Microplastic in Montana

A Study of Fifty River Access Sites

ENVIRONMENT MONTANA
RESEARCH & POLICY CENTER

FRONTIER GROUP

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Introduction

Every day, people throw away tons of plastic "stuff" – cups, plates, bags, containers, forks, knives, spoons and more.[1] All of this waste not only trashes our parks and public lands, but it also washes into our rivers, where it harms wildlife.

Once in our environment, plastic does not decompose. Instead, it breaks down into smaller and smaller pieces known as microplastics.

For a bird or fish, it's easy to mistake these small pieces of plastic for food – especially when there are thousands of pieces of microplastic floating in the waterway. Scientists have found that ingesting even tiny particles of plastic can alter the behavior and metabolism of fish in our lakes and rivers, and people can ingest these chemicals as they make their way up the food chain.[2,3]

A widespread problem

Scientists are still documenting the scope of plastic pollution and investigating its effects in freshwater ecosystems, but microplastics have recently been found in a number of remote environments throughout the world:

- US Geological Survey researchers found microplastic in 90% of rainwater samples collected from six sites in and near Rocky Mountain National Park;[4]
- Researchers found microplastic concentrations in the air of a remote section of the French Pyrenees Mountains that were as high as in Paris;[5] and
- There is growing evidence that isolated marine environments in the Arctic and Antarctic now have plastic pollution as well.[6]

Studies in Montana have also found microplastic in local waterways. A 2018 Adventure Scientists study found microplastics in 57% of samples collected from the Gallatin River watershed.[7] An ongoing study of Flathead Lake found microplastic there as well.[8]

Caption: (top) A piece of a polystyrene foam cup is found next to the Missouri River at the Ulm Bridge Fishing Access Site in Ulm, MT. Credit: Skye Borden.

Caption: (bottom) A plastic bag breaks down on the bank of the Clark Fork River at the Sha-Ron Fishing Access Site near Missoula, MT. Credit: Skye Borden.

Methodology

The goal of the microplastic study was to examine the presence and type of microplastics near fishing access areas across Montana. To that end, our 50 study sites were selected from maintained fishing access sites to represent a range of physical geography, population pressures, and waterbody types.

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 University Extension, Dauphin Island Sea Lab and Sea Grant.[9]

Water samples were collected from our 50 sites in glass quart jars that had been cleaned and triple-rinsed in filtered water. At each site, samplers walked out from the center of the fishing access ramp or trail to a water depth of approximately two feet and drew water samples from this point. When sampling in moving water, participants sampled upstream from themselves to minimize the potential for contamination.

Ten quarts were drawn at each site. All jars were labeled and recoded in a field data sheet with the sample number, site description, and date. The jars were then transported to the lab for processing.

All lab materials, including the filter funnel and petri dishes, were triple rinsed with filtered water between samples to minimize potential contamination from outside sources.

Samples were processed by using a filter flask and hand pump to pass water through 47 mm gridded filtered papers. The filter paper was then transferred to a petri dish for visual inspection under a digital microscope at 40x magnification.

To aid in visual identification, additional "squeeze tests" were performed with fine-tipped tweezers on any potential microplastic pieces. Any pieces that could not be positively identified through both a visual and squeeze test were not recorded.

Identified microplastics were categorized into four types:

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

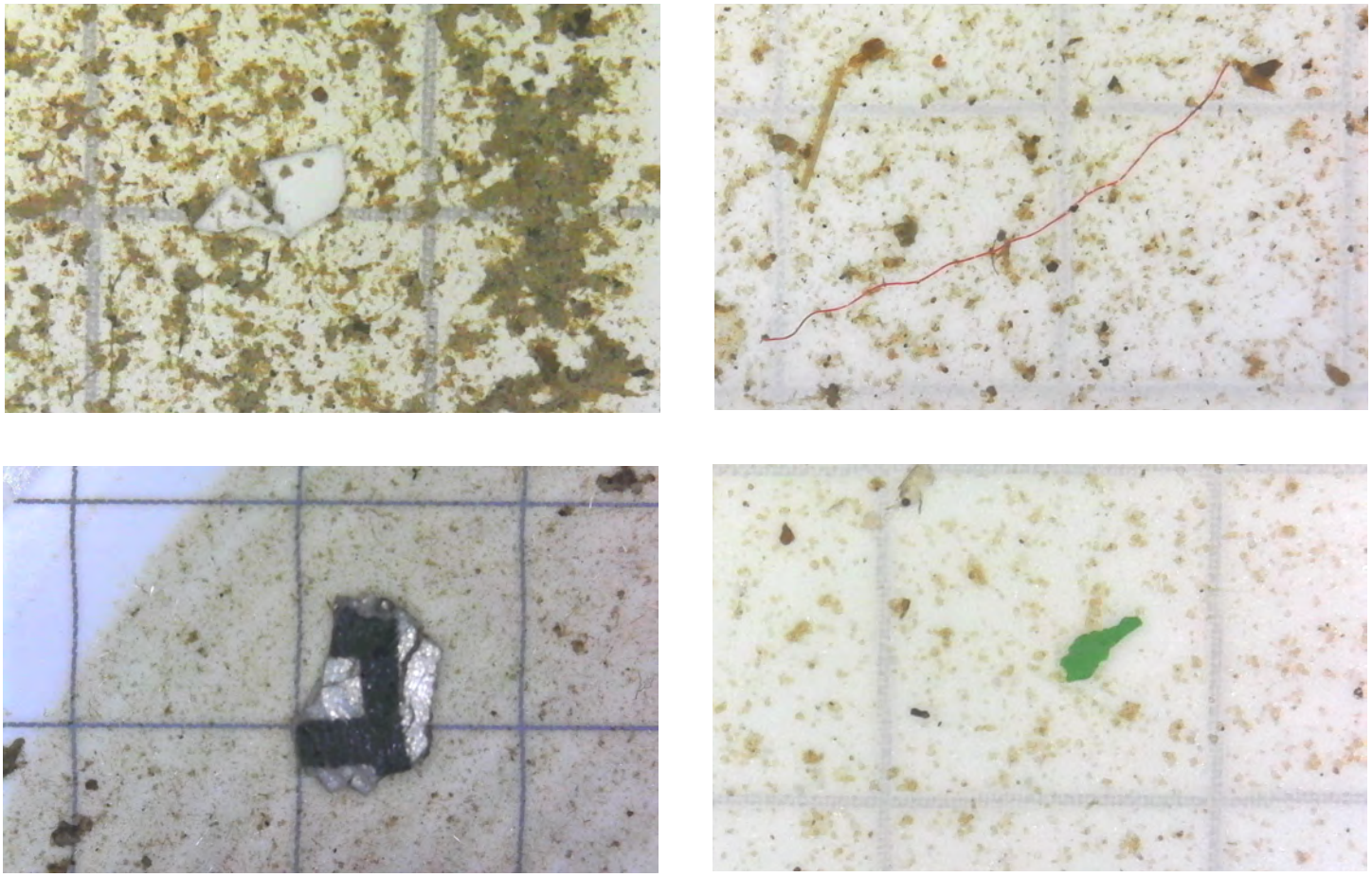
A digital photo was taken of each identified microplastic, and totals for each site were recorded in a data table.

Results

Of the fifty sites tested, thirty-three (66%) contained one or more types of microplastic.

Half (50%) of the sites contained microplastic fragments; twenty-one (42%) of the sites contained fibers; and nine (18%) of the sites contained film. Microbeads, which have been banned in personal care products in the United States since 2018,[10] were not found at any site.

OBSERVED MICROPLASTIC TYPES



Digital microscope images (clockwise from top left): a polystyrene fragment from Russell Gates Memorial Fishing Access Site on the Blackfoot River; a red fiber from the Tobacco River Campground on the Tobacco River; another fragment from Middle Thompson Lake at Logan State Park; and a piece of film (with writing still visible) from Riverfront Park on the Yellowstone River. Credit: Environment Montana Research & Policy Center.

