

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



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Research presented is collaborative among USGS (Rybicki), ERDC (Lynde Dodd) and MSU (Ryan A Thum)



US Army Corps
of Engineers.



Content

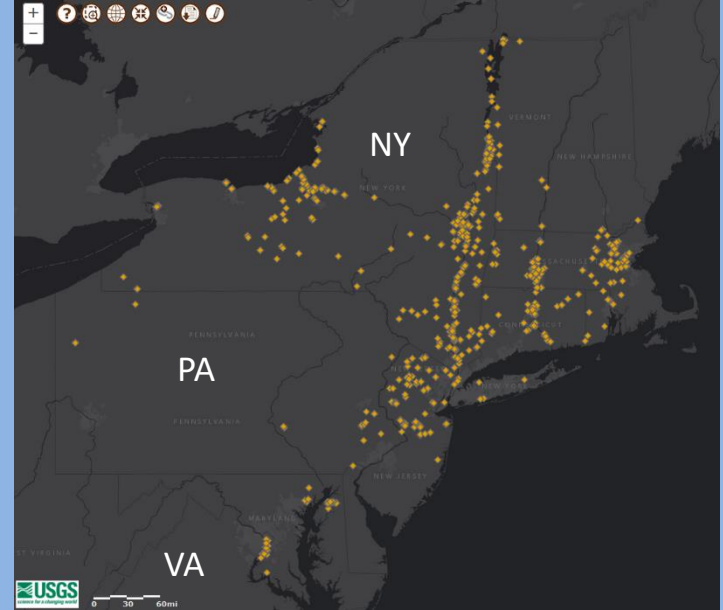
- Report on a newly introduced species of water chestnut from Asia
- Current distribution in the U.S.
- How we determined its name
- Mode of dispersal
- Assessment of water bodies most at risk of colonization

Background- water chestnut (*Trapa natans*)

Water chestnut is native to Europe, Asia and tropical Africa. It was first introduced to North America in the 1800s.

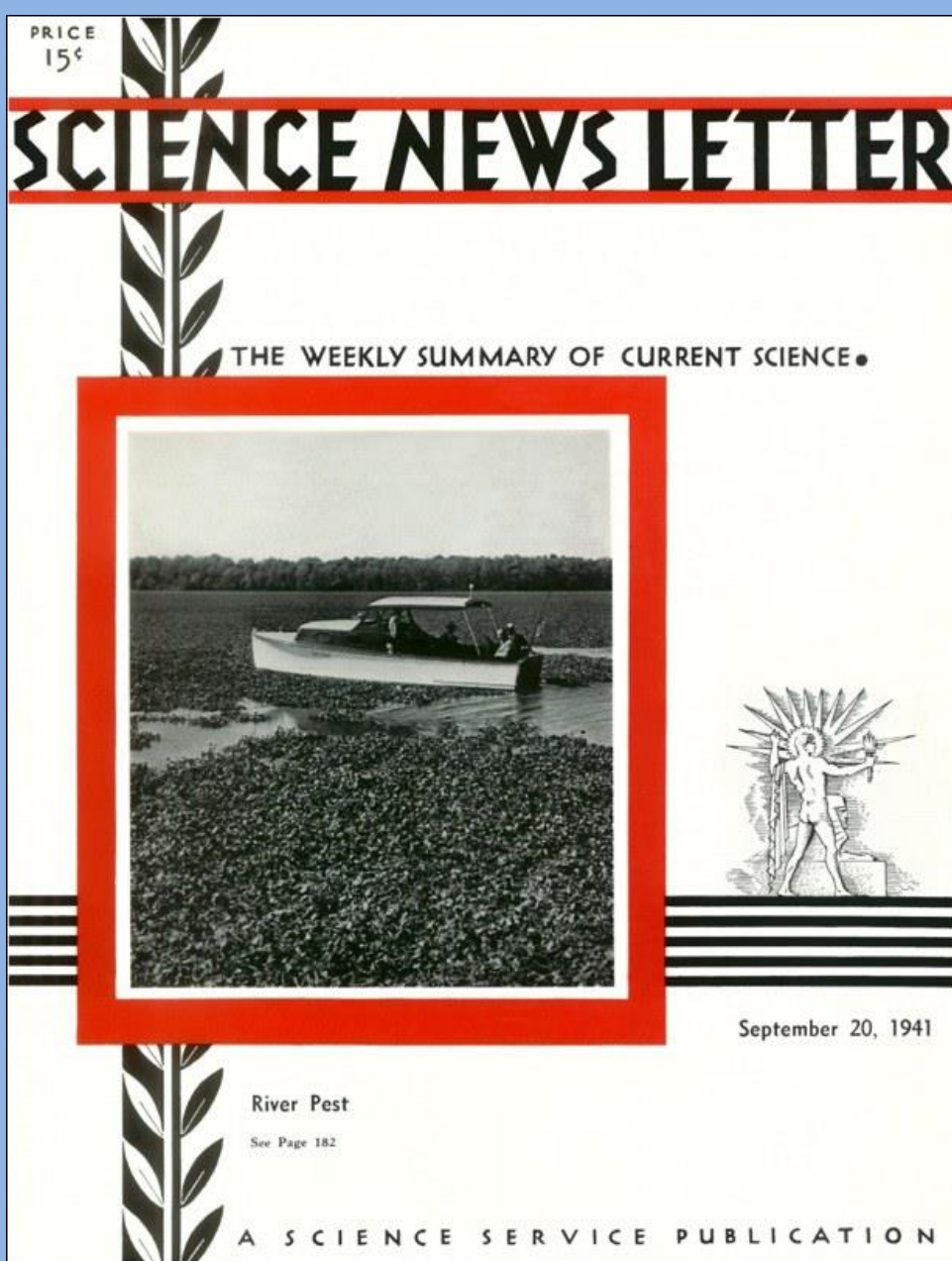
It is an aquatic annual herb with an edible fruit with medicinal qualities. It sprouts from seeds in spring and plants die off after a hard frost. Some seeds are dormant in the sediment for years.

Once in a water body it quickly covers the water surface to depths of about 3 m. It interferes with the exchange of oxygen to the water and blocks sunlight from reaching the bottom. It may affect water flow and aesthetics.



Map of current extent of observed Eurasian water chestnut (*Trapa natans*) in the United States (USGS, 2020).

Currently, *Trapa natans* occurs primarily in the northeast U.S. Historically, it was in the Potomac River.

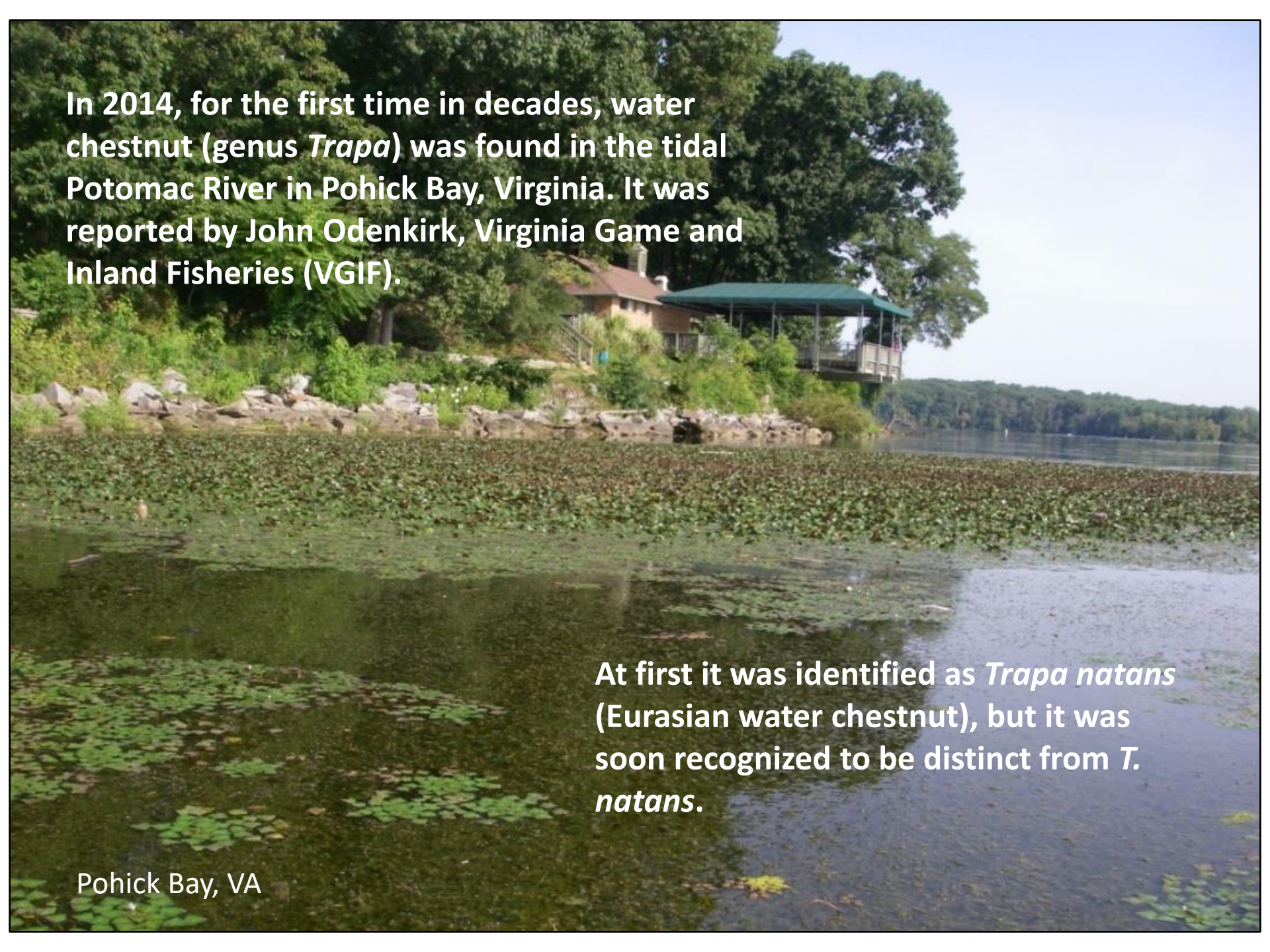


Background: *Trapa natans* was first discovered in the Potomac in 1920s, and quickly spread 8 km up and 56 km down the freshwater portion of the river. It spread from Washington, D.C. to Quantico, VA by 1941 where it obstructed navigation (Photo).

