



ALLIANCE for the
GREAT
LAKES

Adopt-A-Beach:

20 Years of Great Lakes Litter Data

**A Story of Plastic Pollution
Told Through Citizen Science**





Adopt-a-Beach volunteers enjoying the day at a cleanup at Grand Haven City Beach in Michigan in 2019.

Photo Credit: Tara Starback

THANK YOU!

The Alliance for the Great Lakes Adopt-a-Beach program and region-wide litter dataset would not be possible without the time, effort, and resources generously provided by our dedicated volunteers, partners, donors, and funders. We are so grateful for each and every action you have taken to help protect the Great Lakes!



Weighing collected litter at a cleanup at Montrose Beach in Chicago in 2019.

Photo Credit: Lloyd DeGrane



Picking up litter at an Adopt-a-Beach cleanup at Jeorse Park Beach in East Chicago, Indiana, in 2023.

Photo Credit: Lloyd DeGrane



Adopt-a-Beach volunteers recording litter data at a cleanup at Montrose Beach in Chicago in 2023.

Photo Credit: Lloyd DeGrane



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Executive Summary

For over 30 years, dedicated Alliance for the Great Lakes Adopt-a-Beach volunteers have been on the front lines of keeping litter off our beaches and out of the Great Lakes, removing over half a million pounds from the Great Lakes shoreline since 1991. In 2003, volunteers took their efforts a step further by contributing to our online Great Lakes litter database, indicating what type of litter they were finding on the beach. Adopt-a-Beach is the biggest Great Lakes cleanup volunteer program and has the largest litter dataset exclusively for the Great Lakes.

Through analysis of 20 years of litter data from over 14,000 cleanups covering beaches along all five Great Lakes, some strong patterns emerge. Our most consistent finding is that we find a lot of plastic on the beach. On average, 86% of the litter collected in a given Adopt-a-Beach season is composed either partially or fully of plastic. We know this plastic is not going anywhere; it's just breaking down into smaller and smaller pieces and leaching dangerous chemicals into our waterways. In fact, since we started collecting data for "tiny trash,"

which we define as pieces of foam, glass, or plastic measuring less than 2.5 cm, our top category of collected pieces of litter has been "plastic pieces" (measuring less than 2.5 cm).

Research tells us that plastic is pervasive in the Great Lakes. The dangers of plastic emerge from every step of its life cycle—from production to disposal, harming wildlife, communities, and the environment, including our drinking water.

The Adopt-a-Beach program is a great example of the power that lies in people coming together for a common cause. However, if we are going to change the tide on this issue, we need action that goes well beyond the individual. We need to reduce single-use plastic, advance business innovations such as reuse and filtering out microfibers, conduct research on the impacts of plastic, and engage governments (at all levels) with plastic and packaging producers to work together to create a sustainable future. In short, we need systemic and forward-thinking solutions.

Ultimately, the most effective way to reduce plastic pollution is to reduce the production of single-use plastic and to hold producers responsible for the waste their products generate. Residents, businesses, governments, manufacturers, and organizations like the Alliance for the Great Lakes all need to come together and encourage policy that does the following:

- Reduces or eliminates the most problematic plastics, like single-use plastic (including plastic foam and plastic bags) and microfibers;
- Prevents pollution at the source by stopping industrial plastic pellets from spilling into our lakes;
- Encourages business innovation and deploys new technologies such as including microfilters in all washing machines just as we do for dryers;

- Increases access to clean water through water refilling stations as well as reuse and refill packing solutions; and
- Holds producers responsible across the life cycle of their products and packaging from design and materials to end-of-life management, and incentivizes innovation, moving toward reusable and sustainable alternatives, with the objective of using less plastic in the first place.


The Alliance for the Great Lakes is working with partners across the region to identify innovative, impactful, and lasting solutions. We are eager to expand our partnerships, mobilize our supporters, and advance smart policy solutions. We want to look back 30 years from now and see less plastic pollution across the Great Lakes region.

Background Information: Removing Litter and Collecting Data

For over 30 years, Alliance for the Great Lakes Adopt-a-Beach cleanups have been a fun, easy way for community members to come together and help protect the Great Lakes. The program started in 1991 in a few states as part of the [International Coastal Cleanup](#), a global shoreline cleanup effort, and has evolved into a robust, regional shoreline cleanup program, with cleanups happening year-round in all eight Great Lakes states and along all five Great Lakes each season.

Through the Adopt-a-Beach program, volunteers receive training and resources to be able to become a Team Leader and host a beach cleanup in their community for fellow volunteers. Since the start of the program, **over 200,000 dedicated volunteers** have participated in Adopt-a-Beach cleanups, removing **over 9,700,000 individual pieces** and **over 535,000 pounds of litter** from the shoreline. If not for the efforts of these individuals, these pieces of litter could otherwise be ingested by wildlife or end up in the Great Lakes, a source of drinking water for 40 million people.

Not only are volunteers removing litter from our beaches, but they are also collecting valuable data about what type of litter they are finding. In 2003, Adopt-a-Beach became the most extensive volunteer program ever to collect data on Great Lakes beach litter with the launch of year-round cleanups and an online database to ease data collection. Thanks to Adopt-a-Beach teams, we now have over 20 years of data from cleanups in all eight Great Lakes states. Adopt-a-Beach is the biggest Great Lakes cleanup volunteer program and has the largest litter dataset exclusively for the Great Lakes. No lab or individual researcher could collect this large dataset on their own.



Participants at a September cleanup at 63rd Street Beach in Chicago in 2009.

*Photo Credit:
Lloyd DeGrane*



An example of litter collected at an Adopt-a-Beach cleanup.

Photo Credit: Lloyd DeGrane



Volunteers picking up litter and collecting data at Jeorse Park Beach in East Chicago, Indiana, in 2023.

Photo Credit: Lloyd DeGrane

9,702,320
PIECES
OF LITTER



535,324
POUNDS OF LITTER

OVER **200,000**
VOLUNTEERS



OVER **14K**
BEACH
CLEANUPS

BEACH
CLEANUPS
ON ALL
5 GREAT
LAKES



HIGHLIGHTS OVER THE YEARS

- **1991**
First Alliance for the Great Lakes Adopt-a-Beach events held in September as part of the International Coastal Cleanup.
- **2003**
Year-round cleanups begin, along with the online database.
- **2007**
Adopt-a-Beach volunteers push for and win beach smoking bans along 30 miles of shoreline in Michigan and Chicago.
- **2012**
Scientists begin publishing research on plastic pollution in the Great Lakes using Adopt-a-Beach data and other data sources.
- **2013**
The first season with Adopt-a-Beach cleanups held in all eight Great Lakes states.

- **2018**
The Alliance for the Great Lakes, our partners, and tens of thousands of advocates across the region led the fight for legislation to phase out plastic microbeads in personal care products. Illinois was the first state to ban microbeads. As the movement spread across the nation, several other states followed suit. Eventually, this momentum led Congress to take legislative action, phasing out the manufacture and finally the sale of microbeads nationwide in July 2018.
- **2020**
An all-new Adopt-a-Beach website launched, making it easier for people to volunteer and track data.
- **2022**
A milestone was celebrated—half a million pounds of litter removed from Great Lakes shorelines.
- **2023**
With support from Adopt-a-Beach volunteers, Illinois passes laws increasing access to water refill stations, ending state purchasing of foam foodware, and requiring the state to conduct an extended producer responsibility needs assessment.
- **2024**
As a response to volunteer feedback, a tool was released allowing volunteers to collect litter data on their mobile devices, making data collection and submission more efficient.



