

The Rapids

US EPA's Trash Free Waters Monthly Update

June 2022

epa.gov/trash-free-waters

Introduction

Hello all,

Happy June! Australian non-profit, the Minderoo Foundation, recently produced a [Global Plastic Watch](#) tool which uses satellite imagery from the European Space Agency and AI to map plastic waste from space in near real-time. So far, the tool has identified thousands of waste sites in 25 countries including all of Southeast Asia and Australia.

In addition, the Center for International Environmental Law recently published "[Sowing a Plastic Planet: How Microplastics in Agrochemicals Are Affecting Our Soils, Our Food, and Our Future](#)", which exposes the growing use of microplastics in agrochemical products and its threats to human health and the environment.

Please continue to share any upcoming events with Layne Marshall (marshall.layne@epa.gov) so that the Trash Free Waters team can advertise these opportunities with all of you on the first Monday of each month.

Thanks,
Romell Nandi
US EPA
Trash Free Waters National Program Lead

EPA Announcements

[New TFW Flow Newsletter Published](#)

The TFW Program recently published the *Flow* newsletter, a bi-annual publication outlining a range of recent updates related to trash reduction and prevention. This issue included articles on the global plastic treaty, developing a Microfiber Report to Congress, releases of the South Atlantic Strategy and Curbside Disposal Education Campaign Case Study Report, and recent TFW place-based projects in Alabama, Kansas, and New York.

[Release of the Curbside Disposal Education Campaign Pilot Case Study](#)

The Curbside Disposal Education Campaign Pilot was implemented through a partnership between the EPA's TFW program and the Washington, D.C. government. The primary goal of this initiative was to educate District residents about proper waste containment and encourage behavioral changes to reduce unintentional leakage associated with curbside municipal trash collection. TFW just published a comprehensive case study report to provide details on project scope, data collection methodology, key findings, and recommendations for future efforts.

[Article Highlighting EPA's Hybrid Model for Microplastic Identification](#)

A recent EPA Science Matters article highlights a new EPA-developed hybrid method for identifying and counting microplastics in environmental sediment samples. The method involves two main steps: (1) extraction, the process of separating particles from the sediment; and (2) analysis, the process of determining whether each of the individual extracted particles are made of plastic so the total number of plastic particles can be counted.

[EPA Gulf of Mexico Program TFW Grant Recipient Installs Plastic-Filled Sea Turtle Sculpture](#)

The Alabama Department of Environmental Management recently installed the first of eight wildlife sculptures to be placed at state welcome centers as a part of the "Help Keep Our Waters Clean" project. The project was funded with a \$500,000 grant awarded by the Gulf of Mexico Program's Trash Free Waters Grant Program in late 2020. The sculptures and complementary signage draw motorists' attention by highlighting wildlife and conveying a message about reducing land-based trash from entering the Gulf by abating roadway litter. Another part of the project includes placing signs along interstates to inform motorists that they are entering a watershed and to encourage them not to litter.

[TFW Hosts Eighth Webinar in Series](#)

Over 130 participants joined in to listen to the eighth TFW webinar "Using Clean Water Act Programs to Reduce Trash in Waterways." Attendees learned how states in the Mid-Atlantic region are addressing trash pollution using CWA programs, including the Water Quality Standards, Total Maximum Daily Load (TMDL), Nonpoint Source, and National Pollutant Discharge Elimination System programs. A recording of the webinar will be available on the [TFW website](#) soon.

[Litter Gitter Success in Alabama](#)

Since being installed at Buck Creek in March, an Osprey Initiative Litter Gitter - an in-stream trash capture device - has collected almost 21 pounds of litter from the creek. The purchase and maintenance of this device was made possible through a \$500,000 EPA Gulf of Mexico Trash Reduction and Prevention grant awarded through the Freshwater Land Trust in spring 2020.

