4.2: Quantify microplastics pathways within watersheds and develop technological solutions.

Action 4.2.1: Identify and quantify microfibers and microplastics from wastewater, stormwater, airborne, and agricultural sources.

Organizations involved: SCCWRP, SFEI, 5 Gyres Institute, CASA, BACWA, SCAP, Dr. Andrew Gray's Laboratory at UC Riverside, Dr. Natalie Mladenov at SDSU, ESRM Program at CSU Channel Islands, The Nature Conservancy

Status: In Progress

Update: Through an OPC-funded project, SCCWRP collaborated with wastewater treatment agencies to estimate microplastic removal efficiencies across multiple levels of wastewater treatment (see OPC Goal 2, Action 2). Furthermore, the Water Research Foundation conducted a study on the impact of solid stream treatment on microplastics in biosolids. Results are anticipated spring 2026.

Additional OPC and CASG support enabled SFEI to quantify microfiber emissions from household laundry dryers and model their transport to San Francisco Bay. SFEI is also conducting extensive measurements of microplastics in urban stormwater runoff, assessing the performance of bioretention rain gardens, and estimating microplastic loads to the Bay, finding that highlight stormwater as a major source. Complementary studies include conceptual modeling of tire-wear particle transport; The Nature Conservancy's statewide estimates of microfiber fate from apparel washing[7]; and SDSU's NOAA-funded research showing that dry-weathering of common plastic items, particularly medical masks and thin single-use bags, leads to far greater fragmentation than submersion. Furthermore, The Nature Conservancy has analyzed and quantified the sources of agricultural plastic waste across California to inform potential interventions.

Finally OPC funded SFEI to develop a Statewide Plastics Monitoring Strategy and Planning Framework (see OPC Goal 1, Research and Funding Action 1), which includes recommendations to quantify microfibers and microplastics from wastewater, stormwater, airborne, and agricultural sources.

An Orange County beach covered in sewage and debris after large rain events.

7 Geyer et al., 2022

Action 4.2.2: Research innovative solutions to address microfibers in textiles and apparel.

Organizations involved: CASA, BACWA, SCAP, CPSC, Materevolve, The Nature Conservancy, 5 Gyres

Status: Completed & Continuous

Update: In 2022, NOAA MDP and EPA's Trash Free Waters Program, with support from Materevolve, produced the *Interagency Marine Debris Coordinating Committee Report on Microfiber Pollution*, a Save Our Seas 2.0 Act deliverable that provided Congress with an overview of the issue and outlines a coordinated federal plan to address microfiber pollution alongside industry and research stakeholders. Building on this momentum, OPC and Materevolve convened a California-focused workshop to accelerate knowledge sharing and develop recommendations for reducing textile-derived microplastics. The workshop report identifies priority research and development needs for the textile sector.

Following the workshop, the Microfibre Consortium formed the Fiber Fragment Ecotoxicology Working Group to address key gaps in understanding the ecological impacts of fiber fragments. Additionally, in 2024 5 Gyres and The Nature Conservancy released *Reducing Microfiber Pollution: An Industry Playbook*, offering practical guidance for apparel brands to minimize microfiber emissions throughout product design and supply-chain processes.

Action 4.2.3: Research technological solutions to address microfibers at wastewater treatment plants or in washing machines.

Organizations involved: CASA, BACWA, SCAP, Materevolve, NOAA MDP, 5 Gyres

Status: Completed & Continuous

Update: Materevolve hosted the California Microfiber Workshop: Science, Innovation & Connection in 2020 and worked with NOAA MDP to publish the workshop's proceedings. The workshop highlighted emerging technologies and strategies for reducing microfiber releases from both washing machines and wastewater treatment systems. ZDHC Foundation and The Microfibre Consortium developed *Fiber Fragmentation in Wastewater: Snapshot Guidance for Suppliers* which provides manufacturers and suppliers with practical direction for minimizing fiber shedding and improving downstream capture.

Complementing these efforts, 5 Gyres conducted research on the effectiveness of washing machine filters in reducing microfiber emissions, contributing important performance data for potential household-level interventions.

See OPC Goal 2 Action 2 for an OPC-funded SCCWRP study that quantified microplastics removal efficiency of wastewater treatment processes, which involved 10 participating wastewater treatment facilities across the pilot and official sampling phases.

Objective 4.3: Research ecological and toxicological impacts of commonly found ocean litter on marine resources and human health.

Action 4.3.1: Advance research on the chemical components of common ocean litter items (by resin type) and the potential for pollutants to migrate into the environment and aquatic organisms via ocean litter.

Organizations involved: OPC, ACC, California Lost Fishing Gear Recovery Project at UC Davis, Dr. Erika Holland at CSU Long Beach, DTSC, ESRM Program at CSU Channel Islands (including Dr. Clare Steele), Graduate School of Public Health at SDSU, SCCWRP, Ocean Science Trust, UPSTREAM

Status: Completed & Continuous

Update: Dr. Erika Holland's lab at CSU Long Beach conducted studies showing that artificially weathered polypropylene pieces can trigger stress-related gene activation and altered swimming behavior in exposed organisms, highlighting the role of environmental aging of plastics in regards to toxicity.

CSU Long Beach students, in collaboration with SCCWRP, investigated the effects of microplastic fibers on oyster and fish larvae, finding that both species accumulated and retained small numbers of fibers during prolonged exposure.

At the statewide level, the Ocean Science Trust convened experts to develop a microplastic risk-assessment framework for California in 2021, recommending that risk analyses focus on particulate hazards until more detailed chemical toxicity data become available. SCCWRP, in partnership with the State Water Resources Control Board, released the Toxicity of Microplastics Explorer (ToMEx) data portal that includes data related to the toxicity of microplastics on aquatic and human health.

In 2025, OPC hosted workshops on industry-specific plastic pollution items identifying research priorities related to the chemical composition of tires and textiles.

Litter in the Los Angeles Harbor drifts out to sea.

Action 4.3.2: Assess population and community-level impacts to economically important and/or especially vulnerable species from exposure to plastics and adsorbed pollutants.

Organizations involved: ACC, SCCWRP, Ocean Science Trust

Status: In Progress

Update: SCCWRP convened specialists through the Microplastics Health Effects Workshop to identify thresholds at which microplastics cause harm, determine which particle characteristics pose the greatest risk, and document biological responses across taxa. SCCWRP and the SWRCB also created the ToMEx Aquatic Organisms Database to consolidate evidence of microplastic-related impacts. The Ocean Science Trust developed a California-focused microplastic risk assessment framework to guide evaluation of ecological risks (see Action 4.3.1), while ACC organized a systematic review of mammalian developmental and reproductive toxicity to assess potential population-level effects. Together, these efforts strengthen the foundation for evaluating species- and community-level consequences of plastic exposure.

Action 4.3.3: Research impacts to human health via direct consumption of microplastics and seafood exposed to plastic debris.

Organizations involved: ACC, California Lost Fishing Gear Recovery Project at UC Davis, SCCWRP, UPSTREAM

Status: In Progress

Update: Building on insights from the Microplastics Health Effects Workshop (see Action 4.3.2) and the Ocean Science Trust's California-specific microplastic risk assessment framework (see Action 4.3.1), SCCWRP and SWRCB developed the ToMEx Human Health Database, a resource that compiles scientific evidence on microplastic-related health effects and supports evaluation of exposure pathways relevant to consumers.

Objective 4.4: Assess the effectiveness of existing bans, policies, and programs.

Action 4.4.1: Conduct cost-benefit analyses for implementation of different common ocean litter item reduction policies/strategies and provide them to cities and businesses (i.e., local ordinances to ban expanded polystyrene, deposit schemes, packaging redesign).

Organizations involved: BASMAA, Dr. Andrew Gray's Laboratory at UC Riverside, UPSTREAM

Status: Completed

Update: A 2020 UCLA report on plastic waste in Los Angeles County found that shifting from plastic foodservice ware to alternatives can generate net savings for vendors over time. Similarly, UPSTREAM Solutions' *Reusable California Playbook* highlights the cost benefits food businesses can achieve by adopting reusable foodservice materials.

Action 4.4.2: Analyze the impact of the single-use plastic carryout bag ban on reducing disposable bag use, preventing ocean litter, and reducing government costs.