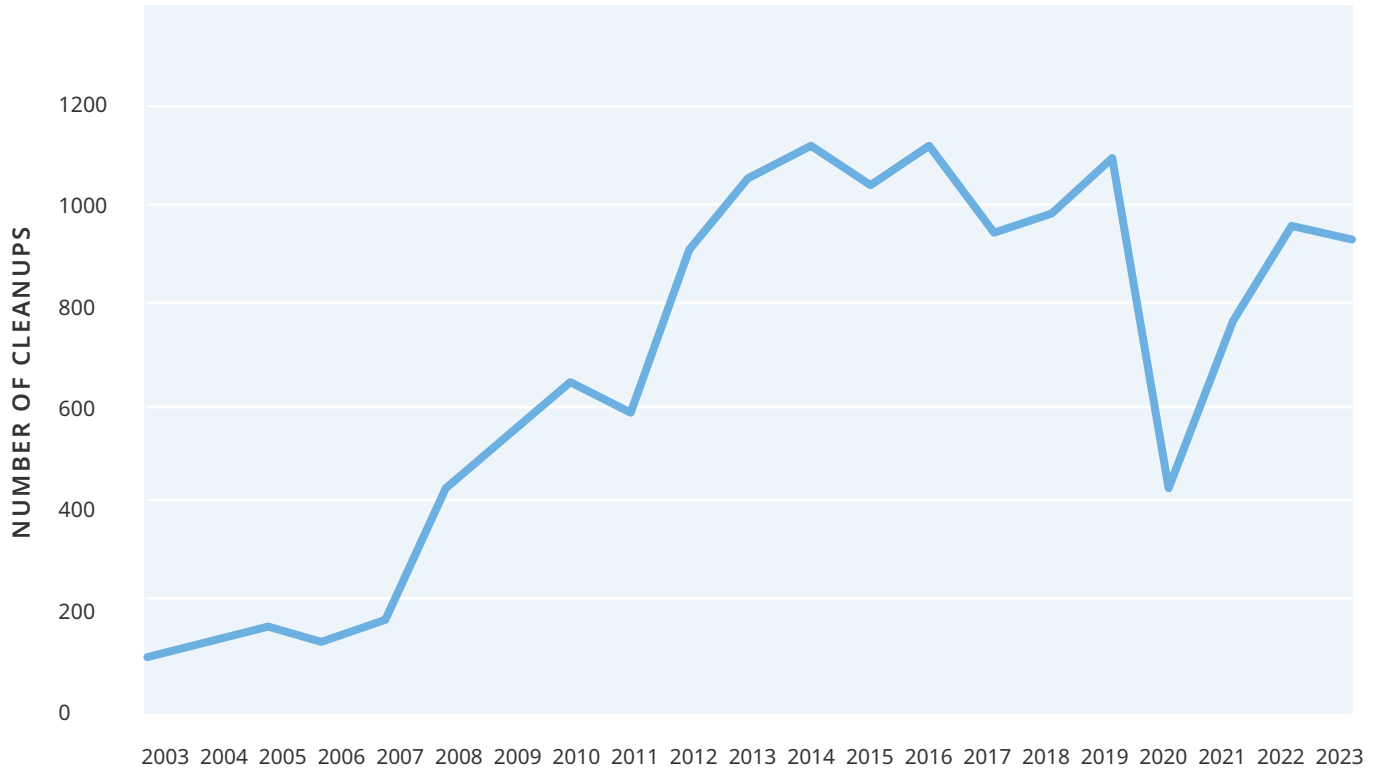
2003 CLEANUPS



2023 CLEANUPS

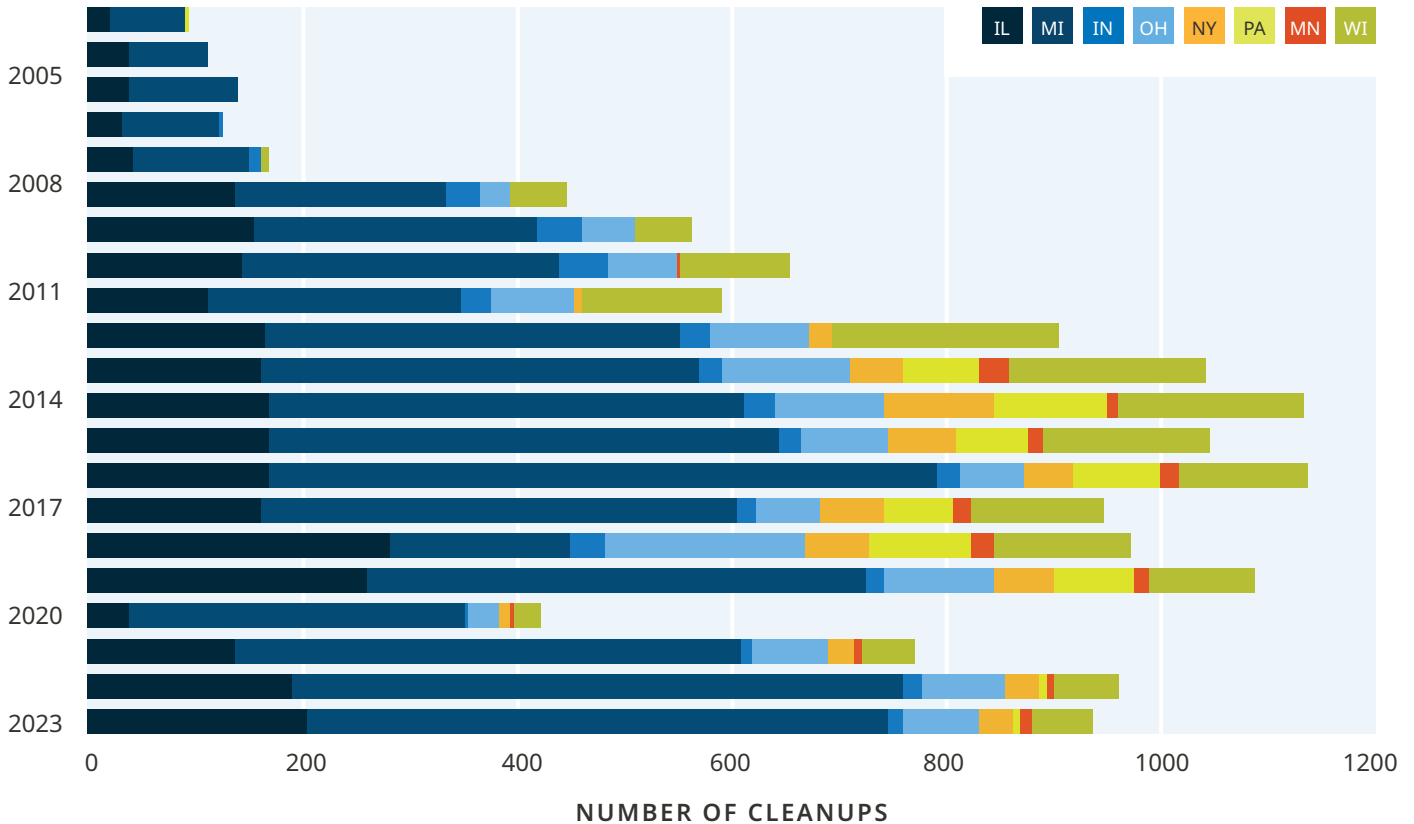


NUMBER OF ADOPT-A-BEACH CLEANUPS OVER TIME



Number of Adopt-a-Beach cleanups over time from 2003–2023, the years during which we collected litter data through our online database. During the year 2020, we saw a significant decrease in cleanups due to a pandemic, followed by a steady increase and return of our volunteers to the program.

