MORE EFFECTIVE AND ENVIRONMENT-FRIENDLY FISH ATTRACTORS DO NOT CONTAIN PLASTICS

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Fish attractors are structures placed underwater to mimic submerged trees, rock formations and other features. Depending on the objective, these structures can provide target fish species refuge from predation, allow them to ambush prey, or simply protect them from unsuitable currents. Fish attractors are installed in reservoirs and other water bodies that are lacking structure, and research has demonstrated they are effective in attracting fish, and thereby increasing angler success.

Depending on the species and size of fish being managed, fish attractors range from discarded Christmas trees tied to rocks to formed concrete spheres with holes. Some of the more complicated attractor designs incorporate rocks and concrete (to keep the structure submerged) and lumber, tree branches, bamboo or other materials to provide sheltering structure.

Some fish attractors have been built incorporating plastic pipes (e.g., polyvinyl chloride [pvc], polyethylene) or other plastic materials because they are readily available in a wide variety of shapes and sizes and were thought to be more durable than wood. However, new information about the eventual fate of plastic in water suggests that materials other than plastic should be used in fish attractors.

There is growing awareness of the plastic pollution in our oceans. Much of this plastic garbage floats down rivers on its way to the ocean, impacting aquatic life along the way. Even before it reaches an ocean, some of the plastic breaks apart into small particles and fibers ("microplastics") that are ingested by freshwater fish and other creatures.

In a recent study, microplastics were found in 100 percent of largemouth bass and gizzard shad sampled from Illinois reservoirs. Microplastic ingestion is especially common in minnows and suckers, which are important species in recreational fishery food webs.

A home-made fish attractor featuring a variety of materials: plastic pipes and bucket, concrete and bamboo. The plastic will eventually break apart and may end up in the bodies of fish and other organisms in the water.

Preliminary research at the University of Tennessee Institute of Agriculture documented microplastic fibers in 100 percent of freshwater clams (*Corbicula flaminea*) and 85 percent of crayfishes (*Cambarus* spp.) collected in urban and forested tributary streams of the Tennessee River system in 2019.

Tangled ball of microplastic fibers found in the digestive tract of a clam from Third Creek, Knoxville, Tennessee (25x magnification).

The impacts of microplastics on the health of fish and other aquatic life is not fully understood, but, for example, there is evidence that microplastics can harm *Daphnia,* microscopic animals that are an important food for many fish species. These and other results suggest ingestion of microplastics by prey species may eventually contaminate game fish in recreational and commercial freshwater fisheries. Although our understanding of exact sources and fates of microplastics is still developing, it's clear that any plastic material has the potential to negatively impact aquatic ecosystems.

Plastics aren't needed for building good fish attractors. In fact, plastics are not mentioned among the acceptable materials listed by the Tennessee Valley Authority in their **Fish Attractor Guide** (tiny.utk.edu/tvafishguide). Research indicates that wood structures — particularly those made with "brushy" materials with lots of small openings — are more effective in attracting fish than those made with plastics.

Furthermore, wood submerged in water is surprisingly durable. Wood can rot quickly when left outside in a place that is wet enough to support the "decay fungi" (basidiomycetes). However, when completely submerged, wood is too wet — and too low in free oxygen — to support these fungi. Underwater, the main decomposers of wood are "soft rot" fungi and bacteria, both of which are very slow to break down wood compared to decay fungi. Note that this is true in fresh water and cold saltwater environments. In warm saltwater, there can be other animals present (marine borers) that can quickly break down wood. Whether wood is broken down by fungi, bacteria or other means, it eventually decomposes to the carbon dioxide and water from which it was formed — wood is completely biodegradable. Wood is also environmentally preferable to plastics in that it requires much less energy to manufacture and has lower life cycle environmental impacts.

Preservative-treated lumber or naturally durable wood (e.g., redcedar or white oak) is used to extend the life of wooden structures that are at risk for decay. Such materials are appropriate for decks and fences on land, and for docks and other structures in water that are only partially submerged. However, as explained above, the risk of decay is low for fully and consistently submerged wood (such as in fish attractors), and the breakdown by bacteria is slow, meaning that the use of treated wood for fish attractors is unnecessary, unless it will be exposed to the air periodically and very long service life is required.

Unlike wood that biodegrades, and concrete that erodes into benign sand and gravel, plastic does not biodegrade and can end up contaminating fish and other creatures living in the water. Given the negative effects of plastics and the ready availability of better materials, the use of plastics in fish attractors can and should be avoided.

Summary

Fish attractors are effective tools for increasing angler success. Plastic pollution in water is a growing problem and small pieces of broken plastic (microplastics) are being taken up in the bodies of fish and other aquatic organisms, with negative consequences. Just as disposing of plastic waste in waterways should be avoided, so too should we avoid including plastics in fish attractors. Wood, rock and concrete-based fish attractors are recommended because they are effective and long-lasting, and will not pollute the water when they eventually decompose.

A simple and effective fish attractor made from materials that will eventually biodegrade (wood) or erode to benign sand and gravel (concrete).

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