

# Sports & Outdoors

## A chilling concern: faux fabric, plastic in the water, and what we can do about it



Synthetic fabrics are ubiquitous when dressing for the outdoors and sport, especially during winter, but new evidence shows that laundering those fabrics may be contaminating waterways with plastic particles. Stock photo

**James Wisniewski**  
Leader Sports

What clothing you put on each morning may have consequences beyond your comfort or style.

There's mounting research that suggests synthetic clothing and fabrics are contributing to increasing pollution in oceans and freshwaters.

Since 2013, Bozeman-based research group Adventurers and Scientists for Conservation (ASC) has collected water samples around the world with startling results.

Marine samples taken from waters near Antarctica, Maine and all points in between, reveal the presence of microplastics. These tiny plastic particles vary in size from nanometers, invisible to the naked eye, to five millimeters, about the height of the numbers on a credit card.

Cause for concern stems from these particles' ability to carry known toxins like DDT and Bisphenol-A (BPA), both of which multiple studies have linked to a slew of negative health effects.

"These polymers are oil-based and toxins are attracted to them. Lots of microbes that we know are bad, they readily attach to these particles. The particles are easily mistaken for food by aquatic life," said Jenna Walenga, ASC Microplastics program manager. "They [plastics] never disappear, they only keep breaking down."

In a 2011 study, ecologist Mark Browne, of the University College Dublin and volunteers tested beaches on six continents for the presence of microplastics.

Every beach contained the particles in question.

According to Browne's research, published in the peer-reviewed journal, *Environmental*

*Science and Technology:*

"An important source of microplastic appears to be through sewage contaminated by fibers from washing clothes.

"Forensic evaluation of microplastic from sediments

showed that the proportions of polyester and acrylic fibers used in clothing resembled those found in habitats that receive sewage-discharges and sewage-effluent itself.

"Experiments sampling wastewater from domestic washing machines demonstrated that a single garment can produce [more than] 1,900 fibers per wash.

"This suggests that a large proportion of microplastic fibers found in the marine environment may be derived from sewage as a consequence of washing of clothes."

Translation: Browne found that most of the microplastics came from the synthetic fabrics most commonly used in clothing manufacture.

He also found that sample sites closer to areas of high-population density contained more microplastics.

The problem isn't just what's ending up on the beach; it's also what's ending up on our plates and possibly in our drinking

water.

"Potentially microplastics do end up in drinking water," Walenga said. "In some tests of tap water in this area [Gallatin River Watershed] and in Maine we do find some small pieces of plastic."

As Walenga also pointed out, marine life—especially bottom feeders—eats microplastic particles.

Microplastics work their way up the food chain and become increasingly concentrated as larger fish eat smaller marine life that has already consumed microplastics.

Several U.S. and international studies have found evidence of this, with a study of fish in the English Channel showing that 36.5 percent of fish examined had ingested plastic.

When synthetic clothing is washed, up to 2,000 tiny plastic fibers are shed.

Those particles are too small to be seen and too small to be trapped by the typical washing machine filter, so when they leave the washing machine, the particles slip through sewage treatment systems and eventually enter waterways.

Recently, ASC found that microplastics aren't exclusive to oceans and coasts.

Sampling along the Gallatin River Watershed showed the presence of these particles at five different survey sites.

As a result, ASC began a major data collection in September involving 60 volunteers taking water

## What's in a jacket?

If it's a fleece jacket, then chances are it's comprised of a relatively new fabric (or derivative of) invented in the late 1970s under the name Polar Fleece, which *Time Magazine* has since named one of the 20th century's greatest inventions.

After beginning production in 1906, Massachusetts-based Malden Mills made everything from wool sweaters to wool military uniforms during the course of its history.

Dupont Chemical set off a polyester boom that altered wool's place in the market for decades to follow when it introduced polyester in 1951. Today, polyester is typically made from polyethylene terephthalate, a plastic derived from petroleum.

Regardless, the synthetics boom compelled Malden Mills to experiment with polyester fibers,

weaving the synthetic yarn in a number of different styles.

