**Microplastic Lesson Background**

**Microplastics** are small pieces of plastic, 5mm or less in size, that enter the ocean. They can make it to the ocean when tiny plastic particles in personal care products or synthetic clothing fibers are washed down the drain, or from the breakdown of larger plastic debris. Microplastics are a size category of **marine debris**. Marine debris is anything human-made that doesn’t belong in the ocean or Great Lakes.

**Potential Impacts of Microplastics**

There is ongoing research about the impacts of marine debris, and specifically microplastics, on the ocean and the organisms that live there. Microplastics can be found from the surface to the bottom of the ocean all over the world, which makes the impacts they have on the marine environment a global concern. Potential impacts of microplastics include the accumulation of **toxins** on their surface, ingestion of plastics by organisms, and the colonization of **microbes** on their surface.

It is important to note that the term *impacts* simply means effects. It is also important to know that the ways in which small plastics in the ocean are affecting marine environments are continually being discovered, and the subtle implications of these effects are still not well known. At this time, there is not substantial evidence that plastics or any associated chemicals are transferred through the food web in a way that is harmful to humans.

***Accumulation of toxins.***Toxins is a somewhat ambiguous term used to describe different harmful substances. In this lesson, the toxins referred to are chemical toxins. The US Environmental Protection Agency (EPA)

defines something toxic as “any chemical or mixture that may be harmful to the environment and to human health if inhaled, swallowed, or adsorbed through the skin;”12 Toxic substances have been shown to adsorb to the surface of plastic marine debris. Researchers in Tokyo showed that PCBs (polychlorinated biphenyls), DDE (dichlordiphenyldichloroethylene), and NP (nonylphenols) in seawater adsorbed to the surface of plastic.While toxins have been shown to stick to plastics, the extent to which this happens in nature and the impacts on the marine environment are still being studied. There is a need for more information on this topic.

***Ingestion of microplastics by organisms.***Many organisms have been shown to ingest microplastics, from small filter feeders to larger animals. They can ingest plastics indirectly if they eat another organism containing microplastics, directly when mistaking microplastics for food, or accidentally. Smaller organisms such as planktonand marine isopods, and filter feeders such as sea cucumbersand oystershave been reported to eat microplastics. A species of lobster was shown to eat microplastics present in its food, and the plastics remained in the lobsters’ stomachs.Larger animals such as harbor sealsand many species of fish and sea bird have had plastics found in their stomachs. The actual impacts of microplastics ingested by these animals is unclear. There may be physical or chemical impacts of eating microplastics.

***Impacts of ingestion.***Larger microplastics may block the digestive tract of small organisms, but not in others. There is not much evidence for this. The impacts of organisms ingesting plastics are not well known.

***Potential impacts on humans.***There is not sufficient research to make determinations about the safety of seafood subjected to microplastics. Microplastics have been found in some oysters that were raised for food. The impacts on the marine food web are not clear. Negative impacts on marine ecosystems does potentially have negative impacts on marine resources that people rely on, marine recreation, and economics. It is possible for microplastics to impact fisheries, recreation, and other services provided by the ocean and its connecting waterways.