



2022

MARINE DEBRIS PROGRAM

Accomplishments Report

Office of Response and Restoration | National Oceanic and Atmospheric Administration



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Introduction

Across the United States and around the world, the problem of marine debris continues to present challenges for wildlife, habitats, and people. Despite these obstacles, the community working to solve this global problem continues to grow. At the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program, we are proud to be a part of this community and contribute to solutions as the United States Government's lead on the issue of marine debris.

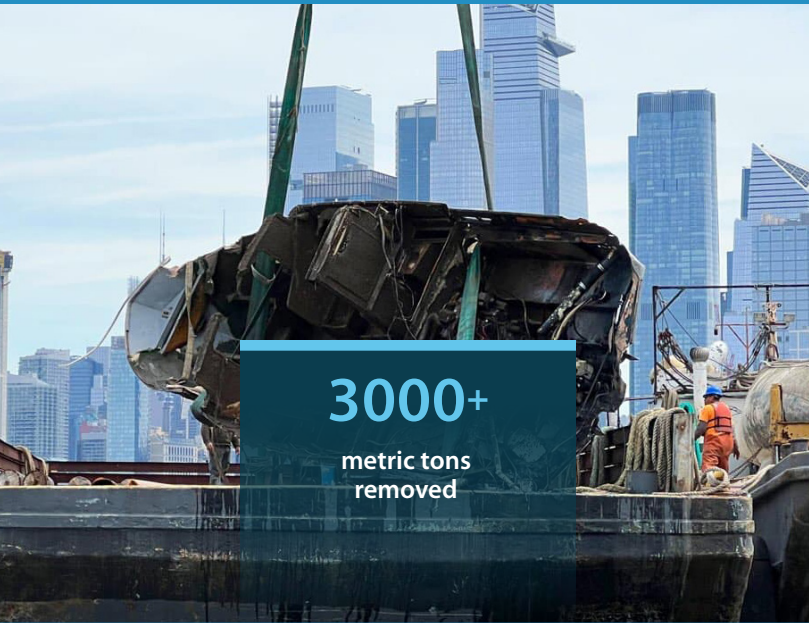
We are pleased to present this 2022 Accomplishments Report, which represents a snapshot of the work of the Marine Debris Program and our partners throughout the fiscal year. The highlights we provide in this report show the breadth of our work across our program pillars - prevention, removal, research, monitoring and detection, response, and coordination - to meet our mission to investigate and prevent the adverse impacts of marine debris. Throughout fiscal year 2022, our team and partners worked with schools to reduce waste on campus, removed marine debris caused by natural disasters, expanded the offerings in our NOAA Marine Debris Monitoring and Assessment Project toolbox, worked with coastal managers to prepare for emergency storm events, supported projects with local, federal, and international partner organizations, and so much more.

In fiscal year 2022, the NOAA Marine Debris Program also received the opportunity to expand our work in the United States through the Bipartisan Infrastructure Law. This law provided \$150 million to NOAA for marine debris assessment, prevention, mitigation, and removal for Fiscal Years 2022-2026. In September, the NOAA Marine Debris Program awarded \$1 million in Bipartisan Infrastructure Law funding to the National Fish and Wildlife Foundation to support marine debris removal in the Papahānaumokuākea Marine National Monument, enabling the removal of over 500 metric tons of debris in coming years. In June, the NOAA Marine Debris Program announced a \$56 million competitive funding opportunity using Bipartisan Infrastructure Law funding to remove large marine debris and use proven interception technologies to capture marine debris. The awards for this competition will be announced in 2023.

The achievements in this report are examples of the important action already taken to reduce the impacts of marine debris on our ocean and coasts. At the NOAA Marine Debris Program, we are proud to continue these efforts into the future with the critical support of our staff, partners, and volunteers.



2022 By-the-Numbers



3000+
metric tons
removed



19
newly-funded
projects



6,574
P-12 students
engaged

265
teachers
reached

55,093
youth and adults
engaged



2
new marine debris
action plans



100,000+
visitors viewed marine
debris educational
exhibits at 3 National
Park Service sites

EDGE TO KEEP MY OCEAN CLEAN

INSPIRING
OTHERS!