The "ah-ha" moment for Malden Mills came when one of their dense polyester weaves was brushed.

The brushing created the familiar fur, or nap, that is commonly associated with

fleece garments; it also improved the fabric's feel, insulating and moisture wicking abilities.

By 1979, Malden Mills had created a viable alternative to wool, previously the only textile-game in town for warm, insulating fabric.

Fleece seemingly solved all of the problems with wool: it was lighter, cheaper, relatively itch-free and non-allergenic and moths had no desire to eat it. And oddly enough, Malden Mills didn't immediately pursue a patent.



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### ...most of the microplastics came from the synthetic fabrics most commonly used in clothing manufacture.

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samples at 71 different sites from Three Forks to Big Horn Pass in Yellowstone National Park, Wyo.

Samples taken in remote areas will help provide a sort of control.

"Are [microplastics] possibly entering [water] from the air? That's why we test in National Forests and National Parks—what might people might consider less-impacted areas," Walenga explained.

The group will take samples three more times, for a total of four.

The next sampling will take place in December, Walenga said. "We're looking for baseline

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# Sports & Outdoors

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information, to see if flow levels [have any effect] and to see if there are any sort of patterns," Walenga said.

To protect against contamination, volunteers do not wear synthetic clothing when taking samples. Stainless steel bottles are used for collection and first rinsed in the sample site. A single fill follows after which the containers are closed; they remain unopened until they arrive in Maine at the lab of research scientist Abigail Barrows.

To determine the presence of microplastics, Barrows pumps samples through a gridded, 0.45 micron filter, allows the filter to dry and then systematically examines the grid under a microscope with a magnification rate of 40x.

Barrows is looking for plastic particles smaller than 5mm. She notes particles' size, shape and color.

Initial results from the ASC Global Microplastics project, including the number of plastics per liter, are plotted on a world map and can be viewed at <http://www.adventurescience.org/microplastics.html>.

Despite the increasing evidence, there's no way to know yet what exactly is causing the presence of microplastics in water samples the ASC has taken from the Gallatin Watershed.

It's likely the shedding of plastic fibers from synthetic fabrics, but even then the perpetrator could be any number of items from jackets to polyester base layers, or even synthetic fishing line and netting.

Walenga said that some have suggested that carpeting or upholstery might even be the culprit.

That said, "Synthetic clothing is going to shed. We know that it's likely to shed because of the way it's made. And fuzzy fabrics (like fleeces) are more likely to shed," Walenga explained. "We aren't able to say 100 percent that it's a fleece jacket. We have a

**...there's no easy solution to this pollutant problem. It's not as simple as just telling everyone to buy wool and cotton clothing due to the large environmental impact of producing both of those textiles.**

feeling that it's probably from synthetic clothing or fishing line, but further analysis is needed to determine what's causing the polymers."

Walenga is quick to point out that there's no easy solution to this pollutant problem.

It's not as simple as just telling everyone to buy wool and cotton clothing due to the large environmental impact of producing both of those textiles.

She also acknowledges a dearth of alternatives. In the world of outdoor sports and performance outfitting, synthetic fabrics are inescapable.

They were developed for good reason: breathable, durable, lightweight and warm are easy selling points.

And they were a revelation, Walenga said. "But only now are we beginning to see the long-term effects of [those fabrics] development."

Even though there's no "big solution," there is cause for optimism.

Walenga advocates a three-tiered approach for those asking "What can I do to make a difference?"

Consumer awareness is the first tier. For example, washing fleece and synthetics less or not at all, buying natural fabrics like cotton and wool, and choosing second-hand clothing.

The second tier might be washing machine manufacturers making changes to machines' filters along with clothing makers innovating and changing the textile-manufacturing process.

Neither of those is a fast fix; nor is the last tier, legislative action, but Walenga points to the recent bans of microbeads as an example of the effect consumer awareness and advocacy coupled

with good data can have.

Plastic microbeads used in exfoliants, soaps and other cosmetics came under fire when researchers found that the non-biodegradable plastic beads made their way past most wastewater treatment systems and into waterways where fish consumed them with ill effects.