Organizations involved: ACC, California Coastal Commission, Dr. Andrew Gray's Laboratory at UC Riverside, Plastic Pollution Coalition, SCCWRP, Surfrider Foundation

Status: Completed

Update: Multiple lines of evidence indicate that California's single-use plastic carryout bag ban (SB 270, Padilla 2014; Appendix B) has contributed to substantial reductions in disposable bag use and plastic bag pollution. Data from SCCWRP's California Bight Monitoring Program show a marked decline in plastic bags in Southern California watersheds between 2013 and 2018, while California Coastal Cleanup Day recorded fewer plastic bags collected just one year after the statewide ban took effect in 2016.

California strengthened its efforts in 2024 with the passage of SB 1053 (Blakespear and Bauer-Kahan), which further tightens restrictions on plastic bags (see Appendix B). Recent research further confirms that bag bans and fees effectively reduce plastic bag litter, including in California.[8]

Policy tracking tools, such as Surfrider Foundation's Plastic Reduction Policy Map and the Plastic Pollution Coalition's Global Plastic Laws Database, provide additional resources for assessing outcomes and guiding future analyses.

Action 4.4.3: Conduct research into consumer behavior to assess attitudes toward reusable and disposable items, convenience, willingness to pay, and incentives to avoid commonly littered items (e.g., cigarette filters).

Organizations involved: Clean Water Action/Clean Water Fund, CPSC, Dr. Sean Anderson at CSU Channel Islands, PRCC, Save Our Shores

Status: In Progress

Update: Cal Poly students conducted early assessments of public responses to proposed cigarette litter and Styrofoam bans, while the Tobacco Product Waste in California white paper summarizes existing studies on consumer behavior within the tobacco sector. On-the-ground outreach by Save Our Shores indicates strong community receptiveness to reusable-focused initiatives in the Monterey Bay region, where many jurisdictions have already adopted ordinances to reduce land-based litter (Appendix A). Building on this momentum, Save Our Shores also advanced the Ban the Butt campaign, contributing to Santa Cruz County's 2024 decision to ban the sale of filtered tobacco products.

Deterioration of cigarettes.

Cigarette litter.

8 Papp and Oremus, 2025

Objective 4.5: Improve coordination among California organizations conducting ocean litter research.

Action 4.5.1: Improve communication among ocean litter research entities in California through participation in the Ocean Litter Strategy implementation process.
Organizations involved: NOAA MDP, OPC, The Albatross Coalition, Zero Waste San Diego, CASG
Status: Completed
Update: With support from NOAA MDP, CASG convened the OLS Goal 4 Research Workgroup twice annually to facilitate communication, collaboration, and information-sharing among researchers. Additional workgroups for other OLS goals also met regularly, often coordinating and discussing research aligned with their respective priorities.

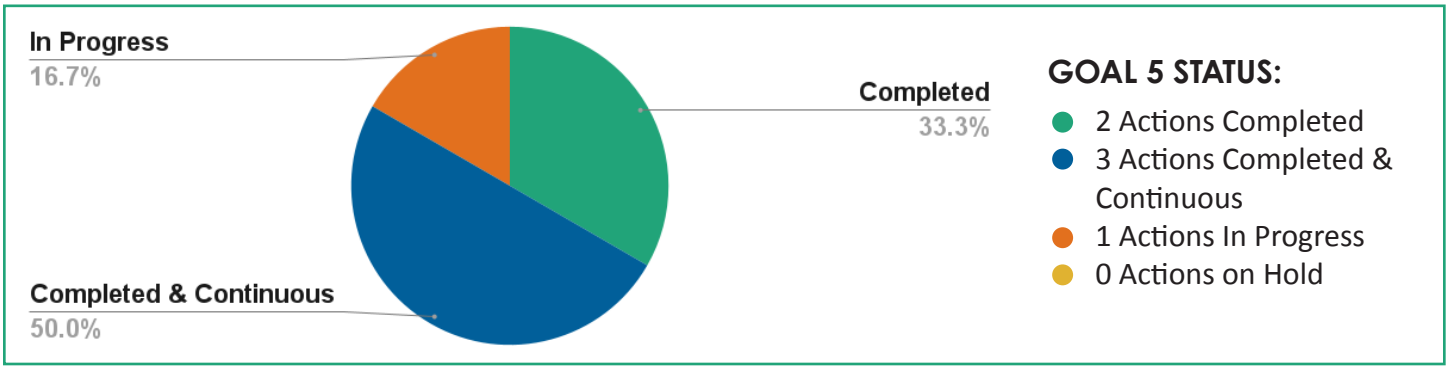
Action 4.5.2: Increase dissemination of research results to the public and management agencies (e.g., CDFW).
Organizations involved: OPC, NOAA MDP
Status: Completed
Update: As leads of the OLS, and the Goal 4 Research Workgroup, NOAA MDP and OPC organized the dissemination of research primarily through the OLS biannual webinars and workgroups which shared emerging research from partners across the state. OPC also disseminated research findings through their website, newsletter, and interagency coordination efforts, including the Plastic Pollution Steering Committee.

Researchers conduct standardized transects to measure the amount and types of marine debris on shorelines.


Photo Credit: NOAA

Goal 5: Generate behavior change by educating and engaging communities and individuals to reduce ocean litter

Goal 5 Status



Objective 5.1: Increase formal and informal science-based education to raise awareness of ocean litter.

Action 5.1.1: Compile and share a database of existing resources and curriculum for formal education on ocean litter.
Organizations involved: NOAA MDP
Status: Completed
Update: In 2019, Algalita and the NOAA MDP identified ocean litter related curriculum and toolkits for educators. In 2022, CASG, in partnership with NOAA MDP, created street litter lessons and activities with a list of accompanying resources and curriculum. NOAA MDP updates their Educational Portal, Quarterly Newsletter, and NOAA Sea to Sky Resource Collection of databases with educational materials as they become available.

Action 5.1.2: Integrate standards-based ocean litter curriculum into school programs.

Organizations involved: Algalita, 5 Gyres Institute, California Coastal Commission, Institute for Geographic Information Science at San Francisco State University (SFSU), Monterey Bay Aquarium, NOAA MDP, One Cool Earth, PRCC, Save Our Shores

Status: Completed & Continuous

Update: In partnership with NOAA MDP, One Cool Earth launched their school-based, Next Generation Science Standards (NGSS) aligned marine debris education program in 2021 which has expanded its reach to 29 schools as of 2024. Their goal is to reach 11,000 students per year with at least seven lessons per student, plus other hands-on activities. The curriculum provides fundamental concepts related to waste lifecycles, natural systems as well as provides hands-on activities for students to understand and intervene to prevent marine debris.

From 2018 to 2024, Algalita reached over 5,000 schools, 61,000 teachers, and 105,000 students directly through their free, standards-aligned ocean literacy programs. This action-driven approach reinforces academic standards while fostering student agency, environmental leadership, and long-term stewardship.

Central to this work is Algalita's Wayfinder Society for Environmental Education, a digital platform that equips educators with NGSS- and Advanced Placement Environmental Science- (APES) aligned lessons and activities to engage students in place-based science, civic inquiry, and hands-on investigation. Each resource is supported by detailed standards alignment guides, editable lesson materials, and flexible classroom integration options. In Fall 2024, Algalita launched a new series of NGSS-aligned field experiences, reaching over 600 students, primarily from Title 1 schools in Los Angeles and Orange Counties. These immersive trips take students into local watersheds and coastal environments where they investigate plastic pollution, collect data, and apply classroom learning to real-world contexts. Each trip is paired with pre- and post-visit activities to reinforce learning outcomes and support instructional standards. Additionally, Algalita's online Student Hub has empowered more than 3,350 students from 112 countries to log over 7,150 hours of action, often in collaboration with teachers through class-wide projects and events like the Earth Month Action Challenge. These efforts are guided by custom-built Action Pathways that help students explore their unique role in tackling plastic pollution.

Photo Credits: Algalita Marine Research & Education

Algalita guides LA County students in hands-on water quality and microplastics testing.

Students kayak local waters to collect plastic pollution samples.

Algalita leads a beach cleanup and waste characterization study with local students.

Action 5.1.3: Develop and distribute toolkits to empower high school and college students to educate people on their campuses and in their communities.

