

INTERNATIONAL PLASTIC PELLET COUNT REPORT

2025



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I. Executive Summary

Plastic pellets are the raw building blocks of everyday plastic items — yet their spills go largely untracked and unregulated. This report presents results from the first International Plastic Pellet Count, a global citizen science effort to quantify the extent of this pollution. Between April 27 and May 8, 2025, volunteers from around the world collected **49,256 pellets** at more than **200 sites** across **14 countries, 29 U.S. states, and Washington DC**.

An estimated 445,970¹ metric tons of pre-production plastic pellets, otherwise known as *nurdles* or *pellets*, make their way into oceans annually. Throughout the United States and much of the world, it is not required for pre-production plastic pellet spills to be reported because they are not classified as hazardous material.

Pre-production plastic pellets are often spilled at various points along the plastic supply chain, including during production, storage, and transport, resulting in these tiny pellets slipping through storm drains and into local waterways. Because of their small size, these plastics pose a serious threat — they're difficult to clean up, and present a significant danger to animals and fish that may mistake them for food.

By documenting the prevalence of plastic pellets around the globe, the International Plastic Pellet Count demonstrated the need for governments to better regulate plastic pellet pollution to prevent plastic pellets from making their way into the environment, and to reduce plastic production to safeguard ecosystems and human health around the world.

II. Background on Plastic Pellets and Other Pre-Production Microplastics

Plastic pre-production pellets, commonly referred to as ‘nurdles’, are small cylindrical or spherical plastics typically less than 5 mm in size. They are the raw material used to make familiar plastic products like water bottles, grocery bags, and polystyrene foam takeout containers.

These tiny plastics are frequently spilled, leaked, or dumped into the environment, especially our waterways, during manufacturing and transport. As a result, an estimated 10 trillion² plastic pellets now enter our oceans each year.

Like all forms of microplastics, plastic pellets—classified as primary microplastics—pose a significant threat to wildlife, particularly in aquatic environments. Animals can consume³ plastic pellets, which negatively impact their health and remain in their bodies. Additionally, if an animal eats another that has ingested plastic, the plastic can be passed along in a process known as trophic transfer.



Photo Credit: Hannah Tizedes, The Cleanup Club, Michigan



Photo Credit: Saman Abesiriwardana/Pacific Press/Shutterstock

II. Background on Plastic Pellets and Other Pre-Production Microplastics

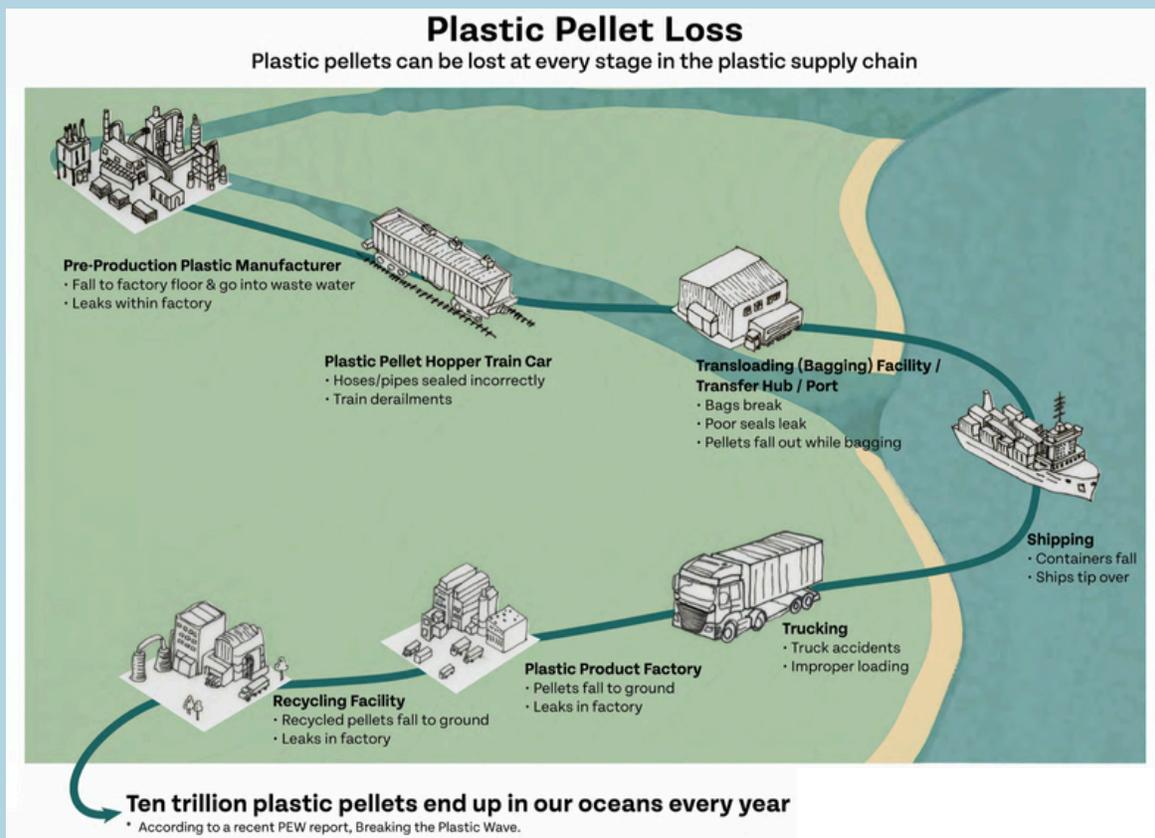
Beyond pellets, other forms of pre-production plastics—such as flakes, powders, and liquids—are also highly problematic. Once released into the environment, these substances are nearly impossible to clean up. This report, however, focuses specifically on plastic pellets, as their uniform shape and size make them easier to identify and collect by hand compared to other forms of pre-production plastic pollution.