The spiny seed pods pierced the feet of river beachcombers and competed with native submerged aquatic vegetation (SAV) that was considered preferable fish and waterfowl habitat. Between 1939 and 1945, the U.S. Army Corps of Engineers controlled water chestnut with mechanical harvesters (3.7 million dollars (converted to current dollars). For decades afterwards, the fresh- tidal Potomac River was devoid of SAV.



Sources: 1) Martin and Uhler 1939 <https://www.sciencenews.org/sn-magazine/september-20-1941>;
2) Naylor, 2004, <https://www.sciencenews.org/archive/u-s-scientists-seek-use-water-chestnut?tgt=nr>
3) Gwathmey, 1945. Potomac River cleared of floating islands (Richmond Times Dispatch, vol. 22).

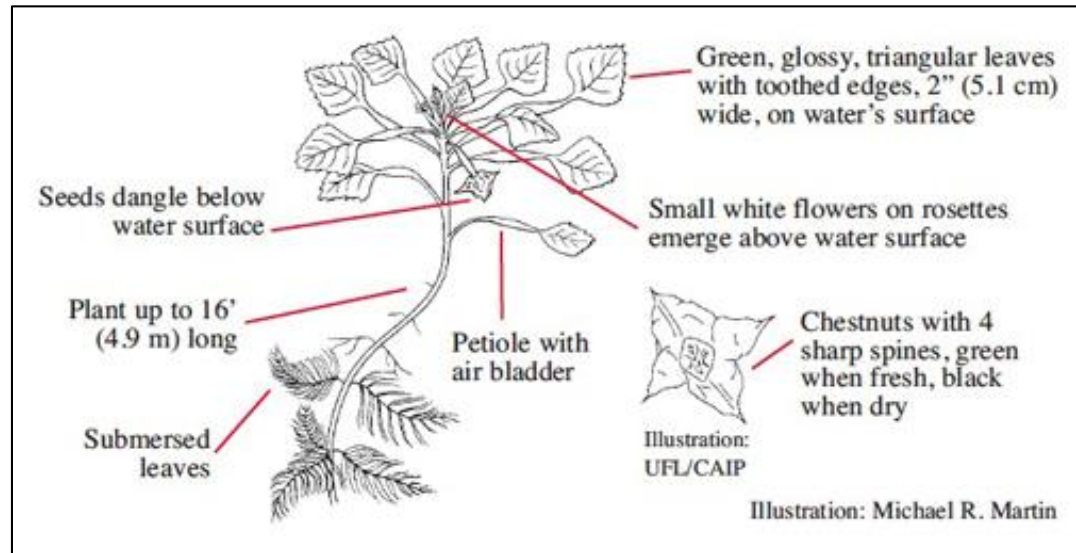


In 2014, for the first time in decades, water chestnut (genus *Trapa*) was found in the tidal Potomac River in Pohick Bay, Virginia. It was reported by John Odenkirk, Virginia Game and Inland Fisheries (VGIF).

At first it was identified as *Trapa natans* (Eurasian water chestnut), but it was soon recognized to be distinct from *T. natans*.

Pohick Bay, VA

EURASIAN WATER CHESTNUT - *Trapa natans*



- ❖ Green underside leaves
- ❖ White flowers
- ❖ 4-spined fruits and seeds
- ❖ Prominent crown

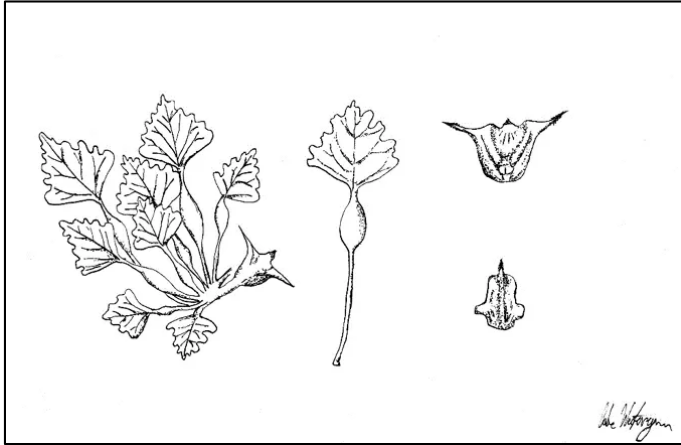
Trapa sp. is an annual

New York State Department of
Environmental Conservation

Invasivespeciesinfo.gov

Crow and Hellquist 2000, Slide courtesy of Jil Swearingen

“TWO-SPINED” WATER CHESTNUT – Trapa sp.



Drawing by Gabe Westergren

- ❖ Underside leaves reddish
- ❖ Flowers pink, sepals red
- ❖ 2-spined fruits and seeds



Photos by Nancy Rybicki



Photos by Blythe Merritt

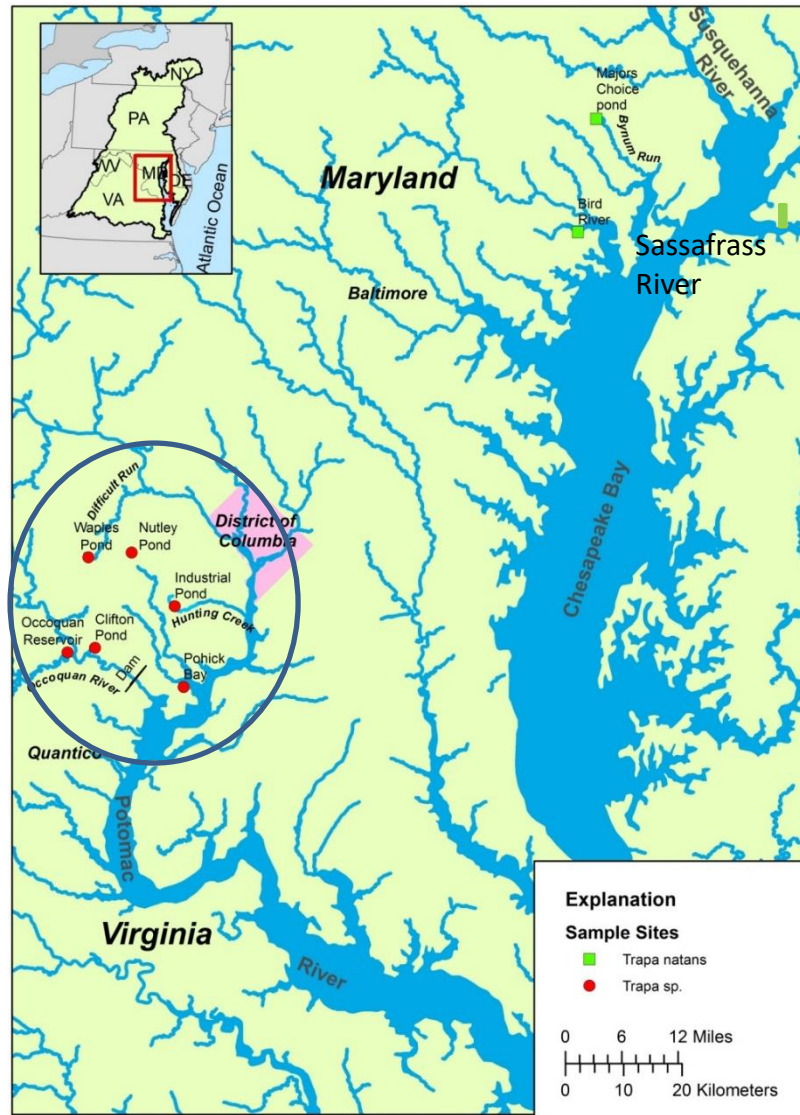


(<http://vaplantatlas.org/index.php?do=plant&plant=4646&search=Search>)

Distribution in 2015

A Chesapeake Bay map shows the 2015 study area, the newly discovered colonies with **2-horn *Trapa*** (red dots) in Virginia in the Potomac River watershed and the pre-existing colonies with **4-horn *Trapa natans*** (green squares) in Maryland in the upper Chesapeake Bay.

Based on surveys and inquiries, 2-horn *Trapa* was in 8 sites (Pohick Bay and ponds and tributaries in Fairfax and Prince William Counties) in the Potomac River Watershed.



2018 m ² of Trapa	Site Code	Jurisdiction	Treatment	Site name	Initial year	N
0	BP-VA	FFX SW	Herbicide	Brookfield Pond	2017	1
0	FBD-VA	FFX SW	Herbicide	Fairfax County Bus Depot	2017	2
0	GCP-VA	FFX SW	Herbicide	Fairfax Government Cent	2012	3
0	LHC-VA	FFX SW	Herbicide	Lee Highway Costco	2017	4
0	ML-VA	FFX SW	Herbicide	Myrtle Leaf Pond	2018	5
0	PB-VA	NVRP	Mechanical	Pohick Bay	2013	6
0	PS-VA	Prince William	Herbicide	Pfitzer Stadium (PW) Pri	2014	7
0	CP-VA	Private	Mechanical	Clifton Pond	2010	8
0	DD-VA	Private	Herbicide	Fairfax Station, pond on D	2014	9
0	HH-VA	Private	Mechanical	Fairfax Station, 11309 Hu	2018	10
0	IR-VA	Private	Herbicide	Industrial Pond	2000	11
0	NVCC-VA	Private	Mechanical	Annandale, NVCC Annan	2018	12
0	VCB-VA	Private	died out	Nutley Pond [redacted] Baroni	2010	13
0	MD-VA	Private	H and M	Miller Drive Pond (PW) (8	2014	14
0	BH-VA	Private	H and M	Brook Hill Dr. Pond, 4913	2014	15
0	OR-VA	Tributary	Mechanical	Occoquan Reservoir (PW)	2010	16
?	NC-VA	unknown		Pond Mt Holly, Near Nom	1995	17
40.47	FH-VA	Private	H and M	Forest Hills Community, p	2010	18
121.4	AL-VA	Private	none	4890 ALLIANCE DR, Fai	2017	19
161.9	SP-VA	Private	none	Stringfellow Park n Ride (2017	20
242.8	HP-VA	Private	none	H-mart Retention Pond, C	2017	21
404.7	WY-CA	Private	none	[redacted] Wyckland Dr, Clifto	2010	22
647.5	WP-VA	FCPA	none	Waples Pond	2010	23
688	WO-VA	Private	none	Willow Oak Corporate Dri	2015	24
688	WL-VA	FFX SW	treat if persists	13431 WOOD LILLY LN,	2018	25
890.3	HO-VA	NVRP	none	Hemlock Overlook 13220	2014	26
1174	CR3-VA	Private	none	[redacted] Clifton Road, Clifton	?	27
1376	CR2-VA	Private	none	[redacted] Clifton Road, Clifton	?	28
1943	CR1-VA	Private	none	[redacted] Clifton Rd, clifton, V	?	29
4007	CB-VA	Private	none	10002 Coral Berry Drive, I	2018	30
8661	WC-VA	Federal	none	Wellington Road Contract	2016	31
10927	VGA-VA	Private	none	Virginia Golf Academy, 58	?	32
27277	TL-VA	FCPA	partial treatment	Twin Lakes Golf Ponds (6	2000	33