Organizations involved: Algalita, The Albatross Coalition, Zero Waste San Diego, Monterey Bay Aquarium, NOAA MDP, PRCC, SFSU

Status: Completed & Continuous

Update:

In 2023, the Monterey Bay Aquarium Education Division compiled their free educational assets and educator development programs, including several marine debris topics, so that teachers can select a subset of curriculum to build their own toolkits tailored to their community.

From 2018 to 2024, Algalita and their partners developed toolkits, featuring topics like microplastics, ocean currents, and beach pollution, and distributed them to over 1,600 middle schools, high schools, and colleges across the U.S. through their Wayfinder Society for Environmental Education.

In 2023, SFSU developed workshop materials that demonstrate how to work with NOAA's Marine Debris Monitoring and Assessment Project (MDMAP) data in an open source software, R Studio, to build quick maps of transect marine debris data. SFSU has further developed these materials into lab exercises for a professional Geographic Information Systems certificate course. Additionally, NOAA MDP created A Guide to the NOAA's MDMAP for Educators as a resource for those who are interested in implementing MDMAP surveys with their students.

Youth examine microplastics they collected in the field under microscopes.

Youth conduct activity to identify how pollutants flow through watersheds.

Objective 5.2: Educate consumers about the sources of ocean litter to drive behavior change in purchasing.

Action 5.2.1: Implement coastal and inland public education campaigns about common ocean litter items to drive changes in purchasing.

Organizations involved: 5 Gyres Institute, California Coastal Commission, California Marine Sanctuary Foundation, Californians Against Waste, NOAA Channel Islands National Marine Sanctuary (CINMS), ESRM Program at CSU Channel Islands, Heal the Bay, NMSF, PRCC, Save Our Shores, Stand Up To Trash, Surfrider Foundation

Status: Completed & Continuous

Action 5.2.1 Continued

Update: Since 2018, 5 Gyres has been involved in Brand Audits with Break Free From Plastic and the TrashBlitz, which aim to hold brands accountable for the waste they produce while also highlighting commonly littered products and packaging for consumers. Surfrider Foundation also engages wider audiences through regional conferences and biweekly webinars on the lifecycle impacts of plastic, with connection to actions individuals and governments can take to mitigate plastic pollution.

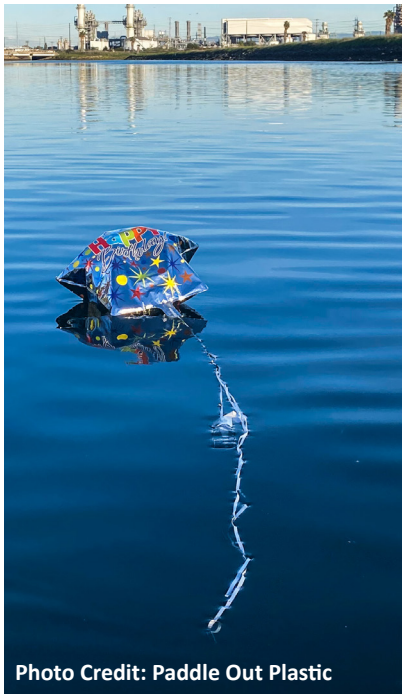
In 2021, through their Plastic Pollution Campaign, Save Our Shores highlighted the "Sinister Six" pollution items that are found during beach clean-ups and developed "8 Quick Tips" to mitigate plastic pollution by informing consumer choices in purchasing.

Heal the Bay, in partnership with Reusable LA, began developing outreach materials on the benefits of using reusable foodware (both for food facilities and for customers).

In 2023, the California Coastal Commission updated their 11 year campaign, Let's Make Litter Extinct, which highlights problem trash "species," what is being done to prevent their entry into the environment, and how people can help.

Since 2020, Stand Up To Trash has conducted monthly beach cleanups and a Lunch & Learn Program to raise awareness of plastic pollution and educate the public on various environmental topics that aim to influence individual purchases and behaviors. In 2024, Stand Up To Trash created "The Ocean Starts at Your Front Door" booklets and distributed about 1,000 to local schools and on field trips to Dana Point Harbor.

In 2022, CINMS, NMSF, and California Marine Sanctuary Foundation launched a Balloon Free Seas social media campaign, and a handful of class lectures to raise awareness on the impacts of balloons on marine wildlife and to offer alternatives to celebrating Valentine's Day, Mother's Day, and school graduations.



Mylar balloon floats in Long Beach Los Cerritos Channel.

Stand Up To Trash monthly cleanup.

Action 5.2.2: Develop messaging for consumers and producers on microfibers given our current state of knowledge on this emerging issue.

Organizations involved: Californians Against Waste, CASA, BACWA, SCAP, CPSC, ESRM Program at CSU Channel Islands, Materevolve

Status: In Progress

Action 5.2.2 Continued

Update: Beginning in 2018, the organizations involved in this action began compiling information, planning for outreach, and searching for grants to fund the development of messaging around microplastics. This led to a workshop in 2020 hosted by Materevolve titled California Microfiber Workshop: Science, Innovation & Connection, which was funded by the NOAA MDP and the NMSF. Furthermore, in 2025, OPC and Materevolve hosted the California Statewide Microplastics Strategy Workshop for the Textile Sector to explore the full lifecycle of textiles, from materials and design to laundering and disposal, to identify voluntary actions, research priorities, and long-term policy opportunities. Materevolve's work on developing messaging for consumers is still ongoing.

Action 5.2.3: Implement a public education campaign about cigarette filters.

Organizations involved: BASMAA, California Coastal Commission, Californians Against Waste, CPSC, SDSU, Save Our Shores, Surfrider Foundation, UPSTREAM

Status: Completed

Update: In 2021, Surfrider Foundation, with funds from the NOAA MDP, installed 175 cigarette butt cans, distributed 13,000 pocket ashtrays, and outreached to over three million people through receptacle signage and bus, train, and print advertising, preventing an estimated ~400,000 cigarette butts from potentially entering the marine environment. Surfrider Foundation and associated student clubs, through their "Hold Onto Your Butt," program also produce educational materials and awareness campaigns on this issue.

Save Our Shores worked in collaboration with singer/songwriter, Ben Harris, to create an outreach music video called "Butts Up" and hosted community screenings of the Cigarette Surfboard to highlight cigarette filter pollution in Santa Cruz. Building off of these efforts, Save Our Shore's year- long campaign against the retail sale of filtered tobacco products resulted in the "Ban the Butt" ordinance in Santa Cruz county in 2024 which was followed by a similar ordinance in the City of Santa Cruz in 2025 (Appendix A). Advocacy for similar bans in other jurisdictions are currently underway.

CPSC joined the Greater Sacramento Smoke & Tobacco Free Coalition and expanded partnerships with other NGOs to work on education and advocacy for cigarette litter prevention.

In 2024, with funding through CDPH CTCP, a Tobacco Product Waste White Paper was produced by SDSU on tobacco, health, and litter, examining the ecological and economic impacts of this waste stream, the challenges posed by its persistence and widespread littering, and identifies opportunities for policy, product redesign, and behavior-change interventions to reduce tobacco product waste across California.

