Microplastic in Illinois

A survey of rivers, lakes, and streams in the Land of Lincoln.

ENVIRONMENT ILLINOIS
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The views expressed in this report are those of the authors. Participation in this project does not mean an endorsement of the views expressed therein.

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Executive Summary

PLASTIC IS EVERYWHERE. WE USE plastic products for packaging, food service, and health care; plastic makes up clothes we wear, personal care products we use, and toys that our kids play with. All told, Americans generate over 35 million tons of plastic waste every year.[1] To put it another way, the U.S. throws out enough plastic every 16 hours to fill the Dallas Cowboys stadium, and that amount is increasing.[2]

Illinois is no exception. Take our largest freshwater system, the Great Lakes. A 2016 study by the Rochester Institute of Technology found that around 22 million pounds of plastic enter the Great Lakes every year, and half of that enters Lake Michigan alone.[3] We see this trash most visibly as litter. A citizen science report from Alliance for the Great Lakes that used 20 years of data collected by Adopt-a-Beach volunteers on all five Great Lakes found that 86 percent of litter collected on Great Lakes beaches is composed either partially or fully of plastic.[4] Overall, plastic pieces were the top litter item collected from 2014–2023.[4]

But litter alone doesn't capture the full scope of plastic pollution. Research suggests that we could be not counting large amounts of the plastic that makes its way into the environment.[5] That's because plastic doesn't degrade in the environment like an apple or a piece of paper; instead, it breaks into smaller and smaller pieces of plastic called microplastics. Microplastic is plastic less than 5mm in length, or smaller than a grain of rice.[6] This plastic has been found in the deepest depths of the ocean and on the highest mountains in the world.[7,8]

With microplastic becoming a growing area of concern, especially to our health and our environment, we wanted to better understand the problem here at home. That's why Environment Illinois Research & Education Center sampled over 30 freshwater sites along a variety of rivers, lakes, and streams across the state of Illinois.

We found microplastics at 100% of the sites analyzed.

Emily Kowalski collecting a water sample from Lake Michigan.; Zion, IL

Our project collected samples of waterways in November and December of 2025 and tested them for four types of microplastic pollution:

1. Fibers: primarily from clothing and textiles
2. Fragments: primarily from harder plastics products or plastic pellets
3. Film: primarily from bags and flexible plastic packaging
4. Beads: primarily from facial scrubs and other cosmetic products.

The results found were troubling. Of the 31 sites analyzed, 31 (100%) contained one or more type of microplastic:

- **100% of sites sampled had microfibers;**
- **77% of sites sampled had microfragments;**
- **52% of sites sampled had microfilms;**
- **And microbeads were not found at any site.**

The waterways sampled stretched from Lake Michigan to the northeast to the Mississippi River to the southwest. Our sites included freshwater in protected state parks, in forest preserves, near campsites, and in rivers running through towns and the city of Chicago. While many of the waterways sampled had little to no visual litter at the point of access, our survey found that plastic is a nearly invisible constant in Illinois waters.

Kayak on Heron Pond, Vienna, IL

In order to address the environmental crisis being caused by plastics, our leaders at the federal, state, and local levels should implement the following policies:

1. **Municipalities and the Illinois General Assembly should pass bans and other restrictions on hard-to-recycle single-use plastics, such as polystyrene foam foodware, bags, bottles, straws, and utensils.**
2. **The Illinois General Assembly and Congress should pass legislation that closes loopholes for plastic pellet pollution under the Clean Water Act and establish a zero-discharge policy for plastic pellets.**
3. **State and national policymakers should oppose measures that double down on the fossil fuel-to-plastic or plastic-to-fuel pipeline and that incentivize the creation of new plastic.**
4. **State and local governments should pass laws preventing overstock clothing from being sent to landfills so that clothing manufacturers and retailers stop producing more clothing than we could ever need.**
5. **The Illinois General Assembly should establish producer responsibility policies that make manufacturers responsible for dealing with the waste that their products become.**
6. **Illinois should require filters on all new washing machines to prevent microplastic contamination.**
7. **Cities should develop green infrastructure and stormwater programs to help stem the tide of plastics and microplastics being washed into our waterways and surrounding environment.**

Introduction

EVERY DAY, AMERICANS THOW away huge amounts of plastic: single-use packaging, cutlery, containers, bags, and more.[9] This plastic waste is all around us. You see it in the food wrappers and bottles littering city streets, packaging from online orders piling up in our homes, and plastic bags that float through the wind and get caught on trees. Even if disposed of in a trash can, too much of this plastic waste ends up in our environment, polluting our parks, rivers, and lakes.