Pre-production plastic pellets contain chemicals, such as plasticizers, flame retardants, and UV stabilizers, and they act as “sponges” – they can leach⁴ harmful additives and adsorb environmental pollutants,⁵ like DDT, PCBs,⁶ and mercury.⁷ Studies have shown that when fish consume microplastics, it can lead to negative effects, such as inflammation, immunotoxicity, genotoxicity, and DNA damage. Microplastics can even change the behavioral patterns, swimming, and feeding habits⁸ of fish. In sea urchins, exposure to even a small amount of plastic pellets can cause oxidative stress⁹ and embryo impairment.¹⁰

Plastic pellets are lost throughout the supply chain and can be found in various environments. They are normally found in the highest concentrations near facilities that produce, transport, or use them. Once in the environment, they often enter nearby water bodies.

Some of the hot spots for plastic pellets are near plastic pellet manufacturers, railway lines, facilities that are used as storage during the shipping process, plastic pellet bagging (transloading) facilities, domestic and international ports, recycling facilities, and near plastic production facilities.



Graphic Credit: Kelly Leviker, PIRG

III. International Plastic Pellet Count Methods and Results

PROTOCOLS

Volunteers surveyed local waterways for plastic pellets as part of the International Plastic Pellet Count. Standardized protocols required surveys in 10-minute intervals, with all data logged into [Nurdle Patrol](#) to calculate the total counts. If surveys were conducted in the U.S. on national parks or federal lands, data was also logged into the [TrashBlitz](#) Plastic-Free Parks mobile app.

KEY FINDINGS INCLUDE:



49,256 pellets collected



229 sites surveyed



14 countries



29 U.S. states and Washington, D.C.



1,101 volunteers participated

By conducting a global count en masse, we gain a better understanding of the extent of pre-production plastic pellet pollution. For more information on detailed methods, see the Appendix.

RESULTS

Beyond the removal of almost 50,000 plastic pellets from the environment, the International Plastic Pellet Count helped build awareness of plastic pellet pollution and engaged hundreds of volunteers in an ongoing citizen science effort. Over two-thirds (68.3%) of counts found at least one pellet. Several community scientists reported that despite doing regular beach clean-ups or frequently visiting beaches, they had never observed plastic pellets prior to participating in the 2025 International Plastic Pellet Count.

The event also helped address existing data gaps. Plastic pellet pollution is often most concentrated¹¹ near sites where pellets are manufactured, used, or transported. This pattern was confirmed by a count near a plastic facility in Point Comfort, Texas, where two volunteers from the San Antonio Bay Estuarine Waterkeeper collected 18,348 pellets in just 10 minutes. At the same time, the findings highlight the widespread distribution of plastic pellets across various locations.



Photo Credit: Diane Wilson, San Antonio Bay Estuarine Waterkeeper, Texas

I have been tracking plastic pellets from Formosa Plastics, in Texas since at least 2008. After our lawsuit in 2019, we have been trying to clean up the plastic in the creek where Formosa has 10 stormwater outfalls. The clean-up has been a three-year project with over 3,000 truckloads of pellet debris removed. Sometimes, they have had to excavate 36 inches down to remove impacted pellets in the soil. It will cost \$50 million to complete. This is where I counted 18,000 plus pellets in ten minutes.

DIANE WILSON, SAN ANTONIO BAY ESTUARINE WATERKEEPER, TEXAS

I did not see a nurdle (plastic pellet) until a week ago, when I was planning to do the May 3rd count. I stood still in the wrack line close to the surf. Looked down. Focused. And there was a nurdle. And another!! We found 28 nurdles in two 10 minute counts, and we barely moved.