Funding Opportunities

[Massachusetts Sustainable Materials Recovery Program \(SMRP\) Municipal Grant](#) and [Recycling Dividends Program Funds](#)

MassDEP Sustainable Materials Recovery Program (SMRP) Municipal Grant funding may be used to improve local recycling, composting, reuse, and household hazardous waste diversion programs. Cities, towns, and regional authorities in the state of Massachusetts are eligible to apply. The Recycling Dividends Program provides payments to qualifying municipalities that have implemented specific waste reduction, reuse, and recycling programs and policies. **The application period for both opportunities is open until June 15.**

[EPA Environmental Finance Center \(EFC\) Grant Program \(EPA-I-OW-OWM-22-01\)](#)

EPA encourages non-profit organizations, universities, and other eligible entities to apply to receive funding as a designated EFC in an EPA Region or as a national EFC for EPA Headquarters. A major priority for this program over the next five years is to provide technical support to disadvantaged communities across the country. Selected technical assistance providers will help communities develop and submit project proposals, including State Revolving Fund (SRF) applications for Bipartisan Infrastructure Law funding. Additionally, the EFCs will support a range of projects focused on solid waste, clean air, toxic substances, drinking water, wastewater, and stormwater. Approximately \$68 million in federal funding is available through this program. **The deadline for submissions is June 17.**

[2022 Global Ocean Clean-up Campaign](#)

As part of a global clean-up and plastic pollution awareness campaign, Oceanic Society will be providing small grants (\$2,000) to at least five coastal organizations in locations worldwide to organize, lead, and document a community-based coastal or ocean cleanup on September 8, 2022. Locations may include beaches, marine areas, rivers, estuaries, or other waterways in coastal areas of the world. Selected projects will also be required to creatively use the collected plastic pollution from the clean-up to create a unique art piece or sculpture. These creations will be judged and three additional cash prizes will be awarded for first place, runner up, and audience choice. **The deadline for submissions is June 20.**

[Energize The Environment Grant Program](#)

Quadrattec is proud to offer a \$3,500 environmental grant to an individual or group currently pursuing a program or initiative designed to benefit our environment. Some examples of this would be trail building or restoration projects, park beautification events, litter prevention initiatives, community environmental educational projects, and youth educational engagement events. Interested individuals or groups should submit a 1000-1600 word essay to grants@quadrattec.com that paints a picture of who you or your organization are, what drives and inspires you or your organization, what you or the organization are looking to accomplish, and how you plan to apply our grant to your project. **The deadline for submissions is June 30.**

[U.S. FWS Coastal Program \(F22AS00110\)](#)

The U.S. FWS Coastal Program is a voluntary, community-based program that provides technical and financial assistance through cooperative agreements to coastal communities, conservation partners, and landowners to restore and protect fish and wildlife habitat on public and private lands. The Coastal Program staff coordinates with partners, stakeholders and other Service programs to identify geographic focus areas and develop habitat conservation goals and priorities that anticipate and ameliorate the impacts of climate change and other environmental stressors. **The deadline for submissions is June 30.**

[America the Beautiful Challenge 2022 Request for Proposals](#)

The National Fish and Wildlife Foundation (NFWF), through anticipated cooperative agreements from the Department of the Interior, Department of Defense, and the Department of Agriculture, is pleased to announce the launch of the America the Beautiful Challenge (ATBC) 2022 Request for Proposals. ATBC proposals should address conservation and public access needs that showcase cumulative benefits to fish and wildlife, carbon sequestration and storage benefits, engage with and benefit underserved communities, support community access to nature, and help safeguard ecosystems through conservation, resilience-focused and nature-based solutions. Approximately \$85 million will be available for 2022. **The deadline for submissions is July 21.**

[EPA Small Business Innovation Research \(SBIR\) Program](#)

EPA intends to release its 2022-2023 SBIR Phase I Broad Agency Announcement/solicitation in mid-June. The proposed topics for this year's solicitation include Clean and Safe Water, Air Quality and Climate, Homeland Security, Circular Economy/Sustainable Materials, Safer Chemicals, and Risk Assessment. More info to come. **The deadline for submissions is expected to be mid-August.**

[Translating Coastal Research into Application](#)