Plastic litter in a park, Chicago, IL

Once plastic is lost in our environment, it does not biodegrade. Instead, it breaks into smaller and smaller pieces known as microplastics.[10]

Microplastics don't enter the environment from just one source. Plastic food packaging, plastic bags and other plastic littered on roads, in streams, or in parks can release microplastics. Plastic pellets, also known as nurdles, are the raw plastic feedstock that is used to make new plastic items, and are lost by the trillions every year during the plastic manufacturing process if they are dumped or spilled in factories or during transport.[11] Synthetic materials in car tires release microplastics onto roads that are swept into stormwater infrastructure.[12] Clothing and other textiles are also a major source of microplastics. Fibers are one of the most commonly found types of microplastic and they come from synthetic and hybrid materials like fleece.[13] Normal wear and tear will release microplastics into the air, and cleaning these textiles in a washing machine releases millions of microfibers into wastewater infrastructure that treatment plants are unable to fully filter out.[14]

The small size of microplastics makes it easy for them to be blown or swept away, deposited in the environment far from their source.[15] Microscopic plastic can also move between Illinois' interconnected watersheds, contaminating connected river systems like the Chicago, Mississippi, and Illinois Rivers. Plastic disposed of in landfills can also release microplastics which can then find their way to the environment.[16] This means that even if every piece of plastic made it safely to the garbage can or landfill, plastic may still end up contaminating waterways.

Once in the environment, microplastic pollution poses a real threat. For a bird or fish, it's easy to mistake microplastics for food – and there is no shortage of colorful pieces of plastic floating through our waterways. This is a serious physical hazard; these plastics can cause suffocation and gut blockage, and animals that ingest too much plastic can starve.[17] A 2022 study found microplastic in the digestive tract of 85% of fish examined from three Lake Michigan tributaries.[18] These microplastic particles began appearing in these high concentrations in fish only after plastic manufacturing became industrialized in the 1950s.[19] Scientists have found that ingesting even tiny particles of plastic can alter the behavior and metabolism of fish – and people can ingest these pollutants as they make their way up the food chain.[20]

Small pieces of plastic litter collected during a beach cleanup. Plastic litter in our environment can break down into smaller microplastics.

A growing area of concern regarding our plastic waste is the environmental and public health threat posed by these microplastics. Microplastics attract pollutants that may already exist in the environment at trace levels, accumulating toxins like DDT & PCBs and delivering them to the wildlife that eat them.[21] Microplastic has been found in human blood and even the lungs of living patients.[22] Not enough is known about the full effects of microplastics in humans, but chemicals related to plastic can cause endocrine disruption, hormonal effects, and reproductive disorders.[23]

Prior Research

This report builds on previous research done by our partners in Montana, Pennsylvania, Oregon, Colorado, Alaska, and most recently Minnesota. Previous surveys analyzed water samples from dozens of freshwater sites in those states and found comparative findings. Below is a summary of their results.

When taken together, these findings point to a consistent, concerning pattern of microplastic contamination in waters across the United States, with microfibers appearing to be an especially ubiquitous contaminant.

Table 1: Prior Research

State	Year	Number of sites	% of sites with plastic present	% of sites with microfibers	% of sites with microfragments	% of sites with microfilms	% of sites with microbeads
Montana	2019	50	66%	42%	50%	18%	0%
Pennsylvania	2021	53	100%	100%	87%	94%	2%
Oregon	2021	30	100%	100%	20%	3%	0%
Pennsylvania	2022	50	100%	100%	84%	84%	2%
Colorado	2023	16	100%	100%	75%	88%	0%
Alaska	2024	39	100%	100%	20.5%	33.3%	0%
Minnesota	2025	40	100%	100%	25%	12.5%	0%