GEOGRAPHIC DISTRIBUTION OF CLEANUPS OVER TIME



Geographic distribution of Adopt-a-Beach cleanups over time, from coverage in a few states to region-wide cleanups.

PUTTING THE DATA TO USE

Having this large Great Lakes dataset is extremely useful, as it illustrates the growing negative impact of plastic pollution, allows us to determine patterns and trends in litter along the Great Lakes, and provides evidence that can be used to advance policy. Our Adopt-a-Beach litter data has been requested and used by many groups and individuals, including educators, community members, and researchers. Long-term datasets are particularly valuable to researchers and policy makers because they can demonstrate trends over time and show both positive and negative changes.



SUCCESS STORIES

Peer-reviewed research using Adopt-a-Beach data is expanding knowledge about the causes of litter and policies that can reduce plastic pollution. For example, Adopt-a-Beach data has been used by researchers to discuss the environmental drivers of human-caused litter along Lake Michigan beaches and to demonstrate that a large percentage of human-caused litter on Great Lakes beaches is plastic. In one study, researchers praised the “strong potential” of the data for future studies due to the consistency of the data collection through the years. This data can also illustrate if and how policy solutions are working, which is only possible with data collected consistently and over time.

DATA LIMITATIONS

While the Adopt-a-Beach Great Lakes litter dataset has a lot to show us, it is important to note that there are some limitations to this data, due to the nature of how it is collected and factors at play beyond the program.

The Adopt-a-Beach program is a citizen science program, with hundreds of thousands of volunteers having participated across the region over the years. This method of data collection has been integral in allowing us to have such a large database. However, we do want to emphasize that this is not a rigorous, scientific study conducted by researchers of beach litter around the Great Lakes.

The data we receive is dependent on the number of volunteers, number of cleanups, and geographic distribution of cleanups in a given year, all factors that have changed

over time. For example, as the program has gained momentum, it has gone from only occurring in a few states in its inaugural year, to now being region-wide. For most of the history of the program, we also saw an upward trend in the number of cleanups. However, a pandemic in 2020 caused a large decrease in cleanups, followed by a return to cleanup activity in years following. Other variables, such as water levels and weather patterns, can also influence the frequency of cleanups.

The way we collect data has also evolved over time. While we have been diligent in categorizing our data similarly over time for reporting and analysis purposes, we have at times updated our litter categories to more accurately reflect the items we find on the beach. For example, in 2014, we introduced the category of “tiny trash,” which includes small pieces of foam, glass, or plastic that are less than 2.5 cm.

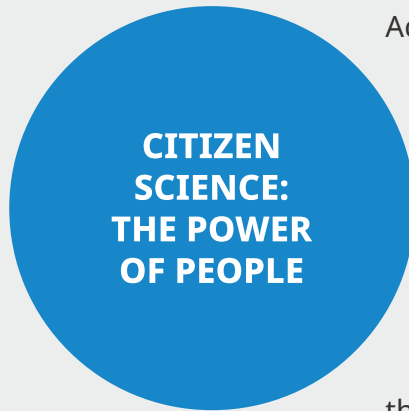
Our systems of data collection have also evolved. In 2020, we introduced a new website, and in 2024, we launched a tool for volunteers to collect litter data on their mobile devices. In analyzing this dataset, we kept these things in mind, separating different years of data when needed to show patterns and trends in the most accurate way possible.

Due to these factors, we are careful about drawing any detailed comparisons or conclusions from our data, especially pertaining to fluctuations in the amount of litter collected from year to year. There are, however, some consistent patterns that we notice in our Adopt-a-Beach data that tell a powerful story, thanks to our Adopt-a-Beach teams.

Citizen science, or the participation of members of the public in scientific research and knowledge production, has been around for a long time, with non-scientists contributing to areas of knowledge such as astronomy, birding, and weather patterns. Now, many organizations, such as NOAA, NASA, and the National Park Service, rely on citizen scientists to collect valuable data and information, including whale sightings, water levels, and species identification. Citizen scientist programs can allow for more data to be collected and can result in a dataset that is more geographically diverse, as data becomes easier to collect, report, analyze, and share.

The Adopt-a-Beach program is a great example of the power of citizen science—of the public coming together to produce a dataset that sheds light on issues like plastic pollution in the Great Lakes. Without our dedicated volunteers all over the region, we would not have been able to collect this

large dataset. Technology has played a role in letting this program expand into the regional effort it is today. With the creation of a new, updated website and a tool that allows volunteers to track litter data from their mobile devices, we hope the program is more accessible and the volunteer experience is improved.



Adopt-a-Beach citizen scientists have also inspired further action. For example, in 2007, Adopt-a-Beach volunteers pushed for and won smoking bans along 30 miles of shoreline in Michigan and Chicago to help reduce litter from cigarette butts, one of the most common litter items found at cleanups by Adopt-a-Beach volunteers. Additionally, scientists have published research on plastic pollution in the Great Lakes using Adopt-a-Beach data and other data sources. We are hopeful this Great Lakes dataset will continue to inform solutions to issues facing our Great Lakes.

What Do We Find on the Beach?

The Story Behind the Data

Each Adopt-a-Beach season, our data tells a story based on what we find on the beach and how much of each item that we find. While the nature of our data collection process and how that process has changed over time makes it difficult to make granular conclusions or specific comparisons from year-to-year, we are able to notice some patterns, especially when we look at our dataset as a whole from the last 20 years.

To help us better analyze our litter data, each litter type (cigarette butts, plastic beverage bottles, balloons, etc.) gets placed in a reporting category, such as “tiny trash,” “food related,” and “smoking related.” It should be noted that the litter types that make up the category of “tiny trash” were

not introduced as a field on our litter data collection form until 2014. Thus, to analyze the dataset in reference to these categories of litter, we pulled data from the last 10 years (2014–2023) that consistently included the category of “tiny trash.” From this data, we can see that the vast majority of the litter collected (89% in an average year) falls into the categories of “tiny trash,” “food related,” or “smoking related.” We also pulled the top ten items of litter that were collected during our 20-year dataset. To better understand any trends and patterns, we separated the top litter categories into two lists—one covering 2003–2013 and one covering years after 2013, when the litter category of “tiny trash” was included in our data. In looking at this graph and tables, a few consistent patterns emerge.

TOP LITTER ITEMS COLLECTED: 2003–2013



Top litter items collected from 2003–2013, in order from the greatest number of collected pieces to the least.