**DR. NANCY MESSMER, REGIONAL ENVIRONMENT CHAIR,
WASHINGTON STATE, LIONS CLUBS INTERNATIONAL**



Photo Credit: Katie Abare, 5 Gyres Ambassador, South Carolina

People are surprised to find out that industrial plastic pellets are on the shores of Lake Champlain, since it's surrounded by New York's Adirondack mountains and Vermont's farms and orchards. But when you look closer at the basin, there are manufacturers in the watershed that use plastic pellets as a raw material, we just don't talk about them or put them on a tourism brochure. Where these industrial pellets are coming from and how they are getting into Lake Champlain is still being investigated.

JULIE SILVERMAN, LAKE CHAMPLAIN LAKEKEEPER, VERMONT

...to discover how many there are on the beaches I frequent! I will now never not be looking for nurdles.

EMMA HENDERSON, 5 GYRES AMBASSADOR, OHIO

FINDINGS BY REGION

A. UNITED STATES

A total of 42,008 pre-production plastic pellets were logged across 29 states and Washington, DC. Texas sites reported the highest counts by far, with 23,115 pellets – most of which were found along the Texas coast. California (4,167), Michigan (3,681), South Carolina (3,094), and Ohio (2,851) also reported substantial amounts.

A total of 5,408 pellets were documented across sites on federally managed lands, including national parks and national historic districts. Notable sites included 3,070 pellets at Charleston Historic District, 824 in the Tongass National Forest, 402 at Plattsburgh Bay (Cumberland Bay) National Historical Landmark, 390 at Padre Island National Seashore, and 387 at Golden Gate National Recreation Area.

The notably high counts in states bordering the Great Lakes, navigable rivers, and oceans highlight the widespread movement of pre-production pellets through water systems and the threat they pose to aquatic ecosystems.

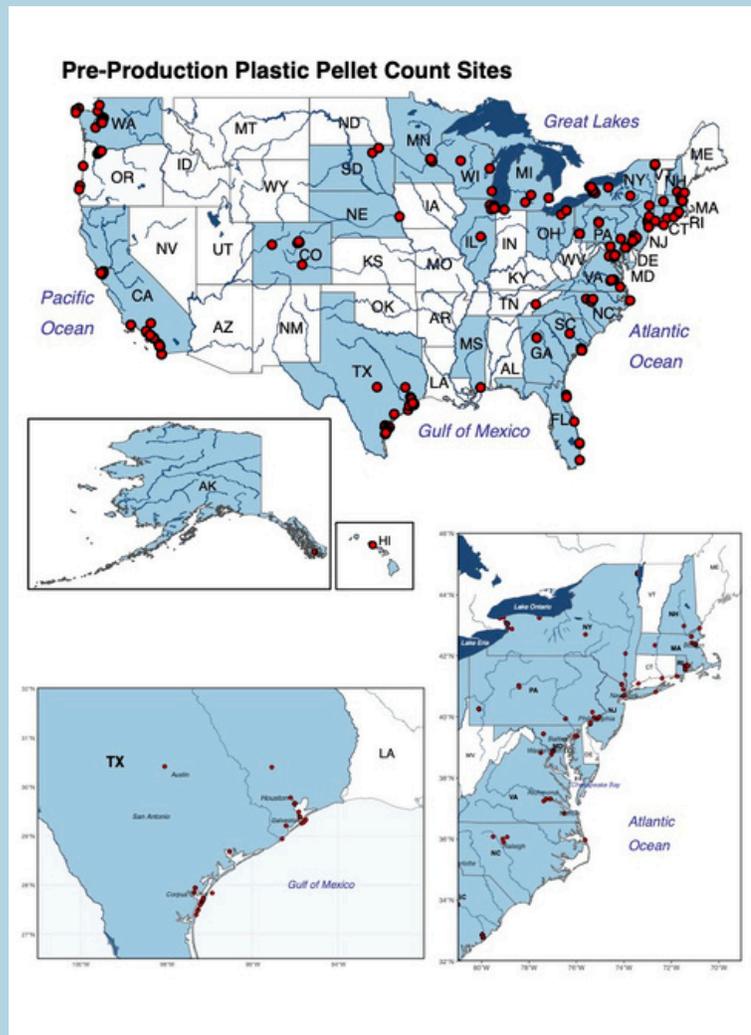


Figure 2 presents a map of the United States showing where 41,960 pre-production plastic pellets were logged across 29 States and Washington DC. Blue shading indicates states where counts occurred, and red dots represent individual count sites.