The U.S. Coastal Research Program (USCRP) is a multi-agency led effort to coordinate Federal activities, strengthen academic programs, and address coastal community needs. Proposals should address the needs or gaps that have been identified by or are evident from USCRP-funded projects, to move research project findings toward application (i.e., the translation of societally-relevant coastal and estuarine physical processes science to science-based solutions that address coastal community needs related to resilience). It is anticipated that approximately \$4,000,000 will be available through this opportunity. **The deadline for submissions is August 30.**

Environmental Justice Data Fund

The Environmental Justice Data Fund (EJDF or “the Fund”) is an \$8 million fund, created and seeded by Google.org, that aims to help frontline communities that have been historically underserved and disproportionately impacted by climate change and environmental injustice. The Fund will enable frontline communities in the United States to use data to unlock resources, increase their access to Justice40 benefits and federal infrastructure funding, and advocate for new policies that empower communities to address past environmental harm and pave the way to a more sustainable, climate-resilient future. **Applications are being accepted on a rolling basis, but the final deadline for submissions is September 16.**

Upcoming Events

Chesapeake Bay Awareness Week

June 4-12th, various locations around the Bay and virtual

Chesapeake Bay Awareness Week is a time to celebrate the cultures, history and natural beauty of the nation's largest estuary. During the week, there are a wide variety of online and in-person events, volunteer opportunities and social media conversations for everyone to take part in to celebrate the Chesapeake Bay.

EPR Masterclass: Packaging Redesign through EPR: Success Stories

June 7th (11 AM ET), virtual

The Product Stewardship Institute is hosting a webinar to discuss how EPR can help achieve packaging redesign and advance the circular economy with global packaging Extended producer responsibility (EPR) experts: Jürgen Dornheim (P&G), Feliks Bezati (MARS), Gloria Gabellini (PEPSICO), Karen van de Stadt (KIDV), and Joachim Quoden (EXPRA), moderated by Scott Cassel, PSI's CEO and Founder, with Sydney Harris, PSI's Policy & Programs Manager..

Capitol Hill Ocean Week

June 7-9th, Washington, D.C. and virtual

Capitol Hill Ocean Week (CHOW), hosted by the National Marine Sanctuary Foundation, is a multi-day conference that convenes policymakers, scientists, managers, business leaders, conservationists, educators, students, and members of the public to engage in dialogue and debate on significant issues that impact our ocean and Great Lakes and to propose innovative policies and partnerships to address these issues. CHOW 2022 is open to the public and free to attendees. This year's conference will focus on climate change impacts to our ocean, coasts, and Great Lakes, and the communities that rely on them.

World Ocean Day

June 8th

The theme of this year's World Ocean Day is “One Ocean, One Climate, One Future – Together.” Find tools and resources to help you plan your outreach, activities, and events at WorldOceanDay.org including: the 2022 Event Planning Toolkit, the Social Media Toolkit, and the Events Calendar and World Map where you can list any event, activity, or announcement to share your efforts with the world.

Plastic Waste Free World North America Conference and Expo

June 8-9th, Atlanta, GA

The Plastic Waste Free World Conference & Expo is an international conference and exhibition for companies looking for new technologies, materials, and solutions to help realize their plastic waste targets and source the latest innovations driving the new circular economy. The event attracts major manufacturers, brand owners, retailers, materials experts, circular economy experts, government

organizations, NGOs, the recycling industry, and the plastics sector to engage in discussions that will help reduce waste plastic in the environment. Conference tracks include: 1) Eliminating Waste Plastics, 2) Retail and Consumer Goods Packaging, and 3) Fashion and Textiles.

Build Resilience With Gender Empowerment, Sustainable Food, and Reuse Policies

June 9th, virtual

The Center for Biological Diversity, Upstream Solutions, and the Environmental Law Institute are hosting a webinar to discuss local strategies to reduce climate change emissions and create equitable and healthy communities. We'll discuss how to build climate-resiliency around food systems, reuse /refill solutions, and gender empowerment, and share research that summarizes the inclusion of these topics into climate plans. The Center will unveil a new report titled, "[Gender and the Climate Crisis: Equitable Solutions for Climate Plans](#)" and participants will leave with resources on why and how to include these topics into climate planning and practical policy recommendations to build upon this work.