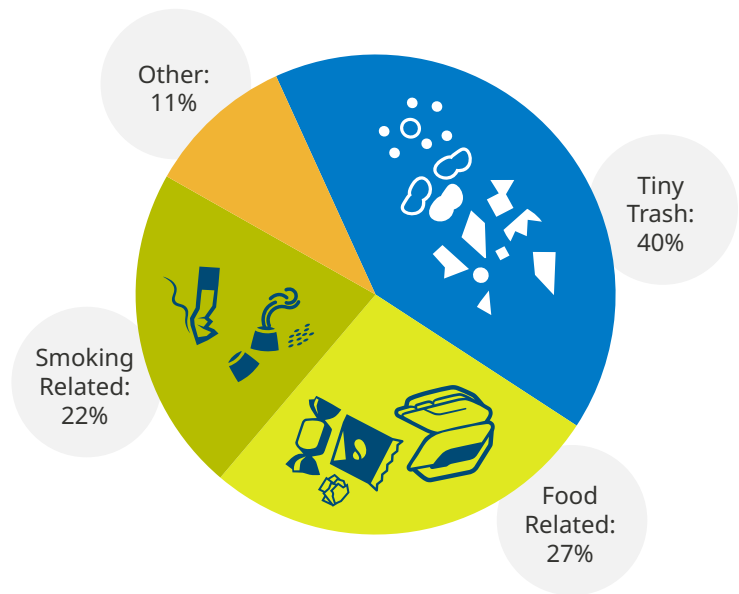
TOP LITTER ITEMS COLLECTED: 2014–2023



Top litter items collected from 2014–2023, in order from the greatest number of collected pieces to the least. The data category of “tiny trash,” which included tiny pieces of foam, glass, and plastic measuring less than 2.5 cm, was added in 2014.

LITTER TYPE: 2014-2023

Average percentage of litter collected in a year that falls into each litter type category from 2014–2023. “Tiny trash” includes pieces of foam, glass, and plastic that are less than 2.5 cm.



THE LITTER IS THERE BECAUSE WE LEAVE IT THERE.

We can see from our top categories of litter collected that most of these items are not washing up from anonymous, faraway places. Most of the items are there because we left them on the beach or they blew onto the beach from a nearby source. Whether we find them in tiny pieces or fully intact, most of the items we are finding—cigarette butts, food wrappers, plastic water bottles, etc.—are all too familiar to us.

A LOT OF THE LITTER ITEMS THAT WE FIND ARE VERY TINY.

On average, 40% of the litter items we are finding in a given year are tiny pieces of foam, glass, or plastic that are recorded to be less than 2.5 cm. Our top 10 categories of collected litter from the last 10 years (the years during which we included the category of “tiny trash”) included all three “tiny trash” litter types: “foam pieces,” “glass pieces,” and “plastic pieces.”

Adopt-a-Beach volunteers are often surprised at how many tiny pieces of plastic and other materials they find at a cleanup once they start combing through the sand of a beach that, at first glance, appears to not have much litter to be found.

WE FIND A LOT OF SINGLE-USE ITEMS AND MOST OF THEM ARE PLASTIC.

Another pattern that we notice from our data over the years is that we collect a lot of single-use items, such as plastic bags, straws, food wrappers, takeout containers, and plastic utensils. These are items that get used once and discarded. These are oftentimes the items that get left behind on the beach or that get blown out of trash receptacles, ending up on our beaches and in the Great Lakes. When we examine our data further, we also see that most of these items contain plastic. These plastic items aren’t going away, but rather breaking down into smaller and smaller pieces.

86% of Adopt-a-Beach Litter is Plastic

More than 22 million pounds of plastic pollution end up in the Great Lakes every year, according to the Rochester Institute of Technology.

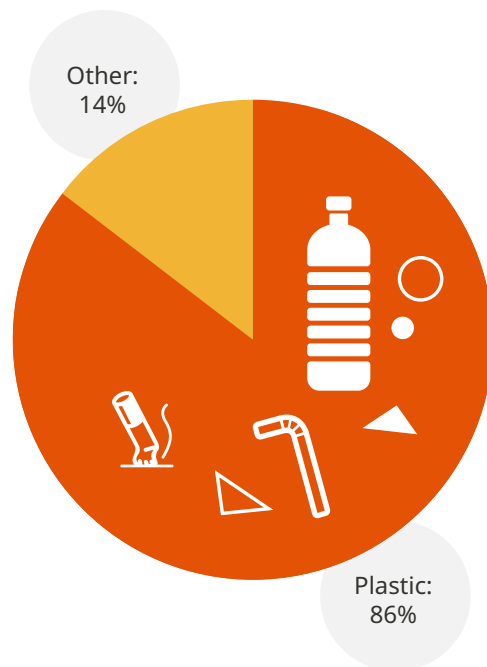
Unfortunately, to our Adopt-a-Beach volunteers, this may not come as a surprise, as we have found a whole lot of plastic on the beaches every year. Even as some components of our data collection process have evolved and changed, this pattern has remained consistent, varying slightly from year to year. On average, 86% of

Adopt-a-Beach litter collected in a season is composed, either fully or partially, of plastic.

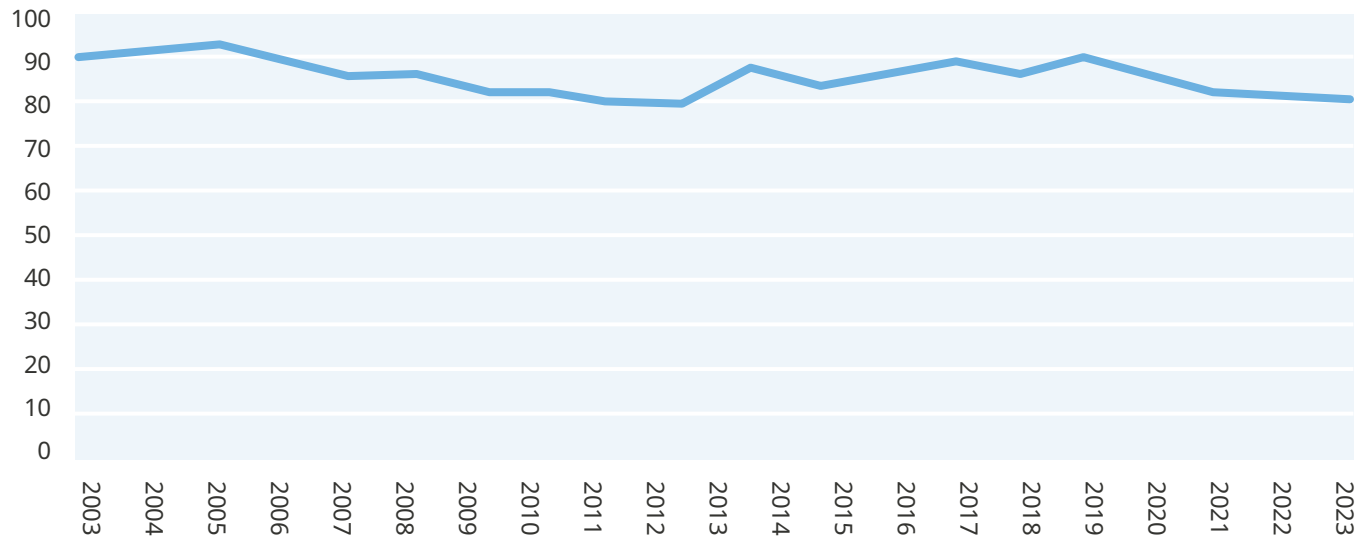
This discarded plastic never really goes away. It just breaks down into smaller and smaller pieces. In fact, the top item of litter collected in the last ten years has been tiny “plastic pieces” (measuring less than 2.5 cm). Since we started collecting data for the category of “plastic pieces,” 1,726,031 individual tiny pieces of plastic have been found and removed from the Great Lakes shoreline by Adopt-a-Beach volunteers.

