

The Rapids

US EPA's Trash Free Waters Monthly Update

November 2023

epa.gov/trash-free-waters

Introduction

Hello all,

2023 is the tenth anniversary of the Trash Free Waters program! To recognize the anniversary, we put together [Celebrating Ten Years of the EPA's Trash Free Waters](#) to summarize the program's past and look at the road ahead, with a timeline showing some important program milestones. Please check it out!

Please also look out soon for an announcement on the [next Trash Free Waters webinar](#) on the topics of human health and microplastics. The next webinar will be held at the end of November.

The [Break Free from Plastic Pollution Act of 2023](#) was re-introduced on the Hill (the original bill was introduced in 2021) on October 25 by Senator Jeff Merkley (OR) and Representative Jared Huffman (CA). Among other provisions, the bill establishes reduction targets for single-use plastic products and beverage containers, creates a nationwide beverage container refund program and bans certain single-use plastic products that are not recyclable.

Scientists at the Minderoo Foundation in Australia recently created a first-of-its-kind open-access database on plastic chemical exposure and human health impacts. The [Plastic Heat Map](#) compiles findings from over 3,500 studies dating back to the 1960s, when large scale production and plastic pollution began growing rapidly. The goal of this project is to improve understanding of this issue, inform change in regulations and highlight opportunities for future research.

The Plastic Pollution Coalition recently launched [The Global Plastic Laws Database](#) to research, track and visualize plastic legislation that has been passed around the world.

A recent paper, [Cleaning Up without Messing Up: Maximizing the Benefits of Plastic Clean-up Technologies through New Regulatory Approaches](#), recommends that requiring environmental impact assessments and life cycle analysis for plastic clean-up technologies across the globe could improve effectiveness and ensure sound environmental management.

Finally, the Plastics Industry Association and American Chemistry Council have recently launched [Operation Clean Sweep Blue verification](#), a new program aimed at reducing plastic pollution. While Operation Clean Sweep was founded in 1991 to help prevent preproduction plastic from entering the environment, the new “Blue verification” will add an external, facility-level inspection program.

Please share any upcoming events, funding sources, or innovative initiatives with me at nandi.romell@epa.gov so that the Trash Free Waters Team can advertise these opportunities.

Romell Nandi
US EPA
Trash Free Waters National Program Lead

EPA Announcements

[Puerto Rico Strategic Plan to Reduce Aquatic Debris](#)

On October 11, NOAA's Marine Debris Program and EPA's TFW program (headquarters and Region 2) released the 2023-2028 *Puerto Rico Strategic Plan to Reduce Aquatic Debris*. The Strategic Plan establishes a comprehensive framework for strategic actions to reduce the impacts of aquatic debris on Puerto Rico and its coasts, people and wildlife. The plan was created through a voluntary, collaborative effort involving EPA, NOAA and organizations in Puerto Rico. The NOAA Marine Debris Program will record and help track the progress of actions taken to implement the Strategic Plan.

[South Atlantic Strategy for Trash Free Waters](#)

The second stakeholder implementation meeting for the *South Atlantic Strategy for Trash Free Waters* was held on October 17, 2023. The meeting included speakers on individual projects implementing the strategy, funding sources and external work and resources relevant to addressing specific actions articulated in the strategy. To facilitate peer-to-peer learning, participants also shared their own project accomplishments and challenges they are facing related to project implementation.

[Latest in TFW Article Series Posted on Website](#)

The fifth article in the Trash Free Waters Article Series describes the negative impacts of trash on the environment and the especially notable impact of tourism at vacation destinations and what tourists can do to help minimize these negative impacts.

[EPA Region 4 Staff Helps Clean Trash from Chattahoochee River](#)

Twenty EPA Region 4 employees and staff from the Georgia Environmental Protection Division and the Chattahoochee River National Park Service removed more than 1,000 pounds of trash along four miles of the Chattahoochee River on October 10. The cleanup was one of many run by Rivers Alive, Georgia's main volunteer waterway cleanup program, which aims to keep all watersheds within state lines trash free. The most frequently picked up item during the October 10 cleanup was plastic bottles; also removed were balls of all sorts, styrofoam, tires, an inflatable raft, a kayak, lighter fluid, oil, coolers and more.

