Hydrilla!

MORE THAN A NUISANCE TO N.C. WATERS

IN 2000, the Eno River was a free-running stream. Anglers tossed poppers to bass and bream visible in the open pools. Stands of native river-weed graced the gravel bars. In 2005, staff at the Eno River State Park noticed an invader, an aquatic weed that had taken root in the slower sections of the river. By 2011, the weed had spread through the 12-mile length of the Eno in the park, smothering the many pools. Park officials called for help—the hydrilla monster had arrived.

Hydrilla verticillata is an aquatic weed native to South Asia. It was imported to the United States as part of the aquarium trade, and as with so many other imported species, it was released into the wild and began to spread. It was first documented in North Carolina at William B. Umstead Park in the 1980s. Hydrilla has since invaded nearly every corner of North Carolina, including Lake Gaston in the north, Lake Waccamaw in the southeast and Lake Santeetlah near the Tennessee border.

THE FIGHT IS ON TO CONTROL THIS INVASIVE AQUATIC PLANT THAT THREATENS MANY OF OUR INLAND BODIES OF WATER

Hydrilla prefers the still water of lakes, ponds and canals. However, it will grow in rivers, thus its presence in the Eno. The weed takes root in a bottom of sand or mud and grows toward the surface on a stem with whorls of four to eight leaves. The weed's growth rate is dizzying—an inch or more per day to lengths as long as 18 feet. The density of growth is such that it can form thick mats on the surface, which cut out light below. Hydrilla produces tubers (underground buds), which can lie dormant in the soil for five to eight years. This allows the plant to survive through adverse conditions, such as drought or chemical poisoning. Once established, it is a tough weed to kill.

Hydrilla has negative impacts on a variety of waterways. It greatly reduces flow in drainage canals, which can cause flooding and damage to canal banks and structures. It can clog intakes of water pumps in irrigation canals and disrupt flow patterns necessary for cooling in cooling reservoirs for power plants. On recreational lakes, mats of hydrilla can block access at ramps and docks, and limit surface area suitable for waterskiing and fishing.

Hydrilla outcompetes most of our native aquatic grasses. It can grow at lower light intensities than many other plants. It can absorb carbon from the water more efficiently, so it continues to thrive during the summer when carbon can become limiting to other plants. It can also store extra phosphorus, so when lack of this nutrient limits the growth of other plants, hydrilla uses what it has stored. It is tolerant of a wide range of water conditions, including salinity of up to 9 to 10 parts-per-thousand.

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PHOTOGRAPHED BY **MELISSA McGAW**

Top: A handful of *Hydrilla verticillata* from the Eno River. Above: Chemicals are distributed in Badin Lake to control hydrilla. Below: The Chinese mystery snail is another invasive species that reproduces rapidly in inland waters. Opposite: A grass carp, or white amur, feeds on hydrilla. These fish are used to control aquatic weed growth.

When large mats of hydrilla die off in the fall, dissolved oxygen in the water is greatly reduced. That could lead to large-scale fish kills in a river like the Eno, though that has not yet been observed. And a form of blue-green algae will grow on the top of hydrilla mats, that when eaten by birds can cause avian vacuolar myelinopathy (AVM) that kills waterfowl and bald eagles.

"There's a little bit of everything when it comes to hydrilla," said Christian Waters, inland fisheries division chief for the N.C. Wildlife Resources Commission.

The many threats from this weed have prompted local, state and federal agencies in North Carolina to declare war on hydrilla, a battle that is being waged in lakes Waccamaw, James, Gaston, Kerr, Jordan, Norman and Hampton — to name a few. North Carolina has approximately 550,000 acres of inland waters, and experts say hydrilla could eventually invade about 75 percent of those.

State agencies across the country, including the N.C. Wildlife Resources Commission, have gone to great lengths to stress that all aquatic organisms, including vegetation, should not be introduced, stocked, planted or moved. Public relations campaigns preach that even unintentionally relocating hydrilla is not acceptable — clean, drain and dry your boat and equipment has become a popular refrain.

Too Much of a Good Thing

For all its negative impacts, hydrilla can have a positive one on sport fisheries, especially for largemouth bass. Chuck Ward is an avid fisherman and a winner of many bass tournaments. He works for a company that manages lakes and ponds toward various ends, including maximizing fishing potential.