A Widespread Problem

This Illinois-centered survey contributes to a growing field of data that shows microplastic contamination across our planet. Scientists are still documenting the extent of plastic pollution and investigating its specific effects on freshwater ecosystems and on human health, but there is no question that plastic is being found everywhere. Here are a few findings that show how pervasive the plastic problem has become:

- Microplastics have been found in global and domestic samples of tap water, sea salt, and beer,[24]
- Microplastics have been found in a study of some of the most popular bottled water brands across several countries that point to contamination from packaging and manufacturing,[25]
- U.S. Geological Survey (USGS) researchers found microplastic in 90% of rainwater samples collected from sites in Rocky Mountain National Park and the Denver-Boulder urban corridor,[26]
- Researchers from Utah State and Cornell University found that microplastics are taken up by the air and carried around the globe through atmospheric currents,[27]
- Plastic pollution has now been found in isolated marine environments in the Arctic and Antarctic,[28]
- Research from the Chinese Academy of Sciences has shown that microplastics in the soil can be taken up by the roots of wheat and lettuce crops and transferred to the edible portions of those plants,[29]
- Recent studies from Utah State University and the University of Strathclyde among others have found high concentrations of microplastics in fog, dust, and sea spray,[30]
- In Oregon, a recent study from Portland State University found microplastics in the stomachs of oysters and razor clams off the Oregon Coast. In fact, only two out of the nearly 300 mollusks tested were found to be plastic-free,[31]
- Microplastic pollution has been recorded at the highest elevation on Earth, Mt Everest, and the lowest, the Marianas Trench at the very bottom of the Pacific Ocean,[32,33] and
- Microplastics have been found in human placentas.[34]

Illinois River, Morris, IL

Methodology

Survey Sites

THE GOAL OF THIS SURVEY WAS TO examine the presence and type of microplastics in waterways throughout Illinois. Our survey sites were selected to represent a wide variety of geographies, levels of urbanization and recreation, and ecological importance. The 31 survey sites included rivers, lakes, streams, and ponds, many of which are well-known regional waterways:

- Lake Michigan supplies drinking water to over 6 million Illinoisans and is an important cultural and recreational resource.[35]
- The Chicago River, which runs through downtown Chicago, has been heavily altered and its natural flow has been reversed.[36]
- The Mississippi River is both a historic and current shipping route.
- The Illinois River flows entirely within the state for 332 miles, the second longest river in the state after the Mississippi.[37]
- The Cache River is a part one of the largest and most complex wetland ecosystems in Illinois.[38]

Sam Klein (left) collects samples with Tony Gerard (right) of Friends of the Cache River collecting water samples, Olmsted, IL

A full map of sampling sites, along with pictures, descriptions, and locations of nearby plastic industry factories, can be found on our website at: www.EnvironmentIllinoisCenter.org

Sampling

For water sampling and processing, we used the Microplastics: Sampling and Processing Guidebook protocol developed by the National Oceanic and Atmospheric Administration (NOAA), Mississippi State

Six jars of sample water taken from Skokie Lagoons, Glencoe, IL

University Extension, Dauphin Island Sea Lab, and Sea Grant.[39] To aid in the identification of microplastics, we also used the Guide to Microplastic Identification by the Marine & Environmental Research Institute (now Shaw Institute).[40]

Water samples were collected from the 31 sites in six glass quart jars during November 2025 and December 2025. Jars were sealed during storage, transport, and before sampling. At each site before collecting samples, jars and their lids were triple-rinsed with the source water. All samples were collected by Environment Illinois Research & Education Center staff and trained volunteers. To fill the jars, samplers walked to a water access point with a water depth of approximately two feet (where possible), and drew water samples from this point to avoid collecting sediment. For sites with no access to a depth of two feet, samples were taken at the deepest accessible depth. When taking samples from moving water, samplers sampled upstream from themselves to minimize the potential for contamination. Samplers were instructed to avoid wearing fleece and other synthetic clothing materials to minimize the risk of contamination by clothing fibers.

Six quarts were drawn at each site. All jars were labeled with the site name, date, and name of the sampler. Additional information such as sampling geocoordinates and weather conditions were recorded in a field data sheet. After sampling, jars were transported to the analysis site, where they were stored at room temperature away from direct sunlight.