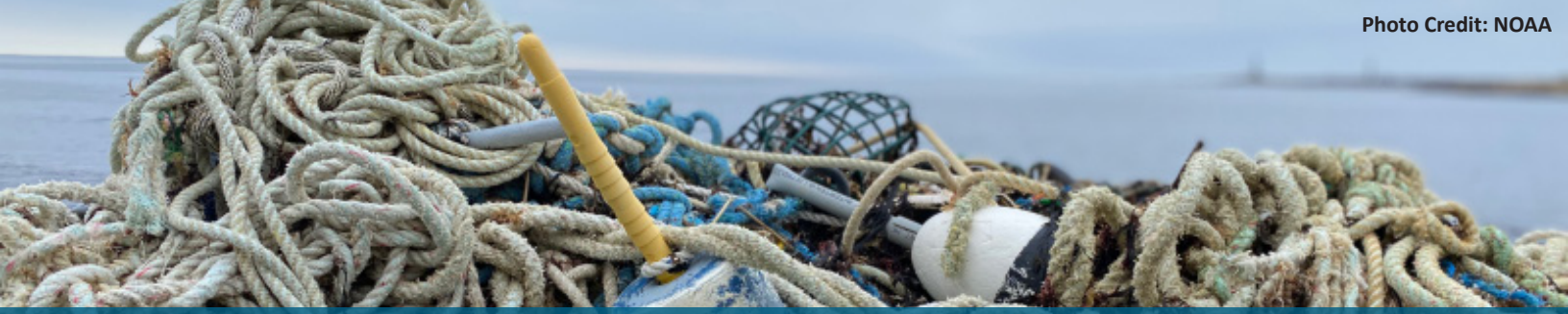


Photo Credit: NOAA

Goal 6: Reduce the sources of ocean-based debris and maximize the efficiency of ocean-based debris cleanup

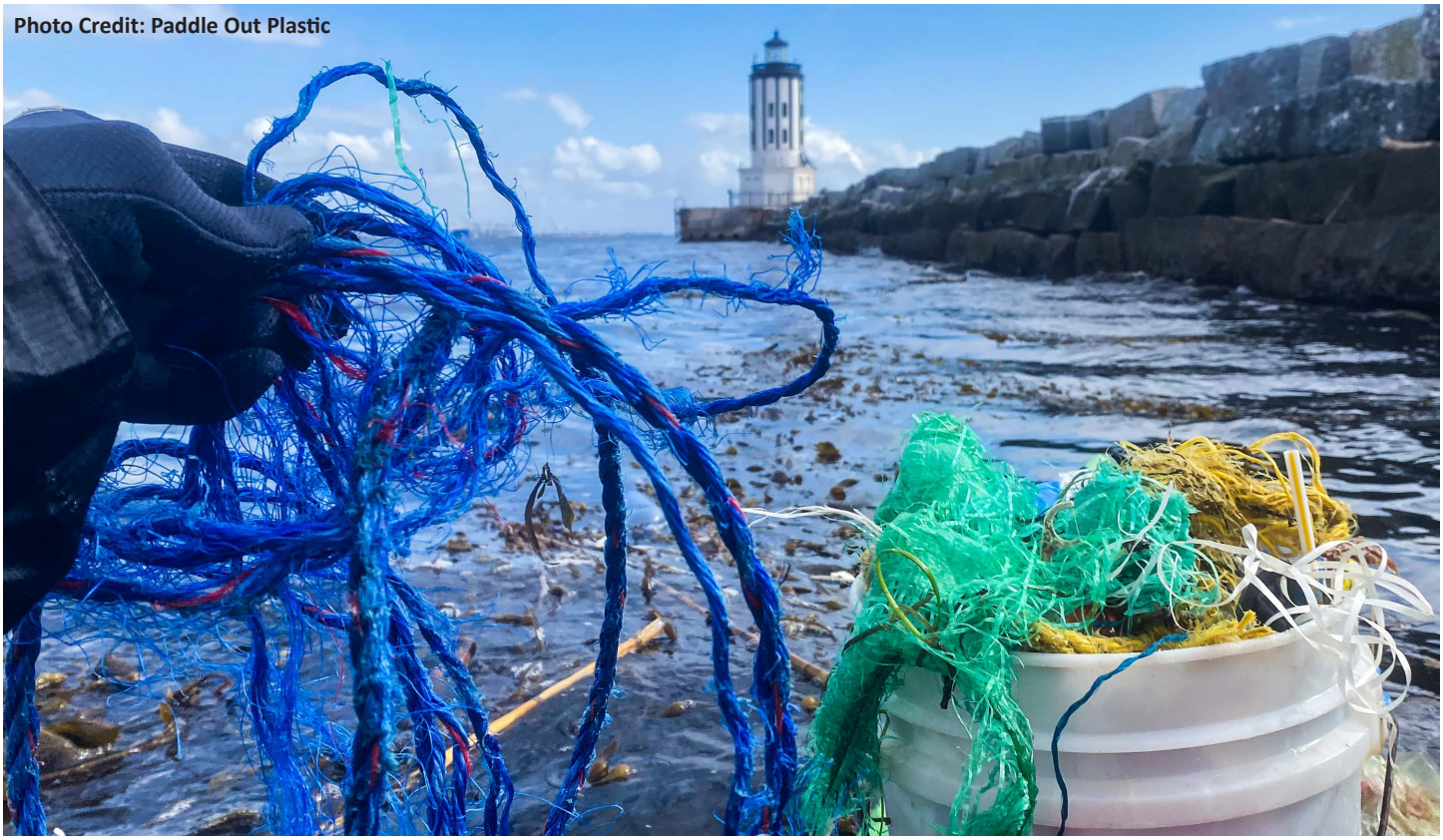
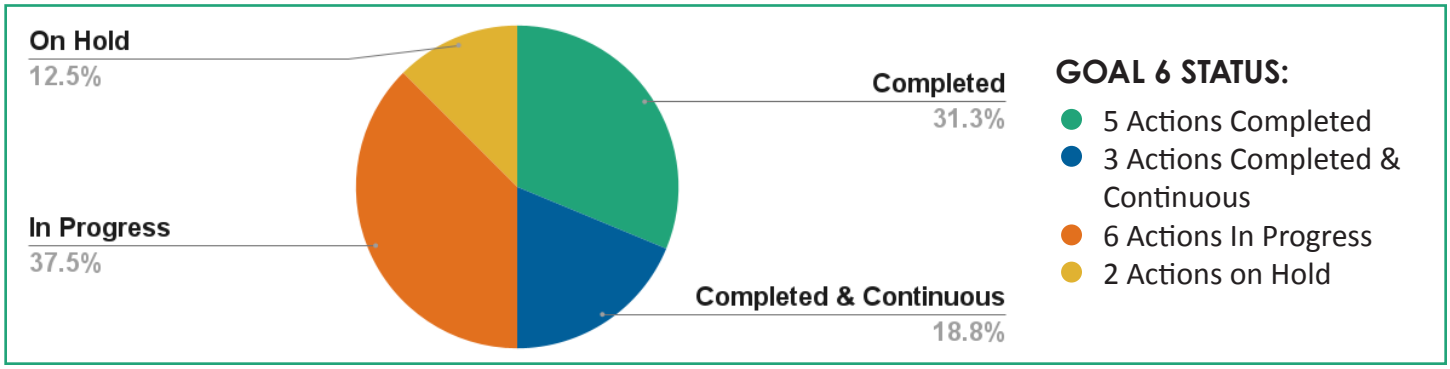


Photo Credit: Paddle Out Plastic

Rope litter in the Los Angeles Harbor.

Goal 6 Status



Objective 6.1: Leverage industry knowledge to prevent lost fishing gear.

Action 6.1.1: Leverage commercial and recreational fishermen's knowledge to develop strategies for preventing and dealing with gear loss, and share these strategies among the commercial and recreational fishing communities.

Organizations involved: NOAA MDP, CDFW, California Lost Fishing Gear Recovery Project at UC Davis, CINMS, National Marine Sanctuaries Foundation

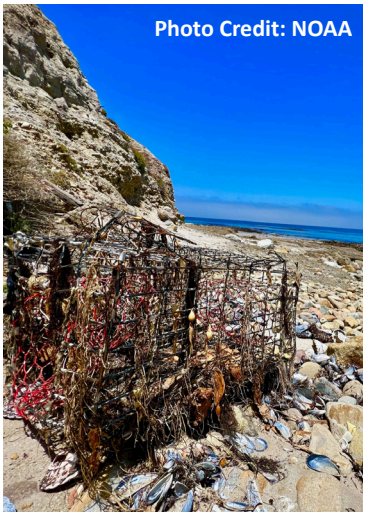
Status: Completed & Continuous

Update: Progress on this action began in 2018 with partnerships focused on the spiny lobster fishery, recreational fisheries, and the California Coastal Pelagic Species/WetFish Roundhaul fishery. By 2019, partners had compiled data from sources such as BoatUS and CDFW to better understand the scale of gear loss and identify effective outreach materials. In 2020, the CINMS worked with Santa Barbara lobstermen on shoreline cleanups, researched monofilament line collection and outreach programs, and, with NMSF support, attempted to expand periscope bin programs and monofilament line recycling in fishing tackle shops.