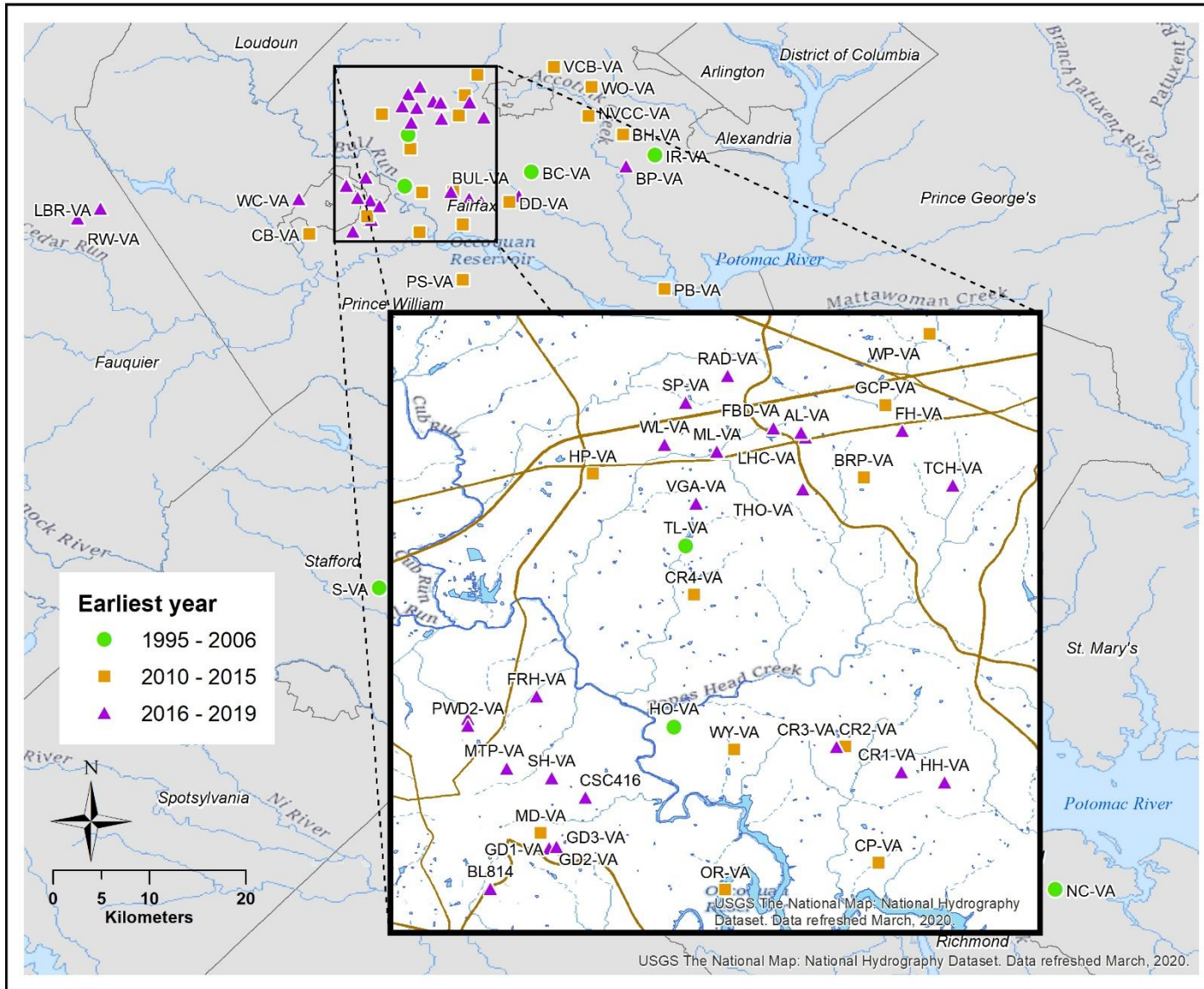
Table shows acres of two spined *Trapa* in Virginia as of December 2018

No. of acres, jurisdictions, treatments, and initial year of colonization were determined through herbarium records, interviews and site visits. Earliest record was 1995, based on a herbarium specimen from a pond in Mt Holly, VA.

Most (30) sites were in Fairfax County, 6 were stormwater management ponds under the jurisdiction of Fairfax Stormwater Management Division (FFXSW). Many are private ponds.

In the past, the management of water chestnut was in the jurisdiction of the COE, now it is a multijurisdictional issue.

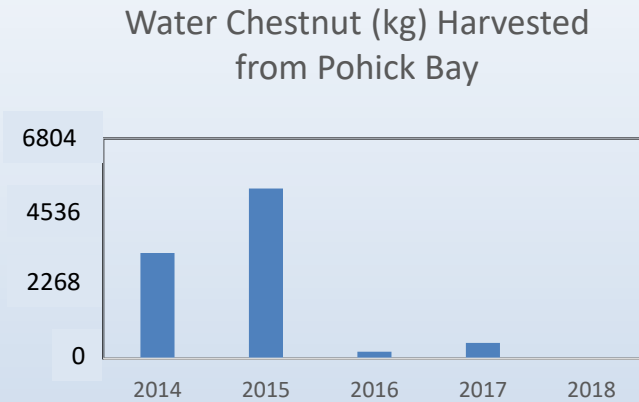
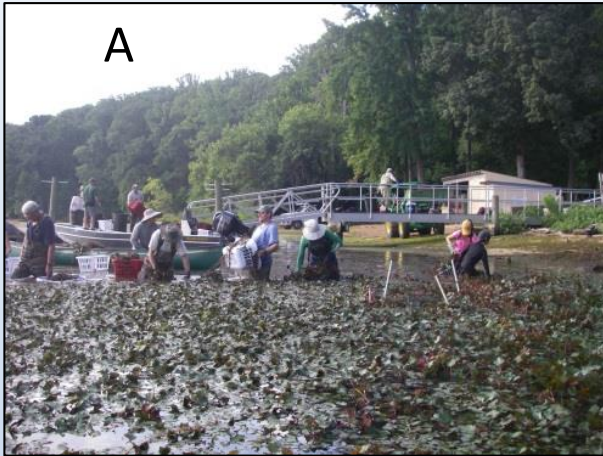
Distribution of two-spined water chestnut (53 sites) from 1995 to 2019



Map of sites that have had water chestnut between 1995 and 2019. **Green dots** are earliest records and **purple** are more recent. The most recent sites are in Fauquier County. Now documented in 5 counties.

Distribution map <https://nas.er.usgs.gov/> by Ian Pfingsten USGS. Based on National Hydrography Dataset+ High Resolution waterbodies layer

Management- September 2014, Pohick Bay, Virginia Game and Inland Fisheries (VGIF) coordinated a harvest



VGIF organized the event (people, boats, equipment). Volunteers hand pulled water chestnut and placed it in bushel baskets. Boats were used to transport pulled plants to a dock and onto a front end loader. Harvested plants were moved to an upland site.

Kilograms harvested has diminished over time. The initial area was about 1350 m².

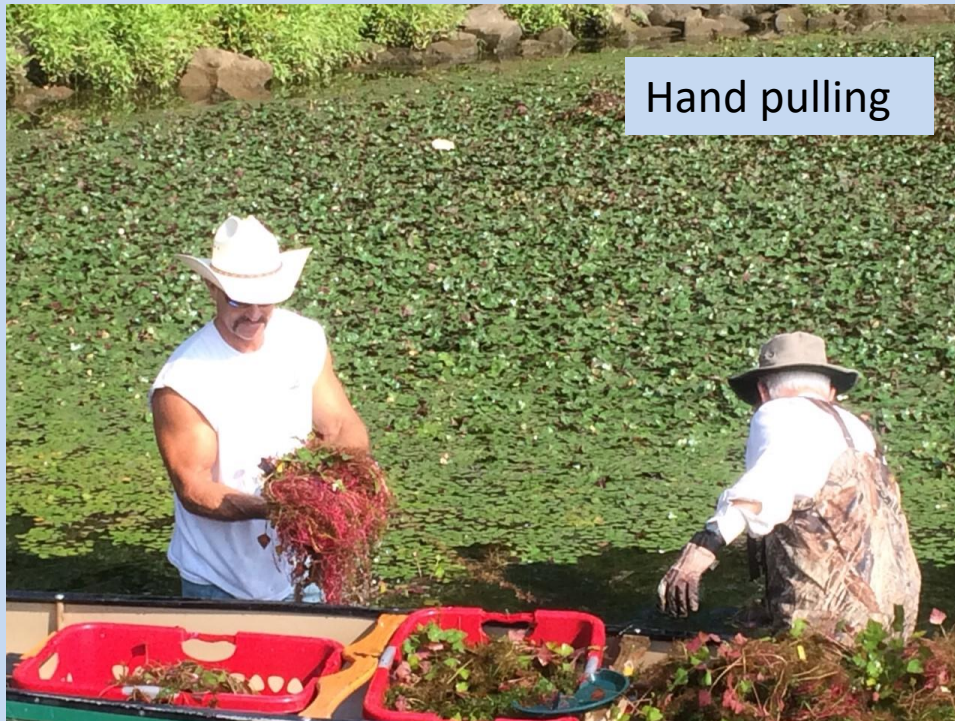


The water chestnut has been harvested beginning in fall 2014 by John Odenkirk (VGIF) and volunteers, who have harvested it every year since it was discovered.

Management of *Trapa*:

Invasive *Trapa* populations in the U.S. are typically managed with mechanical harvesting equipment, hand-pulling or treatment with herbicides. Hand pulling costs up to \$22,000 for 4000 to 6000 m² while herbicide treatment is about \$3,000 to \$5,000, per year.

VDGIF will manage *Trapa* if it is on a water body in their jurisdiction, such as Pohick Bay, Lake Brittle, and Burke Lake.



Hand pulling

The ideal timing for control of this annual plant is before seeds set. This reduces the number of seeds available for recolonization the following growing season. For two-horn *Trapa* in Virginia management by early-July is best.