LITTER MATERIAL: 2003-2023

On average, 86% of the litter collected at an Adopt-a-Beach cleanup in a given year from 2003-2023 has been composed either partially or fully of plastic.



PERCENTAGE OF LITTER REMOVED THAT IS PLASTIC



The percentage of collected litter that was partially or fully composed of plastic in each year of the Adopt-a-Beach program since the start of our online database in 2003.



For many, the issue of plastic pollution brings up mental images of the garbage patch in the ocean and impacted marine life. However, as reflected in our litter data, plastic pollution is a huge issue in the Great Lakes as well.

To better understand the source and impacts of plastic pollution, it is helpful to examine environmental factors at play. There are many differences between oceans and the Great Lakes that influence the movement and eventual harmful impacts of plastic.

Global ocean currents allow trash and debris to travel long distances and wash up on faraway coasts. However, these types of currents do not exist in the Great Lakes. As we saw from our top categories of litter we find, these litter items found on our beaches are mostly from local sources. And, if not removed from the beach, they eventually end up in the lakes.

Another important difference is that while we don't drink ocean water, the Great Lakes are a source of drinking water for 40 million people. As plastic breaks down into smaller and smaller pieces, we run the risk of it

ending up in our drinking water, which we know is happening. Microplastics—pieces of plastic less than 5 millimeters long—have been found in drinking water, beer, and even human blood.

Sherri Mason, Director of Sustainability at Penn State Behrend in Erie, Pennsylvania, has been a researcher who has shed light on microplastic pollution in the Great Lakes. Mason's research has focused on Lake Erie, "which has a concentration of microplastic that rivals the Great Pacific Garbage Patch, a floating landfill that's twice the size of Texas, according to multiple studies."

Most of the plastic in Lake Erie is less than 5 millimeters in diameter, nearing microscopic size "about the width of a human hair," Mason describes, nearly impossible to clean up.

Saltwater is also more dense than freshwater, and most of the world's oceans do not freeze, unlike parts of the Great Lakes. All these factors can affect how plastic is moving throughout the ecosystem and how it impacts the environment, wildlife, and communities.

OCEAN VS. GREAT LAKES PLASTIC POLLUTION

MICROPLASTICS HAVE BEEN FOUND IN:



DRINKING WATER



BEER



HUMAN BLOOD

Another very common type of material that Adopt-a-Beach volunteers find during cleanups is foam, often in tiny pieces that were originally from items like foodware. In fact, since we started collecting data for the category of “foam pieces” (measuring less than 2.5 cm) in 2014, that has been our third category of most collected litter items at cleanups. Volunteers have reported removing 526,854 foam pieces since 2014.

Plastic foam, which is known scientifically as “expanded polystyrene” and by many as “Styrofoam” (a brand name for a plastic foam product), is a particularly problematic type of plastic used in many different ways such as for foodware, packaging, construction, and insulation. Its lightweight nature allows it to easily break apart and to disperse in the environment. Once the foam pieces end up in our waterways, it is nearly impossible to clean them up.

Plastic foam does not biodegrade in nature. Additionally, its chemical components and the fact that many foam products are contaminated due to their contact with food are factors that contribute to it being nearly impossible to recycle. Like other plastic products, plastic foam can cause harm during its entire life cycle. Byproducts of plastic foam production can pollute the water, harming neighborhoods near factories. The chemical styrene, from which polystyrene is made, is a possible human

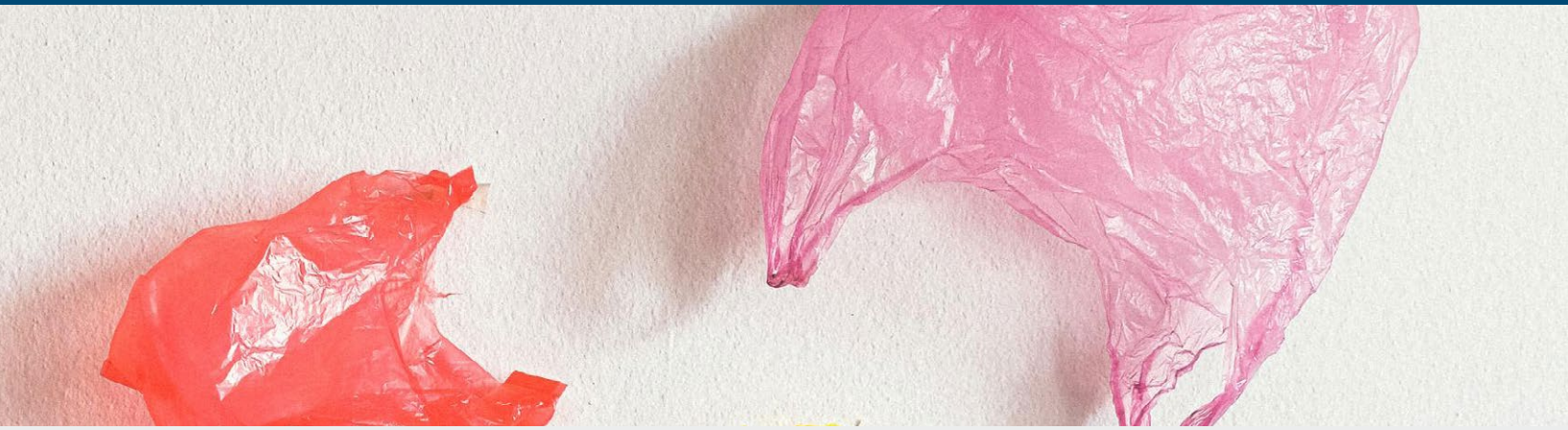
carcinogen. Also, like other plastic products, plastic foam contains chemical additives, which can leach into food, beverages, and the environment. Research has shown that chemicals leaching from plastic foam are toxic to aquatic animals.

We need policy that takes these harms into consideration and works to reduce or eliminate the most problematic plastics, like plastic foam. We have seen some successful steps toward this. In 2023, with support from Adopt-a-Beach volunteers, Illinois passed a law to end state purchasing of foam foodware, using the power of public resources to nudge the marketplace in a more sustainable direction. The next step is to ban and reduce the use by businesses of expanded polystyrene and encourage reusable and sustainable packaging.

PLASTIC FOAM



Small pieces of plastic and foam collected at an Adopt-a-Beach cleanup.
Photo Credit: Lloyd DeGrane



Another particularly problematic plastic item that Adopt-a-Beach volunteers find on our beaches is single-use plastic bags. If you combine both litter types that we collect (“Plastic Grocery Bags” and “Plastic Bags (other)”), plastic bags are the ninth most common item that volunteers found at cleanups from 2014–2023. We also find small pieces of plastic bags, which get coded as “plastic pieces.”

People use *a lot* of plastic bags—5 trillion per year, in fact, or 700 a year for every person on the planet. While a single-use plastic shopping bag is used, on average, for just 12 minutes, plastic bags can take 10 to 20 years to degrade in the environment. And even then, they are not gone, but rather have broken down into microplastics (pieces of plastic that are less than 5 millimeters long) that continue to cause harm to the environment, wildlife, and people.