Funding Opportunities

[Building Resilient Infrastructure and Communities](#)

The Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC) grant program will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program's guiding principles are to support communities through capability and capacity building, encourage and enable innovation; promote partnerships, enable large projects, maintain flexibility, and provide consistency. **The deadline for submissions is February 29, 2024.**

[NOAA New England Bay Watershed Education and Training](#)

The National Marine Fisheries Service Greater Atlantic Regional Fisheries Office is seeking proposals under the New England Bay Watershed Education and Training Program, an environmental education program for K-12 experiential learning. This funding opportunity focuses on projects combining long-term, classroom-integrated "Meaningful Watershed Educational Experiences" and capacity building for K-12 Environmental

Literacy at the state and local level. Awards will range from \$25,000 to \$150,000 and projects must target students and teachers in New England. **The deadline for submissions is February 20, 2024.**

[Ocean Odyssey Grants: Marine Debris Awards for Diversity Equity, Inclusion, Justice, and Accessibility](#)

The National Marine Sanctuary Foundation and NOAA Marine Debris Program are offering funding to support underserved, underrepresented or overburdened communities in promoting initiatives that investigate and prevent adverse impacts of marine debris in the United States. Awards will range from \$5,000 to \$7,500 and will support 10-15 projects. Project activities may include marine debris prevention, research, monitoring, detection, response, removal and coordination. **Applications are due December 18, 2023.**

Other opportunities...

[NOAA Marine Debris Art Contest](#)

The NOAA Marine Debris Program holds an annual art contest to reach K-8 students and help raise awareness about marine debris. An awards panel will collect all entries and select 13 winners to be featured in a marine debris calendar. Entries will be judged on their creativity, artistic presentation, and relevancy to the theme of 1) How marine debris impacts the ocean and the Great Lakes environment, and 2) What you are doing to help prevent marine debris. **The deadline for submissions is December 15, 2023.**

[Session Proposal Submissions for River Network's River Rally 2024](#)

River Network is looking for individuals who are interested in sharing their work at River Rally 2024. The event convenes nonprofits, government agencies, and more, and will take place in Grand Rapids, Michigan May 13-16, 2024. River Network is accepting proposals for learning labs, presentations, facilitated session panels, keynotes and plenary panels, and posters, as well as suggestions for field trips and general events. **The deadline for proposal submissions is November 10, 2023.**

Upcoming Events

[Webinar: Microplastics](#)

November 7 (1 PM-3:15 PM ET), virtual

The Interstate Technology and Regulatory Council (ITRC) is offering a webinar on microplastics to provide supporting and background information for their 2023 Microplastics Guidance Document. This training is intended for state regulators, environmental consultants and community and Tribal stakeholders. This webinar will discuss microplastics sources and distribution, human health risks associated with microplastics, prevention and mitigation strategies for reducing microplastics in the environment and more. Attendees are encouraged to view the ITRC Microplastics Guidance Document before the webinar.

[Webinar: From Plastic to Progress: Creating Inclusive EPR Systems around the World](#)

November 8 (8 AM-9:15 AM ET), virtual

This webinar will offer valuable insights into the process, challenges, and opportunities associated with EPR design and implementation, including ensuring such systems are equitable and inclusive. Experts from Sri Lanka—which is now more than one year into piloting a voluntary EPR system, the Philippines, and Kenya will share their

experiences in instituting EPR schemes and recommendations for other countries embarking on their own system designs.

Students for Zero Waste Conference

November 10-12, Swarthmore College and virtual

The Post Landfill Action Network is hosting the Students for Zero Waste Conference with in-person events at Swarthmore College in Swarthmore, PA, as well as the opportunity to join virtually. The event features student-led panels, skill-building workshops, discussion groups and field trips.

Virtual Film Screening: *Small Town Explosion: What Really Happened in East Palestine?*

November 14 (7 PM ET), virtual

Beyond Plastics is hosting a free virtual screening of a new short documentary film about the massive chemical train derailment in East Palestine, Ohio, last year. Five of the train cars were carrying vinyl chloride, which are chemicals used to make PVC plastic. The event will feature the screening and a Zoom Q+A session with the filmmaker, the Appalachia Director of Beyond Plastics, and the Vice President of the East Palestine Unity Council.

