



Staff Recommendation

August 15, 2023

Item 7a

Action Item:

**Consideration of Authorization to Disburse Funding for Projects
that Improve Understanding and Inform Management
of Microplastic Pollution**

Kaitlyn Kalua, Deputy Director

Revised August 11, 2023

Recommended Action: Authorization to disburse up to \$1,905,672 to California Sea Grant (CASG) for projects that were selected through the competitive solicitation administered by CASG. The following grantees and projects were selected to increase understanding and inform management of environmental microplastic contamination:

7a.1 \$363,814 to Natural History Museum of Los Angeles (NHMLA) for “Plastics Past and Present: Understanding historical trends of microplastic consumption in California marine webs to better inform management”

7a.2 \$175,819 to San Francisco Estuary Institute (SFEI) for “Investigation to assess clothes dryers as a source of microplastic pollution to inform solutions”

7a.3 \$199,432 to California Marine Sanctuary Foundation for “From watershed to whales: Tracking the source and transport of microplastics in the greater Monterey Bay region to inform risk assessments”

7a.4 \$406,647 to University of California, Los Angeles for “Design factors affecting microplastic retention, removal, and generation in structural best management practices”

7a.5 \$506,250 to California State University, Long Beach for “Field monitoring of microplastics loading and accumulation in low impact development best management practices (LID BMPs)”

Location: Statewide, San Francisco Bay region, Monterey Bay region, Los Angeles County

Strategic Plan Goals and Objectives: Goal 3: Enhance Coastal and Marine Biodiversity; Objective 3.4: Improve Coastal and Ocean Water Quality

Equity and Environmental Justice Considerations:

Integration of equity and environmental justice principles in the research design and/or project outcomes, including but not limited to mentorship to students, with the goal of increasing retention in science, technology, engineering, and mathematics (STEM) and launching careers in coastal science; supporting research programs within or building research relationships with Minority Serving Institutions (MSIs); community engagement and partnerships with local community based organizations, tribes, and/or impacted communities; and/or project outcomes that inform and improve management of microplastic contamination that disproportionately impacts severely disadvantaged communities (SDAC) or disadvantaged communities (DAC).

Findings and Resolution:

Staff recommends that the Ocean Protection Council (OPC) adopt the following findings:

“Based on the accompanying staff report and attached exhibit(s), OPC hereby finds that:

1. The proposed projects are consistent with the purposes of Division 26.5 of the Public Resources Code, the California Ocean Protection Act;
2. The proposed projects are consistent with the Budget Act of 2022 which included a \$50 million General Fund appropriation for grants or expenditures for resilience projects that conserve, protect, and restore marine wildlife and healthy ocean and coastal ecosystems; and;
3. The proposed projects are not ‘legal projects’ that trigger the California Environmental Quality Act (CEQA) pursuant to Public Resources Code section, section 15378.”

Staff further recommends that OPC adopt the following resolution pursuant to Sections 35500 *et seq.* of the Public Resources Code:

“OPC hereby approves the disbursement of up to \$1,905,672 to CASG for the following grantees to increase understanding and inform management of environmental microplastic contamination:

- \$363,814 to Natural History Museum of Los Angeles
- \$175,819 to San Francisco Estuary Institute
- \$199,432 to California Marine Sanctuary Foundation
- \$406,647 to University of California, Los Angeles
- \$506,250 to California State University, Long Beach

This authorization is subject to the condition that prior to disbursement of funds, grantees shall submit for the review and approval of the Executive Director of the OPC detailed work plans, schedules, staff requirements, budgets, and the names of any contractors intended to be used to complete the projects, as well as discrete deliverables that can be produced in intervals to ensure the projects are on target for successful completion. All projects will be developed under a shared understanding of process, management, and delivery.”

Executive Summary:

Staff recommends that OPC approve the disbursement of up \$1,905,672 to CASG to fund five microplastics research projects that directly support OPC and CASG Strategic Plans and priorities by increasing understanding and informing management of environmental microplastic contamination. OPC authorized the use of these funds at its January 24, 2023 meeting for a \$1,328,710 grant to California Sea Grant to administer a competitive solicitation to identify the highest priority projects and oversee the administration of the microplastics research subgrant, pending Council approval of selected projects. Up to \$253,710 of this grant amount is supporting California Sea Grant’s administration of this competed research and selected two-year projects. The remaining \$1,075,000 is being considered for disbursement to sub-grantees at this Council meeting. An additional \$576,962 is being requested for authorization and disbursement in order to fund all five highly ranked projects. OPC staff therefore seeks approval to increase the original authorization from \$1,328,710 to \$1,905,672.