"When I arrive at a lake to fish, the first thing I look for is hydrilla," Ward says. "Hydrilla wins bass tournaments."

Ward recalls seeing a video made in the 1980s called "Bigmouth," which showed the underwater habits of largemouth bass in Florida's Silver River. It was apparent that bass enjoy living in and around hydrilla, using it for cover and for ambush sites. "Bass will cut trails through hydrilla," Ward said. "They turn it into their own little city."

Too much hydrilla, however, can have a negative impact on fisheries, according to Waters. "When it gets expansive in a lake and is allowed to top out, the interior of those stands can have limited light production and oxygen, forcing fish out to the edge of the bed," he said.

Bass habitat aside, owners and users of many lakes and ponds across the state want hydrilla eliminated — or at least contained. Doing so requires a steep financial investment — millions of dollars to control hydrilla growth and even more to try and eradicate it. It also requires a combination of strategies for each specific body of water. For recreational lakes and ponds, the most effective strategy appears to be a combination of treatment with herbicides and stocking of triploid (sterile) grass carp. The herbicides will knock back hydrilla, and the carp, which feed on aquatic weeds, will keep it under control.

Currently, the most popular herbicide is fluridone, sold under the names Sonar, Avast! and Whitecap. Fluridone doesn't kill hydrilla outright, but rather disrupts the plant's ability to photosynthesize. Fluridone has the benefit of being non-toxic to humans and animals, but it must remain in the target area at a specified concentration long enough to be effective — a period of up to 90 days. Rain can render fluridone ineffective by lowering its concentration; wind and water flow can carry the chemical away. That makes fluridone treatment inadvisable for certain types of structures, such as storm-water ponds, which are designed to move water quickly through a filter medium. Other chemicals kill the weed outright, but they can be quite expensive and labor intensive.

For larger bodies of water where hydrilla is well established, one can't declare victory after a single treatment of herbicides. "It's a 15-to 20-year control process," Waters said. "If you skip just one year, the whole process starts over again."

The long, expensive battle to manage a lake infested with hydrilla is born out by the example of Lake Gaston. Hydrilla first appeared in this 20,000-acre reservoir in the late 1980s. In 1992, the U.S. Army Corps of Engineers began an annual program of herbicide treatment, combined with the stocking of grass carp. Despite those efforts, hydrilla spread to more than 3,000 acres by 1995. Treatments have been ongoing for 20 years at an average cost of around $1 million a year. Although the spread of hydrilla has been contained, it isn't going away.

The Eno Experiment

For Keith Nealson, superintendent of Eno River State Park, the chief concern is whether hydrilla can be managed without compromising the ecology of the river. The Eno is home to several aquatic plant species, an endangered mussel and a species of concern in the Roanoke bass. There were no guarantees that grass carp wouldn't eat the native grasses, nor that they would stay in the river for any length of time. It was presumed that herbicides would wash out. Thus, manual removal of hydrilla was the best option.

During the summer of 2011, Nealson spearheaded an experiment in which volunteers and staff spent almost 320 hours pulling weeds from a 100-foot-long stretch of river. Despite removing 80 to 90 percent of the visible biomass, hydrilla grew back to the previous extent and density within two months.

After consulting with officials at the state, county and city (Durham, Hillsborough) level, park staff decided to experiment with fluridone treatment — the first application of herbicides in a moving body of water in North Carolina. In the summer of 2015, an injection system was installed just upstream of the park and regular injections of fluridone were begun. Officials monitored the health of native riffleweed and water willow. By the end of summer, the results were analyzed.

"The area treated had a remarkable lowering of hydrilla," Nealson said. "We noted some yellowing of water willow and some effect on riffleweed, but not significant. Two weeks after turning off the treatment, we observed no problems with these grasses."

Nealson said they plan to treat the same area in 2016, after which they'll decide what to do on a more permanent basis.

"The question is, can we eradicate hydrilla completely, or do we want to manage it at a cost of about $50,000 a year?" he said.

