Invasive Aquatic Plants and Lake Guntersville:

History, Impact and Types

By Bradley Sartain

About the Author:

Bradley Sartain is an Aquatic Plant and Fisheries Biologist at Aqua Services, Inc. located in Guntersville, Alabama. He is a graduate of Mississippi State University, where he completed his Bachelor degree in Fisheries Science and received received his Master of Science in Aquatic Plant Biology. An avid bass fisherman, he has published several scientific articles on management and control of invasive aquatic plants.

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Introduction

Lake Guntersville is Alabama's largest reservoir at 69,000 acres and is famed as one of the best bass fishing lakes in the country. In addition to world class fishing it is also a popular destination for recreational boaters, water skiers, and campers. The great fishing success at Lake Guntersville can be attributed, at least in part, to the vast expanses of aquatic plants that occupy the lake. Aquatic plants provide many important ecological benefits; such as, improving water clarity, stabilizing sediments, providing fish habitat, and adding to the overall ecological diversity in shallow littoral areas. In the past few decades, invasive non-indigenous aquatic plant species such as Eurasian watermilfoil and hydrilla have become well established throughout Guntersville. Long growing seasons and warm temperatures, combined with the rapid growth of these species, have allowed them to flourish throughout the lake and reach nuisance levels that can negatively impact a water body. Impacts include, alterations in the interactions between fish and other aquatic species, constricting navigation canals, declines in recreational use, lowering property values, disrupting nutrient cycling, and provide mosquito breeding habitat. In addition to the aforementioned aquatic plants, Lake Guntersville also harbors a number of native aquatic plant species. Floating plants such as white water lily and American lotus; emergent plants such as water primrose and water willow; and a large number of submersed plants such as eel grass, coontail, southern naiad, and several pondweeds, to mention a few.

The dramatic increase in coverage of Eurasian watermilfoil and hydrilla has caused concerns from homeowners, recreational lake users, and commercial businesses. Eurasian watermilfoil was at one time the dominant species in the lake occupying an estimated 15,000 acres in the late 80's, but in the past 10 years hydrilla has taken that position. Hydrilla is a very versatile plant species and can grow in both static and flowing water, from several centimeters to 45 feet in depth in some parts of the country. It has been found in up to 20 feet of water in the Guntersville Reservoir. Due to its growth and reproduction habits hydrilla has been referred to as "the perfect aquatic weed". Hydrilla occupied an estimated 400 acres in 1996 which increased 10 fold to an estimated 4000 acres in 1998. Recently, in 2012, hydrilla was estimated to occupy 10,000 acres with milfoil occupying another 8,000. Together these plants infest 18,000 acres and nearly 80 percent of developed shorelines.

In addition to Eurasian watermilfoil and hydrilla, several other non-native plant species occupy Lake Guntersville. Emergent and floating plants alligatorweed and water hyacinth can also be found in the Tennessee Valley Reservoir systems. Alligatorweed is typically found in the backs of creeks, but it is not uncommon to see plant mats floating down the river. Cuban bulrush and water hyacinth are not frequently seen on Lake Guntersville, but are known to occur in other Tennessee River lakes. Other problematic species that have not found their way into Guntersville include giant salvinia and floating crested heart. Both of these species are very aggressive and can become very problematic. It is in our best interest as a stakeholder group to properly manage the aquatic plants and to meet the needs of all interest groups that utilize Lake Guntersville.

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Hydrilla (*Hydrilla verticillata* L.f Royle)

Hydrilla, a native plant of Asia, was first introduced to the United States in Florida in 1960. Since its introduction it has spread rapidly throughout the United States. Hydrilla's ability to survive well in freshwater reservoirs and rivers has allowed it to become problematic. Reduced water flow, associated with clogged irrigation and/or water control structures, interferences with navigation, boating, swimming, and fishing are some of the negative impacts caused by extensive hydrilla growth. Hydrilla populations have also been known to outcompete and displace native aquatic plants, such as pondweeds (Potamogeton spp.). The dense plant canopy produced in an established hydrilla bed makes it difficult for other aquatic plants to flourish.