OBSERVED MICROPLASTIC BY SITE

Access Site Name	Waterbody	Microplastic Present?	Observed Microplastic Types			
			Fiber	Fragment	Film	Microbead
Pump House	Big Hole River	No				
Salmon Fly		No				
Sportsman's Park		No				
Brewery Flats	Big Spring Creek	Yes		●		
Manuel Lisa	Bighorn River	No				
Hannon Memorial	Bitterroot River	No				
Chief Looking Glass		Yes		●		
Demmons		Yes			●	
Russell Gates Memorial	Blackfoot River	Yes		●		
Blacktail Meadow	Blacktail Deer Creek	Yes	●	●		
Big Rock	Boulder River	Yes	●			
Bull River Campground	Bull River	Yes		●		
Big Pine Campground	Clark Fork River	Yes	●			
Drummond		Yes	●	●		
Sha-Ron		Yes	●	●		
Flatiron Ridge		Yes	●	●	●	
Kona		Yes	●	●		
Ducharme	Flathead Lake	Yes			●	
Woods Bay		No				
Fort Peck Marina	Fort Peck Lake	Yes		●		
Rainbow Point Campground	Hebgen Lake	No				
Holland Lake	Holland Lake	No				
Silver Star	Jefferson River	Yes		●		
Cardwell Bridge		Yes		●	●	
Blackwell Flats	Kootenay River	Yes		●		
North Lion Lake	Lion Lake	No				
Little Blackfoot	Little Blackfoot River	Yes	●	●	●	
Blackbird	Madison River	Yes	●			
Damselfly		Yes	●	●		
Ennis		Yes		●	●	
Loma Bridge	Marias River	Yes	●	●		
Paola Park	Middle Fork Flathead River	No				
Logan State Park	Middle Thompson Lake	Yes	●	●		
Alkali Creek	Milk River	No				
Fresno Tailwater		Yes		●		

OBSERVED MICROPLASTIC BY SITE (continued)

Access Site Name	Waterbody	Microplastic Present?	Observed Microplastic Types			
			Fiber	Fragment	Film	Microbead
Mid Canon	Missouri River	Yes	●	●		
Ulm Bridge		Yes	●	●		
Polebridge	North Fork Flathead River	No				
Upper Prickly Pear	Prickly Pear Creek	Yes	●	●	●	
Water Birch	Rock Creek	No				
Silver Bow Creek	Silver Bow Creek	Yes	●		●	
Tobacco River Campground	Tobacco River	Yes	●	●		
Twelve Mile Dam	Tongue River	No				
Whitefish Lake State Park	Whitefish Lake	No				
Yaak River Campground	Yaak River	No				
Black Bridge	Yellowstone River	No				
Mayor's Landing		Yes	●			
Grey Owl		Yes	●	●		
Yankee Jim		Yes	●	●		
Riverfront Park		Yes	●		●	

Most of the sites with the highest microplastic concentrations were near metropolitan areas. The ten most concentrated sites were within 40 miles of the center of one of Montana's seven core-based statistical areas.[11]

DISTANCE TO POPULATION CENTERS

Site	Waterbody	Microplastic Total	Nearest CBSA	Distance (miles)
Big Pine Campground	Clark Fork River	12	Missoula	33
Little Blackfoot	Little Blackfoot	10	Helena	30
Yankee Jim	Yellowstone River	9	Bozeman	35
Riverfront Park	Yellowstone River	7	Billings	3
Mid Canon	Missouri River	6	Great Falls	38
Kona	Clark Fork River	6	Missoula	8
Silver Bow Creek	Silver Bow Creek	6	Butte	17
Upper Prickly Pear	Prickly Pear Creek	6	Helena	4
Mayor's Landing	Yellowstone River	5	Bozeman	25
Sha-Ron	Clark Fork River	5	Missoula	3

Policy Recommendations

PHASE OUT SINGLE USE PLASTICS

Nothing you use for a few minutes should be able to pollute the environment for hundreds of years. Municipalities should adopt ordinances, like Missoula's proposed bag ban,[12] to phase out unnecessary single-use plastics such as polystyrene take-out containers, plastic bags, and straws.

ENCOURAGE REUSE

Whenever possible, municipalities should adopt practices that make it easier for residents to use reusable materials instead of single use plastics. The *Refill Not Landfill* program in Whitefish, for example, identifies water refilling stations that residents and tourists can use around town.[13]

DEVELOP GREEN INFRASTRUCTURE

A recent study found that car tire debris from stormwater runoff may be a significant contributor of microplastic pollution.[14] Green infrastructure projects, such as Bozeman's boulevard infiltration system,[15] can reduce the amount of stormwater and plastics that wash directly into our waterways.

INCENTIVISE BUSINESSES

Communities should provide recognition for businesses that successfully transition away from the use of unnecessary plastics.

MAKE BETTER PURCHASING DECISIONS

Montana state agencies should include plastic reduction goals and post-consumer recycled product goals as part of their procurement plans.

Photo: Director Skye Borden picks up plastic trash along the Bitterroot River in Hamilton, MT. Credit: Small Axe Productions.

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