#MYCLEANCOAST

Save Our Seas 2.0 Act

In 2022, the NOAA Marine Debris Program completed several requirements in the Save Our Seas 2.0 Act, and continued work on the remaining mandates. In April, the NOAA Marine Debris Program [announced](#) the inaugural Board of Directors of the new Marine Debris Foundation, which was established by the Act. The twelve appointed individuals represent diverse points of view, expertise, education, and experiences relating to the assessment, prevention, reduction, and removal of marine debris. This distinguished group will help the Foundation to begin operations and start augmenting federal efforts to address marine debris.

In March, the NOAA Marine Debris Program and the National Academies of Sciences, Engineering, and Medicine announced the completion of a multifaceted study on the United States' contribution to global ocean plastic waste. The [report](#) provides a comprehensive state of the science, as well as recommendations on potential ways to reduce the United States' contribution to global ocean plastic waste. The NOAA Marine Debris Program is working on implementation of recommendations in the report, including development of a robust, efficient, and effective survey of marine debris on our nation's shorelines.

Justice, Equity, Diversity, and Inclusion

Throughout fiscal year 2022, the NOAA Marine Debris Program continued our commitment to advance justice, equity, diversity, and inclusion in our organization. We sought a diversity of perspectives on our grant programs, implemented scoring criteria to increase funding for projects in underserved and underrepresented communities, and welcomed interns and fellows through paid programs. With these activities, we hope to build a culture of inclusion while addressing the global challenge of marine debris.

Expanding Grant Resources and Opportunities

In recent years the NOAA Marine Debris Program conducted evaluations of our grant programs and assessed how additional resources or outreach efforts could assist applicants. The feedback we received led us to expand our library of resources to help new and returning grant applicants better access information about our funding opportunities. This year, we also incorporated criteria for justice, equity, diversity, and inclusion in our grant competitions and all of our removal and prevention awards strongly incorporated these initiatives into their projects.

Emerging Marine Debris Career Opportunities

In fiscal year 2022, the NOAA Marine Debris Program hosted six fellows and interns through paid opportunities. These students and recent graduates supported a wide variety of projects across the NOAA Marine Debris Program's activities. Learn about the experiences of Benjamin Frey, Elena Aguilar, Harmony Wayner, Jasmine Thompson, Phileas Dazeley-Gaist, and Tanya Torres below.



Benjamin Frey

Benjamin Frey recently received his Master's from the Marine Estuarine Environmental Sciences Graduate program at the University of Maryland Center for Environmental Science. During his [NOAA Sea Grant Knauss Fellowship](#) with the NOAA Marine Debris Program, he has been building relationships, exploring opportunities for collaboration across NOAA on the issue of derelict fishing gear, and supported the Seventh International Marine Debris Conference.



Elena Aguilar

Master's student Elena Aguilar joined the NOAA Marine Debris Program through the [NOAA Experiential Research and Training Opportunity](#). Elena is in the Geography Department at San Diego State University and is using field assessments and remote sensing methods to determine where plastic pollution accumulates in the Los Laureles Canyon Watershed Mexico, which is part of the greater Tijuana River Watershed.



Harmony Wayner

Harmony Wayner recently received her Master's of Resource Management from the University Centre of the Westfjords in Iceland. Through her fellowship with [Alaska Sea Grant](#), Harmony is working with the NOAA Marine Debris Program on a marine debris action plan for Alaska, which will include input from stakeholders across the state for a shared understanding of how to address marine debris on Alaska's extensive and mostly remote coastline.



Jasmine Thompson

In 2022, the NOAA Marine Debris Program supported a [NOAA Office of Response and Restoration](#) (OR&R) paid internship program for undergraduate students at the University of Maryland Eastern Shore. As part of this program, senior Jasmine Thompson interned with the NOAA Marine Debris Program and had the opportunity to connect with team members to learn about their career journeys and better understand the various pathways to marine science fields.



Phileas Dazeley-Gaist

The NOAA Marine Debris Program hosted intern Phileas Dazely-Gaist, a junior at the College of the Atlantic, through the [NOAA College Supported Internship Program](#). Over the course of 10 weeks, they supported the NOAA Marine Debris Monitoring and Assessment Project by applying and honing their coding skills to enter data, perform quality control checks, improve the MDMAP dataset, and develop data visualizations.