In 2021, partners met with CDFW to refine understanding of data collected through the Commercial Spiny Lobster Fishery trap-loss reporting program, while cleanup work expanded through collaboration with Santa Barbara Channelkeeper, CDFW, NOAA, and veteran lobstermen. That same year, the California Lost Fishing Gear Recovery Project partnered with commercial urchin harvesters to conduct more than 50 days of abandoned, lost, and discarded gear recovery in the Southern California Bight, removing thousands of pounds of nets, traps, and other debris; a final report was submitted to the Coastal Commission. Also in 2021, the UN-sponsored Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) published a global review of sea-based sources of marine litter.

In 2022, CINMS continued cleanups and, with NMSF, produced a best-practices short film on reducing gear loss. In 2025, CINMS continues these cleanup efforts with support from NMSF and commercial fishermen and hosts the regional Marine Debris Summit to coordinate cleanups, share data, align funding, and exchange best practices. The California Lost Fishing Gear Recovery Project also continues contracting with fishermen for ongoing recovery of underwater abandoned, lost, and discarded gear.

From 2020-2024, NOAA MDP served as support on the OLS Goal 6: Ocean-based removal and cleanup workgroup, and organized biannual webinars, goal-based workgroup calls, and other engagement opportunities to disseminate and learn from the latest and relevant information to recreational and commercial fisherman in the OLS community.



Lobster trap found on the coast of Santa Rosa Island.

Buoy found on the coast of Santa Rosa Island.

Monofilament recycling bin.

Action 6.1.2: Share lessons learned from the fishing industry with management agencies and other stakeholders to focus policy and funding on prevention and recovery of lost gear.

Organizations involved: CDFW, California Lost Fishing Gear Recovery Project at UC Davis, CINMS, MBNMS, The Nature Conservancy

Status: In Progress

Update: OLS partners have worked with representatives from various fishing industry groups to incorporate their institutional knowledge into policy frameworks on prevention and recovery of lost gear. CDFW and NOAA National Marine Fisheries Service (NMFS) have worked with the California Dungeness Crab Fishing Gear Working Group to develop the Best Practices Guide for commercial and recreational Dungeness crab fishers. MBNMS and the California Marine Sanctuary Foundation have been directly involved in the Risk Assessment and Mitigation Program (RAMP) process and are working with members of the fishing industry to share lessons learned during cleanup events. The California Lost Fishing Gear Recovery Project at UC Davis presented lessons learned at conferences to share with commercial and marine fisheries managers and have worked with CDFW to incorporate fishers knowledge into the implementation of SB 1287 (McGuire, 2016), The Whale Protection and Crab Gear Retrieval Act (Appendix B).

Lost fishing gear.

Diver retrieves lost fishing gear.

Action 6.1.3: Work with the fishing community to design gear that is less likely to be lost, and less harmful to the environment once lost.

Organizations involved: CINMS, NOAA NMFS, UCSB

Status: In Progress

Update: NOAA CINMS has partnered with NOAA NMFS Stranding Network Coordinators and a UC Santa Barbara Mechanical Engineering Department Senior Capstone Project to modify trap fishing gear to reduce entanglement of marine mammals. Field testing and socializing with commercial trap fishermen and review by CDFW and NMFS are potential next steps.

Objective 6.2: Implement Best Management Practice (BMP) Plans for reducing lost gear within the aquaculture industry.

Action 6.2.1: Compile key outcomes desired for effective BMP Plans for the aquaculture industry through a collaborative process with, and between, growers.
Organizations involved: CDFW, FGC
Status: In Progress
Update: Work on BMP plan requirements was paused to prioritize the development of public interest criteria for new aquaculture leases. Discussions on formalizing BMPs are planned to resume with growers in 2026.

Action 6.2.2: Update FGC policies to include BMP Plans in permitting considerations such as the issuance of aquaculture leases, and educate growers and stakeholders about BMP Plans to help in the implementation process.
Organizations involved: CDFW, FGC
Status: In Progress
Update: Through collaboration between CDFW and FGC, an enhanced leasing process was approved by FGC in 2024, improving interagency coordination, tribal engagement, and public review for new aquaculture leases. FGC-approved public interest criteria and evaluation framework are being integrated into permitting and applicant education for new leases. Discussions on this topic between growers and partner agencies are ongoing.

Action 6.2.3: Include aquaculture BMP Plan implementation California Coastal Commission requirements in coastal development permits, where appropriate.
Organizations involved: California Coastal Commission
Status: Completed
Update: The California Coastal Commission has been including marine debris BMPs on all new aquaculture permits issued since 2021. A new guidance document solidifies these permit conditions for aquaculture facilities.

Objective 6.3: Improve tracking of lost fishing and aquaculture gear in order to better understand lost gear patterns and impacts, and to facilitate removal.

Action 6.3.1: Improve lost fishing gear data collection and database systems to facilitate the prevention, tracking, and recovery of lost gear.

Organizations involved: California Lost Fishing Gear Recovery Project at UC Davis, CINMS, CSU Channel Islands, Dr. Andrew Gray's Laboratory at UC Riverside, The Nature Conservancy

Status: Completed & Continuous

Update: The Santa Rosa Island Research Station at CSU Channel Islands, with funding from NMSF, developed a derelict fishing gear tracker that compiles LOT numbers, coordinates, images, and survey data from the Northern Channel Islands. CSU Channel Islands also applied NOAA's MDMAP to assess temporal variation in macro- and micro-debris and evaluate impacts of lobster fishery gear on beaches in the Channel Islands.

CSU Channel Islands' research station participated in the 2025 CINMS/NMSF/Global Ghost Gear Initiative Marine Debris Summit alongside key organizations, including the California Lobster and Trap Fishermen's Association, to discuss joint gear-removal efforts and best practices for waste mitigation. NMSF and CINMS co-hosted another regional Marine Debris Summit in August 2025, with a focus on improving data collection, storage, and sharing.

CDFW has strengthened their reporting through a bi-weekly requirement for the commercial Dungeness crab fishery and annual reporting of lost gear quantities and locations, with summaries incorporated into the state's Risk Assessment and Mitigation Program (RAMP). Additionally, the California Lost Fishing Gear Recovery Project continues providing data upon request and contributes to shared lost-gear databases.

Action 6.3.2: Implement a pilot project to assess the effectiveness of different tagging and marking methods for aquaculture gear.

Organizations involved: None

Status: On Hold

Update: No updates reported.

Action 6.3.3: Include aquaculture gear marking and debris collection reporting requirements in coastal development permits, where appropriate.

Organizations involved: California Coastal Commission

Status: Completed

Update: Beginning in 2021, the California Coastal Commission incorporated aquaculture gear marking requirements into all aquaculture permits issued as part of the marine debris BMPs.

Objective 6.4: Increase the removal of ocean-based debris.

Action 6.4.1: Research and provide recommendations to overcome policy barriers to lost gear removal and ocean-based marine debris cleanup.
Organizations involved: California Lost Fishing Gear Recovery Project at UC Davis, NOAA CINMS, The Nature Conservancy
Status: In Progress
Update: The California Lost Fishing Gear Recovery Project is working with GESAMP to inform lost gear removal policy for member states.

Action 6.4.2: Support and expand existing programs for the prevention and removal of abandoned or derelict vessels (e.g., expansion of recreational vessel removal, funding for removal of commercial vessels).
Organization involved: NOAA MDP
Status: In Progress
Update: Funding from the NOAA MDP has supported the removal of vessels from Richardson Bay and monitoring of beneficial impacts of vessel removal on eelgrass and waterbirds. More funding has been provided through the NOAA MDP's Large Scale Marine Debris Removal and Interception Technologies grant competition.

Action 6.4.3: Implement and/or expand voluntary buyback, return, and/or recycling programs for old and unused recreational and commercial fishing gear.
Organizations involved: California Lost Fishing Gear Recovery Project at UC Davis, California State Parks Division of Boating & Waterways, California Coastal Commission, NOAA MDP, The Nature Conservancy
Status: Completed
Update: The California Fishing Line Recycling Program (implemented by both California State Parks and the California Coastal Commission Boating Clean & Green Program) has installed hundreds of fishing line recycling stations resulting in thousands of pounds of line being collected and properly recycled. These stations are located at harbors, fishing piers, parks, etc. The NOAA MDP supported a transboundary effort through the 2020 United States Mexico Canada Agreement Implementation Act. The North American Net Collective Initiative collected used and retired fishing gear for processing, recycling, and use in new products.