FINDINGS BY REGION

A. UNITED STATES

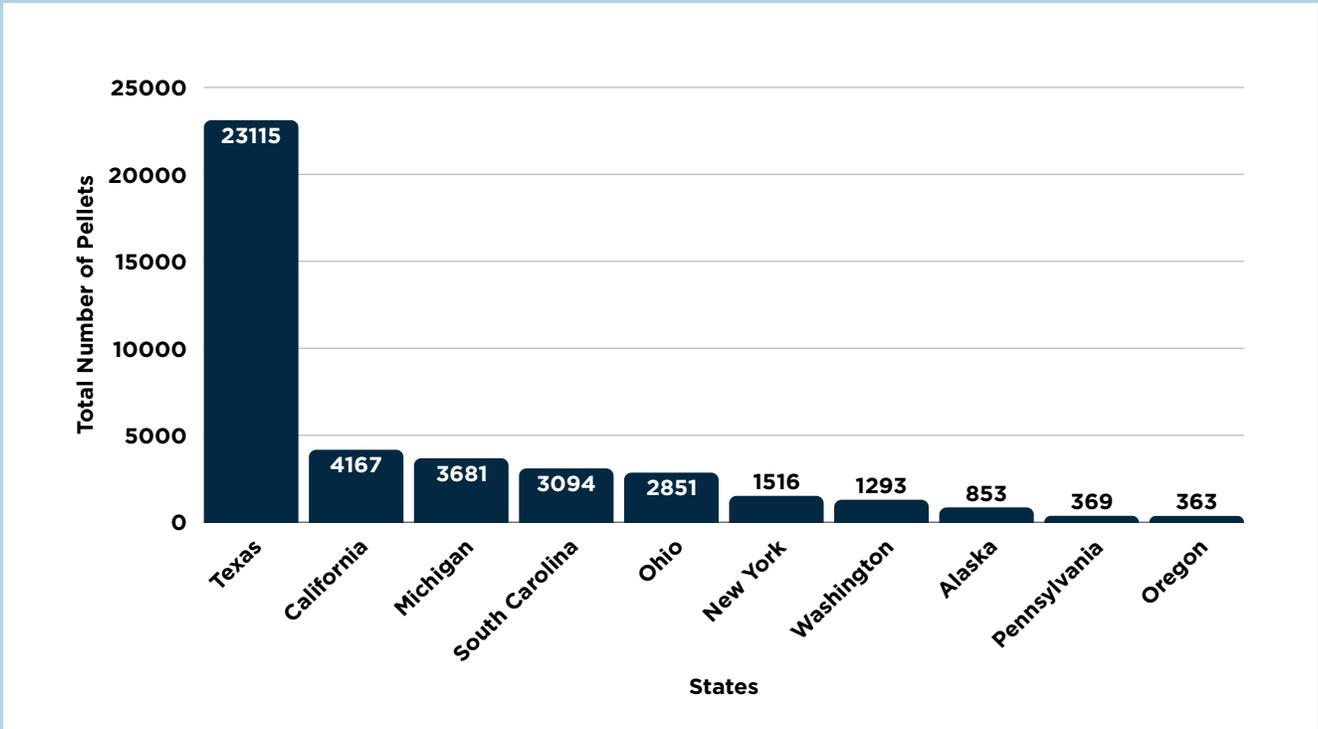


Figure 3 demonstrates the total number of pre-production plastic pellets recorded in the top 10 states by overall pellet count.



Photo Credit: Jenn Margaret, The Cleanup Club, Michigan

FINDINGS BY REGION

B. GLOBAL FINDINGS

Internationally, sites in Australia reported the highest number of pre-production plastic pellets with 5,467 counted, followed by Canada with 1,266. Several other countries, including South Africa (165), Hong Kong (147), and Mexico (131), also reported notable counts. These findings illustrate that pellet pollution is not confined to one region, but is a global issue affecting diverse coastlines and waterways. The presence of pellets across multiple continents underscores the need for international collaboration in addressing plastic pollution at its source.