Tanya Torres

Tanya Torres joined the NOAA Marine Debris Program as a fellow in March 2020 through the [National Sea Grant College Program](#) and [California Sea Grant](#) after getting her master's from University of Hawai'i at Mānoa. During her two and half year fellowship, Tanya facilitated the California Ocean Litter Prevention Strategy through regular progress tracking and stakeholder engagement, supported grants management, and developed a report on furthering justice, equity, diversity, and inclusion.

Prevention

Prevention is the ultimate solution to stopping marine debris. The NOAA Marine Debris Program works with communities throughout the country to increase knowledge of the issue and reduce barriers to preventing marine debris. Dedicated partner organizations create educational resources and provide hands-on marine debris experiences to students, teachers, and the public. Engaging people in prevention ensures we all have the tools to be a part of marine debris solutions. The projects below are a snapshot of our funded marine debris prevention projects with partners across the United States.

Sustainable Growth for Campuses and Students

Eckerd College is building on successes on their campus to support undergraduate students at the University of North Florida in developing long-term behaviors that reduce single-use plastic consumption. Through week-long Plastic Reduction Challenges and campus and community cleanups, students are growing their knowledge of marine debris and their own abilities to reduce plastic waste in their everyday lives. Since the start of their project, 33,600 single-use plastic items have been refused and students have removed 876 pounds of debris through 25 cleanups.



1,694 students engaged

6 Plastic Reduction Challenges



7,600 students engaged

23 schools participated

One Cool Project by One Cool Earth

One Cool Earth, through their Earth Genius Program, worked with elementary school students from across 10 school districts in San Luis Obispo, California, to implement waste prevention lesson plans and practices. With over 50% of students identifying as primarily Latino, One Cool Earth consulted with Latino support groups and associations to ensure program activities were culturally grounded and translated all educational materials into Spanish. They also provided public school teachers free professional development opportunities, bilingual curriculum, and lesson implementation guidance, as well as a [Marine Debris Prevention Best Practices Manual](#).

Taking Out Single-Use Takeout Containers

Single-use plastic food containers are a significant source of marine debris in Hawai'i. Zero Waste O'ahu successfully piloted a reusable food takeout container program, Full Cycle Takeout, with the goal of reducing potential land-based marine debris on the North Shore of O'ahu. Project partners distributed, collected, sanitized, stored, and redistributed clean reusable containers, and worked with participating restaurants and their staff to implement the program. With the completion of this two-year pilot project, the Full Cycle Takeout team is exploring new partnerships and the use of these containers at events, cafeterias, and more.



8,200+ containers diverted

4 restaurants participated

Removal

While prevention is essential for keeping debris out of the ocean in the first place, removing debris already in the ocean and Great Lakes keeps it from further impacting wildlife, habitats, and communities. The highlights below are examples of projects supported by the NOAA Marine Debris Program that remove marine debris from coastal areas and waterways.

Capturing Debris and Inspiring Action Along the Anacostia River

In Maryland, Prince George's County installed two Bandalong litter traps to help stem the flow of litter into the Anacostia River, and ultimately, the Chesapeake Bay. The litter traps were maintained by young adults, ages 17-24, who participate in a local, paid green jobs training program. The County also created four colorful and engaging place-based [workbooks](#) for elementary through high school students to learn about litter prevention in their local community.



Cleaning Up Debris in the Upper Peninsula

The Superior Watershed Partnership is working with the Great Lakes Conservation Corps, Lake Superior Volunteer Corps, Bay Mills and Keweenaw Bay Tribal communities, and Earthkeepers to remove marine debris from the nearshore waters of Lake Superior, including large plastics, derelict fishing gear, industrial debris, and other trash. In the first year of work, the project team and volunteers removed 5.6 metric tons of debris through cleanup events in Michigan's Upper Peninsula.

Removal, Recycling, and Recovery on the Katmai Coast

The remote and dramatic landscape of Katmai National Park in Alaska makes gathering and removing marine debris a difficult task. The Ocean Plastics Recovery Project coordinated marine debris expeditions using teams of volunteers deployed by small boats to reach and clean the park's remote shorelines, and worked with partners to research recycling technologies. Through this project, 53 volunteers have already contributed 4,170 hours towards testing these marine debris recovery and disposal options.