Analysis

All samples were analyzed at the Environment Illinois Research & Education Center's office in downtown Chicago. Samples were processed using a filter flask and motorized pump to pass water through 47 mm diameter, 0.45 µm gridded membrane filters. Each 1-quart sample was filtered through its own membrane filter. The filter was then transferred to a petri dish for visual inspection under a dissecting microscope at 40x magnification. Lab materials–including the filter funnel, petri dishes, forceps, and tweezers–were rinsed and thoroughly cleaned between samples to minimize potential contamination from any outside sources. Covers were placed over the filters to reduce potential cross-contamination.

To aid in visual identification, additional "squeeze tests" were performed on any potential microplastic pieces. The squeeze test refers to the use of fine-tipped tweezers or forceps to apply pressure and test durability. Any pieces that could not be positively identified as plastic through both a visual and squeeze test were not recorded.

Identified microplastics were categorized into four types:

1. Fibers from synthetic fabrics and filaments, such as fleece, fishing line and bailing twine;
2. Fragments from rigid plastics, including polystyrene and clear plastic containers;
3. Film from plastic bags and food wrappers; and
4. Microbeads from older cosmetics and personal care products.

Total counts for each type of microplastic in individual samples from each site were recorded in a data table along with the date the sample was drawn, the name of the sampler, and the name of the person performing analysis. For our full dataset, see Appendix 1.

Sam Klein analyzing a water sample for microplastics using a dissecting microscope.

Hannah Rudnicke (left) and Sam Klein (right) processing and analyzing water samples.