The solicitation included two research calls to advance microplastics understanding and management in California, consistent with the priorities outlined in the [California Ocean Litter Strategy](#) and [Statewide Microplastics Strategy](#). Research Call 1 seeks to increase understanding and management of environmental microplastic contamination by informing improved management of specific microplastic sources, refining, and improving understanding of microplastic thresholds in the environment. Research Call 2 seeks to inform the use of structural low impact development (LID) stormwater best management practices (BMPs) in urban watersheds to intervene and prevent microplastics from reaching California aquatic environments.

The solicitation was highly competitive. CASG released a request for proposals in February 2023 and received 43 letters of interest totaling \$12,725,584. This resulted in 19 full proposals totaling \$6,218,541 for Research Call 1 and 5 full proposals totaling \$2,283,250 for Research Call 2. Full proposals were reviewed by a technical review panel composed of academic scientists, subject matter experts, and state, federal, and international agency staff. The review panel recommended a ranked list of projects for funding and project selection recommendations were made collaboratively between OPC and CASG, and in coordination with State Water Resources Control Board (SWRCB) staff. CASG will contribute NOAA Sea Grant funds to fund selected projects,

continue its role in administration of the OPC funded grants, and will coordinate closely with OPC staff on deliverables and progress.

Project Summaries:

7a.1 Plastics Past and Present: Understanding historical trends of microplastic consumption in California marine webs to better inform management.

Project Description:

This project aims to gain a comprehensive understanding of microplastics in California coastal food webs and establish a baseline for informing management decisions by documenting microplastics across geography, across different species, and across time. This project will address the following research questions: (1) How does microplastic consumption vary by species in California? (2) Does microplastic consumption vary geographically? (3) How do abundances vary between microplastic types in California marine food webs? (4) How has microplastic consumption changed over time in regards to species, location, and plastic type?

To accomplish the project goals, the research team will leverage specimen collections and resources of the Natural History Museum of Los Angeles County (NHMLA). Specimens will be selected from eight decadal time periods, ranging from 1940 to the present. Collectively, this project will examine microplastic contamination in coastal marine fishes across the entire state of California from the pre-plastic era to present. In doing so, this project will identify which species are most highly impacted by microplastics, which habitats/regions those species occur in, and which plastic types are most abundant in the food web. This project will improve understanding of how different types of microplastics cycle through the marine food web, determine which species are most vulnerable, provide a baseline of microplastic contamination across space and time, and document whether past mitigation strategies have changed the types or quantities of plastic in wildlife to inform new policies or management practices to address microplastic contamination.

Equity and Environmental Justice Considerations:

This project will include education and student mentorship opportunities, consistent with OPC Equity Plan Goal 1, Objectives 1.2, 1.3, 1.5; and Goal 4, Objective 4.2. This project will include broad public educational components, including a temporary exhibit at the NHMLA that will be accessible to all visitors. This exhibit will feature large graphics with text in both English and Spanish and will include realistic amounts of fishes consuming microplastics. Dialogue of this exhibit will include information on what microplastics are, where they are found, and what the public can do to help reduce microplastic pollution.

The project budget will additionally support one postdoctoral researcher and two undergraduate students from the USC work-study program to reduce barriers in science and increase representation of previously excluded groups in science. The hired postdoctoral researcher will be provided experiences necessary to help them grow professionally and follow their desired career path, including opportunities to supervise USC work-study students, freedom to publish and present their research open-access, and chances to meaningfully engage with the public. This project will also coincide and complement projects with two postbaccalaureate students as part of the National Science Foundation-funded Understanding Nature and Los Angeles Biodiversity (UNLAB) program at the NHMLA, which gives students from underrepresented groups the experience necessary to pursue graduate school or careers in science.

About the Grantee:

The NHMLA is the largest natural history museum on the West Coast, with over 35 million specimens and artifacts. The NHMLA ichthyology collection is the fourth largest ichthyology collection in the US, by number, housing approximately three million fish specimens. The NHMLA serves approximately 1 million visitors annually and conducts a variety of festivals and outreach events each year that target different audiences.

