

## Early Detection and Eradication Program Needed for *Trapa bispinosa*, a New Species of Water Chestnut in the Potomac River Watershed

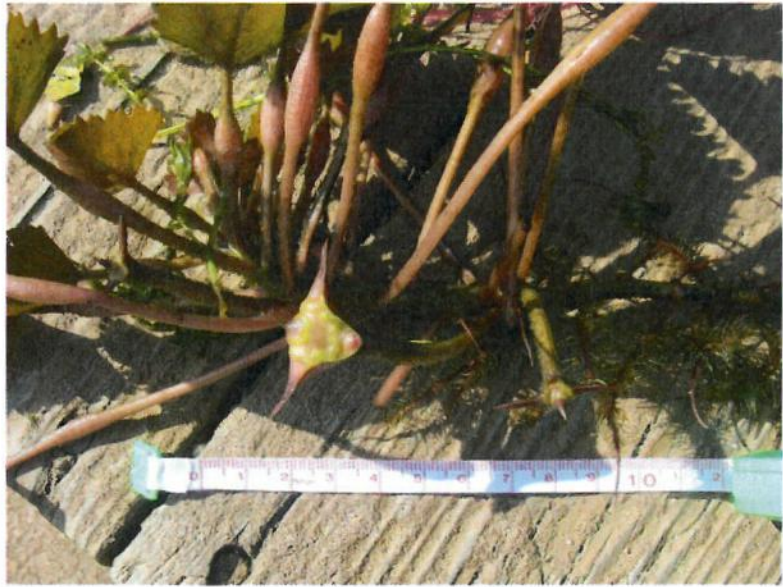
### *Trapa bispinosa*

Eurasian water chestnut (*Trapa natans*) has been present in the United States since the latter half of the 19th century and is a well-known invasive species. Once water chestnut shows up in a water body, it can quickly spread to cover large areas and, if allowed to reproduce, can spread far beyond the initial site. Colonies produce extensive floating mats that cover the water surface and shade out submerged aquatic vegetation. A new introduction of a relative of Eurasian water chestnut was discovered within the freshwater reaches of the Potomac River in Virginia in 2014. It was recognized as new by fruits that have 2 horns in contrast to the 4-horned fruits associated with *T. natans*. This new species was verified in 33 Northern Virginia locations by the summer of 2018. The road to discovery of each location was long and winding. It included verification of the species of any *Trapa* reported to herbaria, extension agents, storm water, golf or private pond, lawn and garden managers, and online naturalist or invasive species databases. The locations and information on the first year of colonization, current size of colony, recent management efforts and verification photos of the 2 horned fruit or pink flower were incorporated into the USGS non-indigenous aquatic species database to create a "*Trapa* sp" distribution map (<https://nas.er.usgs.gov/viewer/omap.aspx?id=f3a647f4-6906-4928-b5b4-1421cd95a211>). Virginia Game and Inland Fisheries, several county extension agents, the Fairfax county storm water pond manager, and other park and private pond owners were all instrumental in tracing the pace of spread of this new type of Water Chestnut. Nine sites were in Clifton VA. All the recent reports (2000 to 2018) are in Fairfax and Prince William counties. VA Tech herbaria specimens showed it was reported in Westmoreland and Stafford counties in 1995 and may still be there. Scientists conducting research on this 2 horned type of *Trapa* have not found this type of Water Chestnut in other states in the NE US. It has only been reported in Virginia, in the Potomac water shed, but more monitoring is needed.

In 2019 an extensive study of populations around the world revealed that its name is *T. bispinosa* Roxb. var *iinumai* Nakano and its DNA and morphology matches samples of this name in Taiwan (Chorak et al, 2019).

Because the distribution of this two horned morphotype, *T. bispinosa*, has expanded but is still potentially manageable it has been chosen as the Maryland Invasive Species Council's Invader of the Month. An early detection and eradication program is needed to prevent its spread.

*T. bispinosa* is an annual, herbaceous aquatic plant with floating and submersed (underwater) leaves. The main stems of seedlings branch repeatedly to form a surface canopy of leaves arranged in a rosette. The floating leaves are alternate with triangular, toothed leaf blades and inflated petioles. Leaves of the rosette are green above and reddish below. The submersed leaves are opposite, linear, and fall off early to be replaced by fine, pinnately branched, leaf-like adventitious roots. The flowers are borne in the axils (the point of attachment of the leaf petiole to the stem) of the floating leaves and have four pink petals. The fruit has a green exterior that disintegrates to reveal a large, hard, nut-like fruit 1½ - 2 in. (30 to 50 mm) wide, with two sharp upper horns that are barbed and two lower false or “pseudo” horns. In the mid-Atlantic region, plants flower after mid-June and may produce fruit from late June until a hard frost.