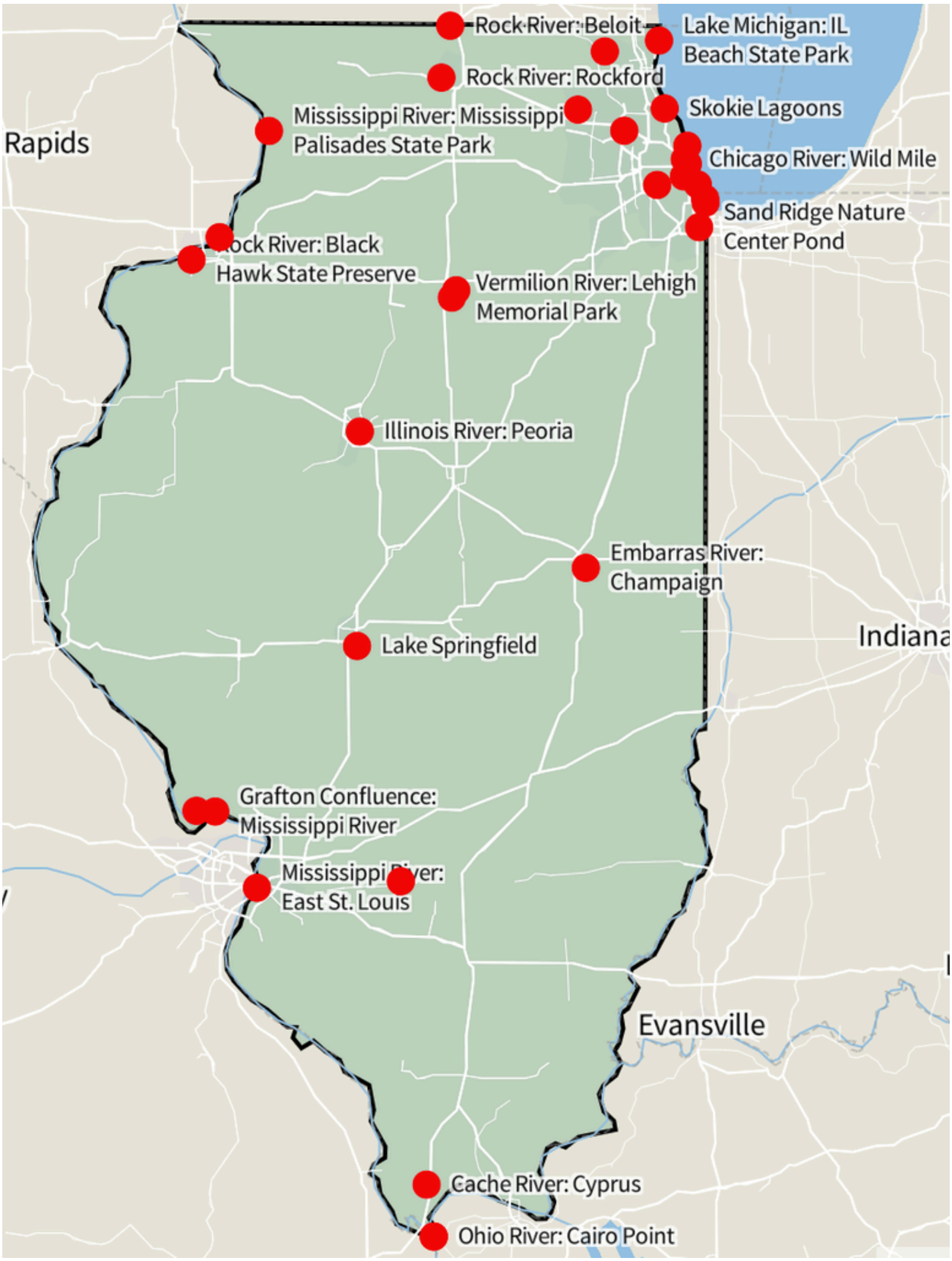
Quality Control

Since microplastics are extremely common contaminants in the air and on surfaces, steps consistent with the Microplastics: Sampling and Processing Guidebook were taken to reduce contamination of the samples at every step of the sampling process.

- On site: jars and lids were triple-rinsed with source water before being used for sampling, samples were taken upstream from samplers, and samples were immediately sealed until analysis.
- During analysis: all equipment was triple-rinsed with tap water between uses, filter paper remained sealed until use, forceps were used to handle filters at all times, and petri dishes holding the filters were covered during microscope analysis. These dishes were only uncovered briefly to allow for squeeze tests.
- Controls: to ensure that microplastic contamination was higher than control within the waterways themselves, two sets of six quart-sized samples of tap water were run through the analysis process to provide a baseline for contamination. All water samples met or exceeded the baseline contamination for average plastics per control sample.

Examples of Observed Microplastics

Microfibers (left column), microfragments (middle column), microfilms (right column).



Map of sampling locations.

Results

OF THE 31 SITES SAMPLED AND examined, at least one sample from all 31 sites (100%) contained one or more types of microplastic. 182 (98%) of individual samples contained at least one type of microplastic.

31 sites (100%) contained plastic fibers; 24 (77%) contained plastic fragments, 16 (52%) contained plastic film, and no sites contained plastic microbeads. The table below indicates where each type of microplastic was found. Checks (✓) indicate a presence of that type of plastic, and dashes (–) indicate an absence of that type of plastic.

Table 2: Results from water samples

Location	Waterway	County	Date Sampled	Microplastics?	Microplastic Types			
					Microfibers	Microfragments	Microbeads	Microfilms
Wild Mile	North Branch Chicago River	Cook	11/6/2025	Yes	✓	✓	-	✓
Montrose Beach	Lake Michigan	Cook	11/6/2025	Yes	✓	-	-	✓
Illinois Beach State Park	Lake Michigan	Lake	11/16/2025	Yes	✓	✓	-	✓
Long Lake	Long Lake	Lake	11/16/2025	Yes	✓	✓	-	-
Fox River Shores Forest Preserve	Fox River	Kane	11/16/2025	Yes	✓	✓	-	-
Busse Woods	Busse Lake	Cook	11/16/2025	Yes	✓	✓	-	-
Skokie Lagoons	Skokie Lagoons	Cook	11/19/2025	Yes	✓	✓	-	✓
Bubbly Creek	South Branch Chicago River	Cook	11/21/2025	Yes	✓	✓	-	✓