Pre-Production Plastic Pellet Count Sites

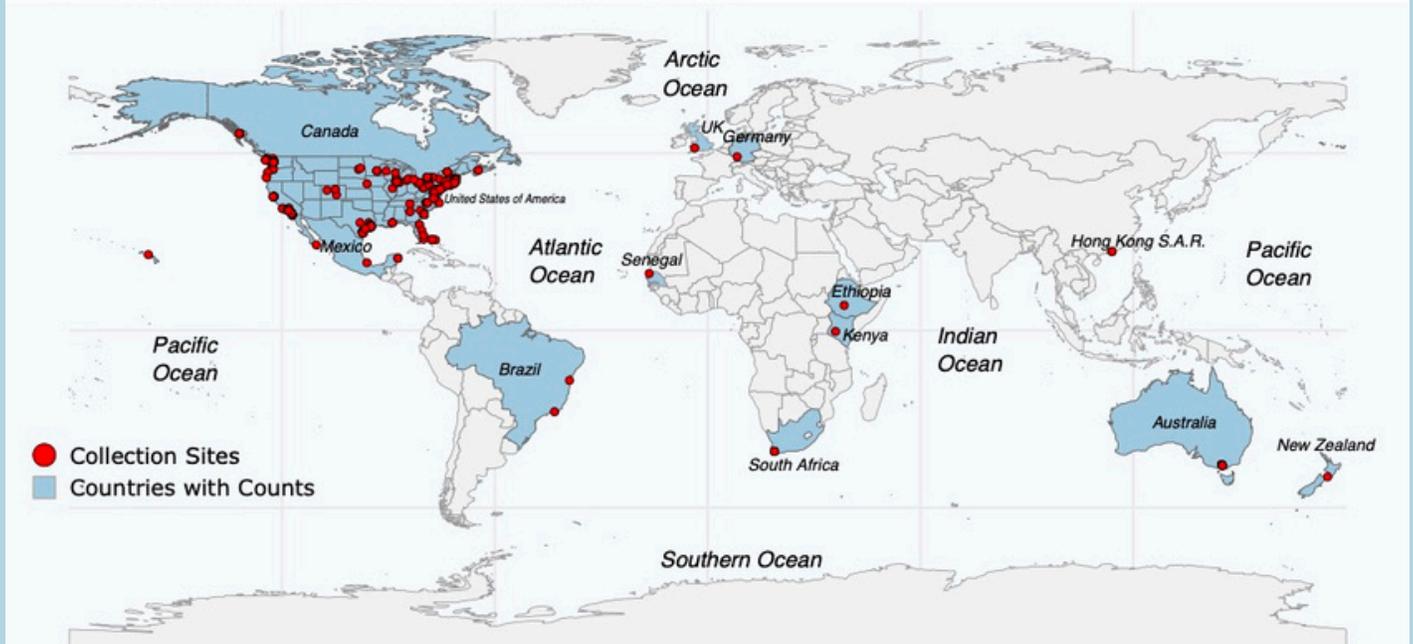


Figure 4 presents a world map showing where pre-production plastic pellet counts were held. Blue shading indicates countries where counts occurred, and red dots represent individual count sites.