Photo courtesy of John Odenkirk (VDGIF)



Northern Virginia
Community College –
Annandale. Contractor
harvested 4000-5000 m²
of coverage (up to
\$22,000 in first year but
annual contract cost and
abundance will diminish
each year)



East end, before
harvest, 2018



East end, after
harvest, 2018

Photos courtesy of David Trimble

If *Trapa* is pulled up before it fruits it can be composted nearshore but if seeds have formed the pulled plants should be composted in an upland site. There are many “do it yourself” methods



Long handled throw rake and line used to pull up plants



Long handled rake used to pull up plants



Boat used to get in water to pull up plants, bring to shore and pitchfork to move plants to tarp



Photos courtesy of Melanie Lovern, Blythe Merritt and Harry Zint

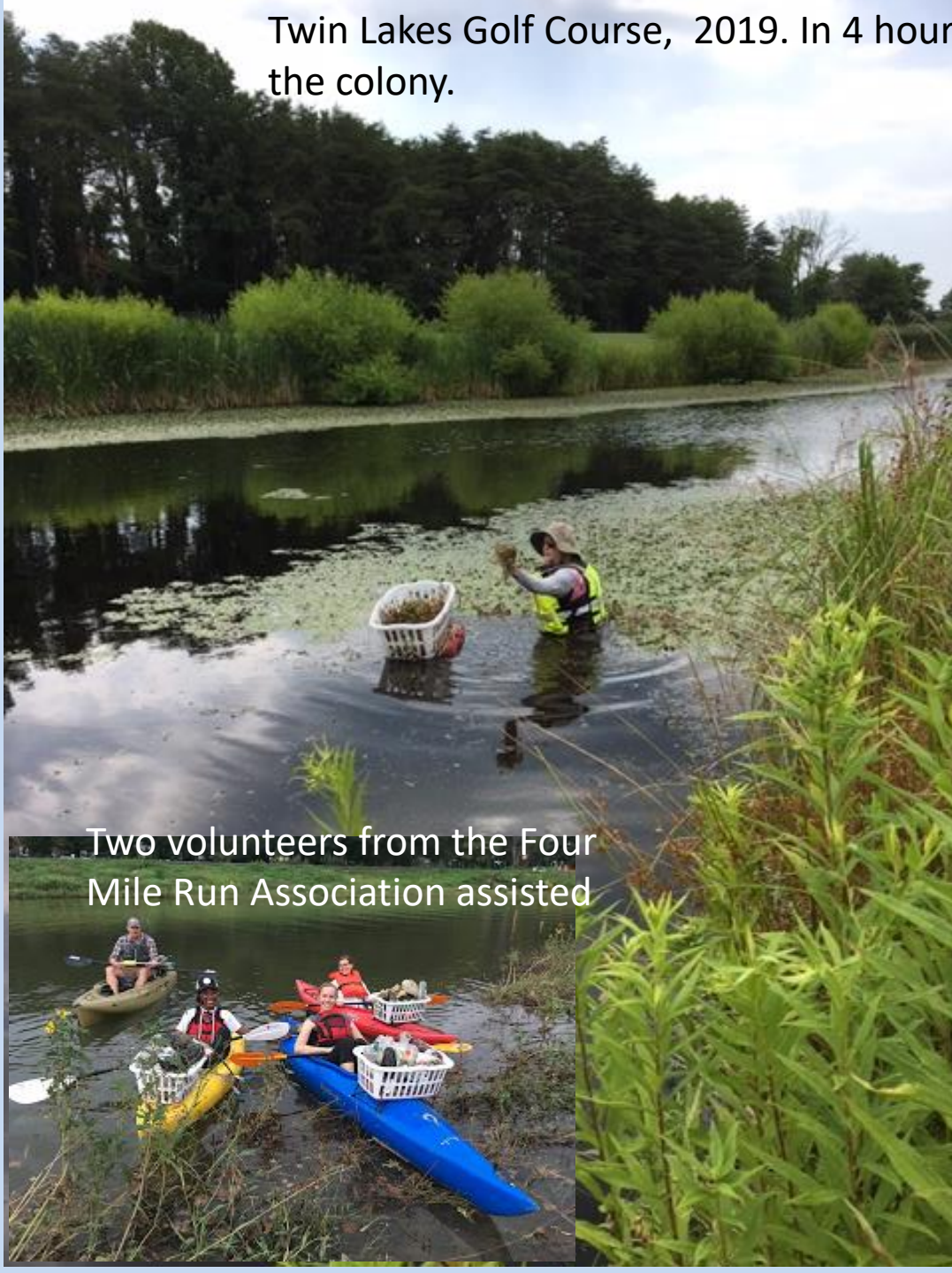
Volunteers conducted a mechanical methods test: Tow rope with a chain and hand pulling at Twin Lakes Golf Course, 2019. (about 12 volunteers, including Bill White, Martha Weiss, Nancy Rybicki, Karen Rybicki and Jil Swearingen)



tow rakes

Photos courtesy of Margaret Greishaber

Twin Lakes Golf Course, 2019. In 4 hours, 12 volunteers only removed 10% of the colony.



Two volunteers from the Four Mile Run Association assisted





This boat-mounted harvester with a blade is designed to clear an area of aquatic plants, and a separate rake attachment pushes the clipped plants away. This was purchased by Fairfax County Storm Water Division and may be used at selected sites to test its ability for water chestnut management in 2020.

What is this new taxon?



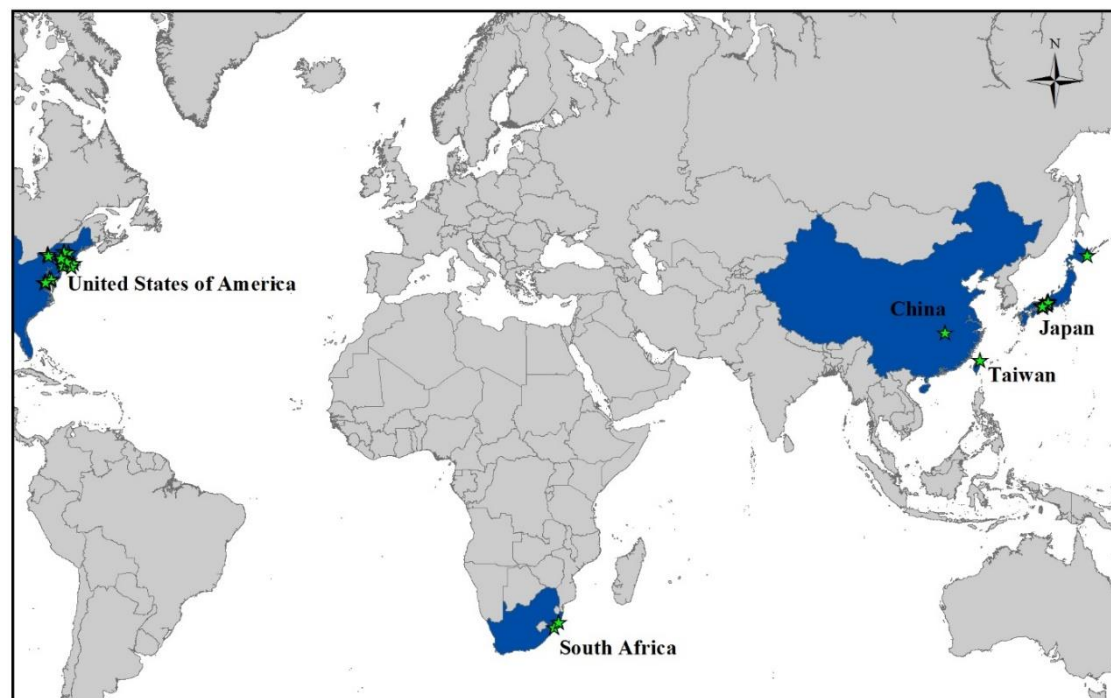
Photos by N Rybicki

Between 2016 and 2019, I collaborated with Greg Chorak, Lynde Dodd, Kадiera Ingram, Murat Buyukyoruk, Yasuro Kadono, Yuan Yuan Chen, and Ryan Thum:

Determine if the two-spined water chestnut (*Trapa*) found in Virginia is morphologically and genetically distinct from other water chestnut populations

Method:

1. Collected *Trapa* samples from populations in VA, the NE U.S. outside VA, S. Africa, China and Japan
2. Described the morphology of the leaf and fruits for each of 22 population
3. Conducted molecular analysis using amplified fragment length polymorphism (AFLP) markers (method from Li et al. 2017)



Map of 22 populations (Chorak, et al. 2019, Aquatic Botany)

