

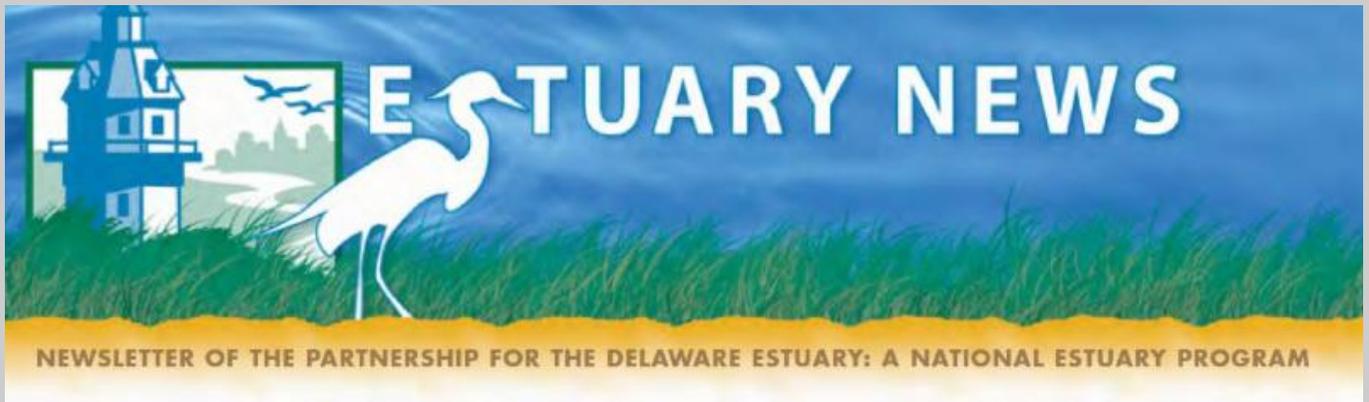


**RT ENVIRONMENTAL SERVICES, INC.**

*Your Solution-Oriented Environmental Services Firm*

RT Environmental Services Spotlighted in Winter 2017 Estuary News

We are pleased to provide below an article published in the  
Partnership for the Delaware Estuary Newsletter



## **Micro-plastics: Where are They Coming From?**

By Gary Brown, President, RT Environmental Services



Micro-plastics are receiving increased attention, particularly since the passage of the Micro-Bead Free Waters Act of 2015. Micro-plastics are tiny pieces of plastics less than one-quarter of an inch in size that start out in different forms. Some micro-plastics start out as micro-beads in our personal care products, but others were previously microfibers in textiles, scrubbers used for industrial clothing, or they are plastic raw material broken down into smaller pieces.

Credit: Alice Dunseath - Film still from Plastic Shores(PlasticShoresMovie.com)

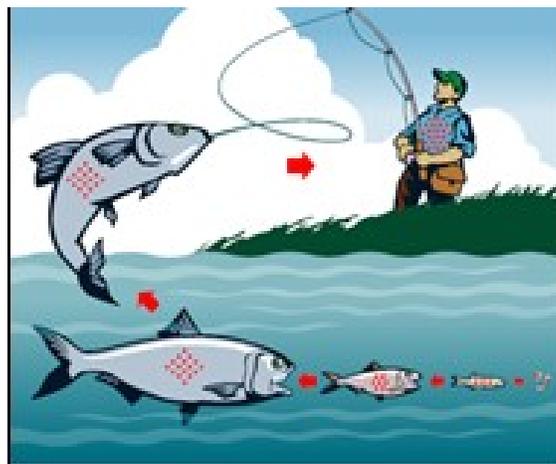
Micro-plastics concerns include:

- \* Plastic degrades slowly
- \* They can release contaminants into water
- \* Contaminants in polluted water can attach to micro-plastics
- \* Some of them look like fish food, so fish ingest them and we then eat the fish

Studies are under way throughout the world and there is increasing evidence of fish consumption of micro-plastics, and there is increasing evidence of fish consumption of micro-plastics, and there is rising concern that eating fish may be bad from a consumption standpoint for humans. There are few studies that define what happens from the contamination standpoint, about the significance or impacts from chemical contaminants in micro-plastics moving up the food chain.

Scientists say the oceans' fish are becoming smaller because of the damaging effects of plastics in the water. Exposure to high concentrations of micro-plastics has been found to stunt growth and alter their feeding habits by causing them to ignore their natural zooplankton food source. Consumption of micro-plastics has also caused fewer hatchlings and slow response to predators, causing the fish population to decrease. It has been estimated that by 2050 there will be more plastic in the oceans than fish.

The Micro-Bead Free Waters Act went quickly through Congress at the time of passage, but there are serious questions about whether it covers all actual sources of micro-plastics which get into our waterways. From an ecological standpoint, micro-plastics are not believed to be a threat to our water supplies as water supply technology usually provides filtration, but on the wastewater side, it is generally agreed that micro-plastics pass through domestic wastewater treatment plants. There are calls to determine the volume of micro-plastics in the Chesapeake Bay, and how they may be impacting health. The Chesapeake Bay is frequently viewed as a key estuary to study contaminants, due to its size and slow water turnover.