Table 2 (continued): Results from water samples

Location	Waterway	County	Date Sampled	Microplastics?	Microplastic Types			
					Microfibers	Microfragments	Microbeads	Microfilms
Sand Ridge Nature Center	Sand Ridge Pond	Cook	11/21/2025	Yes	✓	✓	-	✓
Bedford Park	Des Plaines River	Cook	11/24/2025	Yes	✓	✓	-	✓
Beloit	Rock River	Winnebago	11/24/2025	Yes	✓	-	-	-
Rockford	Rock River	Winnebago	11/24/2025	Yes	✓	✓	-	✓
Black Hawk State Preserve	Rock River	Rock Island	11/24/2025	Yes	✓	✓	-	✓
Illiniwek Forest Preserve	Mississippi River	Rock Island	11/24/2025	Yes	✓	-	-	-
Mississippi Palisades State Park	Mississippi River	Carrol	11/24/2025	Yes	✓	✓	-	✓
Grafton Confluence	Mississippi River	Jersey	12/2/2025	Yes	✓	✓	-	✓
Grafton Confluence	Illinois River	Jersey	12/2/2025	Yes	✓	✓	-	-
East St. Louis	Mississippi River	St. Clair	12/2/2025	Yes	✓	-	-	✓
Eldon Hazlet State Recreation Park	Carlyle Lake	Clinton	12/3/2025	Yes	✓	✓	-	-
Cyprus	Cache River	Johnson	12/3/2025	Yes	✓	✓	-	-
Cairo Point	Mississippi River	Alexander	12/3/2025	Yes	✓	✓	-	-
Cairo Point	Ohio River	Alexander	12/3/2025	Yes	✓	✓	-	✓
Calumet	Calumet River	Cook	12/9/2025	Yes	✓	✓	-	-
Calumet Beach	Lake Michigan	Cook	12/9/2025	Yes	✓	✓	-	✓
Chicago Riverwalk	Main Branch Chicago River	Cook	12/11/2025	Yes	✓	-	-	✓
Promontory Point	Lake Michigan	Cook	12/12/2025	Yes	✓	-	-	-
Peoria	Illinois River	Peoria	12/17/2025	Yes	✓	✓	-	-
Springfield	Lake Springfield	Sangamon	12/17/2025	Yes	✓	✓	-	-
Champaign	Embarras River	Champaign	12/17/2025	Yes	✓	-	-	-
Lehigh Memorial Park	Vermillion River	LSalle	12/18/2025	Yes	✓	✓	-	✓
Starved Rock State Park	Illinois River	LaSalle	12/18/2025	Yes	✓	✓	-	-