Webinar: Here Are the Leaders and Laggards in the Chemical Industry

November 22 (9 AM ET), virtual

This webinar, hosted by ChemSec, will discuss ChemScore 2023 rankings and which chemical companies have been reducing their chemical footprints. Two senior staff from ChemSec will be presenting, and there will be additional presentations by a highly ranked chemical company and a global investment firm.

2nd International Symposium on Plastics in the Arctic and Sub-Arctic Region

November 22-23, Reykjavik, Iceland

This symposium will highlight the latest findings on the extent and impact of plastic pollution in the Arctic and Sub-Arctic regions. The symposium includes panel discussions with experts from academia, government, and non-profit organizations, and covers topics from the impacts of marine litter in the Arctic to Arctic challenges and solutions for improved waste management.

Webinar: Chemical Recycling: A Dangerous Deception

November 28 (7 PM ET), virtual

Learn more about the findings of the report from the NGO Beyond Plastics, “Chemical Recycling: A Dangerous Deception,” with report author Lee Bell of International Pollutants Elimination Network and report contributors Judith Enck and Jennifer Congdon of Beyond Plastics.

Save the dates for future months...

Virtual Grassroots Organizing Training

December 2-7 (choose two out of four 2-hour sessions), virtual

Beyond Plastics is hosting a free grassroots organizing training on strategies to help end plastic pollution and engage communities. The training is divided into two 2-hour sessions, and each session is offered twice to allow flexibility with schedules. The trainings cover: Plastics 101, how ordinary people can make legislative change, essential media skills, grassroots organizing skills, community education and more. Spanish translation is also available.

Mid-Atlantic Marine Debris Summit

December 6-7, Ocean City, Maryland

The Mid-Atlantic Regional Council on the Ocean is hosting the 2023 Mid-Atlantic Marine Debris Summit to bring together state and federal agencies, Tribes, non-profit organizations, academia and other groups from the mid-Atlantic working on marine debris. The two-day summit will feature talks, poster sessions, and networking opportunities. The summit is free to attend and open to the public. There are limited travel assistance funds available for speakers, students and Tribal members.

In case you missed it...

Plastic Impacts on Health Throughout the Lifecycle

September 26

The World Wildlife Fund hosted a conversation with Dr. Phil Landrigan, Dr. Adetoun Mustapha, and Dr. Maureen Cropper, who presented on key findings from the Minderoo-Monaco Commission on Plastics and Human Health. Dr. Rachel Shaffer then joined for a discussion about available policy levers.

Endocrine Disruptors in Plastics: State Policy Options

October 3

Beyond Plastics hosted a conversation between New York State Senator Pete Harckham; Pete Myers, Ph.D., of Environmental Health Network; and Megan Wolff, Ph.D., MPH, of Beyond Plastics. The discussion focused on “endocrine disrupting chemicals,” a term coined by Dr. Myers, and how policy can be used to reduce exposure to these chemicals in plastics. Senator Harckham recently introduced legislation for the state of New York that would reduce plastic packaging, strengthen recycling infrastructure and ban many toxic plastic additives.

Webinar: Uniting States Against Plastic Pollution

November 1

This webinar, hosted by Environment America and PIRG, focused on actions taken by states to reduce plastic pollution.

The Microplastics Breakdown

MICROPLASTICS POLICY

Microplastics and Additives in Patients with Preterm Birth: The First Evidence of Their Presence in Both

Human Amniotic Fluid and Placenta

Jan Halfar, Kristina Čabanová, Karel Vávra, Patricie Delongová, Oldřich Motyka, Richard Špaček, Jana Kukutschová, Ondřej Šimětka, Silvie Heviánková