Action 6.4.4: Implement a fishing gear recovery program, as mandated in SB 1287, for the Dungeness crab fishery. Build or expand gear recovery programs for other fisheries while considering lessons learned in the implementation of SB 1287.

Organizations involved: CDFW

Status: Completed

Update: Implementation of the Dungeness crab gear recovery program mandated by SB 1287 has advanced significantly (Appendix B). Initial development began in 2019 with support from the National Fish and Wildlife Foundation's Fishing for Energy Program, and CDFW formally established the Lost or Abandoned Commercial Dungeness Crab Trap Gear Retrieval Program, with annual implementation beginning in 2020. The program has since been strengthened through additional legislation (SB 1309; Appendix B) and regulatory updates, including the March 2024 emergency regulations expanding retrieval options and ongoing scoping for permanent rulemaking. Permanent changes were adopted in April 2024. Program summaries are available on CDFW's Whale Safe Fisheries webpage. Opportunities to expand gear recovery efforts to other fisheries are being considered.

Action 6.4.5: Identify and remove, when deemed appropriate, legacy debris from California's coastal ocean (e.g., legacy aquaculture debris, anchorage debris).

Organizations involved: CSU Channel Islands, FGC, NMSF, NOAA MDP

Status: Completed & Continuous

Update: With funding from the NOAA MDP, CSU Channel Islands removed thousands of pounds of legacy debris from remote beaches in Santa Rosa and Santa Cruz Islands. This program expanded with additional funding from NOAA through the NMSF. FGC continues to pursue efforts to address legacy debris.

Action 6.4.6: Engage and partner with boaters, fishermen, divers, growers, local communities, and other ocean stakeholders to implement regional cleanup programs (e.g., in bays, ports, or harbors).

Organizations involved: CINMS, California State Parks Division of Boating & Waterways, California Coastal Commission, ESRM Program at CSU Channel Islands

Status: Completed

Update: In pursuit of other related OLS actions, strong partnerships among fishing industries, state and federal agencies, and other ocean stakeholders have been formed supporting extensive cleanup efforts that together have removed thousands of pounds of debris from California's waters. These ongoing collaborations led by the CINMS, the California Coastal Commission, and California State Parks have produced significant results. From 2018 to 2024, CINMS conducted 19 cleanup events with 395 volunteers, removing 37,130 pounds of debris. Similarly, an average of more than 46 boating facilities and groups participating annually in the California Boating Clean & Green Program's Coastal Cleanup Day events mobilized approximately 9,369 volunteers from 2020 to 2024, who collected 128,337 pounds of trash and recyclables using 859 kayaks, canoes, and dinghies.

Action 6.4.7: Place and maintain large receptacles at ports and harbors for fishermen to dispose of trash that has been collected while fishing.
Organizations involved: None
Status: On Hold
Update: While new disposal receptacles for non-fishing gear-related marine debris collected by fishermen have not, to our knowledge, been placed, other related efforts have worked to collect trash at harbors and ports. For instance, CPSC hosts marine flare collection events at ports across the state to provide free collection of expired marine flares versus being landfilled. Furthermore, the California Fishing Line Recycling Program also places collection receptacles at various locations around the state (see Action 6.4.3).

CPSC's "Make the Marine Flare Switch" campaign promotes swapping single-use pyrotechnic marine flares for reusable electronic visual distress signals (eVDSDs).


Photo Credit: NOAA

Appendix A: Local Legislation

- 2008 City of Santa Cruz Parcel Tax for Beaches, Measure E
  - Measure E was passed on Nov. 4, 2008 with 76% vote.
  - The question on the ballot: "To protect public health and the environment by reducing pollution, trash, toxics and dangerous bacteria in our river, bay and ocean; helping to keep beaches clean; protecting fish and wildlife habitat; shall the City of Santa Cruz adopt a Clean River, Beaches and Ocean Tax, with revenues spent locally under independent citizen oversight? The annual rates will be $28 for single-family parcels, $94 for other developed parcels, and $10 for undeveloped parcels."
- 2018 City of San Francisco Reusable Foodware Ordinance
  - The city of San Francisco passed a law requiring food establishments to allow customers to bring their own reusable containers.
- 2019 City of Berkeley Disposable Foodware and Litter Reduction Ordinance
  - Accessory Disposable Foodware will only be provided by request or at self-serve stations, Disposable Foodware will be required to be BPI Certified Compostable, Food vendors will show a charge of $0.25 for disposable hot and cold cups, and Food vendors may only use reusable foodware (durable/washable) for dine-in.
- 2019 City of Beverly Hills Ban on the Sale of All Tobacco Products Ordinance
  - Banned all nicotine product sales in the city of Beverly Hills.
- 2019 City of Pacific Grove Reusable Food Service Ware or Dine-in Ordinance
  - Required food providers to use reusable food service ware for dine-in customers and BPI-certified compostable ware for take-out orders.
- 2019 Santa Cruz County Single-Use Cup Tax Ordinance
  - Any person, business, event, food truck, or other entity, including both permanent and temporary facilities, which sells or provides hot or cold beverages in a single-use, disposable cup must charge an additional twenty-five cents ($0.25) for each cup.
- 2021 City of Carlsbad Single-Use Plastics Ban
  - A phase out of single-use plastic foodware and polystyrene, and allows reusable or compostable for both dine-in and takeout.
- 2021 City of Solana Beach and City of Encinitas Balloon Ban
  - Banned the sale, use, and intentional release of balloons filled with any gas lighter than air, such as helium.
- 2021 UPSTREAM Solutions's #SkiptheStuff Campaign
  - A national effort originally started by UPSTREAM Solutions to make takeout accessories by request only.
- 2022 City of Los Angeles Available upon Request Ordinance
  - Prohibited all restaurants in the city from having self-service disposal food ware dispensers and providing/offering disposal food ware accessories unless requested by customers.

- 2022 City of Los Angeles Comprehensive Plastics Reduction Program (CPRP)
    - The City of Los Angeles Sanitation and the Environment rolled out a plan to reduce single-use plastics entering the waste stream and the environment through “upstream” measures like banning certain products and “downstream” measures like improving reuse, recycling, and composting infrastructure.
- 2022 City of Los Angeles Expanded Polystyrene Ban Ordinance
    - Banned expanded polystyrene (EPS), or Styrofoam, for use in foodware, single-use coolers, and other items to reduce plastic pollution.
- 2022 City of Los Angeles Single-use Carryout Bag Ordinance
    - Expanded its single-use carryout bag ban to prohibit all businesses from providing single-use plastic bags, including the thicker, supposedly reusable bags that had become common under the previous state law.
- 2022 City of Los Angeles Zero Waste at City Facilities & Events Ordinance
    - Aims to reduce waste at city-run facilities and events by limiting non-recyclable and non-compostable materials, especially single-use plastics.
- 2022 Los Angeles County Waste Reduction Ordinance
    - Required all single-use food wear to be compostable or recycled, and banned Styrofoam products, requiring all full-service, dine-in restaurants to have reusable food ware.
- 2023 City of Encinitas Smoking Ordinance
    - Ban on smoking and vaping in all public places.
- 2023 City of Los Angeles Reusable Foodware Microgrant Program
    - Run by LA Sanitation & Environment (LASAN) with support from partners like APTIM, provides grants, technical assistance, and training to restaurants to help them implement reusable systems for dine-in service. A pilot of the program concluded in summer 2024, with 120 restaurants participating.
- 2024 Santa Cruz County Filtered Tobacco Product Ordinance
    - Bans the retail sale of filtered tobacco products.
- 2024 City of Del Mar Balloon Ban
    - Banned the sale, use, and distribution of all balloons filled with a gas lighter than air.
- 2024 City of Oceanside Marine Debris Reduction Ordinance
    - All retail establishments and food service providers will be required to find sustainable alternatives to polystyrene foam and single-use plastic bags.
- 2025 City of Coronado Plastic Reduction Ordinance
    - One of the most comprehensive plastic policies in San Diego County, which includes restrictions on single-use plastic foodware, polystyrene foam, carryout bags, balloons, and single-use plastic bottles at city facilities and events, and requires businesses to offer only reusable or paper bags.
- 2025 City of Santa Cruz Filtered Cigarette Sales Ban
    - Banned the retail sale of filtered tobacco products.