Dry fruit specimens of some of the *Trapa* in study

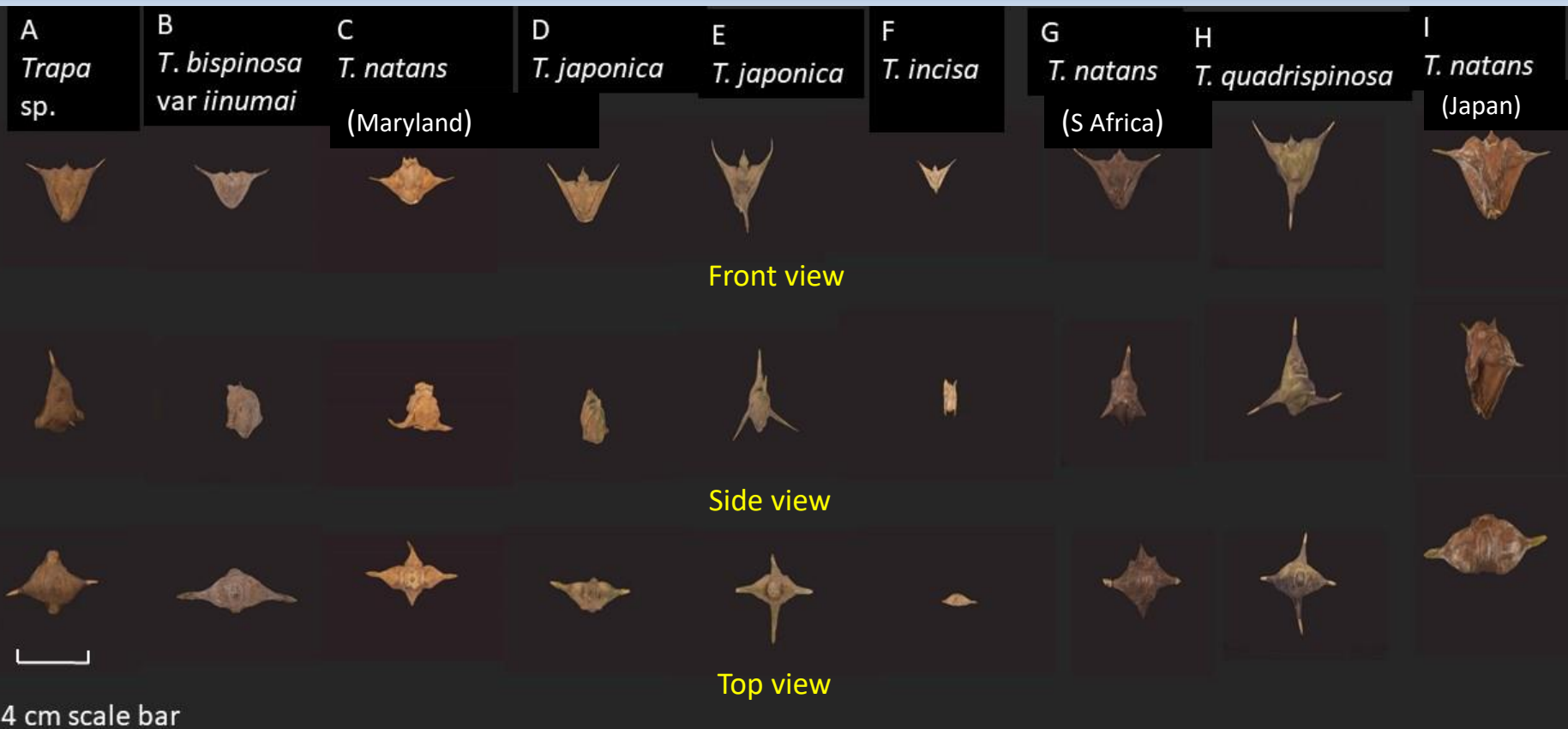
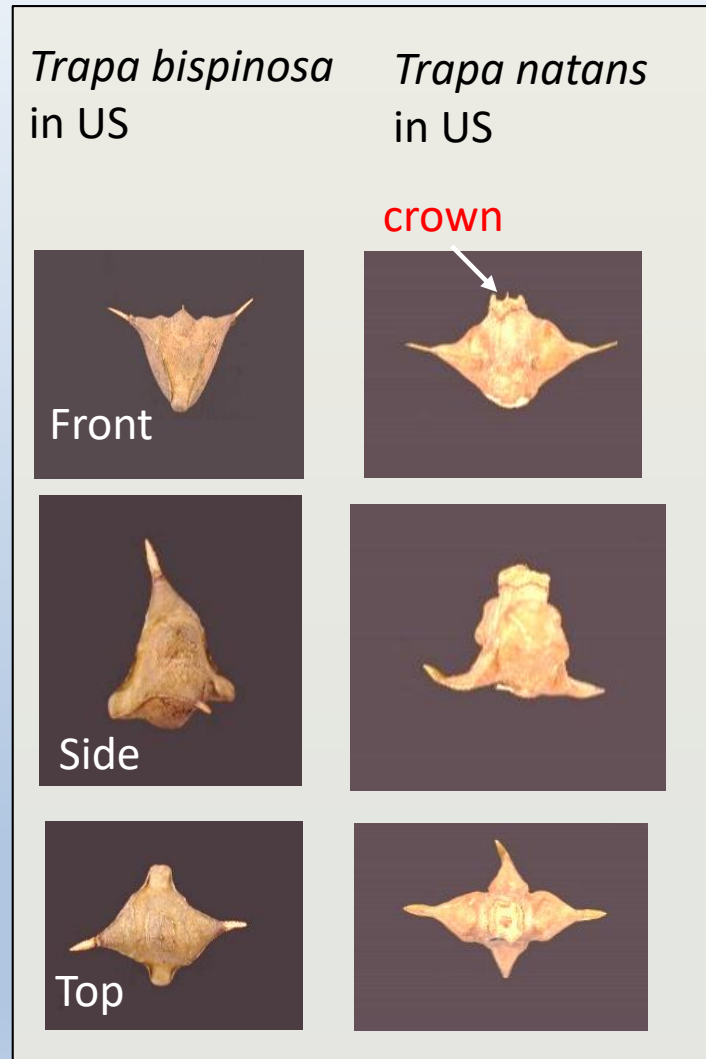


Figure 1 -Photographs of dry fruit specimens of *Trapa* in our study. Species (location) and specimen number: *Trapa* sp. (US), WP-VA_1 (Column A); *T. bispinosa* var *iinumai* (Taiwan), SLR-TW_11 (Column B); *T. natans* (US), BR-MD_1 (Column C); *T. japonica* (Japan), ONO-J_1 (Column D); *T. japonica* (Japan), ONO-J_6 (Column E); *T. incisa* (Japan), NAK-J_18 (Column F); *T. natans* (S. Africa), EM-KZN_13 (Column G); *T. quadrispinosa* (China), HB-C_12 (Column H); *T. natans* (Japan), TEM-J_1 (Column I). Top, middle and bottom row are front, side and top view. (See Appendix B for list of specimens and their morphological attributes)

Credit: Chorak, G.M., L. L. Dodd, N. Rybicki, K. Ingram, M. Buyukyoruk, Y. Kadono, Y.Y. Chen, and R.A. Thum. 2019. Cryptic introduction of water chestnut (*Trapa*) in the northeastern United States. *Aquatic Botany*, 155:32-37. Photos by Pablo Jimenez-Reyes

Results of DNA study

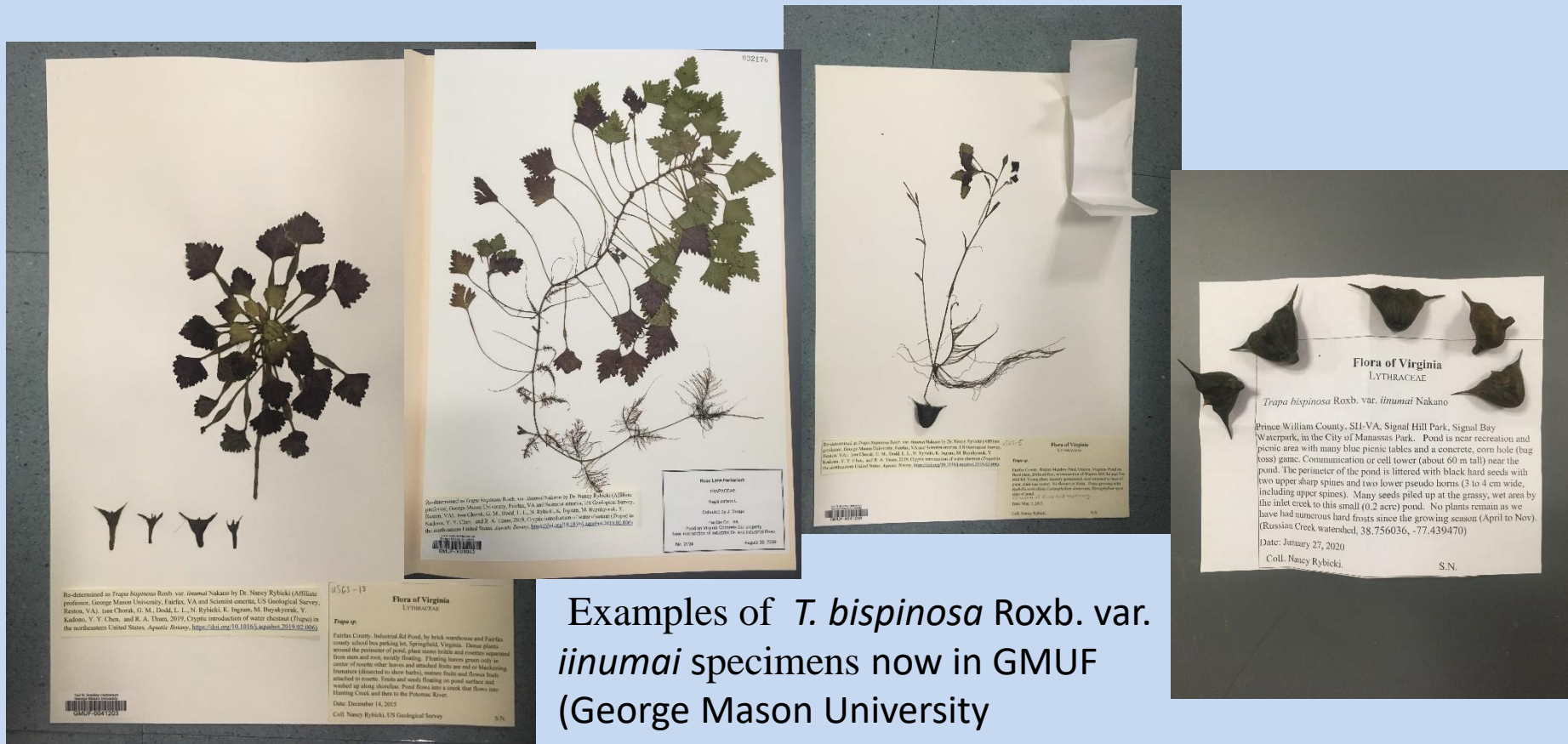
- The U.S. has two types of *Trapa*; *Trapa natans* has four-horned fruits compared to the new two-horned *Trapa*
- The newly discovered U.S. *Trapa* is identified as *T. bispinosa* Roxb. var. *iinumai* in Taiwan
- Distinguishing between these two U.S. *Trapa* taxa will be important for documenting spread and identifying new populations
- Need a world-wide review to clarify the taxonomy of *Trapa*.



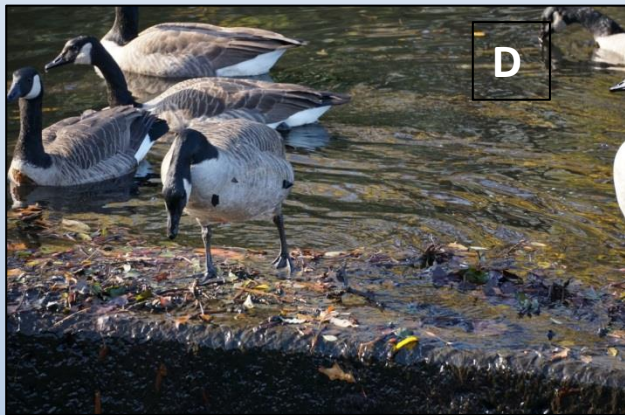
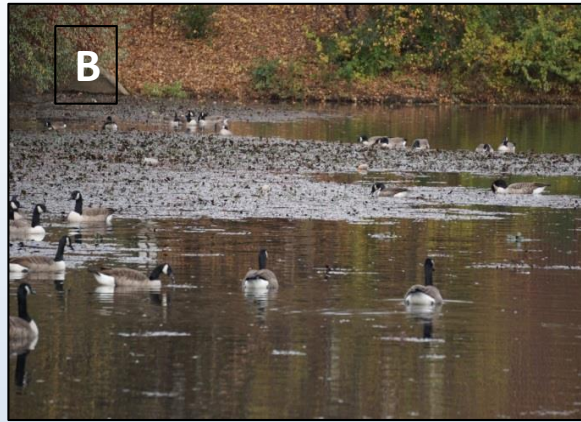
Specimens of *T. bispinosa* Roxb. var. *iinumai* have now been archived for five counties in Virginia:

Westmoreland and Stafford (1995), Fairfax (2000, 2014 to 2015), Prince William and Fauquier (2020).