This study investigated the presence of microplastics in amniotic fluid and placenta. Twenty samples of amniotic fluid and placenta from 10 patients recruited from the Department of Obstetrics and Gynaecology, Faculty of Medicine at the University of Ostrava in Switzerland were analyzed via Fourier transform infrared spectroscopy. As described, all of the women who participated in the study, experienced singleton pregnancies, complicated with preterm prelabor rupture of membranes (PPROM) between 24 + 0 and 36 + 6 weeks of gestation. Microplastics or plastics additives were found in nine patients' amniotic fluid, placenta, or both. The number of particles in amniotic fluid ranged from 0 to 8, while in the case of placental samples, the number of particles accounted for 0 to 10. A total of 44 particles of microplastics and polymer additives were identified in all samples. The particle area ranged from 49.5 μm^2 to 46,372.7 μm^2 . Chlorinated Polyethylene (CPE) and Calcium zinc PVC Stabilizer with particle sizes between 10 and 50 μm were the most prevalent. One patient was found to have a higher number of particles in the amniotic fluid than in the placenta. For two of the patients, the number of particles in the amniotic fluid and placenta was the same. In the remaining seven patients, the number of particles in the placenta was always higher than in the amniotic fluid. This finding was interpreted as indicating that the placenta likely acts as a partial barrier against the entry of microplastics into the amniotic fluid and fetus. The overall amount of microplastics and additives in the placental samples was found to have differed from recent studies, which was attributed to the different methodology and analysis of particles. The authors asserted that this study presented the first evidence of microplastics and additives in both human amniotic fluid and placenta samples. They also observed that the mechanisms through which microplastics traverse the placenta and their effects on the human body warrant further investigation. The article also highlighted that there is an unknown possibility of microplastics affecting fetal development during the prenatal period, as well as the potential long-term consequences for population health, which warrants extensive and in-depth research. **Read the full abstract here:**

<https://www.sciencedirect.com/science/article/pii/S0045653523025717>

Nanoplastics Activate a TLR4/p38-mediated Pro-Inflammatory Response in Human Intestinal and Mouse Microglia Cells

Joana Antunes Paula Sobral, Marta Martins, Vasco Branco

Human colon adenocarcinoma cells and mouse microglia cells ([resident cells of the brain that regulate brain development, maintenance of neuronal networks, and injury repair](#)) were exposed to three sizes of polystyrene nanoplastics (NPs): 25 nm, 50 nm, and 100 nm over 24, 48, and 72 hours, with the goal of exploring the cells' inflammatory responses. The study results showed that NPs of different sizes, and in a wide range of concentrations, did not significantly affect the cellular viability of the human colorectal adenocarcinoma cells. However, the viability of mouse microglial cells was observed to be significantly affected by exposure to NPs. This effect was most evident for the smaller NPs (25 and 50 nm), which the authors noted to be consistent with previous research using comparable exposure concentrations. The human colon cells were found to exhibit a notable increase in the quantities of certain proteins (P50 and P38 -- which is activated by stress and plays an important role in immune responses and the regulation of cell survival and differentiation), while the mouse microglia cells demonstrated what was described as a much less pronounced upregulation of the same proteins. An overall increase in the nuclear translocation of P38 was also observed in the mouse cells. NP exposure was associated with an increase in the levels of the protein cytokine interleukin, which is essential in pathogen resistance. The mouse glial cells exhibited substantial increases in iNOS mRNA after exposure to the nanoplastics. This effect was observed to have been entirely prevented by pre-exposure to inhibitors of TLR4 (a kind of toll-like receptor (TLRs), which are membrane proteins and play an important role in recognizing invading pathogens and triggering an immediate immune response) or the P38 protein. The authors observed that their findings underscore the potential of nanoplastics to activate inflammatory pathways, with response kinetics varying depending on the cell type. As described, their findings suggested that TLR4 levels and P50 pathways plays a main role in inflammation, but the authors also noted that inhibiting this pathway did not consistently

reduce pro-inflammatory gene transcription, which they hypothesized implied the involvement of other factors such as P38 in the inflammatory response. **Read the full abstract here:**
<https://www.sciencedirect.com/science/article/pii/S1382668923002405>

MICROPLASTIC POLLUTION REMOVAL AND MITIGATION

Scientists Intrigued by Bacteria That Devour Waste Plastic: Could A Ravenous Bacteria Help Us Tackle Plastic Pollution