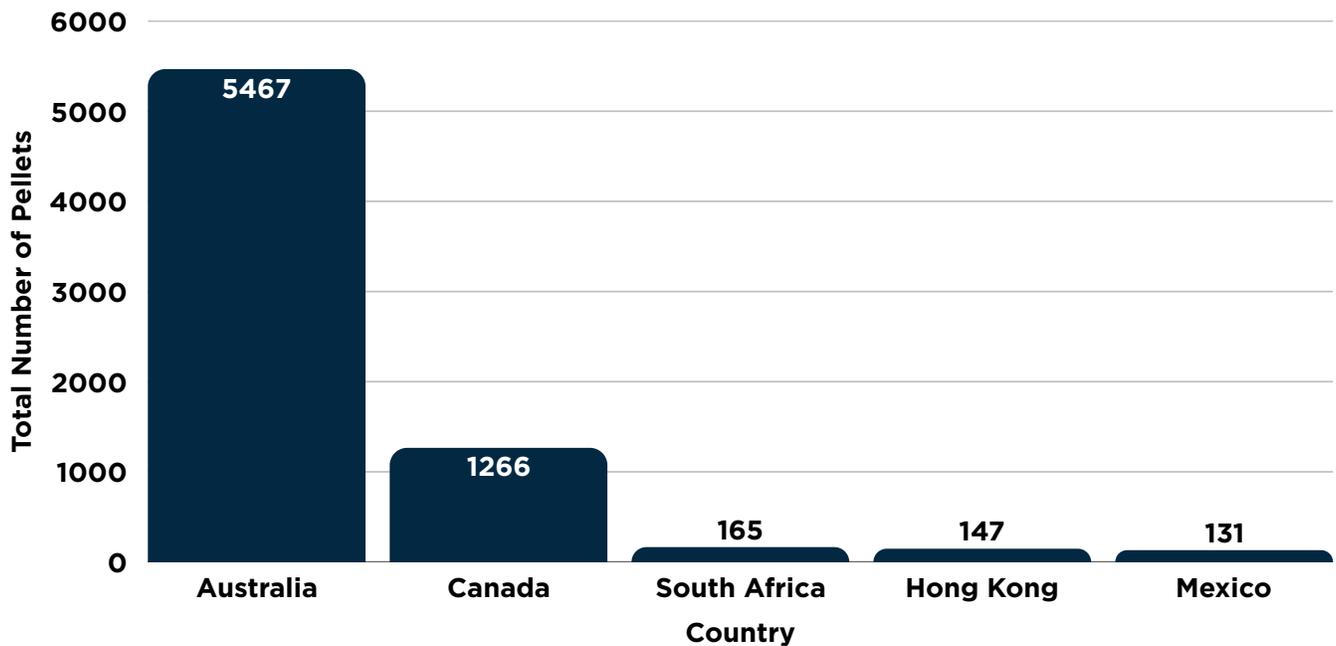


Figure 5 demonstrates the total number of pre-production plastic pellets recorded in the top 5 countries (excluding the U.S.) by overall pellet count.

Il ya beaucoup de raisons pour mon intérêt à \mener la lutte contre les déchets plastiques. Le plastique est néfaste à l'environnement. Il agit comme une barrière, empêchant l'eau de s'infiltrer correctement dans le sol, ce qui peut gravement affecter l'agriculture en réduisant la disponibilité en eau pour les plantes voir les rendements. Une fois transporté par le vent, il contribue à la pollution de l'air, surtout lorsque ces particules finissent par être inhalées par les humains et les animaux.

There are many reasons for my interest in leading the fight against plastic waste. Plastic is harmful to the environment. It acts as a barrier, preventing water from properly infiltrating the soil, which can seriously impact agriculture by reducing water availability for plants and even yields. Once carried by the wind, it contributes to air pollution, especially when these particles end up being inhaled by humans and animals.

ROKHAYA NIANG, EXECUTIVE DIRECTOR OF SENEGAL RIVER WATERKEEPER, SENEGAL

IV. Policy Recommendations

Our lands and waters should be free from microplastics, including plastic pellets which harm wildlife and human health. Governments around the world need to better regulate pellets to stop this harmful pollution and protect our waterways. Policy solutions to stop the spread of plastic pellets have been proposed globally. Measures like the [Plastic Pellet Free Waters Act](#), which aims to curb pre-production plastic pellet pollution, and the [Break Free From Plastic Pollution Act](#), which addresses the full plastic lifecycle, are important legislative efforts in the U.S. Additionally, rules under consideration by the European Union to prevent pre-production plastic pellet loss, along with the [Global Plastics Treaty](#) being negotiated by the United Nations, are essential to addressing plastic pellet pollution globally.

This section outlines key policy solutions and advocacy tools that communities can use to take action.

I'm so excited to work on plastic pellets because this is an issue where we can directly work on holding producers responsible.

CAPTAIN EVAN CLARK, THREE RIVERS WATERKEEPER, PENNSYLVANIA



Photo Credit: Captain Evan Clark, Three Rivers Waterkeeper, Pennsylvania

A. LOCAL ORDINANCE (U.S.)

a. Localities are already taking action to reduce plastic pollution. From banning plastic bags to prohibiting polystyrene food containers, municipal measures demonstrate how local leaders can help to cut plastic waste and serve as models for other communities working to protect water quality. Although there are no ordinances passed in local municipalities on pre-production plastic pellets around the U.S., other plastics regulations demonstrate that they can be powerful tools. The following example below could serve as a blueprint for a model ordinance.

[City/County Name] Plastic Pellet Discharge Prevention Ordinance]

Section 1. Title

This ordinance shall be known as the “Plastic Pellet Discharge Prevention Ordinance of [Year].”

Section 2. Purpose

The purpose of this ordinance is to eliminate the discharge of plastic pellets—also known as nurdles—into the environment from industrial, packaging, and transport operations within [City/County Name]. These pellets are a leading source of microplastic pollution and pose a severe threat to local waterways, wildlife, and public health. This ordinance ensures full containment of pellets throughout their lifecycle within local jurisdiction.

Section 3. Definitions

- Pre-Production Plastic Pellet (Nurdle): A small, round, cylindrical, or disc-shaped plastic resin used as raw material in plastic manufacturing.
- Discharge: Any spill, leak, emission, or release—intentional or accidental—of plastic pellets into the environment, including, without limitation, into air, land (including natural and manmade surfaces), storm drains, surface waters, or wastewater systems.
- Facility: Any entity engaged in the production, processing, packaging, storage, handling, or transportation of plastic pellets.
- Containment Systems: Physical or operational measures designed to prevent plastic pellets from escaping the facility, including barriers, filters, vacuum systems, sealed transfer mechanisms, and secondary containment for outdoor storage areas.
- Stormwater System: Any publicly or privately owned facility used for collecting or conveying stormwater, including catch basins, gutters, storm drains, and outfalls.