Understanding Environmental Justice through two EPA tools: EJSCREEN and EnviroAtlas

June 15th (3PM ET), virtual

Understanding patterns of how different sectors of the population are impacted inequitably by environmental issues is a necessary step towards a solution. This webinar will examine two of the tools EPA has developed to help users understand and address EJ: EJScreen and EnviroAtlas. EJScreen is an EJ mapping and screening tool that provides a nationally consistent dataset and approach for combining environmental and demographic indicators. EnviroAtlas is a data-rich, web-based decision support tool that combines maps, analysis tools, downloadable data, and informational resources. This webinar will be used to demonstrate how to use EJScreen data in EnviroAtlas and vice versa, with a focus on EJ issues.

North America Community-Based Social Marketing Workshop

June 20th-22nd, virtual

Dr. Doug McKenzie-Mohr will be delivering an introductory community-based social marketing training virtually in June. This workshop will be of particular interest to agencies working to promote waste reduction, energy and water efficiency, conservation, sustainable food consumption, the control of invasive species, modal transportation changes and other sustainable actions. Community-based social marketing is a unique approach to fostering both environment and health-related behavioral changes and is now being utilized globally.

Global Council for Science and the Environment

June 21st-24th, virtual

The theme of the 2022 Annual Conference of the Global Council for Science and the Environment is Biodiversity, Conservation Science, and Climate Change. A panel session on Wednesday, June 22 will share resources on why and how to include gender empowerment, food systems, and reuse in climate planning.

Earth Optimism × Folklife

June 22nd - 26th and June 30th - July 4th, Washington, D.C.

Earth Optimism × Folklife: Inspiring Conservation Communities invites visitors to explore the possibilities and solutions that address some of our planet's most significant challenges through new ways of living, learning, and working toward a shared sustainable future. Earth Optimism is a Smithsonian movement that focuses on changing the narrative from doom-and-gloom to hope, inspiring action and mobilizing a global community. One of the themes is "Coastal Connections."

Great Lakes Economic Forum (GLEF)

June 26-28th, Chicago, IL

An estimated 22 million pounds of plastics enter the Great Lakes every year. The “Materials & Circular Great Lakes” breakout session at GLEF will provide insight into Circular Great Lakes, a binational, collaborative initiative of the Council of the Great Lakes Region, which seeks to end plastic waste by closing the loop and accelerating a circular economy for plastics across the region. Speakers, who are also partners of the Circular Great Lakes Initiative, will discuss the importance of forging a future without waste and the biggest opportunities associated with creating a Great Lakes circular economy.

UN Ocean Conference 2022

June 27th - July 1st, Lisbon, Portugal

The United Nations Ocean Conference, co-hosted by the Governments of Kenya and Portugal, will mobilize action around science-based innovative solutions aimed at starting a new chapter of global ocean action. Solutions for a sustainably managed ocean involve green technology and innovative uses of marine resources. Topics also include addressing the threats to health, ecology, economy and governance of the ocean - acidification, marine litter and pollution, illegal, unreported and unregulated fishing, and the loss of habitats and biodiversity.

Strengthening Tribal Sovereignty through Waste Management Codes and Ordinances

June 30th (2PM ET), virtual

Join for part of EPA’s Tribal Waste Management Program Webinar Series to learn how developing enforceable codes and ordinances can ultimately assist a tribe in addressing its unique environmental issues while honoring and preserving its traditions for future generations. Annie Perry of Snowpony Consulting will share her in-depth knowledge related to the step-by-step process of developing codes and ordinances. Kori Ellien will discuss her experience implementing and enforcing environmental codes with the Yurok Tribe. Ms. Ellien will also highlight the success the Tribe has had at preserving tribal traditions by removing abandoned vehicles on the Yurok Tribe’s land.