Credit: Frank McShane  
Pollutants like micro-plastics "bioaccumulate," or increase in quantity, as they move up the food chain. This happens when small fish, and then people

Micro-beads have received much recent attention because micro-beads are known to be a deliberate additive to facial products used for skin cleansing. During the use process, the beads break down, but there is research that suggests that micro-beads made of natural polyesters called PHAs (polyhydroxyalkanoates) can be considered biodegradable. PHA's are more dense than the plastics that occur in micro-beads, so they sink in water. Plastics and current micro-beads are buoyant, increasing the chance of them floating through sewage systems and into estuaries and marine ecosystems. Environmental groups are expressing concern that exfoliating scrubs and toothpaste with sparkles might be harming our ocean.

catch and eat them. The longer a fish lives, the more time it has to bioaccumulate pollution.



Credit: Delaware River Basin Commission  
Elaine Panuccio of the Delaware River Basin Commission collects water sample at Race Street Pier in Philadelphia on November 16. This was DRBC's first-ever sample for micro-plastics. It plans to improve this process before partnering on a project next summer.

Micro-plastics also come from larger plastic debris, such as plastic bottles and bags that have broken down into smaller particles. This source is considered a more difficult problem to address because of the ubiquitous nature of what is partially degraded litter present in waterways. Rain events have been observed to correlate the sharp increases in the number of plastic bottles, plastic bags and large plastic objects floating in water. Although litter traps can be somewhat effective, the discharge of larger plastics into water still leaves a significant large plastic source, which can break down over time. Studies in Australia's Sydney Harbour show that while the first two sources are well understood, the third source of micro-plastics is a mystery. However, more recent scientific studies strongly suggest that the remaining large source of plastic fibers is indeed clothing.

The key to fibers in clothes is knowing the details of what is involved. Polyester and acrylic fabrics are used for all sorts of clothing, from dresses to gym wear. They could be leaching upward of 700,000 tiny plastic fibers into the environment for each 15-pound load of laundry washed. This information comes from new research from Plymouth University.

Different materials shed different amounts of fibers, with acrylic sweaters shedding 729,000 fibers per wash, polyesters shedding 469,000 fibers per wash, and polyester/cotton blends shedding about 138,000 fibers per wash.

The type of detergent or softener used in the wash did have an effect on the amount of fibers shed, but there was no clear trend on increasing or decreasing quantities that could be correlated to the material type. It can therefore be concluded that the ubiquitous wearing and laundering of clothing is a relatively unknown, but major source of micro-plastics and the hardest to control.



While the full effects of plastic pollution are still being studied, there is concern that the chemicals in

Credit: Sea Education Association/Marilou Maglione

the plastics could kill fish before they reach reproductive age. It's also known that plastic bits build up in sperm whales for instance and contribute to their deaths. Studies have shown that 28% of the fish in Indonesia and 25% of the fish in the United States contain plastic debris. There is concern that if no action is taken, the quantity of micro-plastics in the environment will increase in the coming years.

Dr. Marcus Eriksen is a seasoned scientist who estimates that 269,000 tons of plastic from 2.25 trillion particles is present in the world's oceans. He has a Ph.D. in science education from the University of Southern California, and he started with a 2,000-mile, five-month journey down the Mississippi River on a homemade raft and decided to further study plastic marine pollution. Today he has completed sailing expeditions totaling 25,000 miles, and discovered new garbage patches of plastic pollutions in many areas of the southern hemisphere.

Micro-plastics have been found in ice cores across the sea floor, vertically throughout the ocean and on every beach worldwide. The little stuff is everywhere.

The life of plastic in oceans, part of a study underway since 2009, finds large plastic items leaving the coastline in droves, but it rapidly shreds as it migrates toward the calmer waters of subtropical "gyres." Gyres are currents on the ocean's surface that rotate, much like inside your toilet bowl. These gyres collect plastic and other debris, where sunlight, waves and nibbling fish rip it to micro-sized particles, smaller than a grain of rice. Micro-plastics then flow through the bodies of billions of organisms, making their way out to deeper currents and ultimately the sea floor. The sea floor is the end life of plastics.

Because there are 5.25 trillion particles, it is clear that source controls are the only viable solution. Plastic can be designed to be biodegradable and making materials to be environmentally sound, and what products are used, is the leading potential solution over time.

*Let's hope that **production of biodegradable plastics** can help increase the percentage of micro-plastics that are in a more ecologically appropriate form than micro-plastic materials and fibers. Too many of these pollutants are released when we wash and dry our clothes, or when we discard or wash down cosmetics, and large volumes of micro-plastic fibers find their way into our waterways and estuaries.*

For more information on the Partnership for the Delaware Estuary, go to <http://www.delawareestuary.org/> or call 302-655-4990.



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