Section 4. Prohibited Conduct

It is unlawful for any facility or operator to:

- Discharge plastic pellets into air, land (including natural and manmade surfaces), storm drains, surface waters, or wastewater systems;
- Allow pellet loss from operational areas, including loading docks, outdoor storage zones, and transport routes;
- Conduct pellet handling activities without appropriate containment, transfer equipment, and cleanup protocols.

Section 5. Required Preventive Measures

Facilities Must:

- Install sealed loading and transfer equipment to prevent pellet spillage during transfers;
- Implement pellet containment infrastructure, such as catch trays, vacuum systems, perimeter barriers, and screen filters on stormwater drains;
- Maintain and document routine pellet cleanup procedures, including daily sweepings and visual inspections;
- Provide staff training on pellet management and spill response;
- Submit a Pellet Discharge Prevention Plan to [appropriate city agency] within 90 days of ordinance enactment and update it annually.

Section 6. Permit Conditions and Inspections

Facilities Must:

- All local industrial stormwater or wastewater permits issued to facilities that handle plastic pellets must include pellet discharge prevention requirements consistent with this ordinance.
- The [City Environmental Services Division / Department of Public Works] shall inspect such facilities no less than once annually and may conduct unannounced inspections in response to complaints or observed violations.

Section 7. Enforcement and Penalties

- A facility found in violation of this ordinance is subject to civil penalties of up to \$X per day per incident.
- Repeat or willful violations may result in:
 - Suspension or revocation of permits;
 - Mandatory corrective action plans;
 - Cost recovery for public cleanup efforts.
- All penalties collected shall be used to fund local plastic pollution prevention and enforcement programs.

Section 8. Relationship to Other Laws

This ordinance shall not limit or preempt stricter regulations under state or federal law, including the Clean Water Act. Where state or federal discharge standards for plastic pellets exist, this ordinance shall be interpreted to enhance or enforce them locally.

Section 9. Severability

If any provision of this ordinance is found to be invalid, the remainder shall remain in effect.

B. UNITED STATES

California is the only state in the United States that has passed a law regarding the handling of pre-production plastic pellets. [California Assembly Bill No. 258](#) requires the California State Water Resources Control Board and the California Regional Water Quality Control Boards to implement a program to control the discharges of pre-production plastics, defined as plastic resin pellets and powdered coloring for plastics, from point and nonpoint sources.

In January 2025, [HB 2178](#) was introduced in Virginia. This bill would have mandated that the Department of Environmental Quality establish a program to ensure zero discharge of pre-production plastics into the environment. It importantly addressed all pre-production plastics, including plastic pellets, flakes, powders, fibers, and powdered coloring for plastics, and it specified 'zero discharge.' This is critical as not all pre-production plastic is categorized as a pellet, and this approach would better protect the environment. At the time of this report's publication, the bill has not been passed.

Several other states, including [Texas](#), [South Carolina](#), and [Illinois](#) have introduced bills to restrict the dumping or spilling of pre-production plastic pellets.

U.S. Congress

Two important bills introduced in prior Congresses have highlighted potential policy solutions to reduce pollution from pre-production plastic pellets. [The Plastic Pellet Free Waters Act](#) would direct the EPA to issue a final rule that prohibits certain discharges of plastic pellets and other pre-production plastic into waters of the United States. [The Break Free From Plastic Act](#) would require new safeguards against single-use plastics, strengthen plastic production facilities accountability, prevent packaging pollution from entering waterways and food chains, and limit the export of plastic waste internationally. When reintroduced, these bills would offer clear and practical ways to protect U.S. Americans from pre-production microplastic pollution.

In addition to these bills, the Environmental Protection Agency (EPA) could also play a critical role by strengthening and enforcing regulations that address plastic pellet pollution at its source through the Clean Water Act.

C. GLOBAL

European Union Regulations

The Council and European Parliament are taking action to regulate the loss of pre-production plastic pellets. Their proposed framework would create obligations and procedures for when pellets are lost, and require installations that handle pellets to have a risk management plan. Additionally, the proposed framework sets obligations for the transport of pellets by sea in freight containers, which ensure good quality packaging and provide transport and cargo-related information. This is essential since 38% of pellets spilled in the European Union in 2022 were transported by maritime means.

While the proposed regulations act as a significant step forward, certain exemptions may limit their effectiveness. Notably, companies handling fewer than 1,000 tonnes of pellets annually are excluded from many of the framework's requirements. Addressing these loopholes is essential to ensure mitigation of pellet pollution across all sources.