Research

The marine debris issue is complex, often requiring multidisciplinary approaches and partnerships. Research collaborations can inform marine debris solutions and identify gaps in our knowledge that require further investigation. The NOAA Marine Debris Program supports research projects that address some of our most pressing questions about where debris comes from, how it moves through the environment, and how it impacts wildlife and our ocean, waterways, and Great Lakes. This report includes examples of marine debris research projects from the NOAA Marine Debris Program's funded partners.

Using New Technologies to Enhance Shoreline Debris Detection and Classification

The NOAA National Centers for Coastal Ocean Science and NOAA Marine Debris Program, in collaboration with Oregon State University, completed a research project showing that polarimetric images (PI), or images that capture polarized light reflecting off of marine debris, improve automated classification of debris on shorelines compared to standard images. The project also produced operational guidelines on how to best conduct surveys using an uncrewed aerial system integrated with a PI camera. Lastly, the project team developed a free, [open-source machine learning model](#), called DebrisScan, which allows users to upload and process their own aerial images to get debris-labeled photos and information about potential debris, including the material type, distribution, and quantity. Overall, the results of this project provide strong indication that using these technologies for detection of macro-sized marine debris can complement and enhance existing shoreline monitoring and detection methods.



The classification of debris in polarimetric images was **15% more accurate** than regular photographs.

Developed **DebrisScan**, a free, open-source web-based app for automatically identifying marine debris in aerial images.

16 or fewer microplastics were found in any individual oyster or environmental sample, showing that microplastic concentrations in this area were low.

Laboratory results demonstrated that **30-40% of polyester fibers** and **~30% of polyethylene and polystyrene spheres** left the oysters within **3 hours** of ingestion.

Selective Ingestion of Microplastics by Oysters

Eastern oysters are an important bivalve species on the East and Gulf coasts of the United States, supporting large aquaculture and fishery industries. Oysters are filter feeders, meaning they draw in, select, and eat particles, including microplastics, from the surrounding environment. Researchers at the University of Connecticut conducted field and laboratory studies to determine the types and concentrations of microplastics ingested by oysters, and how the shape, size, and other particle characteristics may influence whether or not they are eaten. The [laboratory results](#) indicate that the relative size of a particle is the most important factor in determining whether it will be ingested and that the type of plastic does not influence selection. The findings of this study are helping inform coastal managers about threats of microplastics to economically and ecologically important marine resources.

Monitoring and Detection

Marine debris is a global issue, but the challenges it presents can vary widely across geographic regions. Monitoring and detection efforts not only improve our understanding of the size and range of marine debris in the environment, but also provide critical data on the types and amount of debris. This information can inform management practices and prevention efforts. The NOAA Marine Debris Program supports projects that generate monitoring and detection data, incorporate innovative technologies, and provide guidance to the marine debris community.

387 surveys conducted

31 new MDMAP sites established

Introducing New Tools to Use and Contribute Marine Debris Data

The NOAA Marine Debris Program's flagship monitoring effort is the NOAA [Marine Debris Monitoring and Assessment Project](#) (MDMAP). MDMAP is a monitoring method and network of data collectors that help answer fundamental questions about the amount and types of marine debris found on shorelines. Input from the MDMAP community led to updates to MDMAP tools, including a shoreline survey guide, data sheets, and an open access [database](#) with visualizations. The NOAA Marine Debris Program also developed training videos for MDMAP participants that are available in both [English and Spanish](#). These videos walk through each step of conducting MDMAP surveys, from choosing the right site all the way through learning how to categorize and record data in the MDMAP database.



Response

Each year, natural disasters threaten lives and livelihoods across the country. Devastating storms and floods can sweep huge quantities of debris into the ocean and Great Lakes, endangering habitats, hindering navigation, and creating hazardous pollution. The NOAA Marine Debris Program works with partners around the country to prepare for and respond to disaster debris and collaborate with communities at risk of and recovering from severe storms.

Supporting the Response to Hurricanes Ian, Nicole, and Fiona and Typhoon Merbok

During the 2022 hurricane season, extreme winds and storm surge caused widespread damage, generating a vast amount of marine debris including displaced, overturned, and capsized vessels, as well as destroyed docks, piers, and homes. The NOAA Marine Debris Program supported states and territories hit hardest by the storm events and met with stakeholders in impacted areas of Florida, South Carolina, Puerto Rico, and Alaska to determine long-term needs to respond to marine debris.