Description

Hydrilla is a submersed plant that grows in a variety of water conditions. It is a very versatile plant species and can grow in both static and flowing water, from a few centimeters to 15 meters (m) in depth. The depth at which hydrilla can become established is often dependent on water turbidity, although it is a shade tolerant species. Hydrilla can be found in a variety of water chemistry situations and due to its growth and reproduction habits hydrilla has been referred to as "the perfect aquatic weed". Both dioecious and monoecious types are present in the Tennessee Valley. Stems are ascending towards the water surface and often branch out when they reach the water surface. Leaves are sessile occur in whorls, mostly 4-8 leaves per whorl. Leaves are typically 1.5 cm in length, oblong, and have serrate leaf margins. Flowers are very small and rise from the leaf axils.

Regulation

Hydrilla is listed as a federal noxious weed.

Distribution

Hydrilla is found throughout the United States from Maine down the east coast to Florida. It is also found throughout the Midsouth from Georgia to Texas and north to Indiana. It has also been documented in Washington, California, and Arizona on the west coast. It is currently present in the Tennessee Valley Reservoir System.

Figure 1: Hydrilla leaves occur in whorls, with 4-8 leaflets per whorl. Leaves are oblong in shape with serrate leaf margins. Photo by Bradley Sartain.

Figure 2: Hydrilla plants produces "tubers" in the sediment like the one shown above. Tubers are capable of remaining viable in sediment for several years, making hydrilla difficult to manage. Although hydrilla is controlled in a specific area, a tuber bank could have been established that is capable of producing plants in the future. Photo by Bradley Sartain.

Figure 3: Hydrilla can produce large monotypic stands that make boat navigation nearly impossible. Photo by Bryan Goldsby.

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Eurasian Watermilfoil (*Myriophyllum spicatum* L.)

Eurasian watermilfoil is a submersed plant that was introduced in several locations in the United States from Europe in the 1940's. It has the ability to form dense mats within infested areas. These dense mats often shade out desired native species, alter macro invertebrate communities, and may interfere with fish spawning in shallow areas. Invasion and explosive growth of Eurasian watermilfoil can displace native plants and reduce species diversity within the invaded area.

Regulation

Eurasian watermilfoil is not listed as a federal noxious weed

Description

Eurasian watermilfoil is a submersed perennial aquatic plant that most often occurs in waters 1-4 meters deep. Leaves are whorled around a glabrous stem. Leaves are typically 1.5-4.0 cm long and occur in 4 leaves per whorl. The leaves are highly divided "feather like" and consist of 14-24 pairs. Inflorescences is a terminal spike (5-20 cm). Flowers are formed on short aerial stems that contain both pollen bearing "male" and seed producing "female" flowers.

Reproduction

Eurasian watermilfoil is capable of reproducing sexually and asexually, with asexual reproduction being the most important. Small buds can form on root crowns and detach at the end of winter allowing new plants to be established early in the spring. During peak growing season stems can release numerous fragments (10-20 cm) either naturally or by plants being broken by wave action or human activities. These fragments are often viable and allow new plants to become established in new areas.

Distribution

Eurasian watermilfoil is found throughout the United States and North America. It has been documented from Florida to Quebec in the east, across the central US, and from California to Alaska in the west. It is currently found in the Tennessee Valley Reservoir Systems.

Figure 1: Eurasian watermilfoil shown growing beneath the water surface, leaves are highly divided and "feather like." Photo by Dr. John Madsen

Figure 2: Stem fragment of Eurasian watermilfoil that is capable of producing a new plant. Photo by Dr. John Madsen

Figure 3: Eurasian watermilfoil is capable of producing large monotypic stands that often shade out desirable native plant species and impede boat operation. Photo by Bryan Goldsby.

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Water Hyacinth (*Eichhornia crassipes* (Mart.) Solms)

Problems caused

Water hyacinth is a floating plant species that is capable of forming thick floating mats that can create nuisance problems in lakes and river systems. Water hyacinth can grow extremely fast and infestations can lead to problems with water quality, mosquito control, navigation, and water flow.

Regulations

Water hyacinth is not listed as a federal noxious weed, but is listed as an invasive by the Southeast Exotic Pest Plant Council.