Save the dates for future months...

National Working Waterfront Network Conference

July 19th - 21st, Boston, MA

The National Working Waterfront Network’s Conference brings together people from across North America to connect with one another and showcase initiatives that protect and promote working waterfronts. The purpose of this conference is to unite stakeholders and initiate innovative, successful, and timely solutions to waterfront and waterway issues. Working waterfronts include waterfront lands, waterfront infrastructure, and waterways that are used for water-dependent activities, such as ports, marinas, small recreational boat harbors, and fishing docks.

International Conference on Plastic Recycling and Waste Management

July 21st - 22nd, Rome, Italy

The International Conference on Plastic Recycling and Waste Management aims to bring together leading academic scientists, researchers and scholars to exchange and share their experiences and research results on all aspects of Plastic Recycling and Waste Management. It also provides a premier interdisciplinary platform for researchers, practitioners, and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges and solutions.

24th Biennial Conference on the Biology of Marine Mammals

August 1st - 5th, West Palm Beach, FL and virtual

The Society for Marine Mammalogy (SMM) holds its conference every two years to promote science, collaboration, and improve the quality of research on marine mammals around the globe. SMM2022 is a hybrid conference under the theme, “A Sea Change: Transforming Science into Stewardship.” The

conference will highlight the value of diversity in all forms in marine mammal science, from our multidisciplinary approaches to the improvement of diversity in our field.

NAWM Annual State/Tribal/Federal Coordination Meeting

August 15-19th, Shepherdstown, WV

The National Association of Wetland Managers (NAWM) is hosting their annual coordination meeting focusing on “Protecting Waters in a Time of Rapid Change.” The purpose of this annual meeting is to support state and tribal wetland program managers and other wetland professionals as they respond to challenges in the coming year. Focus areas for this year’s meeting include: Engaging Under-resourced Communities in Wetland Protections, Continuity and Mentorship for Staffing Changes, Finding Funding for Climate Resiliency, Recent Regulatory Changes and Updates, Advances in Tools and Technology, and Effective Outreach and Communications.

World Water Week

August 23rd - September 1st, Stockholm, Sweden and virtual

World Water Week is the leading annual event on global water issues, organized by Stockholm International Water Institute since 1991. Together with organizations from all sectors and all regions of the world, we find solutions to the world’s greatest water-related challenges. Within the overall theme of “Seeing the unseen: The value of water”, conference sessions will be grouped under three theme headings: the value of water for people and development, the financial and economic value of water, and the value of water for nature and climate change.

7th International Marine Debris Conference

September 18th - 23rd, Busan, Republic of Korea

7IMDC will build on the momentum of past IMDCs by bringing together governments, industry, academia, civil society, and all relevant stakeholders, to discuss the latest science, strengthen collaborations, find solutions and catalyze action to address the urgent global problem of marine litter and plastic pollution. The conference program is expected to be released in mid-June.

International Solid Waste Association World Congress 2022

September 21st - 23rd, Marina Bay Sands, Singapore

The 2022 ISWA World Congress will be hosted by the Waste Management & Recycling Association of Singapore. The Congress has an overall theme of “Don’t Waste Our Future” and will include keynote and plenary sessions by invited speakers, and concurrent sessions with oral and poster presentations by the participants. This will serve as an opportunity and platform for business leaders and entrepreneurs, technology developers, solutions providers, and policy makers to gather and discuss key trends and the opportunities. Registration is expected to open soon.

Virginia Marine Debris Summit 2022

September 27-28th, Virginia Beach, VA

The Virginia Coastal Zone Management Program and Clean Virginia Waterways will host the fourth Virginia Marine Debris Summit in September 2022. More details to come!

Aquaculture Europe Conference 2022

September 27-30th, Rimini, Italy

The theme of this year’s Aquaculture Europe Conference is “Innovative Solutions in a Changing World.” It will feature a Microplastics and Litter session to call attention to the importance of studying this issue, creating solutions, and implementing measures that help to tackle it.

In case you missed it...