Project Timeline:

This project will be completed over two years (October 2023 to September 2025).

Project Financing:

Staff recommends that OPC approve disbursement of up to \$363,814 to NHMLA for “Plastics Past and Present: Understanding historical trends of microplastic consumption in California marine webs to better inform management.”

7a.2 Investigation to assess clothes dryers as a source microplastic pollution to inform solutions.

Project Description:

Despite being the most ubiquitous form of microplastics observed in the environment and ingested by aquatic wildlife, efforts to identify the sources and pathways of fiber pollution have been limited to-date. This data gap limits the mitigation strategies that can be explored to meaningfully reduce microplastic emissions. This project aims to be the first to address the question: Are clothing dryers a significant source of microplastic pollution? This project will take place in the San Francisco Bay region and address the following objectives: (1) Evaluate whether dryer emissions are a major source of microplastic emissions from urban centers to aquatic

ecosystems, (2) Quantify outdoor vented dryer emissions rates from residential dryers and laundromat operations during real drying operations, (3) Evaluate whether retrofit filter technologies can effectively reduce outdoor microplastic emissions, and (4) Engage the public, including members of underserved communities, in study implementation and communicate results widely to engage the public in meaningful solutions for microplastic pollution.

Successful completion of this project will provide the first estimates of real-world dryer emission rates, filling a critical data gap in microplastic emissions inventories. This project will further inform mitigation approaches and solutions by quantifying airborne microfiber emissions from dryer exhaust, before and after installing secondary filters, to evaluate whether commercially available secondary dryer filters are an effective mitigation technology to intercept and prevent fiber emissions.

Equity and Environmental Justice Considerations:

This project will include community outreach, education, and student mentorship opportunities, consistent with OPC Equity Plan Goal 1, Objectives 1.2, 1.3, 1.5; and Goal 4, Objective 4.2. This project will recruit and engage community science participants in partnership with community-based organizations located in the San Francisco Bay region, with the goal of recruiting diverse locations that include a range in geographic distribution and households from different socioeconomic groups. Outreach will be done in partnership with Plastic Free Future, a 501(c)(3) nonprofit organization based in the San Francisco Bay Area, that is dedicated to the reduction of plastic pollution and focuses on outreach to underrepresented communities. Project outcomes will additionally benefit vulnerable communities in the San Francisco Bay Area by determining and quantifying microplastic emissions in these communities caused by clothing dryers and by informing potential solutions to reduce this emission source.

This project will additionally provide guided research experiences and mentorship to students, with the goal of increasing retention in STEM and launching careers in science. The project will engage two or more local community college students in the laboratory component of the project to provide training and education by preparing samples in the laboratory and conduct the FTIR analysis.

About the Grantee:

SFEI is a nonprofit 501(c)(3) organization founded through the San Francisco Estuary Project of USEPA Region 9 to provide independent science to assess and improve the health and resilience of natural and human communities of the San Francisco Estuary, California, and beyond. SFEI administers the Aquatic Science Center, a Joint Powers Authority created by the State Water Board and the Bay Area Clean Water Agencies to assist with the efficient delivery of scientific,

monitoring, and information management support functions. SFEI employs 70 scientists and technicians who oversee an annual budget of over \$7,000,000 for innovative programs in Clean Water, Resilient Landscapes, and Environmental Informatics. Among its many accomplishments over the last 25 years, SFEI completed a foundational investigation of microplastics in San Francisco Bay, and in doing so, provided a unique case study to guide further investigations of microplastic sources and pathways statewide.

Project Timeline:

This project will be completed over two years (October 2023 to September 2025).

Project Financing:

Staff recommends that OPC approve disbursement of up to \$175,819 to SFEI for “Investigation to assess clothes dryers as a source of microplastic pollution to inform solutions.” This amount includes subawards to other institutions that will be managed by the grantee.

7a.3 From watershed to whales: Tracking the source and transport of microplastics in the greater Monterey Bay region to inform risk assessments.