The Eno experiment will provide the state with valuable information for the on-going battle against hydrilla. It's a battle that will never be fully won. But perhaps the invader can be managed in a way that benefits freshwater fisheries without breaking budgets or totally compromising the functional, ecological or recreational integrity of our precious water resources.

John Manuel is a freelance writer and a long-time contributor to Wildlife in North Carolina.

A PLAN TO TACKLE AQUATIC NUISANCE SPECIES

Hydrilla is not the only invader that threatens our freshwater and marine habitats. The state has identified dozens of aquatic nuisance species (ANS) — plant and animal — that fit this definition. With an eye toward preventing and controlling the introduction, spread and negative impacts of ANS, the state assembled an Aquatic Nuisance Species Management Plan Committee in 2014. The committee developed a 100-page management plan, which was released in October 2015.

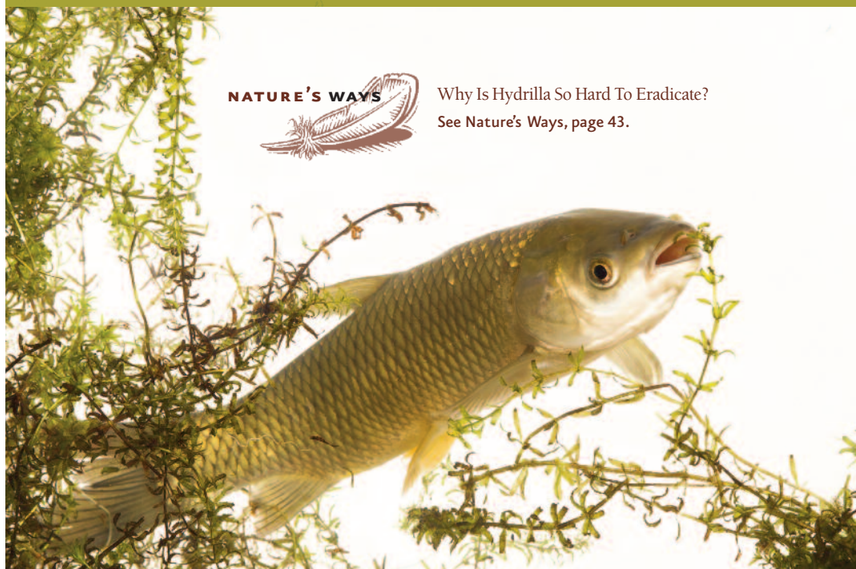
The plan opens by stating that not all exotic or nonnative species pose a threat to our aquatic environments. "Statistically, only a small percentage of all exotics that are able to survive . . . will become an aquatic nuisance species. ANS cause problems when there are few or no native predators or biological controls to keep the growth and reproduction of those specific organisms in check."

That said, the plan goes on to identify 38 species as ANS, ranging from hydrilla to lionfish to zebra mussels. These are ranked as higher, medium and lower priority threats. The plan identifies four state agencies that currently have statutory regulatory responsibilities regarding ANS — the N.C. Department of Agriculture and Consumer Services, the N.C. Wildlife Resources Commission, the N.C. Division of Marine Fisheries and the N.C. Division of Water Resources. It identifies current gaps in the state's response to ANS, including a lack of both spatial and biological information about ANS and their impacts, no systematic reporting mechanisms or monitoring procedures in place, little available research on the economic implications of ANS introduction and proliferation, and fragmented control efforts.

The plan makes seven recommendations, listed as primary objectives, to overcome these gaps. These are:

1) Increase the coordination of ANS prevention and management activities, including the creation of an ANS Task Force to lead the implementation of the plan
2) Educate the public and stakeholders on the impacts of ANS
3) Review existing federal and state legislation to identify inconsistencies and gaps
4) Identify and secure new funding for ANS activities
5) Monitor the occurrence and spread of ANS
6) Manage populations of ANS as appropriate to prevent their establishment and spread
7) Identify and implement needed research on the impacts and control of ANS

The ANS Task Force is in the process of being formed. Once that process is completed, the group will decide if there is additional funding they wish to pursue to implement the recommendations.



NATURE'S WAYS

Why Is Hydrilla So Hard To Eradicate?

See Nature's Ways, page 43.