PLASTIC BAGS

Like other plastic products, plastic bags can cause harm during their entire life cycle, including during production and disposal. Plastic bags are difficult to recycle and, in most places, cannot be recycled at curbside bins, but rather have to be recycled separately. If they are incorrectly included in curbside bins and recycled with other materials, the thin plastic bags get tangled and stuck in the sorting equipment at recycling centers and slow down the process, causing workers to have to manually remove them. For reasons like this, many plastic bags end up in landfills or incinerators.

If plastic bags are not properly disposed of, they can harm the environment, wildlife, and people. Fish and other aquatic wildlife can ingest pieces of plastic bags. Plastic bags also eventually break down into microplastics, which can end up in the Great Lakes and in our drinking water.

We need policy that works to reduce or eliminate the most problematic plastics, like single-use plastic bags.

40% of Adopt-a-Beach Litter is Reported to Be Less Than 2.5 cm

Oftentimes, Adopt-a-Beach participants arrive on the beach expecting to find many large, fully intact litter items, which, of course, does happen. However, what they usually do not expect at the cleanup is the amount of tiny litter items that they find.

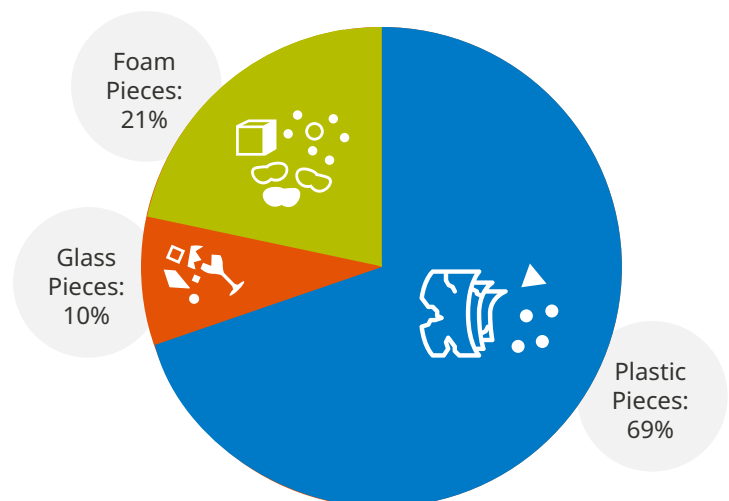
We started collecting data for “tiny trash,” or what we define as pieces of foam, glass, or plastic that measure less than 2.5 cm, in 2014. Since then, on average, 40% of the litter items collected at Adopt-a-Beach cleanups are “tiny trash” in a given season. Additionally, the top litter item found at

Adopt-a-Beach cleanups since 2014 has been tiny trash made of plastic, specifically. Since 2014, 1,726,031 “plastic pieces” (measuring less than 2.5 cm) have been removed from Great Lakes beaches.

And, unfortunately, the smaller these pieces get, the harder it is to remove them from the environment and the Great Lakes. Researchers have found stunningly high amounts of tiny plastic pieces in all five Great Lakes, which provide drinking water for 40 million people.

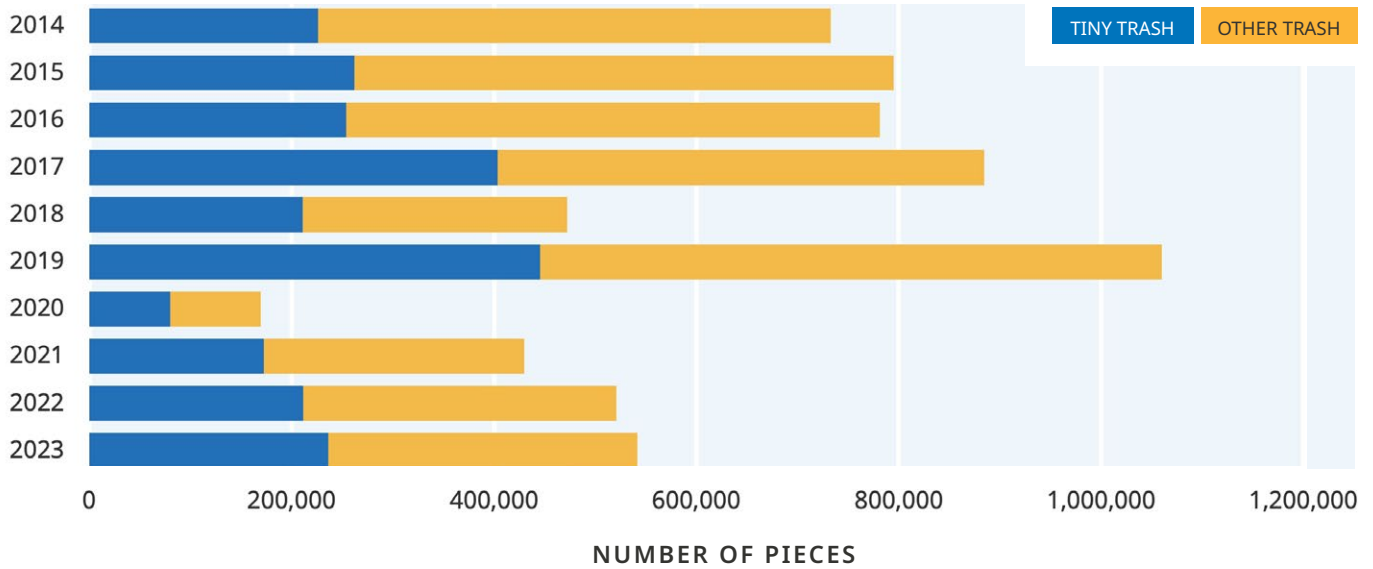
COMPOSITION OF TINY TRASH (<2.5 CM): 2014-2023

Percentage of Adopt-a-Beach litter that makes up each category of tiny trash (“foam pieces,” “glass pieces,” and “plastic pieces” that are less than 2.5 cm) from 2014-2023.



OVER 40% OF ADOPT-A-BEACH LITTER IS REPORTED TO BE LESS THAN 2.5 CM.

TINY TRASH (< 2.5 CM) VS. ALL OTHER TRASH: 2014-2023



The number of pieces of collected litter that were “tiny trash,” pieces of foam, glass, or plastic measuring less than 2.5 cm, vs. all other trash, from 2014-2023.



Tiny pieces of plastic and other materials found at an Adopt-a-Beach cleanup.

Photo Credit: Lloyd DeGrane

The tiny plastic pieces of litter removed by Adopt-a-Beach volunteers are only the most visible parts of a bigger plastic pollution problem. There are many even smaller pieces of plastic that are in our lakes, but they are too small for volunteers to collect.

Some pieces of plastic were small before they arrived on the beach, and others are the result of a larger plastic item that has started to break down.

Microbeads are tiny plastic particles used as an abrasive in many personal care products, such as facial scrubs, soaps, and shampoos. When we use products containing microbeads, the tiny plastic pieces don't dissolve. Instead, they are rinsed down the drain. Because of their small size and buoyancy, microbeads escape treatment by sewage plants and end up in our rivers and lakes. Luckily, the Alliance for the Great Lakes, our partners, and tens of thousands of advocates across the region led the fight for legislation to phase out microbeads in personal care products. Illinois was the first state to ban microbeads. As the movement spread across the nation, several other states followed suit. Eventually, this momentum led Congress to take legislative action, phasing out the manufacture and finally the sale of microbeads nationwide in July 2018.