Victor Tangermann, Earth & Energy

This online magazine article focused on the work of a team of Japanese scientists who discovered a plastic-eating bacteria called *Ideonella sakaiensis* in 2001 that can break down the carbon in plastic and, since then, had been studying this and other similar organisms. According to this article, the researchers found approaches to manipulating these bacteria to produce enzymes that can break down plastic at a faster rate. The author observed that given the scale of plastic pollution, these enzymes need to work fast and thrive in a wide range of conditions. Other scientists were described as probing existing landfills to find a suitable bacteria that could make a meaningful impact on the global scale of plastic pollution; however, these efforts have been unsuccessful thus far. The author asserted that these research efforts have suffered from being underfunded due to low interest and high costs. **Read the full article here:** <https://futurism.com/the-byte/scientists-intrigued-bacteria-devour-waste-plastic>

Review of Emerging Contaminants in Green Stormwater Infrastructure: Antibiotic Resistance Genes, Microplastics, Tire wear particles, PFAS, and Temperature

Benjamin Bodus, Cassidy O'Malley, Greg Dieter, Charitha Gunawardana, Walter McDonald

This paper explored the use of green stormwater infrastructure (GSI) to control five emerging contaminants: antibiotic resistance genes, microplastics, tire wear particles, PFAS and temperature, with the goal of better understanding how green stormwater infrastructure is impacted by and can be designed to mitigate them. The most common removal process was found to be the filtration of stormwater through the GSI, which can physically remove particulate pollutants. According to the authors, the filtration of microplastics and tire wear particles in GSI is largely dependent on the size of the incoming particulates and the pores in the media that serve to strain the pollutants. Further, the authors observed that, unlike sediment particles, microplastics and tire wear particles have unique shapes, structures and conductivities, which may also affect their ability to bypass filters and infiltrate through GSI media. Sedimentation was found likely to be ineffective in removing microplastics and tire wear particles because they have densities similar to water, which makes them buoyant and less likely to settle in sedimentation reservoirs without a long residence time. The authors asserted the designs of GSI should consider if there are critical settling velocities of these pollutants and residence times in will promote their sedimentation. As described, sorption and other physicochemical processes (e.g., ion exchange and oxidation-reduction reactions) are removal mechanisms with the potential to remove biological and chemical contaminants, such as the chemical compounds leached from plastics. Adsorption and oxidation-reduction reactions were identified as a removal mechanism for some microplastics and tire wear compounds, which can be promoted through soil amendments such as granular activated carbon and biochar. The article asserted that several common biological removal mechanisms (e.g., vegetation within GSI) have the potential to remove emerging contaminants and could be a cheap and efficient way to remove plastic waste biproducts from stormwater. The authors recommended that consideration should be given to each of the contaminants' unique physiochemical properties, environmental conditions and design of GSI. Future research is needed to clarify the mechanisms and relationships between removal processes and contaminant properties in GSI, as well as the potential risk to their concentration and accumulation in GSI systems, which will improve an understanding of how to best use GSI to address emerging contaminants in stormwater runoff. **Read the full abstract here:**
<https://www.sciencedirect.com/science/article/pii/S0048969723058229>

FATE AND TRANSPORT OF MICROPLASTICS

Airborne Hydrophilic Microplastics in Cloud Water at High Altitudes and Their Role in Cloud Formation

Yize Wang, Hiroshi Okochi, Yuto Tani, Hiroshi Hayami, Yukiya Minami, Naoya Katsumi, Masaki Takeuchi, Atsuyuki Sorimachi, Yusuke Fujii, Mizuo Kajino, Kouji Adachi, Yasuhiro Ishihara, Yoko Iwamoto & Yasuhiro Niida

The research team examined the presence of microplastics in the air in study sites in three different geographic locations in Japan: Mt. Fuji, south-eastern foothills of Mt. Fuji (Tarobo) and the summit of Mt. Oyama. The team sampled “cloud water” from mists in these areas and used advanced imaging techniques like attenuated total reflection imaging and micro-Fourier transform infrared spectroscopy (μ FTIR ATR imaging); the researchers determined the presence of microplastics in the cloud water and examined their physical and chemical properties. They identified nine different types of polymers, mostly in the form of fragments, at the three sites and one type of rubber in the airborne microplastics (AMPs) detected ranging from 7.1 to 94.6 micrometers in size. Water loving (hydrophilic) polymers were found in abundant quantities in the cloud water, which suggested to the researchers that these polymers served as “cloud condensation nuclei.” This in turn suggested that AMPs play a key role in rapid cloud formation. The article asserts accumulation of AMPs in the atmosphere, especially in the polar regions, could lead to significant changes in the ecological balance of the planet, resulting in severe loss of biodiversity and potentially altering the overall climate. Read the full abstract here:

<https://link.springer.com/article/10.1007/s10311-023-01626-x>

Microplastics in Urban Road Dust: Sampling, Analysis, Characterization, Pollution Level And Influencing Factors

Cuihe Yang, Siping Niu, Yanrong Xia, Jing Wu

This paper reviews the current knowledge on microplastics (MPs) in road dust, including sampling, analytical and detection methods, contaminant characteristics, influencing factors, pollution sources and ecological risk. Additionally, this paper identified research priorities based on the research gaps that were found. The authors observed that MPs have an extremely high regional variability due to factors such as population, land use type, traffic volume and climate. Overall, based on their review, the microplastic pollution in road dust is thought to be underestimated, especially for very small MPs, due to inefficient detection methods. Considering the significant differences in research methods between studies, the establishment of uniform sampling, analysis and ecological risk assessment methods should be a priority. A variety of sampling tools for MPs were identified: metal/plastic pans, dustpans, wooden brushes, natural bristle brushes, brooms, small shovels, vacuum cleaners and even spoons. Vacuum cleaners were found to be the most efficient for sampling; however, the article noted they are expensive and have the potential for external plastic contamination. Accordingly, the authors asserted that non-plastic tools that are readily available and inexpensive are the most desirable and appropriate, and potential external plastic contamination can be avoided. The article also described the next steps and considerations leading up to the analysis of the samples, for example, the storage of samples and the need to avoid sample contamination—paper bags were identified as a good storage container. The most abundant MPs in road dust were reported to be polyethylene, polypropylene, polyethylene terephthalate and polyvinyl chloride. The most typical form of these MPs was found to be fibers and fragments. The main research recommendations provided by the authors included: (1) the influence of weather conditions on the dispersion of MPs in road dust needs to be clearly explained; (2) the urgent need to establish a standard analytical methods for the identification of MPs in road dust; (3) the potential application of artificial intelligence to characterize the MP pollution, especially for the identification of influencing factors; (4) further studies on the ecological risk of MPs in road dust. **Read the full abstract here:**

<https://www.sciencedirect.com/science/article/pii/S0165993623004351>

Microplastics in Antarctica - A Plastic Legacy in the Antarctic Snow?

Kirstie Jones-Williams, Sebastian Primpke, Tamara Galloway, Emily Rowlands, Matthew Cole, Claire Waluda, Clara Manno

The authors observed that microplastic pollution in remote inland Antarctica is largely unknown. This study explored the presence of plastic in the snow from three remote Antarctic camps; Union Glacier, Schanz Glacier and the South Pole. These three sites varied in size and accessibility, but they shared the same snow accumulation rate, prevailing wind direction and annual precipitation. Twelve samples were taken for analysis: five at Union Glacier, four at Schanz Glacier and three at the South Pole. A control sample was taken from what was described as the most remote location accessible atop an exposed ridge between the Schanz and Driscoll Glacier. This study used automated FTIR imaging, which enabled the researchers to identify microplastics sizes as small as 11 μm . Microplastics were found in all samples, with 95% of the particles measuring less than 50 μm , which the authors asserted indicate that previous microplastic reports in Antarctica may be underestimated due to analytical restrictions. Very little variation was found in polymer composition and concentration across the sample sites; the dominant polymers were polyamide (PA), polyethylene terephthalate (PET), polyethylene (PE) and synthetic rubbers, which the authors attributed as coming from both local (clothing, ropes, flags) and long-range (aerially deposited) sources. Seventy-nine percent of the microplastics identified were particles, and fibers comprised only 21% of the microplastics detected. These results were different from prior study results, which the authors attributed to the difference in microplastic detection techniques. According to the article, the high abundance of microplastics found in this study may have wider climatic and ecological implications and highlights the need for additional work to decipher microplastics influence on snow and ice in these regions. It was also suggested that remote camps in the Arctic should be monitored for microplastic pollution and actions to reduce this footprint should be taken. **Read the full abstract here:** https://assets.researchsquare.com/files/rs-3389603/v1_covered_6231f6ef-85ae-4b41-a64f-adcf7a305d57.pdf?c=1698335746

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