Project Description:

This study will quantify microplastics in the Monterey Bay watershed, filling a geographical gap in microplastics research between the San Francisco Bay and Southern California Bight region. This project addresses all four key points of California’s Statewide Microplastics Strategy: Science to Inform Future Action approach by quantifying microplastic concentrations and polymer types to assess the sources and pathways that represent the greatest threat of risk to the greater Monterey Bay region. The project includes four objectives: (1) Quantify microplastic flux between the rivers, beach, ocean, and biota in the greater Monterey Bay region, (2) Use a weight-of-evidence approach to determine sources of microplastics to Monterey Bay, (3) Develop community science to gather plastics data on Monterey Bay beaches while also improving public understanding of environmental science, and (4) Develop a mass balance framework to inform ecological risk assessments and inform conservation and pollution reduction strategies.

Microplastic sampling will take place at river water sampling sites immediately upstream of estuarine influence in the Salinas, Pajaro, San Lorenzo, and Carmel Rivers, beach sand near these river mouths, offshore surface waters adjacent to the river mouths, and biota samples (whole krill, anchovy/sardine gastrointestinal tracts, and whale fecal material). Critically, this project will inform regional management of microplastics through assessment of existing basin management plans, plastic usage, and relative sources and pathways. Detailed recommendations will be

provided to the Regional Water Quality Control Board regarding site-specific best management practices to mitigate microplastic inputs into the Monterey Bay National Marine Sanctuary.

Equity and Environmental Justice Considerations:

This project will include community outreach, education, and student mentorship opportunities, consistent with OPC Equity Plan Goal 1, Objectives 1.2, 1.3, 1.5; and Goal 4, Objective 4.2. This project will educate, train, and engage citizen scientists from the Monterey Bay area to play a vital role in monitoring plastics and other marine debris along local beaches. Trained in accordance with the NOAA's Marine Debris Monitoring and Assessment Project (MDMAP) Shoreline Survey Guide, these volunteers will provide plastic and marine debris surveys focusing on debris 2.5 cm and larger, including plastic, metal, glass, rubber, processed wood, and fabric. By training citizen scientists to collect data on marine debris, the project not only gathers valuable information but also fosters a sense of ownership and responsibility among community members.

This project will further integrate and advance student mentorship and early career opportunities in partnership with the California State University Monterey Bay (CSUMB) by providing paid internships to meet and exceed the 300-hour requirement for the Professional Master's of Science degree offered through the CSUMB Environmental Science program and provide mentorship through the CSUMB Undergraduate Research Opportunities Center (UROC) Scholars Program. The project will additionally leverage existing connections with the CSUMB Goldbogen Lab to train and mentor students from the Salinas High School program, as well as working with an intern via the Monterey Bay-Research Experiences for Undergraduates (REU) program, dependent on interests of the students in the program.

About the Grantee:

Since 1995, California Marine Sanctuary Foundation has worked to protect the state's coastal ecosystems while strengthening coastal resilience in the face of population growth, urban and industrial uses, climate change, and resource extraction. Working together with local communities, government agencies, tribal communities, harbors and marinas, and NGOs, CMSF identify and then implement practical and effective solutions to lessen human impacts and increase stewardship of our state's coastal resources.

Project Timeline:

This project will be completed over two years (October 2023 to September 2025).

Project Financing:

Staff recommends that OPC approve disbursement of up to \$199,432 to California Marine Sanctuary Foundation for “From watershed to whales: Tracking the source and transport of microplastics in the greater Monterey Bay region to inform risk assessments.” This amount includes subawards to other institutions that will be managed by the grantee.

7a.4 Design factors affecting microplastic retention, removal, and generation in structural best management practices.

Project Description:

This project will evaluate the benefits of nature-based stormwater treatment systems to reduce or prevent microplastic pollution via stormwater with the goal of improving understanding of how the design of structural stormwater BMP may affect the retention and release of microplastics. The objectives of this project are (1) To identify how and to what extent the land use characteristics of the drainage area and design factors of stormwater best management practices (BMPs) could affect the accumulation of microplastics in BMPs; and (2) Identify the link between stormwater flow volume and accumulation of microplastics in the BMPs.