When you wash your clothes in a washing machine, tiny strands called **microfibers** from the synthetic fabric in your clothing or from the plastic packaging from detergent packs can be released. These microfibers wash down the drain into our waterways, causing danger to wildlife, who can mistake them for food.

Microplastics are pieces of larger bits of plastic. When plastic litter items end up on the beach, or in other places in our environment, sun, waves, and other environmental factors break them down into smaller and smaller pieces, until they become microplastics, pieces of plastic that are less than 5 millimeters long. Microplastics have been found in our drinking water and in the bodies of Great Lakes fish and migrating birds.

While these tiny pieces of plastic pose many threats to the Great Lakes and the life that relies on them, there are many opportunities for residents, businesses, governments, and manufacturers to help prevent further harmful impacts, such as advancing sustainable manufacturing in our region and reducing or eliminating the most problematic plastics (like single-use plastic) with innovative solutions like microfiber filters.

Impact of Great Lakes Plastic Pollution: On the Beach and Beyond

From our Adopt-a-Beach data and research from experts, we know plastic pollution is a big problem for the Great Lakes, but what exactly happens once the plastic hits the beach or gets into our water that harms the environment, wildlife, and Great Lakes communities?

- Unlike the water in the oceans, 40 million people drink the water from the Great Lakes. **Researchers have found microplastics in our drinking water and other products like beer and sea salt.**
- We share the Great Lakes with many other species—about 3,500 species of plants and animals. **Plastic within the Great Lakes ecosystem is having a large impact on wildlife as well.** A University of Toronto study found that nearly 90% of Great Lakes water samples taken from the last 10 years have microplastics concentrations that “exceed safe levels for wildlife.” Wildlife ingest pieces of plastic, often mistaking them for food. This is dangerous, not only because plastic inherently contains certain chemicals (such as flame retardants), but also because plastic can absorb toxins while in the water. Ingestion can also cause lack of nutrition, with plastic pieces taking up space for nutritious food that is normally part of their diets. Wildlife can also become entangled by plastic items such as fishing line, impeding their movement and ability to search for food.
- **Plastic is making its way into human bodies.** It’s estimated that we each ingest about a credit card-sized amount of plastic each week. Microplastics have been found in our blood, lungs, stool, and even breast milk. A growing body of research is identifying the health impacts and costs caused by plastic. In particular, the chemicals used in plastics have been described as contributing to disease and disability, with research showing that “plastic is responsible for disease, disability, and premature death at every stage of its life cycle.”



Removing plastic from Rainbow Beach in Chicago at an Adopt-a-Beach cleanup in 2022.

PC: Lloyd DeGrane



Plastic and other debris removed by volunteers at an Adopt-a-Beach cleanup.

PC: Lloyd DeGrane

Plastic is pervasive in the Great Lakes ecosystem. It is found in the water, in the bodies of wildlife, and in humans. However, much less is known about the full impact of plastic pollution on the health and well-being of all species.

From initial findings, we know the impact is not good. Research has shown that animals with exposure to certain plastics experienced impaired learning and memory behavior, as well as decreased larval size and likelihood to survive, and thinner female egg shells.

A growing body of research is working to better understand the impacts on human health. The NIH published Minderoo-Monaco Commission on Plastics and Human Health notes that “plastic additives disrupt endocrine function and increase risk for premature births, neurodevelopmental disorders, male reproductive birth defects, infertility, obesity, cardiovascular disease, renal disease, and cancers.”

The Alliance for the Great Lakes also has a close relationship with researchers who have used Adopt-a-Beach data as they have worked to better understand the abundance and environmental drivers of human-caused litter in the Great Lakes region and to show the prevalence of plastic in litter found along the Great Lakes.

We already know enough about plastic pollution to understand that we need to act. Scientists have been studying plastic pollution in the ocean for decades. Overall, there is a lot less research about plastic pollution in the Great Lakes and freshwater. To fully understand the scope of harmful impacts on Great Lakes communities and wildlife, more research is needed.

**MORE RESEARCH
ON GREAT LAKES
PLASTIC POLLUTION
IS NEEDED**



Pieces of plastic found on the shoreline of the Great Lakes at an Adopt-a-Beach cleanup.

PC: Lloyd DeGrane.

Impacts of Great Lakes Plastic Pollution: Before the Beach

Mostly, our Adopt-a-Beach program intercepts the issue of plastic toward the end of the cycle—after the plastic product has been used for its intended purpose and discarded. However, plastic is harmful during all of its stages—from production to disposal.

THE BUILDING BLOCKS OF PLASTIC

Sometimes, on the beach, volunteers see evidence of the harms of the plastic production process in the form of industrial plastic pellets (informally called nurdles). These are very small pellets of plastic and chemical additives that are less than 5 millimeters in size. They are the building blocks of plastic. They consist of petroleum, coated and/or mixed with toxic chemicals. They are intended to be processed into plastic—think plastic bottles, cups, and packaging. These manufacturing raw materials have been found littering our beaches, along with other small pieces of plastic and other materials. Industrial pellets are used to create plastic products and have

been found on the shore of every Great Lake. Industrial plastic pellets are ending up on the shore and in the Great Lakes due to being spilled during the manufacturing supply chain, which can happen during container loading or from improper disposal at factories or from a spill, which have been documented in the Great Lakes region. These are most similar to an oil spill—the industrial plastic pellets and the toxic chemicals that are attached can then go on to harm the environment, wildlife, drinking water, and people, just like any other microplastic. It is time for us to hold producers accountable for spilling and disposing of these pollutants into our waterways.

HEALTH IMPACTS OF MANUFACTURING

While discarded plastic poses serious risks, perhaps the greatest environmental injustices are seen during plastic production. Petrochemical and plastic plants are very dangerous for workers and surrounding communities.

Factories manufacturing plastics release highly toxic, cancer-causing emissions, posing serious health and safety risks for workers and nearby residents. Residents living adjacent to these manufacturing plants experience “high rates of premature birth, low birth weight, childhood leukemia, asthma, chronic obstructive pulmonary disease, cardiovascular disease, vehicular injuries, and mental health problems.” In addition, plastic production workers “suffer high rates of cancer and lung disease.”

As we step away from fossil fuels being used for energy and transportation, the oil and gas industry has leaned into the production of petrochemicals, toxic chemicals that are made from oil and gas that are used to make plastics and other products. The health and environmental impacts felt from the extraction and transportation of oil and gas apply to the overall production of plastic products as well. The toxins involved with those processes can cause many harmful effects, such as damage to sensory organs, effects on bodily systems, impairment of the immune system, and increased likelihood of cancer.



Industrial plastic pellets (informally called nurdles) found in South Haven, Michigan.

*Photo Credit:
Juliann Krupa*

PLASTIC AND CLIMATE CHANGE

Plastic also contributes to climate change, emitting greenhouse gases during every stage of its life. These emissions “are a significant threat to the environment as [they] contribute to global temperature rise.” In fact, “by 2050, a high volume of plastic production will be responsible for up to 13% of our planet’s total carbon budget.” Petrochemicals, which are made from oil and gas, are becoming the largest drivers of the global oil demand. The fossil fuels used to produce plastic leave a huge carbon footprint. Additional greenhouse gases are emitted during plastic refining and manufacture, with refining being among the “most greenhouse gas-intensive manufacturing sectors—and the fastest growing.” The effect of plastic on climate change doesn’t end once it’s produced. Waste management of plastic—whether it’s landfilled, recycled, or incinerated—all release greenhouse gases that contribute to climate change. Plastic products also release greenhouse gases as they break down in the oceans, rivers, or on land.