Figure 1: Total number of microplastics found across all sites

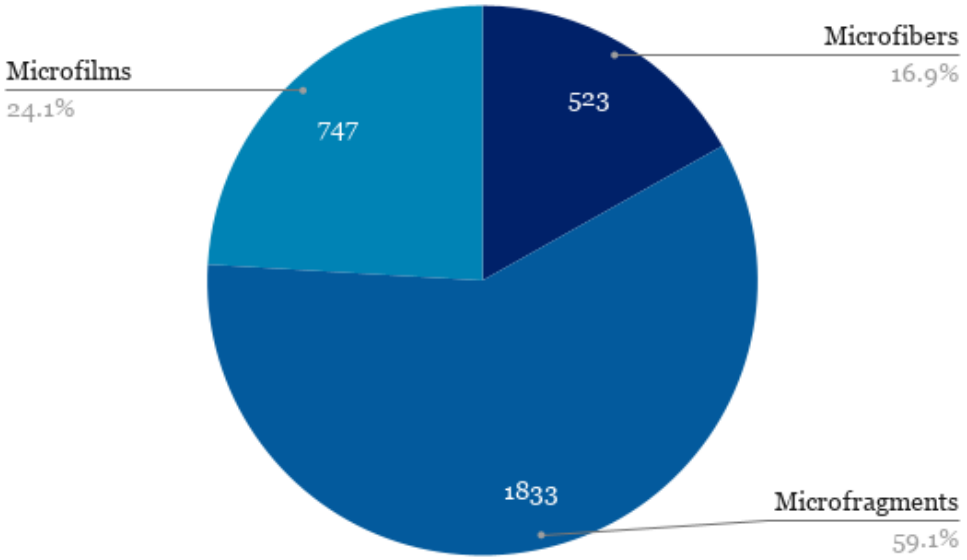
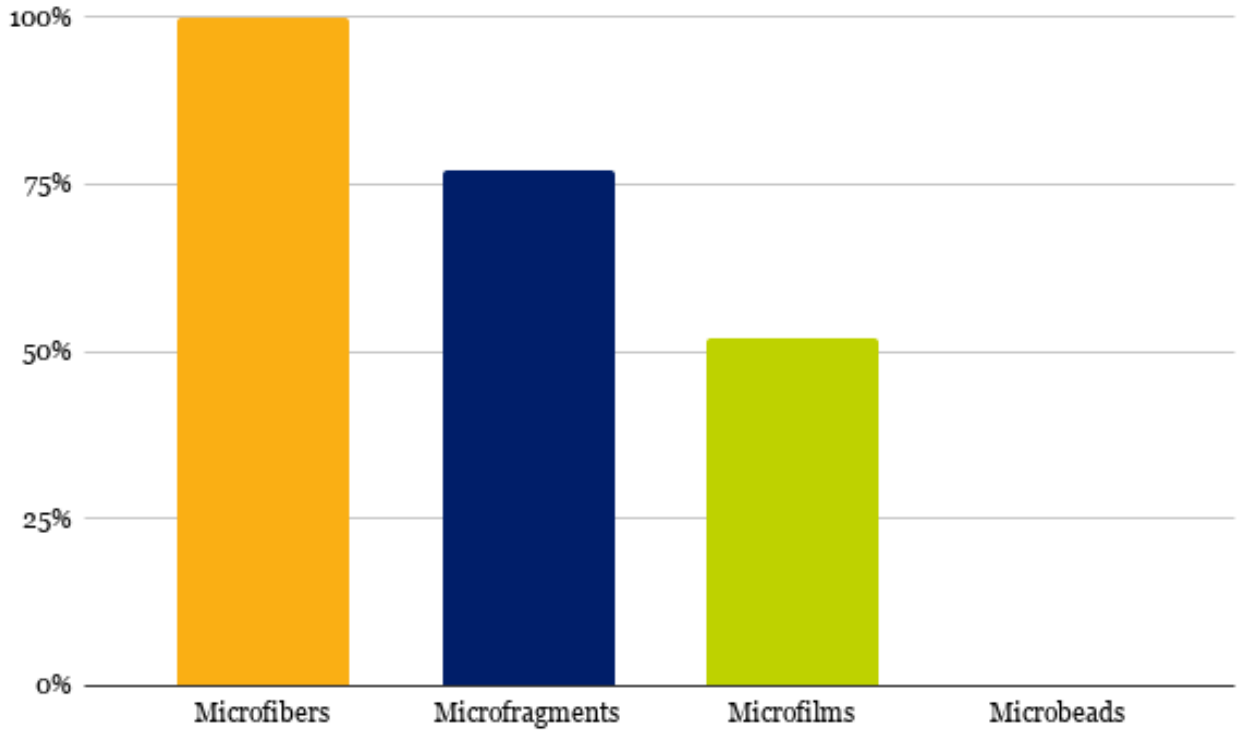


Figure 2: Percentage of surveyed sites with microplastic presence, by type



Policy Recommendations

GIVEN HOW WIDESPREAD THE threat of plastic and microplastic pollution is, there is no silver bullet solution to address this pervasive problem. Multiple policy changes at the local, state, and federal level are needed to combat this problem. Below are several specific recommendations.

Phase out single-use plastics

Nothing society uses for a few minutes should be able to pollute our environment for hundreds of years. Policymakers at all levels of government should push for laws that phase out the use of single-use plastics in order to cut down on waste and curb the flow of microplastics into the environment.

There are currently several laws banning or regulating specific types of plastics, but more is needed to address the problem statewide. The village of Oak Park, Illinois enacted an ordinance in 2023 which phases out polystyrene foam foodware, and limits plastic utensils to only be provided upon request.[41] Also in 2023, a bill was signed into law that phases out polystyrene foam food containers within state agencies.[42] Elgin, Illinois City Council adopted a plastic bag ban in early 2026.[43] Even with these policies that address local or specific types of single-use plastics, there is more work to be done to reduce single-use plastics in the state. The Illinois General Assembly should pass statewide bans on unnecessary single-use plastic items.

