

MILWAUKEE WATERS INVESTIGATION

Activity #4 – Microplastics

Purpose: This activity will briefly introduce students to plastic and microplastic pollution that is an increasing global problem. They will learn about the source of this pollutant, how to collect samples for analysis and solutions to reduce plastic and microplastic pollution.

Students will be able to observe the debris, sediment or sand they collect using a hand lens or stereomicroscope to possibly identify if microplastic particles are present.

Topics Reviewed: Plastics, microplastics, single-use plastics, GPS location, sample collection and analysis, citizen scientists, and solutions to reduce plastic pollution.

Grade Levels: 4th - 12th grades

Background:

Since 1972 research has found, and awareness is growing, that there are enormous quantities of plastic waste in our environment. Scientists have found small pieces of plastic, or microplastics, in the air, on the peaks of mountains, in Arctic ice and in the waters of oceans, lakes and streams. These tiny pieces have also even been detected in fish, birds and animals, and in our [blood](#), food, seafood, bottled and tap water, salt and sugar.

What are microplastics and where do they come from?

Microplastics are tiny pieces of plastic that are smaller than 5 millimeters (0.197 inches or the top of a pencil eraser) that can enter the environment from a variety of sources. There are many types of plastic that break down in different ways and in different sizes. Most microplastics are not manufactured, but are the result of larger pieces of plastic breaking down over time. For example, analysis has shown that [tire pieces](#) breaking down from friction with the road are a significant percentage of pieces in the planet's oceans, lakes and streams. However, nurdles and



Bird with stomach full of man-made plastic. Sparkle Motion/Flickr (CC BY 2.0)



microbeads are manufactured microplastic products that are used as pre-production pellets or abrasive ingredients in personal care and cleaning products.

Microplastic sources include:

- Larger pieces of plastic from plastic bottles, packaging, bags and toys that are already in the environment and breaking down over time from sun and wave action.
- Threads and microfibers of synthetic clothing from washing machines.
- Nurdles that are molded into products and microbeads from toothpaste, cosmetics, and cleaning products.
- Small fragments from car tires as they wear down.
- The air – tiny pieces such as fibers can be transported via the wind and are in larger concentrations near cities.

Are microplastics harmful?

Microplastics have been identified as a worldwide environmental pollutant and their effects on animals and humans are not yet fully understood. More research using many types of scientific study is needed to determine the impacts on health of humans and wildlife. Identifying and quantifying microplastics and methods to collect and analyze samples are evolving, complex, very time-consuming, and costly.

[Evidence suggests](#) that microplastic pieces can cause physical harm to small creatures when they mistake the small pieces for food and particles fill their stomachs and impair their ability to obtain nutrients. Some scientists are also concerned that microplastics can [absorb toxins from the sediment and water](#) to become even more toxic and may transport harmful chemicals into humans and other animals.

What's the future of Microplastics? Unless we take steps to reduce our use of plastics, it is likely that concentrations of microplastic will increase in the environment over time, increasing the potential for harm. This claim is based on the reality that plastic production is dramatically increasing every year, larger plastic pieces create smaller plastic pieces, and the fact that plastic does not degrade, but keeps breaking into smaller pieces. The story could have a happier ending if we reduce our use - especially of single-use plastic, tell manufacturers to find environmentally friendly plastic alternatives, and possibly find new formulas to reduce plastics from breaking down into such small pieces.

Microplastics Discussion

- Inquire if students have any knowledge of the topic of plastics and microplastics in the environment.
- Ask students to name 10 plastic items they can see from where they're sitting.
- Ask how they think plastic gets in the environment.
- Review the [Plastic-Free MKE presentation](#) or any short videos on microplastics. See resources below.
- Watch a quick plastic reduction and solutions [video](#).
- Inform students that when they or the general public collect samples to analyze they are called “**citizen scientists**”.

Other Microplastics Resources and Bibliography:

- **Plastic-Free MKE** – Education Tool Kit: [Lessons](#), [Videos](#) and [Reading List](#),
- **EarthEcho International** - [PlasticSeas](#) lessons
- **Tampa Bay Estuary Program** - [Microplastic Sampling](#) lesson
- **NOAA** - [Microplastic Research in the Classroom](#)
- **Florida Sea Grant** – [Microplastics Awareness Project – lessons](#)
- **Nearpod** – [Microplastics](#) – student online activity for 6-8th grade including polls, survey and 10 question quiz (account needed).

Videos and Articles:

- **Video** - [NOAA - What are Microplastics](#) (1 min.)
- **Video** - **The Story of Stuff:** [The Story of Microbeads](#) (3 min.)
- **Video** – **Pew Charitable Trust:** [Breaking the Wave of Plastic](#) (3 min.)
- **Video** – **Today:** [Microplastics: What are they and where do they come from.](#) (4 min.)
- **Video** – **TedX:** [Microplastics Local Problem – Local Solutions](#) (10 min.)
- **Article** – **Critter Facts:** [5 Ways to Reduce Your Plastic Footprint](#)
- **Article** – **Grove Collaborative:** [Microplastics - What they Are, Why They're a Problem and 5 Ways to Avoid Them.](#)
- **Article** – **Mississippi University:** [Microplastics Sampling and Processing Guidebook](#)