Successful completion of this project will improve understanding of ecosystem functions and stressors, such as microplastics, and the development or refinement of innovative approaches, such as integrated stormwater management systems to limit the net export of microplastics to the California coast. In particular, the project will determine the impact of specific factors such as environmental, hydrogeologic conditions, and land use characteristics within California urban watersheds on the transport or removal of macro- and microplastic loading into the environment with structural LID BMPs. Furthermore, the project will evaluate the effect of site-specific soil conditions, bioretention soil media composition, vegetation, and other design factors to inform LID design, operations, and management strategies that are most effective in intercepting and reducing microplastic loading in the aquatic and marine environment.

Equity and Environmental Justice Considerations:

This project will include community outreach, education, and student mentorship opportunities, consistent with OPC Equity Plan Goal 1, Objectives 1.2, 1.3, 1.5; and Goal 4, Objective 4.2. This project will advance a citizen-science approach to quantify microplastics in different environments throughout the Los Angeles region. The project will leverage an existing partnership with Center for Excellence in Engineering and Diversity (CEED) at the University of California, Los Angeles Engineering School, which works with 20 schools and over 800 students in the Los Angeles Unified and Inglewood Unified School Districts to implement the Mathematics Engineering and Science

Achievement (MESA) program. These local schools predominantly serve underrepresented Hispanic communities. The project team will provide research opportunities to educationally disadvantaged students participating in the MESA program and engage and advance their academic development via hands-on learning activities. Mentorship and training will additionally be provided to undergraduate students to collect soil or dust samples from natural and built environments in the Los Angeles area, support overarching research, and co-author research articles.

Finally, understanding the impact of trash management and associated microplastic pollution in the selected region will benefit underserved and under-resourced communities. The data collected will be integrated into a visual mapping tool and correlated with socio-economic data and proximity to a potential source of microplastics. Together, this project will provide insight into whether certain communities are at higher risk of microplastic exposure from contaminated soil and inform potential site selection for structural LID BMPs to manage microplastic contamination in the Los Angeles region.

About the Grantee:

The University of California, Los Angeles is a public land grant research university located in Los Angeles, California. The Principal Investigator Dr. Sanjay Mohanty is an assistant professor with Department of Civil and Environmental Engineering and has more than 15 years of experience in improving the understanding of the fate and transport of pollutants including microplastics in engineered and natural systems. Dr. Mohanty has laid the groundwork for examining the transport and removal of colloids, microplastics, and other pollutants in environments. His team has helped developed a smartphone-enabled method to detect microplastics in solid samples and is participating in other activities around developing a rapid method to detect microplastics in water samples.

Project Timeline:

This project will be completed over two years (October 2023 to September 2025).

Project Financing:

Staff recommends that OPC approve disbursement of up to \$406,647 to University of California, Los Angeles for “Design factors affecting microplastic retention, removal, and generation in structural best management practices.”

7a.5 Field monitoring of microplastics loading and accumulation in low impact development best management practices (LID BMPs).

Project Description:

There currently is no design or maintenance guidance for microplastics management in the BMP industry. This project will address this critical knowledge gap by evaluating and establishing successes and failures in the design and operation of existing BMPs for microplastic removal to develop evidence-based LID BMP design and construction guidance. The objectives of this project are to (1) Generate a robust, consistent data set to quantify likely microplastic load reductions using filtration LID-BMPs in southern California; (2) Empirically evaluate physical characteristics of engineered filter media that promote microplastic capture using filtration LID-BMPs; (3) Explore indicators of maintenance needs to support long-term LID-BMP performance; (4) Develop evidence-based recommendations for effective LID design, operations, and management strategies as solutions to mitigate microplastic pollution from urban runoff; and (5) Develop a student researcher community and mentor professional development of the next generation of stormwater industry professionals.

This project will evaluate the microplastic removal efficiency in up to six existing BMPs of various service life from the Southern California Stormwater Monitoring Coalition’s ongoing regional BMP monitoring network and establish successes and failures in the design and operation of existing BMPs. The outcome of the project will be used to develop design and/or operational guidance for microplastic management/reduction in the BMP industry.

Equity and Environmental Justice Considerations:

This project will include student outreach and mentorship opportunities, consistent with OPC Equity Plan Goal 1, Objectives 1.2, 1.3, 1.5. This project will provide mentorship and guided research opportunities to increase retention in STEM, encourage higher education, and launch careers in water resources and environmental engineering. Students will be engaged from California State University, Los Angeles and California State University, Long Beach to gain research and professional experience by performing field and laboratory work, and by working directly with and at the Southern California Coastal Water Research Project Authority (SCCWRP). Broad education opportunities will further be provided by conducting workshops at each university focusing on the importance and challenges of stormwater management, design of LID-BMP solutions, the project findings, and one or more project site visits. The workshops will include technical and soft skill components necessary to be successful in the sciences and engineering.