Photo Credit: NOAA

Appendix B: State Legislation

- SB 270 (Padilla, 2014) Single Use Carry Out Bag Ban
  - Bans most grocery stores, convenience stores, liquor stores, food marts, and retail stores with a pharmacy from providing single-use plastic carryout bags.
- SB 1287 (McGuire, 2016) The Whale Protection and Crab Gear Retrieval Act
  - Established a regulatory program with incentives for fishers to retrieve lost Dungeness crab fishing gear, aiming to reduce whale entanglements from lost of abandoned gear.
- SB 1309 (McGuire, 2018): Fishing: Fisheries Omnibus Bill of 2018
  - Aims to enhance and restore salmon populations and address marine life entanglement in the Dungeness crab fishery.
- SB 212 (Jackson, 2018) Pharmaceutical and Sharps Waste Stewardship Program
  - Requires manufacturers and distributors to fund and operate programs for the proper collection and disposal of pharmaceutical and sharps waste.
- SB 1335 (Allen, 2018) Sustainable Packaging for the State of California
  - Requires food service facilities on state-owned property to use only reusable, recyclable, or compostable food packaging.
- SB 1422 (Portantino, 2018) Microplastics in Drinking Water
  - Require annual testing for the presence of microplastics in drinking water and the public disclosure of test results. The legislation mandated the SWRCB to adopt a microplastics definition by July 1, 2020. Adopted definition: Plastic particles with three dimensions that are less than 5 millimeters in length.
- SB 1263 (Portantino, 2018) Ocean Protection Council Statewide Microplastics Strategy
  - Requires the California Ocean Protection Council (OPC) to adopt a statewide research strategy and identify early actions to reduce microplastic pollution in California's marine environment.
- AB 619 (Chiu, 2019) Bring-Your-Own Reusable Food and Beverage Containers
  - Allows temporary food facilities at events to serve customers in reusable containers rather than single-use disposables. It also clarifies existing health code laws, ensuring that the public can bring reusable containers to restaurants for take-out.
- SB 8 (Levine, 2020) Smoking Ban for State Parks and Beaches.
  - Prohibited smoking or disposing of used cigar or cigarette waste on a state coastal beach or in a unit of the state park system.
- AB 793 (Ting, 2020) Minimum Recycled Content
  - Requires minimum post-consumer content tiers for plastic beverage containers to increase from 15% in 2024 to 50% in 2030.
- AB 1583 (Eggman, 2020) The California Recycling Market Development Act
  - Requiring CalRecycle to convene a Statewide Commission on Recycling Markets and Curbside Recycling consisting of representatives of public agencies, private solid waste enterprises, and environmental organizations that have expertise in recycling.

- AB 2287 (Eggman, 2020) Solid Waste
    - Repeals the ban on “marine degradable” plastic labels and authorizes CalRecycle to set labeling and compliance guidelines. Allows adoption of European standards for biodegradable mulch film and limits “soil biodegradable” labels to certified products. Updates compost certification references. Requires the Statewide Commission on Recycling Markets to issue recommendations by mid-2021 and extends recycling bin requirements to large venues starting January 1, 2022.
- SB 343 (Allen, 2021) Truth in Labeling/Recycling
    - Builds on California’s “Truth in Environmental Advertising” law by prohibiting the word “recyclable” and the chasing-arrows symbol on non-recyclable products, reducing recycling contamination and helping consumers make informed choices.
- AB 818 (Bloom, 2021) Do Not Flush Wipes
    - Required certain disposable wipes to be clearly labeled “Do Not Flush” with a related symbol, prohibits misleading claims about flushability, and creates the California Consumer Education and Outreach Program to work with wastewater agencies, conduct collection studies, and report annually to the Legislature and SWRCB.
- AB 881 (Gonzalez, 2021) Plastic Waste Exports
    - Closed the loophole in California law that enables exported mixed plastic waste to be deemed recycled even when it is landfilled, burned, dumped, or otherwise improperly managed. This would increase transparency and accountability for California’s waste management to ensure recycling truly means recycled into new products.
- AB 962 (Kamlager, 2021) Refillable Glass Beverage Containers
    - Allows returnable (“refillable”) bottles to flow through the state’s Beverage Container Recycling Program, thereby providing funding for this process. Rather than being crushed for recycling, the bottles can be preserved for washing and refilling by beverage producers.
- AB 1162 (Kalra, 2021) Single Use Hotel Toiletries
    - Bans small, single-use plastic bottles of personal care products in hotels and other lodging establishments and has been enacted in the following cities: Arcata, Berkeley, Fairfax, Half Moon Bay, San Anselmo.
- AB 1201 (Ting, 2021) Compostable Product Standards
    - Bans the sale of plastic products that are labeled “compostable” unless it meets specified standards and criteria.
- AB 1276 (Carillo, 2021) Unnecessary Food Serviceware
    - Expands plastic straws upon request law to include other single-use food accessories, other food facilities, and third-party delivery platforms - including food that is taken away, delivered, or served on-site.
- SB 54 (Allen, 2022) Plastic Pollution Producer Responsibility Act
    - Establishes an ambitious EPR program for plastic packaging requiring producers to reduce disposables and shift to reusables where possible. It also sets ambitious recycling and composting requirements for the material that does enter the state, requiring all disposable packaging and food serviceware to be truly recyclable or compostable by 2032.
- SB 1013 (Atkins, 2022) Adding Wine and Distilled Spirits to the California Bottle Bill
    - Expands California’s Bottle Bill to include wine and spirits containers, boosting recycling volumes, reducing litter, and protecting California’s environment and natural resources.
- SB 1046 (Eggman & Gonzalez, 2022) Pre-Checkout Plastic Bag Ban
    - Required precheckout bags to be made of paper or compostable plastic beginning in 2025.
- SB 353 (Dodd, 2023) Expanding California Bottle Bill
    - Expands California’s Bottle Bill to include juice containers 46 oz and larger and fixes a flaw in the payment formula that funds recycling centers. According to the Senate Appropriations Committee analysis, staff estimated a potential of additional 100-200 million glass, PET, and HDPE containers

being recycled annually.

- SB 1053 (Blakespear and Bauer-Kahan, 2024) Phasing Out Plastic Bags at Check Stands
    - Expanded California's bag ban by banning all plastic bags at covered stores (supermarkets, large retailers with pharmacies, and convenience stores) regardless of thickness.
- AB 2236 (Bauer-Kahan and Blakespear, 2024) California Plastic Bag Ban Law
    - Bans single-use plastic bags at checkout and allows retailers to offer recycled paper bags for a fee, while also increasing the minimum recycled content for those paper bags to 50% by January 1, 2028.
- AB 2511 (Berman, 2024) Beverage Container Recycling Market Development
    - Extends the California Market Development Payment Program from July 2025 to January 1, 2026, ensuring continued support for in-state recycling markets. This program provides financial incentives to reclaimers and manufacturers using recycled plastic and reimburses up to $150 per ton for processing and reuse of plastic beverage container materials.
- AB 762 (Irwin & Wilson, 2025) Banning Disposable Vapes
    - Ban the sale of non-rechargeable or non-refillable vapes in California. This bill is currently in the Assembly Business and Professions Committee.


Photo Credit: NOAA

Appendix C: California Extended Producer Responsibility Performance Measures (Action 2.1.3)

- Mattress Recycling Council's Used Mattress Recovery and Recycling Plan - An industry-funded, statewide system that requires manufacturers of mattresses sold in California to develop, finance, and implement a convenient and cost-effective program to recover and recycle used mattresses. Retailers are to offer a no-charge take-back of used mattresses and/or box springs to customers once a new one has been delivered. The plan works to address illegal dumping, raise awareness of the value of mattress recycling and invest in research and sustainability efforts.
    - Performance Measures:
        - Track the total number of mattresses and box springs collected and recycled through the Bye Bye Mattress program.
        - Measure the percentage of mattress components (steel, foam, fiber, and wood) that are successfully diverted from landfills. In 2023, the California program reported a 76.9% recovery rate for materials.
        - Measure the number of units that are refurbished for resale (if any).