The Virginia Plant Atlas, is now updated with *T. bispinosa* Roxb. var. *iinumai* found in Virginia (<http://vaplantatlas.org/index.php?do=plant&plant=4646&search=Search>)



Examples of *T. bispinosa* Roxb. var. *iinumai* specimens now in GMUF (George Mason University herbarium)



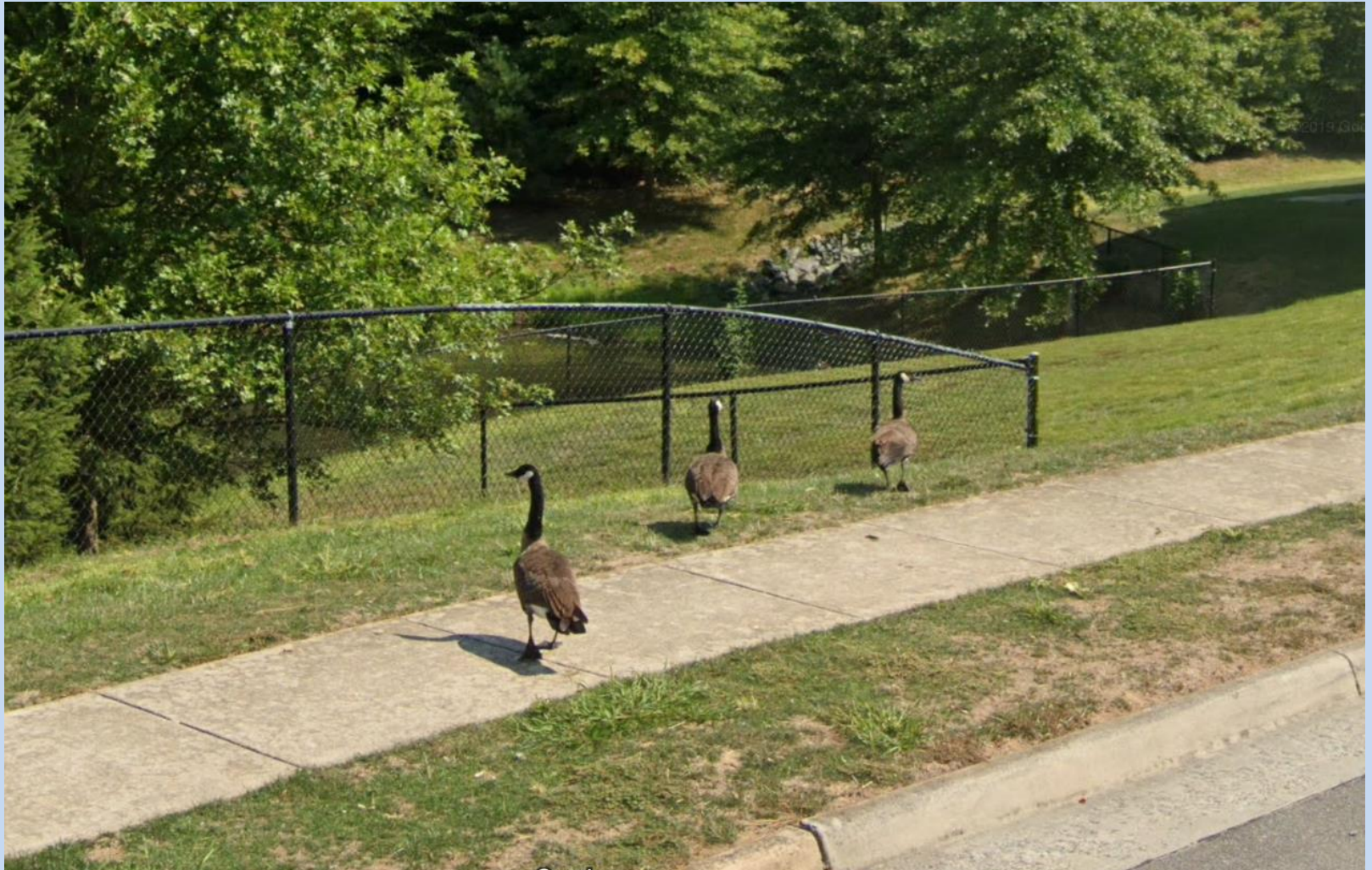
Dispersal of water chestnut fruits and seeds. Photographs taken by observers over a series of days at **Nutley Pond** in Vienna, Virginia show the potential transport mechanisms for *Trapa*.

A) Nutley Pond has a spillway that flowed into a tributary located 24 km upstream of Pohick Bay. Floating rosettes and seeds of *Trapa* sp. litter the spillway and are swept downstream during high flow events.

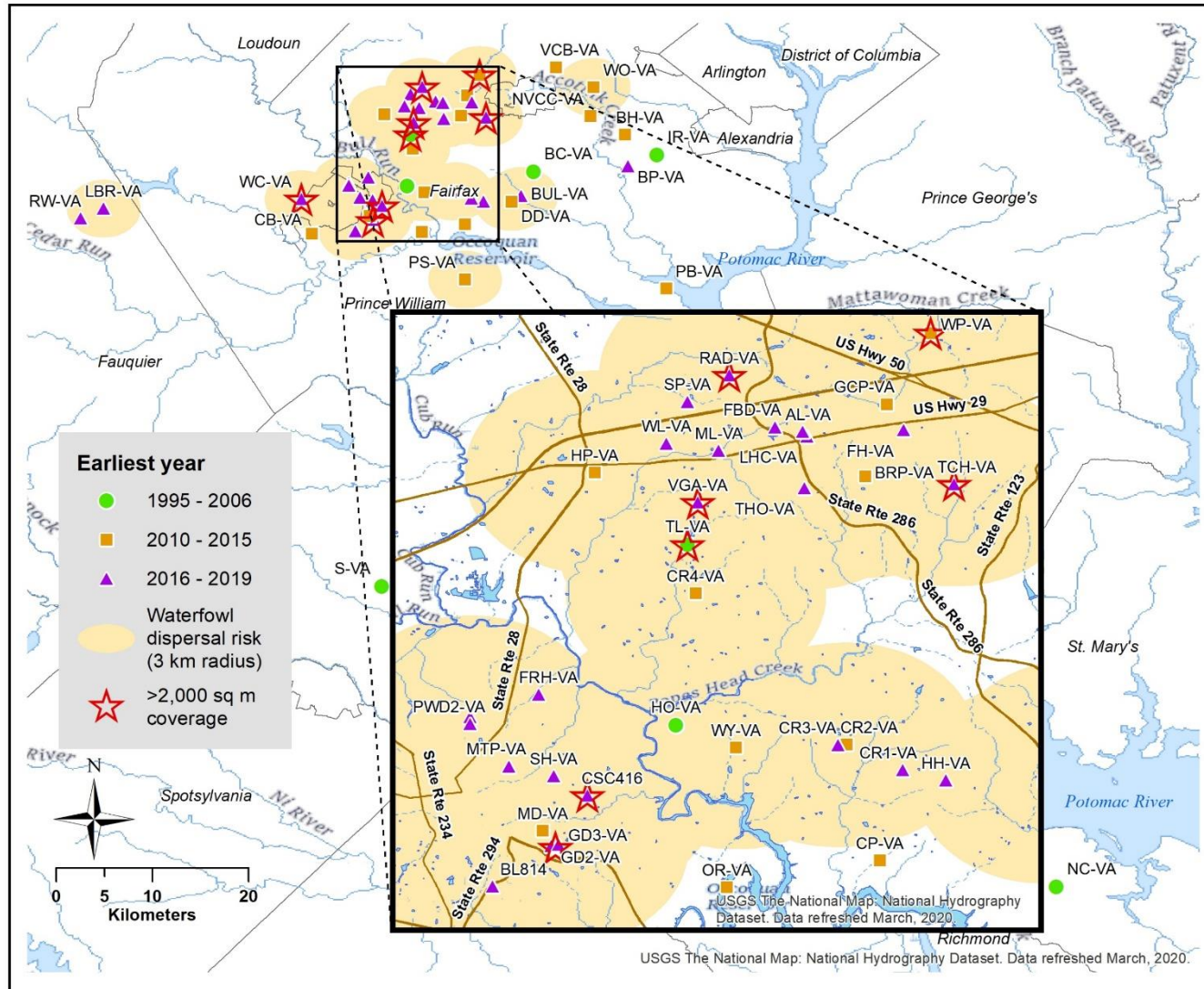
B) Resident Canada geese (*Branta canadensis*) foraged in *Trapa* sp. beds in the pond; **C-F)** Barbed seeds of *Trapa* sp. cling onto geese plumage and seeds may be transported short distances as geese move in between waterbodies. (Photo credit Libby Spence and other Virginia Master Naturalist volunteers).

Assessing waterbodies at risk: A dispersal area* of a 3 km radius was delineated around each *Trapa bispinosa* site indicating the regions most at risk for colonization.