[The Secret to EPR for a Circular Economy](#)

This podcast was produced by Upstream. Dive deep with policy experts, Kirstie Pecci of the Conservation Law Foundation and Judith Enck of Beyond Plastics, on the nuances of Extended Producer Responsibility for packaging that ensures a shift to a circular economy and prevents harmful recycling practices.

[Clean Water Act Module Part 1](#)

The EPA Watershed Academy recently produced the Clean Water Act Module Part 1, designed to provide a history of the Clean Water Act (CWA), an overview of Water Quality Standards (WQS), and describe the role of states, territories, and authorized tribes, the public, and EPA in the WQS process. The course contains fourteen core sections and will take about two hours to complete. This module is recommended for the Watershed Academy Certificate Program.

The Microplastics Breakdown

MICROPLASTICS AND WASTEWATER TREATMENT

[Cooking Up a Way to Remove Microplastics from Wastewater — With Okra, Aloe](#)

American Chemical Society, March 22, 2022 (*Blog Post*)

This article summarized a study exploring the theory that a combination of okra and other plants, such as aloe, cactus and psyllium, remove solid and dissolved pollutants from water and wastewater. These study results were presented during the spring meeting of the American Chemical Society (ACS) that was held from March 20-24, 2022. The article presented an overview of the typical wastewater treatment process in which microplastics (MPs) are removed from water in two steps: 1) MPs that float are skimmed off the top of the water; this step only removes a fraction of the total MPs present; 2) flocculants or sticky chemicals are added which attract MPs and form large clumps. The clumps then sink to the bottom of the water and can be separated. The principal investigator for the project pointed out that some of the substances currently used to remove contaminants are potentially harmful and suggested that food-grade plant extracts could serve as nontoxic alternatives to remove textile-based pollutants from wastewater. The team tested polysaccharide extracts from fenugreek, cactus, aloe vera, okra, tamarind and psyllium as flocculants to capture MPs. The researchers found that polysaccharides from okra paired with those from fenugreek could best remove MPs from ocean water, whereas polysaccharides from okra paired with those from tamarind worked best for freshwater samples. Overall, the plant-based polysaccharides were reported to work better than, or as well as, the traditional flocculant polyacrylamide, depending on the combination of extracts and water source.

[Effectiveness of Microplastics Removal in Wastewater Treatment Plants: A Critical Analysis of Wastewater Treatment Processes](#)

Zöhre Kurt, Irmak Özdemira, Arthur M. James R.

The authors described the goal of this literature review as to examine the effectiveness of every treatment process within conventional wastewater treatment plants (WWTPs) on MP removal. The review considered the physical, chemical and/or biological treatment processes independently. The shape and size distribution of the MPs can affect their removal via filtration during the physical removal processes. For example, smaller-sized MPs were found to be more difficult to remove and detect and some particles could not pass through the sieves even if they are sufficiently small due to their irregular shapes. Removal efficiencies for the chemical processes were found to be highly dependent on the size of MPs and the solution (ZnBr₂; NaCl; NaI) used. For example, ZnBr₂ was determined to be the most effective in the separation of larger particles (800–1000 μm) rather than smaller ones (200–400 μm). The authors examined the most commonly used biological process in a WWTP, activated sludge. The removal of MPs

during the activated sludge process was found to vary between 44% and 99%. One of the significant findings was a combination of processes provided the best removal of MPs. The authors also observed that WWTP processes are mainly mechanisms that relocate MPs within the WWTP.