*T. bispinosa* 2-horned fruits.

In 2014, *T. bispinosa* was found in Pohick Bay (Gunston Cove, Fairfax County) in Lorton, Virginia, which is within the tidal portion of the Potomac River. It has been harvested each year since to prevent its spread in tidal water. The barbed seeds can disperse long distances by floating or by adhering to the feathers and fur of wildlife. Seeds may have hitchhiked among ponds via resident Canada geese. Evidence suggests that *T. bispinosa* has been spreading cryptically in the Potomac watershed for over a decade.



*T. bispinosa* leaves and seed

All species of *Trapa* are native to the Old World and foreign to the New World (North America, Central America and South America). Based on historic experience with the highly invasive Eurasian water chestnut in the U.S., the introduction of any *Trapa* to the U.S. poses a serious risk requiring urgent attention. Therefore, all *Trapa* species qualify as “Early Detection, Rapid Response” invasive species. Volunteers are needed to report any colonies observed via the University of Georgia Center for Invasive Species and Ecosystem Health’s Early Detection and Distribution Mapping System (EDDMapS)- using the Mid Atlantic Early Detection Network

(MAEDN) phone app (<http://www.eddmaps.org/midatlantic/>) and (or) the U.S. Geological Survey's Nonindigenous Aquatic Species program phone app (<https://nas.er.usgs.gov/mobilesightingreport.aspx>). Reports should include pictures of the overall colony and close-ups of the leaves, seeds, fruits, flowers, and rosette to aid in identification of the species. Expert verifiers will review submitted reports with close-up photos to confirm or correct the identification. All colonies should be eradicated to prevent its spread.

### **For further information:**

Chorak et al. 2019, Cryptic introduction of water chestnut (*Trapa*) in the northeastern United States, *Aquatic Botany* 155:32-37, <https://doi.org/10.1016/j.aquabot.2019.02.006>.

Aquatic Nuisance Species Task Force, Water Chestnut Management Plan  
<https://www.anstaskforce.gov/Species%20plans/Water%20Chestnut%20Mgt%20Plan.pdf>

Dodd, L., Rybicki, N., Thum, R., Kadono, Y., and Ingram, K. Genetic and morphological differences of water chestnut (Myrtales: Lythraceae: *Trapa*) populations in the Northeastern United States, Japan, and South Africa (2019, in review, USACOE Special Report) corresponding author, Lynde Dodd, [lynde.l.dodd@usace.army.mil](mailto:lynde.l.dodd@usace.army.mil).

Maryland Department of Natural Resources, Water Chestnut Eradication Report  
<http://dnr.maryland.gov/waters/bay/Pages/Water-Chestnut-Eradification-Report.aspx>

U.S. Geological Survey, Calendar of events for submersed aquatic vegetation and *Trapa natans* in the tidal Potomac River and transition zone of the Potomac Estuary  
<https://water.usgs.gov/nrp/proj.bib/sav/timeline.pdf>

U.S. Geological Survey, Nonindigenous Aquatic Species Database  
<https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=263>

### **Phone Apps**

Mid Atlantic Early Detection Network (MAEDN) (phone app for reporting any colonies observed is available at this address)  
<http://www.eddmaps.org/midatlantic/>

U.S. Geological Survey, Nonindigenous Aquatic Species Reporting (phone app for reporting a sighting is available at this address) <https://nas.er.usgs.gov/mobilesightingreport.aspx>

### **Photo credits**

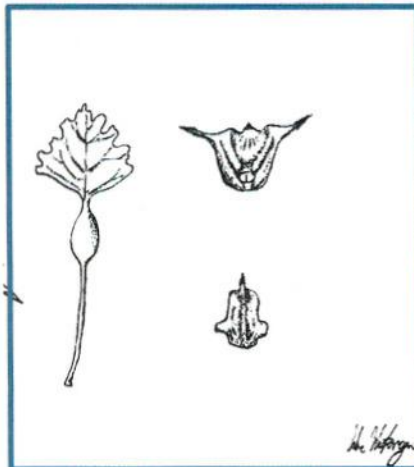
Nancy Rybicki. *Trapa* sp., Pohick Bay, Gunston Cove, Lorton, VA, August 2014