NOT EVERYONE IS IMPACTED EQUALLY

It is very important to note that not everyone is impacted equally by the injustices of plastic production and pollution. From Illinois and Michigan to Louisiana and

Texas, petrochemical and plastics plants are predominantly located in low-income communities and communities of color. Residents living near these facilities bear a disproportionate and ever-accumulating burden of health impacts from chemicals known to be toxic and harmful to human health, causing increased cancer, asthma, and other chronic life-shortening health conditions.

We can and must do better. From our experience in the Great Lakes, pollution cleanup is the least efficient and most expensive way to address this challenge. Preventing harm at the source is the most effective and impactful intervention.

Now is the time to work toward a just transition away from toxic and harmful materials such as plastic and toward more sustainable solutions. One path forward would borrow from both the clean energy transition in Illinois and the plastic reduction solution in California, both of which dedicated resources to clean up the legacy pollution in front-line communities while investing in building resilient neighborhoods, careers advancing sustainable solutions, and ensuring our ecosystems are healthy and vibrant for generations to come.

Moving Toward Solutions

As is heavily reflected in the Adopt-a-Beach data collected by dedicated Alliance for the Great Lakes volunteers, plastic pollution is a huge problem in the Great Lakes, affecting community members at every stage of the cycle of plastic—from production to disposal. To combat this issue, we are going to need a multi-pronged approach, with participation from all of us. Individuals, businesses, governments, and manufacturers all have a role to play. Here are ways that individual residents can join the fight against plastic pollution in the Great Lakes:

- **Refuse single-use plastic items and encourage reuse/refill.** Remembering is the first step! Start a new habit: Use refillable water bottles and refuse single-use plastic items like plastic grocery bags and other single-use plastics. [See more ways to reduce your single-use plastics.](#)
- **Help your community reduce its plastic use.** Local changes can make a big impact. Learn what's happening locally, then take action. Are there water refill stations in your public parks? Has your town or school board banned single-use plastic and polystyrene foam cups and food containers? [Get more questions and resources to help you act locally.](#)
- **Speak up and support local, state, and federal laws and policies that reduce single-use plastic and advance sustainable solutions.** Use social media

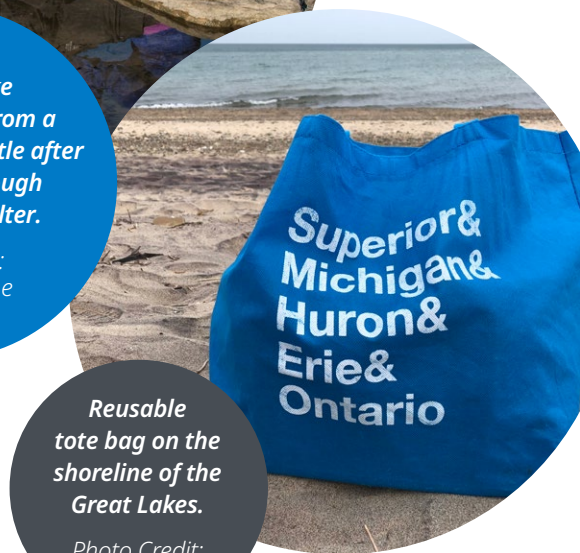
to amplify and encourage action, contact your elected official, hold educational events, and urge action today.

- **Last but certainly not least, join an Adopt-a-Beach cleanup and add to our Great Lakes litter database!** It's a fun, easy way to give back to your community and the lakes. The data you collect is super valuable, giving us insight into issues like plastic pollution. [Find a cleanup near you](#) or [become a Team Leader](#) and host a cleanup of your own.



Drinking Lake Superior water from a reusable water bottle after pumping it through a micro mesh filter.

*Photo Credit:
Lloyd DeGrane*



Reusable tote bag on the shoreline of the Great Lakes.

*Photo Credit:
Olivia Reda*

Individuals of all ages can make a difference in their community through the Adopt-a-Beach program.

Photo Credit: Lloyd DeGrane



Adopt-a-Beach volunteer picking up a plastic water bottle.

Photo Credit: Lloyd DeGrane

The Adopt-a-Beach program is a great example of the power that lies in people coming together for a common cause. However, if we are going to change the tide on this issue, we need action that goes well beyond the individual. We need the government and plastic producers to join the fight. We need a systemic solution.

Ultimately, the most effective way to reduce plastic pollution is to reduce the production of single-use plastic and to hold producers responsible for the waste their products generate.

Residents, businesses, governments, manufacturers, and organizations like the Alliance for the Great Lakes all need to come together and encourage policy that does the following:

- Reduces or eliminates the most problematic plastics, like single-use plastic (including plastic foam and plastic bags) and microfibers;
- Prevents pollution at the source by stopping industrial plastic pellets from spilling into our lakes;
- Encourages business innovation and deploys new technologies such as including microfilters in all washing machines just as we do for dryers;
- Increases access to clean water through water refilling stations as well as reuse and refill packing solutions; and
- Holds producers responsible across the life cycle of their products and packaging from design and materials to end-of-life management, and incentivizes innovation, moving toward reusable and sustainable alternatives, with the objective of using less plastic in the first place.



EXTENDED PRODUCER RESPONSIBILITY

As noted throughout this report, there is no simple solution; the problem is complex and multifaceted. In order to make lasting, impactful, and sustainable change, we need systemic changes that bring many different partners together to build new and innovative solutions. **Extended producer responsibility (EPR)** laws are just that sort of solution: EPR laws hold producers responsible for product management through the product's life cycle. A movement

is gaining traction in the United States: California, Colorado, Maine, and Oregon have all passed versions of EPR policies. Our colleagues in Canadian provinces Ontario and Quebec, as well as many European Union countries, have been implementing EPR policies for years. We in the Great Lakes region have much to learn from the early adoptions of these policies. The Alliance for the Great Lakes is working to bring these innovative approaches to the Great Lakes.





Adopt-a-Beach Team Leaders checking in volunteers for a cleanup.

*Photo Credit:
Lloyd DeGrane*

THANK YOU!

The Alliance for the Great Lakes Adopt-a-Beach program and region-wide litter dataset would not be possible without the endless hours, effort, and resources generously provided by our dedicated volunteers, partners, donors, and funders. We are so grateful for each and every action you have taken to help protect the Great Lakes.

Thank you for being Great Lakes champions!



A Team Leader adding up litter totals from an Adopt-a-Beach cleanup.

*Photo Credit:
Olivia Reda*



Volunteers weighing litter removed at an Adopt-a-Beach cleanup.

*Photo Credit:
Lloyd DeGrane*



Corporate Adopt-a-Beach cleanup participants.

*Photo Credit:
Cristal Ramirez*



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PROTECTING WATER, SUSTAINING LIFE

The Alliance for the Great Lakes is a nonpartisan nonprofit working across the region to protect our most precious resource: the fresh, clean, and natural waters of the Great Lakes. Learn more at greatlakes.org.