Establish a zero-discharge policy for plastic pellets

One typically unseen but preventable source of plastic pollution are preproduction plastic pellets, the lentil-sized pieces that are the building blocks for most single-use plastic products like bottles and bags.[44] These plastics are produced in factories and then transported to other locations where they are molded or melted into what someone might recognize as a plastic item. As of 2024, there were at least seven plastic plants in Illinois that are directly producing these pellets.[45] Pellets can end up on the floor of factories and are swept down drains into our water systems. Additionally, because they're small and lightweight, plastic pellets are often spilled during transport. In June 2024, a train derailment near Matteson, Illinois was reported to have spilled plastic pellets into the environment.[46] The State of

Illinois should establish a zero-discharge policy that requires plastic producers to use best management practices to keep plastic pellets from being spilled or dumped in our waterways.

Plastic pellets found at the Wild Mile, Chicago, IL

Halt policies that promote increased manufacture & use of single-use plastic

Communities and legislators across the Prairie State should oppose subsidies and tax breaks for new petrochemical infrastructure that doubles down on the fossil fuel-to-plastics pipeline. This includes opposing proposals to subsidize or give tax breaks to proposed facilities explicitly making new plastics, and opposing policies that will promote plastic incineration under the guise of "advanced" or "chemical" recycling.[47]

Bicanski via Pizabay.com

A pile of clothing

Fight fast fashion

Clothing production and use could spew 22 million metric tons of microplastics into the ocean between 2015 and 2050.[48] To fight textile waste, retailers must stop sending overstock, unsold and unused clothing, to landfills and incinerators. State and local governments should pass laws preventing this practice so that clothing manufacturers and retailers stop producing more clothing than we could ever need.

Furthermore, the synthetic clothing that is already in use ends up shedding microplastics when being washed.[49] Illinois should require new filters on all new washing machines–filters that are designed to catch synthetic fibers from washing off our clothes and into our waterways.

The Refilleri, used by permission

Refill station for household items such as soap in The Refilleri, Chicago, IL

Pass "Producer Responsibility" laws

Producer responsibility is a mechanism to shift the costs and management of post-consumer waste from local governments and consumers to producers themselves, requiring producers of plastic products to design, manage, and finance waste and recycling programs. Illinois already has several producer responsibility laws for specific products like batteries and paints.[50,51]

Other states including another Great Lake state, Minnesota, have passed producer responsibility laws for packaging.[52] The State of Illinois should consider a full producer responsibility model for packaging, including plastic packaging, in the coming years. Additionally, Congress should pass federal measures like the Break Free From Plastic Pollution Act to make these programs more widespread and shift the burden onto those who create the pollution.[53]

Encourage reuse

When we use something once and then dispose of it, that single-use item creates waste. While disposability is generally equated with convenience in today's culture, it comes at the cost of the wasted materials that are used to produce the product and the cost of managing the waste. This includes microplastic pollution from plastic items. By encouraging durable and reusable products over those that are single-use and disposable, we can extend the life of products and get more value from our resources. The Illinois General Assembly in 2023 passed a bill that allows restaurants and retailers to use consumer-owned reusable containers for food and directs the Department of Public Health to specify best practices for food safety.[54] This policy can be more widely used by restaurants and consumers. Whenever possible, municipalities should adopt practices that make it easier for residents to use reusable materials instead of single-use plastics.

Develop green infrastructure

A study from the San Francisco Estuary Institute found that car tire debris from stormwater runoff may be a significant contributor of microplastic pollution.[55] To keep this debris out of our water, municipalities need to reduce combined sewage overflow and ensure runoff is treated. A recent study by the Chicago Metropolitan Agency for Planning (CMAP) green infrastructure strategy paper outlines how green infrastructure can help the greater Chicagoland area manage stormwater, improve environmental quality, and increase resilience to unforeseen climate impacts.[56] This infrastructure, which includes planting new trees, rain gardens, and permeable pavement, uses greenery and open soil to absorb and filter stormwater runoff. The CMAP green strategy recommends adding green spaces to land usage, transit, and development planning across regional, communal, and building sites. These developments can significantly decrease plastic contamination actively moving through our municipal systems.

Appendix

The total counts of plastics for each waterway can be viewed on our website.

Environment America Research & Policy Center has created a guide for how to test local waterways for microplastics using the same methodology used for this survey: EnvironmentIllinoisCenter.org/resources/a-guide-to-testing-your-local-waterways-for-microplastics/.

Here are some additional photos from this project.








Endnotes

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