- The Carpet America Recovery Effort (CARE) 2023-2027 Carpet Stewardship Plan - A five-year strategy, mandated by California law, to increase the recycling and diversion of post-consumer carpet from landfills.
    - Performance Measures:
        - Achieve a 45% recycling rate for post-consumer carpet by December 31, 2027.
        - Achieve a collection rate of 60% by December 31, 2027.
        - Increase public access to drop-off sites to one site per ~375,000 residents (with a minimum of one per county) by 2027.
        - Ensure 90% of residents are within 15 miles of a public drop-off site by 2027.
        - The Plan states that performance measurement will be ongoing, with monthly tracking, quarterly publication, annual reports including methodology, assumptions, conversion factors, etc.

- SB 212 (Jackson, 2018) Pharmaceutical and Sharps Waste Stewardship Program performance measures:
    - Include a minimum number of collection sites per county (at least 5 sites or one per 50,000 residents) with a reasonable geographic distribution.
    - Ensure that, in counties where the minimum is not already met, retail pharmacy chains designate at least one location or 15% of their store locations as authorized collection sites.
    - Report annually on the weight of covered products collected from ultimate users at each authorized collection site.

- SB 54 (Allen, 2022), Plastic Pollution Prevention and Packaging Product Responsibility Act performance measures:
    - By 2032, producers must ensure that 100% of single-use packaging and single-use plastic food

service ware sold in California is recyclable or compostable; that plastic single-use packaging/food service ware reaches a 65% recycling rate; and that there's a 25% reduction in sale or distribution of single-use plastic packaging/food service ware compared to 2023 levels.
- Producers must register, report data on covered materials, and the overseeing agency (CalRecycle) must publish recycling rates and lists of covered material categories.
- The law includes recyclability/compostability standards.


Photo Credit: Paddle Out Plastic

References

Bagheri, K., Davani, H., Biggs, T., McMillan, H. 2024. Hydrodynamic simulations for trash loading in southern California's dense urbanized watersheds. Journal of Environmental Engineering, 150(8), p.04024031.

Cowger W., Gray, A.B., Guilinger, J.J., Fong, B., Waldschläger, K. 2021a. Concentration Depth Profiles of Microplastic Particles in River Flow and Implications for Surface Sampling. Environmental Science and Technology. 55: 6032-6041. https://doi.org/10.1021/acs.est.1c01768.

Cowger, W., Steinmetz, Z., Gray, A., Munno, K., Lynch, J., Hapich, H., Primpke, S., DeFRond, H., Rochman, C., Herodotou, O. 2021b. Microplastic Spectral Classification Needs an Open Source Community: Open Specy to the Rescue! Analytical Chemistry, 93(21): 7543-7548. https://doi.org/10.1021/acs.analchem.1c00123.

Cowger, W., Gray, A., Brownlee, S., Hapich, H., Deshpande, A., Waldschlager, K. 2022a. Estimating floating macroplastic flux in the Santa Ana River, California. Journal of Hydrology: Regional Studies. 44: 101264. https://doi.org/10.1016/j.ejrh.2022.101264.

Cowger, W., Gray, A., Hapich, H., Osei-Enin, J., Olguin, S., Huynh, B., Nogi, H., Singh, S., Brownlee, S., Fong, J., Lok, T., Singer, G., Ajami, H. 2022b. Litter origins, accumulation rates, and hierarchical composition on urban roadsides of the Inland Empire, California. Environmental Research Letters. 17: 015007. https://doi.org/10.1088/1748-9326/ac3c6a.

Cowger, W., Markley, L.A.T., Moore, S., Gray, A.B., Upadhyay, K., Koelmans, A.A. 2024. How many microplastics do you need to (sub)sample. Ecotoxicology and Environmental Safety. 275(15): 116243. https://doi.org/10.1016/j.ecoenv.2024.116243.

Cowger, W., Karapetrova, A., Lincoln, C., Chamas, A., Sherrod, H., Leong, N., Lasdin, K., Knauss, C., Teofilović, V., Arienzo, M., Steinmetz, Z., Primpke, S., Darjany, L., Murphy-Hagan, C., Moore, S., Moore, C., Lattin, G., Gray, A., Kozloski, R., Bryksa, J., Maurer, B. 2025. Open Specy 1.0: Automated (Hyper)Spectroscopy for Microplastics. Analytical Chemistry. 97: 17345-17356. https://doi.org/10.1021/acs.analchem.5c00962.

Geyer, R., Gavigan, J., Jackson, A.M., Saccomanno, V.R., Suh, S., Gleason, M.G. Quantity and fate of synthetic microfiber emissions from apparel washing in California and strategies for their reduction. Environmental Pollution. 298: 118835. https://doi.org/10.1016/j.envpol.2022.118835

Hapich, H., Cowger, W., Gray, A., Tangri, N., Hale, T., Magdy, A., Vermilye, A., Yu, W., Ayres, D., Moore, C., Vermilye, J., Haiman, A.N.K., Youngblood, K., Kang, Y., McCauley, M., Lok, T., Moore, S., Baggs, E., Lippiatt, S., Kohler, P., Conley, G., Taing, J., Mock, J. 2022. Trash Taxonomy Tool: Harmonizing Classification Systems Used to Describe Trash in the Environment. Microplastics & Nanoplastics. 2:15. https://doi.org/10.1186/s43591-022-

00035-1.

Hapich, H., Cowger, W., Gray, A. 2024. Microplastics and Trash Cleaning and Harmonization (MaTCH): Semantic Data Ingestion and Harmonization Using Artificial Intelligence (AI). Environmental Science and Technology. 58:46. https://doi.org/10.1021/acs.est.4c02406.

Jack, P., Biggs, T., Sousa, D., Coulter, L., Hutmacher, S., McMillan, H., 2025. Multi-Resolution UAV Remote Sensing for Anthropogenic Debris Detection in Complex River Environments. Remote Sensing, 17(13), p.2172. https://doi.org/10.3390/rs17132172

Karapetrova, A., Cowger, W., Michell, A., Braun, A., Bair, E., Gray, A., Gan, J. 2024. Microplastic Distribution in Western North American Snow. Journal of Hazardous Material. 480: 136126. https://doi.org/10.1016/j.jhazmat.2024.136126.

Murphy-Hagan, C., Gray, A.B., Singh, S., Cowger, W. 2025a. Quantifying Microplastic Fluvial Flux from a Coastal Watershed—a Microplastic Rating Curve Approach. Journal of Environmental Management. 294: 127445. https://doi.org/10.1016/j.jenvman.2025.127445

Murphy-Hagan, C., Gray, A.B., Singh, S., Hapich, H., Cowger, W., Seeley, M.E., Waldschlaeger, K. 2025b. Microplastic Characterization and Transport Mode —A Flow-Integrated Approach to Sampling Urban Waterways. Environmental Research. 269:120908. https://doi.org/10.1016/j.envres.2025.120908

Palmer, T., Biggs, T., Araki, R., Bagheri, K., Davani, H., Downing, R., Hutmacher, S., McMillan, H.K., 2025. Quantifying sources, sinks and mitigation of macroplastic and other river debris: A trash balance model. Earth's Future, 13(3), p.e2024EF005677. https://doi.org/10.1029/2024EF005677

Papp, A., Oremus, K.L. 2025. Plastic bag bans and fees reduce harmful bag litter on shorelines. Science. 388(6753). https://doi.org/10.1126/science.adp9274

Singh, S., Gray, A.B., Murphy-Hagan, C., Hapich, H., Cowger, W., Perna, J., Le, T., Nogi, H., Badwal, B., McLaughlin, K., Kessouri, F., Moore, C., Lattin, G., Thornton Hampton, L.M., Wong, C.S., Sutula, M. 2025. Microplastic Pollution in the Water Column and Benthic Sediment of the San Pedro Bay, California, USA. Environmental Research. 269: 120866. https://doi.org/10.1016/j.envres.2025.120866.

Torres, T., Rilum, S., Young, G., Almada, A.A., Talley, T.S. 2025. Advancing effective ocean litter solutions for California. Final Report Submitted by California Sea Grant and USC Sea Grant to NOAA-National Sea Grant, Award no. NA23OAR4170154. Publication no: CASG-2025-001. Available from: https://caseagrant.ucsd.edu/our-work/research-projects/advancing-effective-coastal-litter-solutions-through-californias-ocean