Consumer outcry, backed up by scientific research, has already forced incredible change.

Last month, California banned the tiny pollutants, joining six other states that have already passed laws restricting products that use microbeads.

Unilever and L'Oreal are two of the five largest cosmetic corporations in the world and

are among the companies that have promised to phase out their use of the beads in cosmetics.

Unilever has said all of its products will be plastic-free by the end of 2015.

L'Oreal's large back stocks mean products containing microbeads won't be gone until 2017, though, according to a L'Oreal press release.

"Only then [after research on the effects of microbeads was published] did people start to pay attention," Walenga said. "And now we have bans...those things wouldn't have happened without that research first. Right now we're at the research stage [with the Gallatin Watershed Microplastics program]."

## Outdoor Notes

### First turns

Big Sky Ski resort was the first ski area in Montana to offer lift-served skiing this season.

Big Sky opened for one day only Nov. 7 with the Swift Current and the Lone Peak Triple chairs both turning. Big Sky will open for good, Nov. 26.

The resort's early opening snapped Great Divide Ski Area's 10-year streak of being the first ski area in the state to open.

### Save the bats that save us from biting bugs

White Nose Syndrome is an emerging disease that has devastated hibernating bat populations, causing the most precipitous wildlife decline in North America in the past century. It is estimated that between 5.7 and 6.7 million bats have died from White Nose Syndrome since it was first detected almost ten years ago in a New York cave. It has spread to 26 states and five Canadian Provinces since.

It spreads primarily from bat to bat; however, people can potentially spread the fungal spores responsible for White Nose Syndrome among caves, mines and other bat roost sites.

The Northern Region of the Forest Service has been working with the Northern Rocky Mountain Grotto and several other agencies to develop educational signs about bats and White Nose Syndrome.

Two large signs were created and recently installed on the exterior of two of the Region's most visited caves. Smaller signs will be placed inside of the more sensitive caves along with new cave registers.

During International Bat Week (Oct. 25-31) the Grotto installed several of the small signs in caves in the Beaverhead-Deerlodge National Forest.

"Our goal is to educate others about White Nose Syndrome and bat conservation and provide decontamination information to help reduce the human caused spread of White Nose Syndrome, said Forest Service Biologist Amie Shovlain. "Bats are our most important natural predators of night-flying insects, consuming mosquitoes and, moths, among others.

"Many of these insects are serious agricultural or forests pests. Every year, bats save us billions of dollars in pest control simply by eating insects."

Northern Rocky Mountain Grotto President Ian Chechet commented that:

"The signs will help explorers to understand how important it is to 'Leave No Trace' of their visit. Many caves across the state have garbage left behind by

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In just a few years, fleece would saturate almost every segment of the clothing market.

Malden Mills sold its fabric as "Polar Fleece" and first offered it to consumers in 1981.

Fleece became a hit when Malden Mills partnered with a relatively new outdoor wear company called Patagonia.

The result of the collaboration was the "Synchilla Snap-T Fleece Pullover," which went on sale in 1985 and fostered a host of imitators.

The quarter-zip or quarter-button-up pullovers that can be found at almost every apparel store today can all trace their origins back to the Synchilla Snap-T.

All the knock-offs also nearly put Malden Mills out of business for good. Following bankruptcy proceedings in the 2000s the company was sold and rebranded Polartec in 2007; it continues to produce a variety of synthetic and natural performance fabrics, having thoroughly intertwined its fortunes with fleece and its offshoots.

## What's all the stink about?

Besides a potentially negative environmental impact, fleece suffers from a few drawbacks.

- A low melting point. Stay too close to the campfire for too long and your fleece might end up a little warped-looking. Manufacturers get around this problem with flame-retardant chemical treatments. Probably not a bad idea since fleece retains lots of static electricity.
- Fleece is hydrophobic (resists water and thus soap) but holds bacteria. That smell is synthetic fabric. Stink issues are one of the reasons merino wool has made a comeback as baselayers and socks and other gear.



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