### **Authors:**

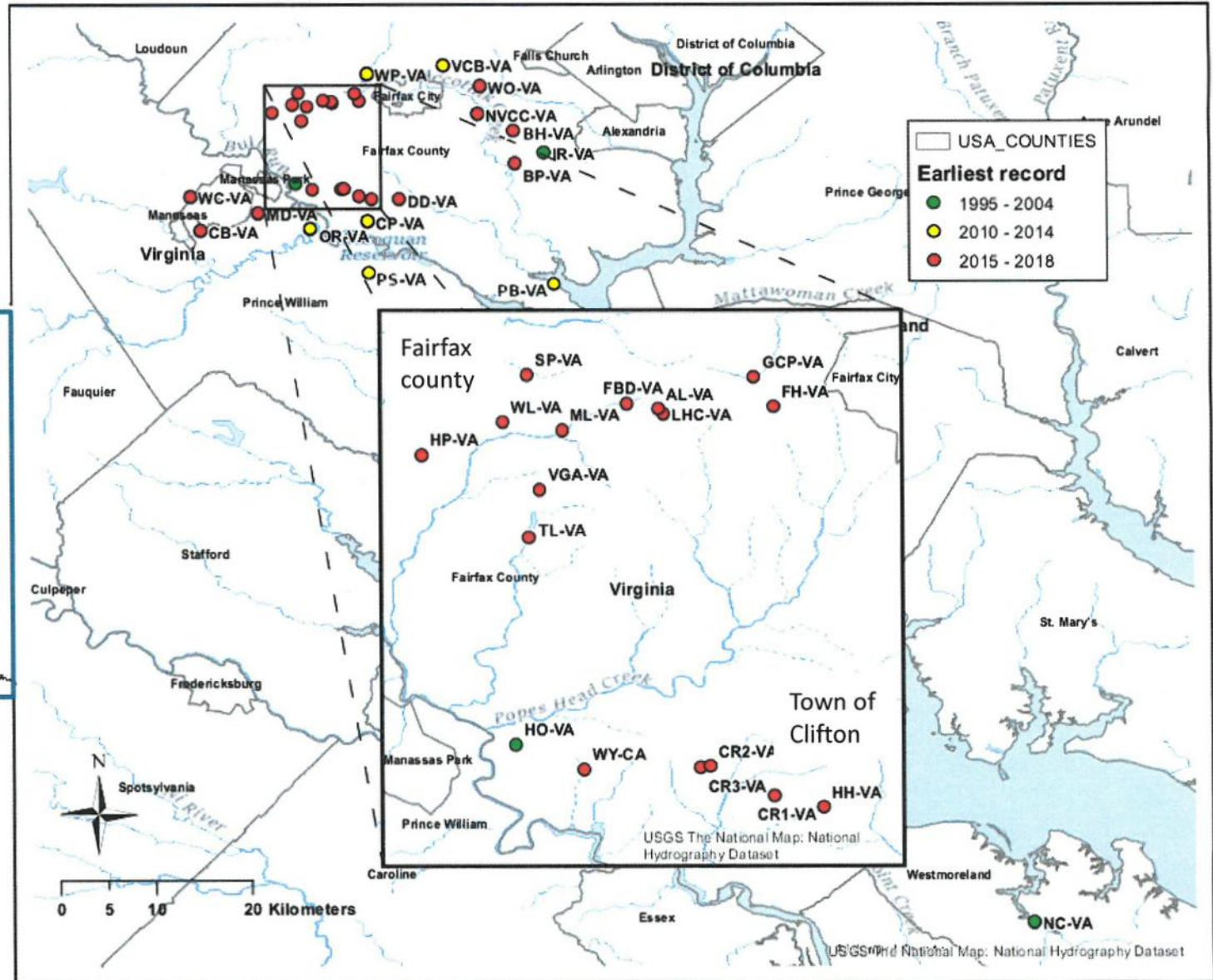
Nancy Rybicki, US Geological Survey, Reston, VA. Contact: [nrybicki@usgs.gov](mailto:nrybicki@usgs.gov).  
Jil Swearingen, Invasive Species Consultant, *In the Weeds*, Cheverly MD. Contact: [jilswearingen@gmail.com](mailto:jilswearingen@gmail.com). Draft of Invasive of the Month, in process for June 2019.

# Map of 2018 Distribution

*Trapa bispinosa* was verified in Virginia in about 8, 18, and 33 sites in 2016, 2017, and 2018, respectively.



Line drawing of the recently introduced *Trapa bispinosa*, by Gabe Westergren



<https://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=1410093> By I. Pfungsten USGS  
See also, Cryptic introduction of water chestnut (*Trapa*) ... (Chorak et al, *Aquatic Botany*, 2019).