100 trained resource advisors in the Gulf of Mexico

31 tabletop exercise participants in the Commonwealth of the Northern Mariana Islands

Creating Connections and Getting Prepared

In 2022, the NOAA Marine Debris Program created connections through training and exercises to support those who respond to marine debris. The NOAA Marine Debris Program and the NOAA Disaster Preparedness Program, both programs of the NOAA Office of Response and Restoration, co-led a two-day virtual training for coastal managers in the Gulf of Mexico about best practices, salvaging techniques, and tools available to protect natural resources during large-scale marine debris removal operations. On the other side of the globe in the Commonwealth of the Northern Mariana Islands, the NOAA Marine Debris Program hosted a tabletop exercise where participants worked through real-world marine debris disaster scenarios.

Supporting Communities Impacted by Hurricanes in North Carolina

In an effort to address the devastation caused by Hurricane Florence along the North Carolina coast, the North Carolina Coastal Federation, in coordination with North Carolina Wildlife Resources Commission, has removed over 50 abandoned and derelict vessels located in important coastal waters and on public lands in the central and southeastern parts of the state. As part of the second phase of this project, they hired crews of commercial fishermen, who have helped clear nearly 350 metric tons of hurricane debris from sensitive marsh habitat. The Federation will continue removing vessels and hurricane debris through a project that was made possible with support from the Hurricane Response Marine Debris Removal Fund, a partnership between the NOAA Marine Debris Program and the National Fish and Wildlife Foundation.



50+
abandoned and derelict vessels removed

346
metric tons of hurricane debris removed

Coordination

The marine debris problem stretches across the United States and throughout the world. To work toward local solutions, the NOAA Marine Debris Program facilitates collaboration and information sharing amongst stakeholders in 11 regions. Partnerships and initiatives, both domestic and international, are also needed to address the immensity of the marine debris problem, including the upcoming intergovernmental negotiating committee (INC) to develop a new international legally-binding instrument on plastic pollution, for which the NOAA Marine Debris Program is proud support and collaborate on with the United States Department of State.

Action Plans from Coast to Coast

Regional Marine Debris Action Plans are community-driven frameworks for addressing marine debris around the nation. Action Plans bring together diverse regional stakeholders from government, industry, non-governmental organizations, and academic institutions to work towards coasts, people, and wildlife free from the impacts of marine debris. In 2022, the NOAA Marine Debris Program supported our partners at the University of the Virgin Islands and New York and Connecticut Sea Grants to develop two new Marine Debris Action Plans, and collaborated with the Gulf of Mexico Alliance to update their Regional Action Plan. These new and updated Action Plans were collaboratively created by nearly 130 partner organizations in the [U.S. Virgin Islands](#), [Long Island Sound](#), and across the [Gulf Coast](#).



2 new plans published over the past year
13 regional and state marine debris action plans now available



Reconnecting at the Seventh International Marine Debris Conference

This year, the NOAA Marine Debris Program had the opportunity to reconnect with the marine debris community in person at the Seventh International Marine Debris Conference (7IMDC). The conference took place in September 2022 in Busan, Republic of Korea and was attended by over 900 people from 89 countries for a week of science, connection, and inspiration. The 7IMDC is the first of this long-running conference series held outside of the United States. The conference was co-hosted by the Republic of Korea's Ministry of Oceans and Fisheries and the United Nations Environment Programme, and NOAA Marine Debris Program was proud to provide support to this important event as the host of the previous six conferences.

International Teamwork in the Asia Pacific

To better understand and address marine debris in the Asia Pacific region, the NOAA Marine Debris Program, along with the U.S. Department of State, participates in the Asia Pacific Economic Cooperation (APEC) Oceans and Fisheries Working Group (OFWG). APEC is an important international forum with 21 member economies, including most of the world's top source countries of marine debris. The NOAA Marine Debris Program supports the APEC Roadmap on Marine Debris Implementation Plan and led efforts to develop a Shoreline Marine Debris Decision Framework tool to increase marine debris monitoring among APEC entities. This work will ultimately lead to a greater understanding of the scope and distribution of marine debris in the region and more effective management practices and policies to address it.



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Office of Response and Restoration

National Ocean Service

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