EXPOSURE TO MICROPLASTICS

Are There Plastic Particles in My Sugar? A Pioneering Study on the Characterization of Microplastics in Commercial Sugars and Risk Assessment

Sadia Afrina Md.; Mostafizur Rahman Md.; Nayon Hossain, Md; Khabir Uddin; Guilherme Malafaia

This study investigated the possible presence of MP particles in five brands of commercial sugars and two unpacked, unbranded, and unlabeled sugars obtained from different supermarkets in Dhaka, Bangladesh. The commercial sugars were selected based on their selling rate and popularity among consumers. No differences were found between the MPs concentrations of the different branded samples or between branded vs. non-branded sugar samples. Additionally, a similar distribution of MPs in terms of number, size, shape, color, and polymer composition was found in all of the samples of sugar. The researchers found that microfibers and spherules were the most prevalent in the samples and the predominant colors of MPs were black, pink, blue, and brown. Nine polymer types were identified in each of the samples: Acrylonitrile butadiene styrene (ABS); polyvinyl chloride (PVC) Polyethylene terephthalate (PET); Ethylene-vinyl acetate (EVA); cellulose acetate (CA); polytetrafluoroethylene (PTFE); high-density polyethylene (HDPE); polycarbonate (PC) and nylon, with ABS and PVC the most frequently occurring. The authors estimated that sugar consumption in Dhaka City can cause the ingestion of millions of tons of MPs annually (2.4-25.6 tons, with an average of 10.2 tons).

POTENTIAL RISKS OF MICROPLASTICS EXPOSURE

Exposure To Microplastics May Alter Cellular Function

April 20, 2021, Florida State University (*Blog Post*)

This summary focused on work that was conducted by a team of Florida State University researchers published in *Chemical Research in Toxicology*, focusing on the effects of the inhalation and ingestion of polystyrene MPs on humans at the cellular level. The team exposed lung cells in a petri dish to small amounts of polystyrene at levels that are commonly found in the environment. The article reported that after only a few days, the researchers found the cell's metabolic processes had slowed down, cell proliferation was inhibited, the shape of the cell morphed and delustering had occurred. Additionally, the study found that the MP particles were taken up by the cells and had formed a ring around the nucleus in each of them. The researchers described the study as a first step in understanding the effects of MPs on human health and highlighted that the findings underscore previously raised concerns about the effects of MPs, particularly for individuals with respiratory disorders like lung cancer, asthma, emphysema, pneumonia, fibrosis or chronic obstructive pulmonary disease (COPD). Notably, the team also cautioned that their study was conducted under lab conditions; the process of breathing in and out could not be mimicked and could potentially affect the amount that an individual inhales and ingests.

Polystyrene Microplastics Induce Mitochondrial Damage in Mouse GC-2 Cells

Tao Liu, Baolian Hou, Zhiping Wang, Yanli Yang

The authors explored the mechanism by which polystyrene microplastic (PS-MPS) exposure causes sperm damage in mice. In this study, a mouse spermatocyte line, GC-2 cells, was exposed to 5 μm PS-MPS to investigate mitochondrial damage. Mitochondria, the authors observed, are the most important organelles in the male reproductive system, and have an important impact on the spermatogenesis, movement, and activity of sperm. The results indicated that exposure to 5 μm PS-MPS decreased adenosine triphosphate (ATP) content, reduced the mitochondrial membrane potential, damaged the integrity of the mitochondrial genome, and caused an imbalance of homeostasis between mitochondrial

division and fusion. Notably, mitochondrial function was found to have been maintained to some extent after PS-MPS damage. The overall results, according to the researchers, verified that PS-MPS can damage mitochondrial structure and function in GC-2 cells and provided a basis for understanding the causes of sperm damage by polystyrene MPs.

MICROPLASTICS IN THE ENVIRONMENT

Lack of Evidence for Microplastic Contamination from Water-Soluble Detergent Capsules

