

BioHavens® and Plastics – The Concerns vs the Benefits

News flash (WaterOnline, January 2018): “Kansas University researchers will be testing biofilms with extracellular polymeric substances (EPS) that may prove an effective barrier for microplastics.

“We think when there is more EPS in the system, we will get better removal,” Sturm said.

BioHavens grow microbes that produce EPS – therefore, BioHavens are part of the solution, not the problem.

Common Concerns

We have been asked whether FII's polymer-based floating island products might:

- a) release breakdown products such as Bisphenol A into water;
- b) release plastic particles that could be detrimental if ingested by fish and other animals;
- c) be related to the issue with microplastics (exfoliant and other micro-beads).

Concerns about some plastics are legitimate but it's important to understand which plastics are cause for concern because not all plastics are the same. The infamous gyres in the ocean are formed mainly from plastic bags that break down and float, and from microfibers that detach from fleece clothing and float, and from other detritus that is not fit to be present in water.

Microplastics are specifically the tiny beads that are used in exfoliants and other products, that are too small to be trapped by wastewater treatment plants, and that find their way into rivers and streams and pose a threat to aquatic life . Because BioHavens promote the growth of biofilm that produces EPS, they are one of the few available technologies that provide an immediate solution to this issue.

BioHaven Plastics are Safe and Fit-for-Purpose

The plastic used in BioHaven products is appropriate and tested for use in even sensitive waters such as streams and lakes. It is the same EPA-approved plastic (PET) used in drinking water bottles that millions of people use every day without harm. No BPA is used in its manufacture so it cannot leach into waterways. BioHaven matrix is manufactured from the highest grade of recycled polyester that has a higher internal viscosity (IV) than many virgin polyesters.

To make sure that the plastic does not break down, even after years of use, all BioHaven floating islands leave our factory with a protective coating covering the top and sides. This coating is the same as that used for lining municipal concrete water tanks and is certified safe to potable water and food-grade standards. It protects the islands from UV damage and keeps them intact under heavy wildlife pressure (from waterfowl and muskrats, for example).

Once an island is launched, it takes very little time for biofilm to completely cover and protect it further. Anyone who has ever cleaned the inside of an aquarium knows how hard it is to remove!

“Don’t throw out the baby with the bathwater”!

When you consider the massive issues with water pollution and the few sustainable technologies available to tackle it on a broad scale, can we afford to rule out plastics because of indiscriminate bias? Data on water contaminants in over 40 US states paint a shocking picture of the many poisons that are unregulated and present in our water. BioHavens have been tested for over 10 years and have no history of adding to the problem. Their “concentrated wetland effect” can address many of these contaminants by substituting for natural wetlands that have been systematically destroyed by human development activities. BioHaven matrix wetlands are robust and don’t break down after a few years to add to the problems.

Long-Term Studies Show BioHavens are Safe

Experiments conducted at the Shepherd Research Center and at other locations indicate that:

- (1) BioHaven floating islands actually remove at least one deleterious plastic by-product (bisphenol A) from water; and
- (2) the presence of BioHaven floating islands in a pond or aquarium has had no detrimental affect on fish; in fact, the opposite has been demonstrated, namely that BioHavens stimulate fish growth rate for all sizes of fish, including fry and small immature fish.

These high growth rates indicate no detrimental ingestion of polymer particles by the fish and no adverse reaction to the presence of the islands.

Below are several case studies that demonstrate the multiple benefits of BioHaven floating islands for wildlife and water quality in general.

Bisphenol-A Case Study

The first case study tracked behavior of Beta Fighting Fish exposed to an estrogen mimicker (bisphenol A). Gill flares thought to be associated with fish virility and sex drive decreased upon exposure to BPA. After three days, incidence of gill flares recovered to pre-exposure levels in a test aquarium with a BioHaven floating island. Gill flare recovery did not occur in the test aquarium without a floating island.

Mississippi State University PhD thesis

A PhD thesis in test pond setting at Mississippi State University measured a 19% increase in fish biomass in a test pond installed with several BioHaven StreamBeds. The impact of BioHavens on fish proved very positive.

Case Studies at Floating Island International

Two case studies and ongoing data collection at Fish Fry Lake at FII headquarters show sustained game fish harvest of 26 pounds of game fish per acre-foot of water, as well as a range of other improvements in water quality parameters.

Minnow Pond case studies track a BioHaven floating streambed’s ability to maintain adequate dissolved oxygen conditions in a high-BOD setting. The result was high cycling of phosphorus into fathead minnow biomass, at the rate of 860 pounds of fish per acre-foot of water. This corresponds to over four pounds of phosphorus removal when the minnows were harvested.

Independent Studies Prove the Benefits of BioHavens

Numerous additional peer-reviewed papers demonstrate a range of improved water quality parameters associated with BioHaven floating treatment wetlands, including BOD removal and reduction in eutrophication. Nearly 30 additional case studies add to these data.

Improved water quality parameters associated with BioHaven floating treatment wetland include reduction in all forms of nitrogen, phosphorus, and several heavy metals. Islands are also associated with reduction in concentration of hazardous bacteria including fecal coliform. Another benefit of floating treatment wetlands is apparent mitigation of conditions associated with harmful algae blooms.

Conclusion

Far from being part of the problem, BioHaven floating islands must be viewed as part of the solution to an increasingly impaired water supply, suffering from an over-generous application of mineral fertilizer and herbicides, as well as other poisonous contaminants. Based on the best available scientific information and testing, BioHaven matrix material is of positive benefit to the system.