Description

Water hyacinth is a floating monocot native to South America. It has been introduced to many regions through water gardens and the aquarium trade due to its showy purple flower. Leaves are thick, glossy, and have a heart shaped base. Leaves can reach up to 3 feet in length. Each leaf occurs singly on spongy inflated petioles. Leaves are attached to each other in a basal rosette. Roots hang beneath the rosette and are feathery in appearance. The most notable characteristic of water hyacinth is its large showy purple flower. Flowers grow in groups of 8-15 on a single spike that extends upward from the rosette center. Flowers can grow up to 3" tall.

Reproduction

Water hyacinth spreads by seed and vegetative reproduction. Seeds produced are small and typically won't germinate until conditions are favorable. Once seeds germinate, daughter plants are produced from horizontally growing stolons. This type of vegetative growth allows water hyacinth populations to expand rapidly, enabling a population to double in 6-18 days.

Distribution

Water hyacinth occurs worldwide in tropical and subtropical regions. It does not tolerate cold temperatures well and is mostly confined to the South Atlantic and Gulf States in the United States. It is currently present in the Tennessee Valley Reservoir System.

Figure 1: Water hyacinth parent plant with a new daughter plant produced from a horizontal stolon. Petioles occurring at the leaf base are thick and spongy. Photo by Dr. John Madsen.

Figure 2: Water hyacinth is often recognized by thick glossy leaves and a showy purplish flower. Photo by Dr. John Madsen.

Figure 3: Water hyacinth is capable of forming large floating mats that shade out desirable native plant species.

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Alligatorweed (*Alternanthera philoxeroides* (Mart.) Griseb)

Problems caused

Alligatorweed has the ability to form dense stands and mats along riparian areas of lakes, rivers, streams, and ditches. Dense stands creep out from the shoreline shading out native vegetation. It also interferes with waterway navigation, recreational boating, water quality, and drainage.

Regulations

Alligatorweed is not listed as a federal noxious weed, but the Southeast Exotic Pest Plant Council (EPPC) recognize it as an invasive weed.

Description

Alligatorweed is native to South America and can be found growing in both terrestrial and aquatic habitats. It is an herbaceous perennial plant that is capable of forming dense mats of plants. It has fibrous roots and long hollow stems (0.2-1.0 m). Leaves are opposite 5.0-13.0 cm long 5.0-20.00 mm wide. Leaves are also entire, linear-elliptic in shape with acute tips. Inflorescences (flower) is a solitary white head and will produce flowers throughout the growing season.

Reproduction

Alligatorweed has the ability to produce seeds but seeds produced at typically not viable. Mainly reproduces vegetatively by stems that break off of at the nodes. Propagules can be dispersed naturally by water currents and animals. Stems can also be transported by boats and boat trailers.

Distribution

Alligator weed is documented in North America, Asia, Australia, and throughout South America. It occurs mainly in the southern United States from Texas, north to Illinois and down the east coast to Florida. It is also reported in California. It is currently in the Tennessee Valley Reservoir System.

Figure 1 & 2: Alligatorweed leaves are opposite, elliptical to oblanceolate in shape. Inflorescences is a small cluster of white flowers that occurs at the leaf node. Photo by Terry Goldsby.

Figure 2:

Figure 3: Alligatorweed is capable of forming large monotypic stands in shallow water areas. Photo by Bradley Sartain.
Introduction

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Giant Salvinia (*Salvinia molesta* D.S. Mitchell)

Problems caused

Giant salvinia is a floating plant species native to Brazil and is one of 12 Salvinia species worldwide. It has the potential to create large floating mats that can interfere with irrigation, navigation, recreational boating, flood control, hydroelectric generation, and public health concerns by providing breeding habitat for mosquitoes. These thick mats also support numerous other secondary and tertiary plant species creating floating islands, enabling them to completely fill in waterbodies over time.

Regulations

Giant salvinia is listed as a federal noxious weed. It is currently not present in the Tennessee Valley Reservoir system.

Distribution

Giant salvinia is an aquatic fern that can be identified by floating fronds that are green and rounded. Fronds are produced at nodes along a rhizome. They are oval in shape and bright green in color. The fronds possess a central midrib that contains a number of white stiff hairs. The hairs on giant salvinia resemble an "egg beater" shape. Giant salvinia lacks a true root system, they possess submersed fronds that are brown and are similar to roots. These submersed fronds function by absorbing nutrients from the water.