***3 km is the rounded average distance between known sites**

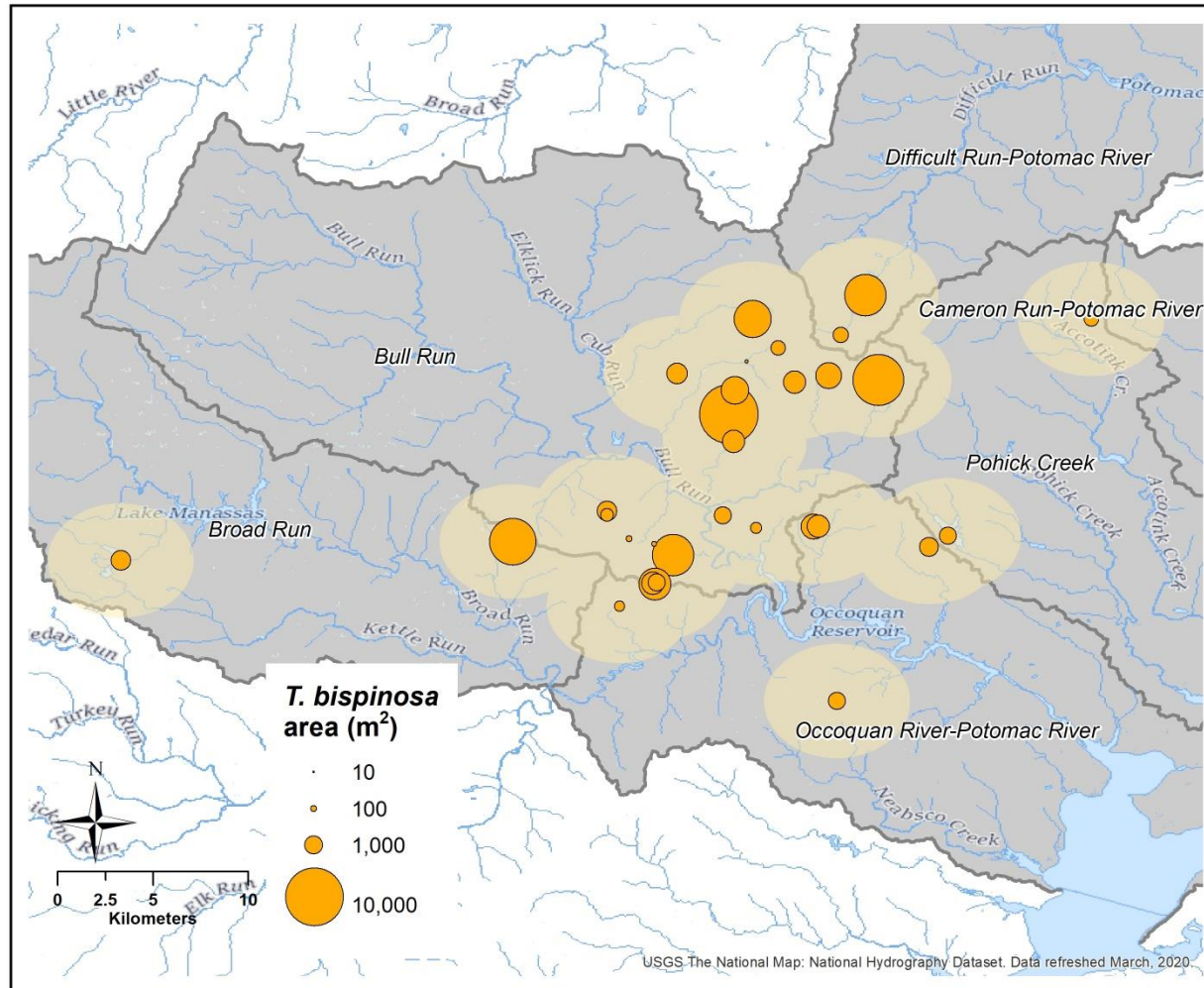


Distribution of two-spined water chestnut (53 sites) from 1995 to 2019



A dispersal area of a 3 km radius (tan) was delineated around each *Trapa bispinosa* site indicating the regions most at risk for colonization. (star is colony > 2000 m²) [Based on National Hydrography Dataset+ High Resolution waterbodies layer]

We also assessed which drainage areas were most at risk. The map shows location and size of active colonies in the 6 Potomac River watersheds impacted by *Trapa bispinosa* in 2019. (HUC 10 watersheds). Bull Run watershed had the majority of large but un-managed colonies in 2019. Size of symbol reflects size of the colony (largest symbol is greater than 10,000 m²).



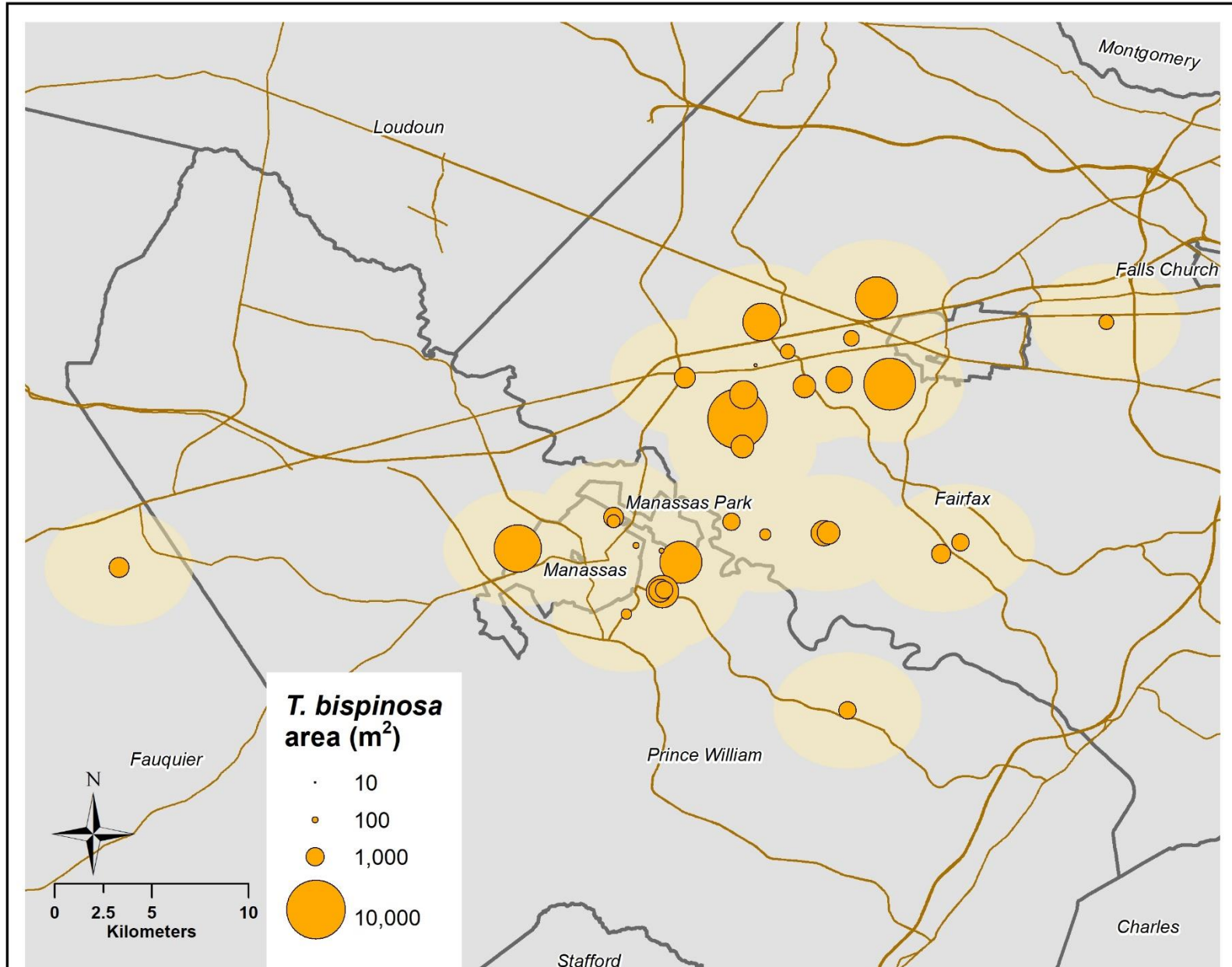
We identified **520** at-risk waterbodies within 3 km of active populations in 2019. The majority are in Bull Run drainage basin.

Table 1. Summary of waterbodies in the six HUC10 drainages by count of colonized and at-risk waterbodies as of 2019 based on National Hydrography Dataset+ High Resolution waterbodies layer

HUC10	Total	Colonized in 2019	At-risk	% colonized (Colonized/Total)	% at-risk (At-risk/Total)
Bull Run	963	20	227	2%	24%
Broad Run	621	2	101	0%	16%
Cameron Run-Potomac	563	0	17	0%	3%
Difficult Run-Potomac	561	2	33	0%	6%
Occoquan-Potomac	459	5	115	1%	25%
Pohick Creek	166	2	29	1%	17%
<i>TOTAL</i> *	<i>3330</i>	<i>31</i>	<i>520</i>	<i>1%</i>	<i>16%</i>

* does not count waterbodies twice when on HUC borders

The map shows location and size of active colonies in the 5 counties impacted by *Trapa bispinosa* in 2019. Fairfax had the majority of known but un-managed colonies in 2019.



We identified **520** at-risk waterbodies within 3 km of active populations in 2019. The majority are in Fairfax county.

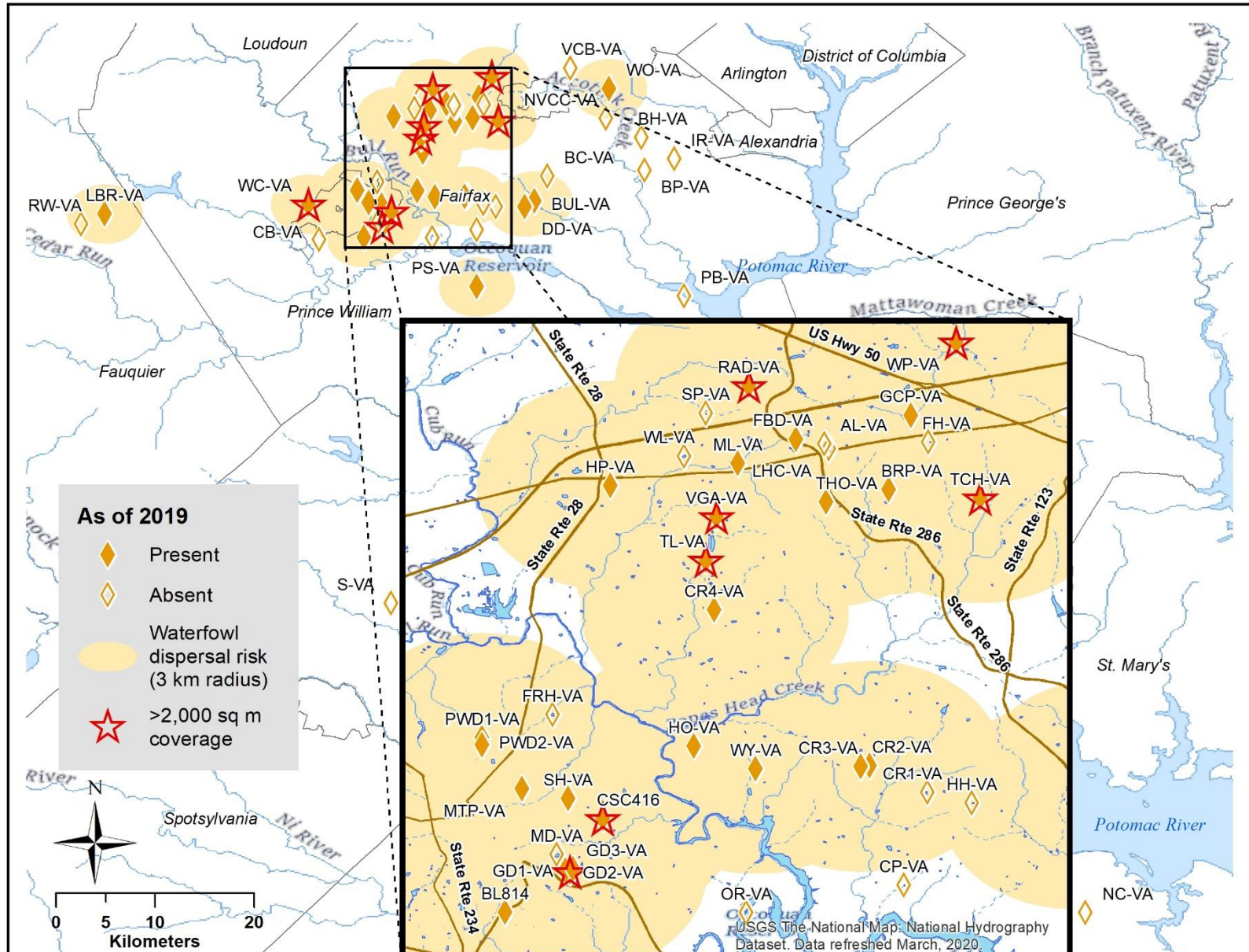
Table 2. Summary of waterbodies in three counties and three cities by count of colonized and at-risk waterbodies as of 2019 based on National Hydrography Dataset+ High Resolution waterbodies layer