Global Plastics Treaty

Despite the world's worsening plastic pollution crisis, world leaders failed to reach consensus on a legally binding global plastics treaty during the fifth round of the Intergovernmental Negotiating Committee (INC-5.2). While a finalized agreement remains out of reach, it would serve as a critical instrument for addressing plastic pollution on a global scale. We support the adoption of a treaty that includes provisions to curb the spread of pre-production plastic pellets, including reducing plastic production at the source, ensuring transparent reporting, establishing binding rules across the plastic lifecycle, and providing funding for implementation.



Photo Credit: UNEP / Bingying Liu | Busan, Korea at INC-5 for a Global Plastics Treaty

V. Citizen Science

Without the efforts of volunteers and community partners, it would be difficult to determine the true extent of plastic pellet pollution. Projects via [TrashBlitz](#), [Nurdle Patrol](#) and [Fidra](#) help close critical information gaps through citizen science. This approach supports monitoring, identifies problems early, and, when integrated into state or national programs, improves coverage and response. Participation in the International Plastic Pellet Count provides valuable local insight and enables individuals to advocate for global regulation of plastic pellets.

Working to document the prevalence of nurdles helps us teach people how even the building blocks of plastic products can pollute our local beaches and rivers. Through educating the public of the impact of plastic pollution from the very beginning, we hope to inspire long-lasting changes in how we use and refuse plastic items.

CAPTAIN SILAS TANNER, MATANZAS RIVERKEEPER, FLORIDA



Photo Credit: Katie Abare, 5 Gyres Ambassador, South Carolina

VI. Acknowledgements

A. Organizing Groups:

Charleston Chapter of Surfrider Foundation, Environment America, PIRG, The 5 Gyres Institute, Waterkeeper Alliance, Harte Research Institute

B. Other Contributors:

Nurdle Patrol, Fidra

D. Reviewers:

Fidra, Frontier Group

E. Thank you to all the individuals who participated in the International Plastic Pellet Count as well as all the local groups who participated, including:

A Cleaner Alki, A Greener Future, Adventure Aquarium, Anacostia Riverkeeper, Beyond Plastic, Blackcess CBO, Buffalo-Niagara Waterkeeper, CALPIRG, Charleston Waterkeeper, Citizens Concerned about Plastic Pollution, CMDR, College of Charleston, Congaree Riverkeeper, Conservation Law Foundation/Lake Champlain Lakekeeper Program, COPIRG, EcoBahia, Environment Georgia, Environment Illinois, Environment Massachusetts, Environment Minnesota, Environment New Jersey, Environment Oregon, Environment Rhode Island, Environment Virginia, Exeter Area General, Federation of Women's Clubs, Flour Bluff High School, Functional Distro, Galveston Bay Area Chapter - Texas Master Naturalist, Galveston Bay Foundation, Golden Gate Bird Alliance, Helderberg Ocean Awareness Movement, James River Association - James Riverkeeper, Kalamazoo Valley Trout Unlimited, Lions Clubs International, Los Angeles Waterkeeper, MASSPIRG, Matanzas Riverkeeper, Mt. Lebanon High School, Northeast Ohio Chapter of Beyond Plastics, Nova Scotia Beach Garbage Awareness, Nueces Delta Preserve, Nurdle Patrol BCS, Oak Valley Middle School, Ocean Conservancy, One Omaha, Oxford Academy, Patient & Planet, PennEnvironment, Plastic Free Seas, Port Phillip EcoCentre - Port Phillip Baykeeper, Proyecto Fronterizo de Educación Ambiental A.C, Puget Soundkeeper Alliance, Ralph Williams and MILA Elementary Schools (BPS), RAPP, San Antonio Bay Estuarine Waterkeeper, Sassafras Riverkeeper, Save the Bay - Narragansett Baykeeper, Senegal River Waterkeeper, Shoreline Education for Awareness (SEA), South Carolina Coastal Conservation League, South Slough National Estuarine Research Reserve, Spaces Landscape Architecture, St. Norbert College, Sunset Coop Nursery School, SUNY Delhi, Surfrider Foundation, Talkin' Birds Radio Show/Podcast, Texas Marine Mammal Stranding Network, The Cleanup Club, The Fund, Third Act Ohio, Tree Academy, Tualatin Riverkeepers, Turtle Island Restoration Network, TVT, Twin Lakes Association, Universidad Veracruzana, and WashPIRG

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IX. Appendix

To access the complete dataset for the report by counts, standardized amounts, and location, please refer to the link below or scan the QR code.

www.5gyres.org/s/2025-international-plastic-pellet-count-dataset.pdf



Photo Credit: Victoria Quill, Save The Bay, Rhode Island