Reproduction

Giant salvinia does not produce flowers or seed. Reproduction is solely by vegetative reproduction, through fragmentation or the production of new plants via lateral or terminal buds from parent plants. Stems are capable of having up to 5 buds per node, each of which is capable of producing a new plant. Plants can multiply quickly. Individual plants can double in size in as little as 5-7 days in optimal conditions.

Distribution

Giant salvinia has been recorded in 20 different countries. It is currently in the southern United States and has been reported in Alabama, Arizona, California, Georgia, Hawaii, Florida, Louisiana, Mississippi, North and South Carolina, Texas and Virginia. It is currently not present in the Tennessee Valley Reservoir System.

Figure 1: Giant salvinia can be identified by its round floating fronds. Fronds possess white stiff hairs. Photo by Dr. Wilfredo Robles.

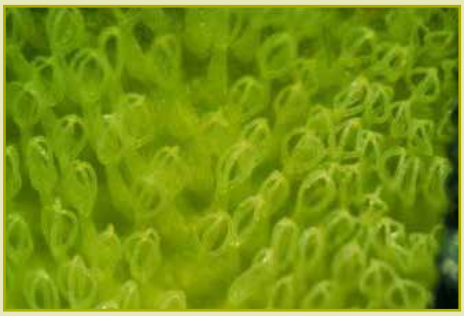

Figure 2: Close up of the white hairs on a giant salvinia frond. They resemble an "egg beater' shape. Photo by Dr. Wilfredo Robles

Figure 3: Giant salvinia can create thick mats that cover entire canals. These mats can also support other plant species that will become established on top. Photo by Dr. Wilfredo Robles.

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Cuban Bulrush (*Oxycaryum cubense* Peopp. & Kunth)

Problems caused

Cuban bulrush has the ability to be an aggressive invader and can form large floating mats that can disrupt navigation and lead to the displacement of other aquatic plant species. It has been documented as an aggressive competitor and typically out competes co-occurring plant species. Extensive populations of Cuban bulrush can cause disruption of predator/prey relationships, particularly in fish populations. Dense plant beds can lead to a population of small and stunted forage fishes and the poor production of desirable game fish.

Regulations

Cuban bulrush is not listed as a federal noxious weed.

Description

Cuban bulrush is a monocot perennial that grows in littoral areas and wetlands. It can be found in swamps, ponds, marshes, rivers, and any other forms of standing water. It has slender triangular stems (which is a common characteristic of sedges) and long slender leaves that can grow one to three feet in length. Cuban bulrush also produces scaly stolons, rooting at the nodes or consists of lengthy-hanging roots, which extend outward just below the water surface. These stolons will mesh together with the roots/rhizomes of other aquatic plants to form dense floating vegetative mats known as sudds. Inflorescences are 1 to 13 3/4" globose heads that consists of at least 5 spikelets. It also consists of achenes that are a pale or reddish brown color, either ovoid or ellipsoid.

Reproduction

Cuban bulrush has two reproductive methods, either by seed or by the development of rhizomes/stolons. The seed is a buoyant achene that is adapted for spread by moving water. Its ability to form floating mats enables it to reproduce asexually by being transported by flowing water. It has been documented that Cuban bulrush has a limited ability to become established in open water areas and that it may require support by pre-existing aquatic species. Cuban bulrush shows a well-illustrated cyclical behavior; invading tillers form, mature, produce flower and fruit, then die. The dead tillers then fall over forming a dense mat of somewhat slowly decaying plant matter, new plants then develop on the decaying mat, and the cycle is repeated. Establishment is increased further due to new seedlings that fall and germinate on the decaying mat of tillers.

Distribution

Cuban bulrush has been present in the southeastern United States since it was first documented in the late 1800's. Currently the United States Department of Agriculture (USDA) Plant Database lists Cuban bulrush as being present in Florida, Georgia, Alabama, Mississippi, Louisiana, and Texas.

(References on following page)

Figure 1: Inflorescences of Cuban bulrush, photo by Amanda Watson.

Figure 2: Cuban bulrush growing over the top of water primrose in a small backwater in the Tennessee-Tombigbee waterway.

Figure 3: Cuban bulrush will often utilize other plant species to be mobile, such as this small plant growing on a rosette of water hyacinth. Photo by Amanada Watson.

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