About the Grantee:

California State University, Long Beach is a public research university located in Long Beach, California. The Principal Investigator Dr. Rebeka Sultana teaches classes related to water resources engineering in the Department of Civil Engineering and Construction Engineering Management. Dr. Sultana’s research interests include land-surface modeling, regional climate modeling, climate variability, hydrologic modeling, and hydrologic applications to remote sensing. Dr. Sultana is a registered professional engineer with the State of California.

Project Timeline:

This project will be completed over two years (October 2023 to September 2025).

Project Financing:

Staff recommends that OPC authorize disbursement of up to \$506,250 to California State University, Long Beach for “Field monitoring of microplastics loading and accumulation in low impact development best management practices (LID BMPs).” This amount includes subawards to other institutions that will be managed by the grantee.

Project Financing:

Staff recommends that the Ocean Protection Council (OPC) authorize encumbrance of up to \$1,905,672 to CASG for projects that increase understanding and inform management of environmental microplastic contamination.

	OPC	Non-OPC CASG
7a.1 Natural History Museum of Los Angeles	\$363,814	
7a.2 San Francisco Estuary Institute	\$175,819	\$230,389
7a.3 California Marine Sanctuary Foundation	\$199,432	\$181,482
7a.4 University of California, Los Angeles	\$406,647	
7a.5 California State University, Long Beach	\$506,250	
TOTAL	\$1,651,962	\$411,871

The anticipated source of funds for this disbursement is the Budget Act of 2022, which included a \$50 million General Fund appropriation to OPC for grants or expenditures for resilience projects that conserve, protect, and restore marine wildlife and healthy ocean and coastal ecosystems. The proposed disbursement and anticipated projects are an appropriate use of this General Fund appropriation because the projects will each provide information to increase the State’s understanding and inform management of microplastic contamination that impact marine wildlife and ocean and coastal ecosystems.

OPC authorized the use of these funds at its January 24, 2023 meeting for a \$1,328,710 grant to California Sea Grant for the administration of microplastics research subgrants, pending Council approval of selected projects. Up to \$253,710 of this grant amount is supporting California Sea Grant’s administration of this competed research and selected two-year projects. The remaining \$1,075,000 is being considered for disbursement to sub-grantees at this Council meeting. An additional \$576,962 is being requested for authorization and disbursement in order to fund all five highly ranked projects. OPC staff therefore seeks approval to increase the original authorization from \$1,328,710 to \$1,905,672. CASG will contribute NOAA Sea Grant funds totaling \$411,871 to fund components of the SFEI and California Marine Sanctuary Foundation projects.

Consistency with California Ocean Protection Act:

The proposed project is consistent with the Ocean Protection Act, Division 26.5 of the Public Resources Code, because it is consistent with trust-fund allowable projects, defined in Public Resources Code Section 35650(b)(2) as projects which:

- Eliminate or reduce threats to coastal and ocean ecosystems, habitats, and species.
- Improve coastal water quality.
- Allow for increased public access to, and enjoyment of, ocean and coastal resources, consistent with sustainable, long-term protection and conservation of those resources.
- Improve management, conservation, and protection of coastal waters and ocean ecosystems.
- Provide monitoring and scientific data to improve state efforts to protect and conserve ocean resources.
- Protect, conserve, and restore coastal waters and ocean ecosystems.

Compliance with the California Environmental Quality Act (CEQA):

The various proposed projects are not ‘legal projects’ that triggers the California Environmental Quality Act (CEQA) pursuant to Public Resources Code section 21068 and Title 14 of the California Code of Regulations, section 15378. If any were determined to be a ‘legal project’ under CEQA, the

proposed project(s) are categorically exempt from review under CEQA pursuant to 14 Cal. Code of Regulations Section 15306 because the projects involve information collection, consisting of data collection, research, and resource evaluation activities that will not result in a serious or major disturbance to an environmental resource. If this were to occur, OPC staff would file a Notice of Exemption.