Javier Bayo, Belén Ramos, Joaquín López-Castellanos, Dolores Rojo, Sonia Olmos

This study explored the ability of water-soluble detergent capsules to release MPs. A total of 39 different brands of water-soluble capsulated detergents were tested, 20 of them for washing machines and 19 for dishwashers, from four different European countries: Spain, Portugal, Belgium, and Italy, as well as two different devices for MP recovery from laundry wastewater. The capsules were tested on different washing cycles in the same machine and washing conditions. Washing machines loads were carried out with three twice-washed 100% polyester blankets. Dishwashing loads consisted of 6 wine glasses, 6 tumblers, 6 flat plates, 6 soup plates, 6 dessert plates, 6 coffee cups, 6 stainless steel knives, 6 stainless steel forks, 6 stainless steel tablespoons, 6 stainless steel dessert spoons, and 2 plastic boxes made of polypropylene. Wastewater samples from all laundry capsules were found to contain MPs, mainly as entangled fibers from PET blankets; however, the authors reported that none could be associated to the capsule itself. Similarly, MPs in the form of fibers were found in all of the samples from dishwashing detergent capsules, but these samples were also found to be much less contaminated with MPs than those from laundry ones. Additionally, the researchers described the vast majority of fibers isolated from laundry wastewater samples were present as a knotty mass, difficult to efficiently be counted, while they found that separate fibers were mostly present in the dishwashing wastewater.

Solid Waste and Microplastics on the Beaches of Holbox Island, Mexico

Arely Areanely Cruz-Salasa, Juan Carlos Alvarez-Zeferinob, Sara Ojeda-Benitez, Samantha Eugenia Cruz-Sotelo, Alethia Vázquez-Morillas

This study examined the presence of MPs, solid waste, and plastic containers on the Mexican island “Holbox,” which is part of the Yum Balam protected area and was declared as a Flora and Fauna Protection Area in 1994. The dual goals of this study were: 1) establish a baseline on the levels of pollution by marine waste on the island; and 2) identify potential sources of pollution, which could inform the establishment of strategies to prevent its generation or arrival. The researchers evaluated the presence of MPs in three beach locations in the urban zone, analyzed the quantity and composition of solid waste in a beach location with a high tourist influx in the urban zone and identified the plastic containers transported by the ocean currents on a virgin beach. The most common MP in the three study areas were fragments. Fibers were found in Location 1 and Location 3; films were found in Location 2 and Location 3, and foams were only in Location 2. The sizes of MPs in each area varied: 72 plastic containers were found on the virgin beach, 28 of which came from other countries, mainly from the Caribbean islands. The authors asserted their results indicated that the waste in the urban area comes mainly from a local dumpsite due to its proximity to the coast and its inadequate management conditions. They attributed the plastic waste on the virgin beach to the marine currents deposit, considering that the Yucatan and Loop currents flow off the coast of Quintana Roo. The article pointed out that the pollution problem stemming from the presence of waste and MP on the beaches could be worsened if inadequate waste management and the high tourist demand continue.

Misidentification of PVC Microplastics in Marine Environmental Samples

V. Fernández-González, J.M. Andrade-Garda, P. López-Mahía, S. Muniategui-Lorenzo

The authors observed that poly vinylchloride (PVC) is the third most demanded polymer (widely used and high rates of production) in Europe, however it is scarcely found in marine ecosystems. The goals they set forth for this literature review article were to: 1) study the weathering processes of PVC in the

marine environment and to evaluate how they can affect PVC identification; 2) examine the measurement process to identify causes of PVC misidentification in environmental studies, and 3) eventually propose solutions to assess more closely the real quantity of PVC in environmental matrices. To that end, they conducted a study focused on PVC weathering and also reviewed the most recent publications focused on identifying MPs. The authors compared the infrared spectra of pristine and weathered PVC (after 10 weeks of simulated marine weathering) and as they anticipated, the spectra differed significantly. They found that the spectrum of weathered PVC very closely resembles the spectrum of weathered polyethylene. The authors also observed that there are many chemical additives that are used in creating PVC, which they found influences its spectral profile after weathering and would make it difficult to identify. The techniques that are required to isolate it from environmental samples were found to modify the surface of PVC, which makes their spectral identification/ quantification an analytical challenge. They asserted that these factors could lead to large PVC underestimations in environmental studies, in which other polymers are identified. The article suggested specific methods and approaches to more accurately identify and quantify particles. Additionally, the need for a suitable spectroscopic database that included PVC weathered standards was also highlighted.

If you'd like to see your posting in this email, please email Marshall.Layne@epa.gov with any suggestions!

EPA Trash Free Waters Program | nandi.romell@epa.gov | epa.gov/trash-free-waters