County/City	Total	Colonized in 2019	At-risk	% colonized (Colonized/Total)	% at-risk (At-risk/Total)
Fairfax Co.	1274	19	308	1%	24%
Fairfax City	16	0	0	0%	0%
Fauquier Co.	1301	1	44	0%	3%
Manassas City	38	3	35	8%	92%
Manassas Park	6	1	5	17%	83%
Prince William Co.	1206	8	131	1%	11%
<i>TOTAL *</i>	<i>3828</i>	<i>31</i>	<i>520</i>	<i>1%</i>	<i>14%</i>

* does not count waterbodies twice when on county borders (e.g., Occoquan Reservoir)

2019 priority* site map. Star shows colony is present and greater than 2000 m². Solid diamond indicates colony present and small in 2019. Hollow diamond indicates site had been managed by 2019.

*priority is given by the size of the *T. bispinosa* colony.



Here we've counted a total of 345 water bodies that are at highest risk because they are near the largest, unmanaged sites. Potentially, a subset of these at-risk water bodies could be located and monitored for presence or absence of water chestnut.

Table 3. Priority sites by colonized area as of 2019

Site	Colonized area (m²)	Other colonized waterbodies w/in 3km	At-risk waterbodies w/in 3km	Owner	Management 2019	Initial year
TL-VA	27,259	3	54	FCPA	Herbicide (>10 years)	2000
WC-VA	8,653	0	44	Federal	None	2016
TCH-VA	7,938	2	21	Private	None	2019
WP-VA	5,391	1	34	FCPA	None	2010
CSC416	5,173	6	39	Private	None	2019
VGA-VA	4,218	6	50	Private	None	2016
RAD-VA	4,155	2	46	Private	None	2017
GD1-VA	3,080	6	57	Private	None	2018

Overall Conclusion:

Two-horned *Trapa*, called *Trapa bispinosa* in Taiwan, is spreading in Virginia in the Potomac River watershed and it threatens to undo years of effort and millions of dollars spent to eradicate water chestnut from the Potomac in the 1950s.

***Trapa bispinosa* was verified at 53 sites from 1995 to 2019 in the Potomac watershed.**

An assessment of water bodies most at risk of colonization by *T. bispinosa* identified 520 at-risk waterbodies within three km of active populations in 2019.

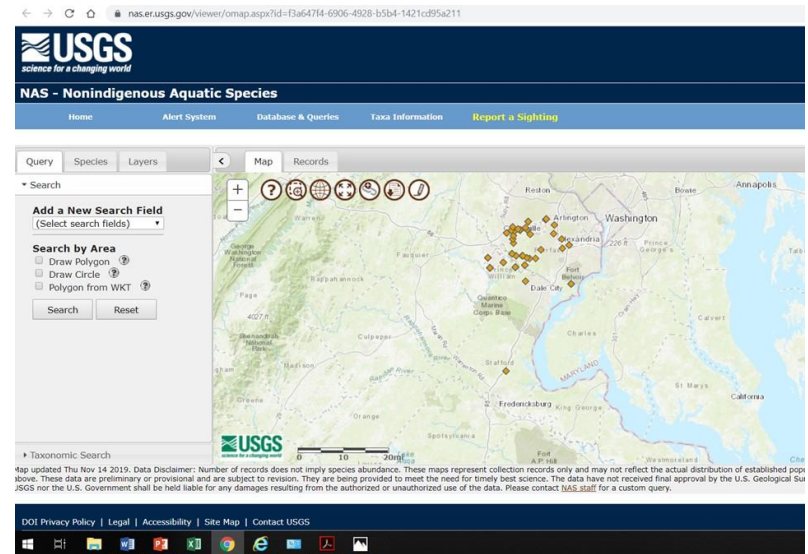
An organized effort for early detection and rapid response could help manage the distribution and spread of *T. bispinosa*.

More monitoring is needed to better understand its actual distribution.

Potential list of Tasks for volunteers and for Virginia Master Naturalist:

1) Field surveys for water chestnut:

Conduct field surveys of ponds, streams, and tidal waters near known colonies. Verify the type of *Trapa* (photographs of the seeds, flowers, and top and underside of the plant). Report colonies to online invasive species database platforms, such as <https://nas.er.usgs.gov/SightingReport.aspx>



2) Outreach for water chestnut:

Inform local newspaper, post on the internet and disseminate information on *Trapa bispinosa*. Educate the public on how to report and manage this plant before it spreads further. Set up information booths about water chestnut at local farm markets or earth day-like events

Help stop the spread of water chestnut

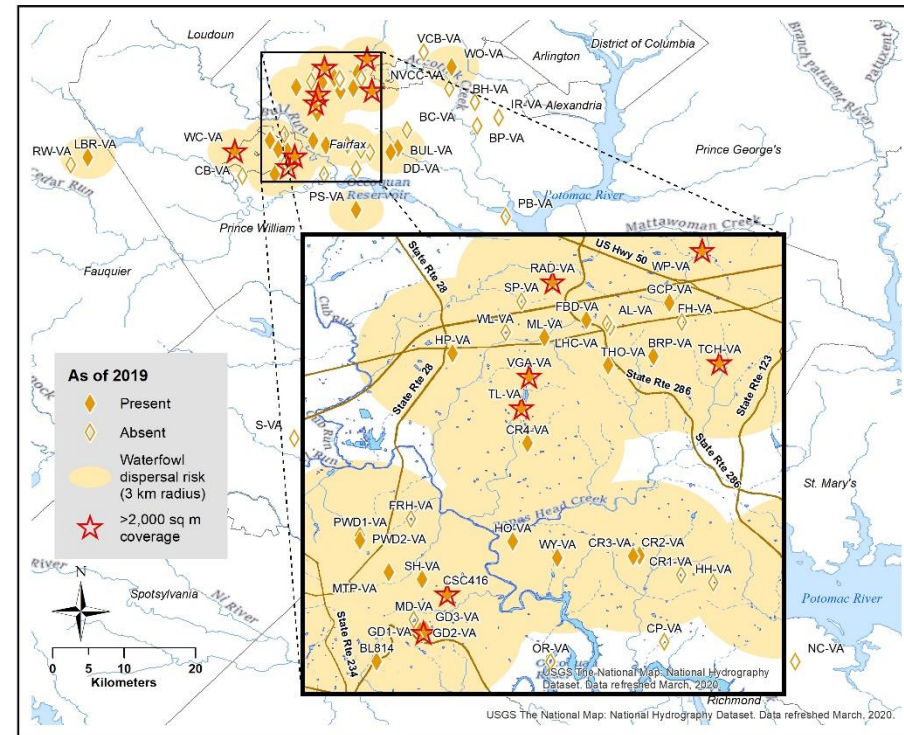
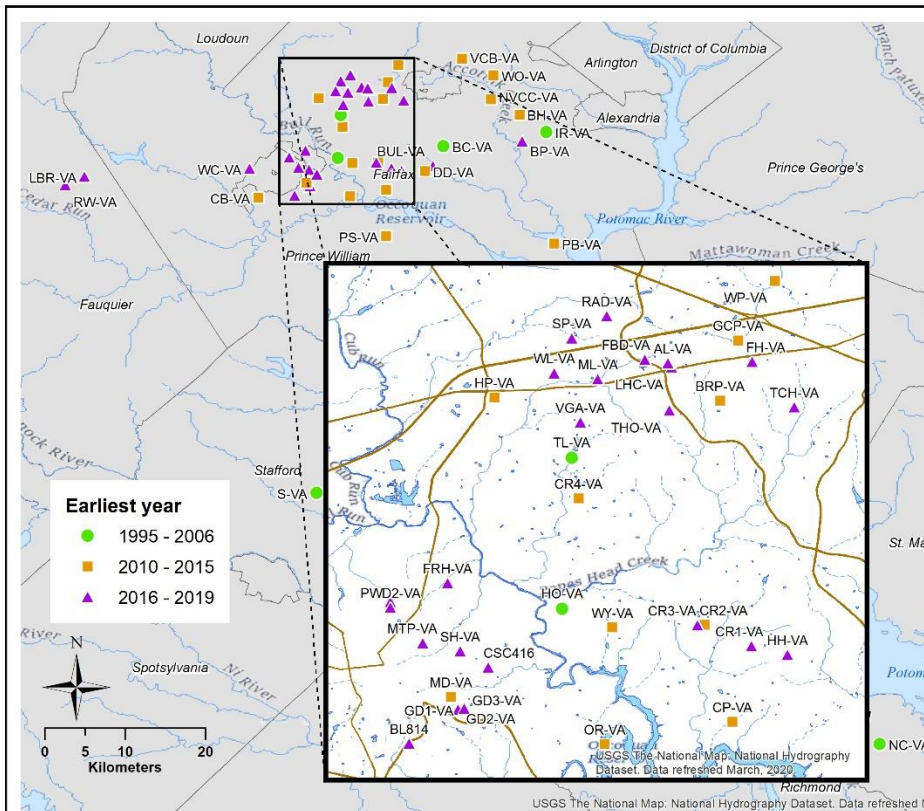


3) Collaborate with other stakeholders to develop a rapid response plan to stop the spread of water chestnut

Field surveys for water chestnut:

The *Trapa bispinosa* maps are available to help volunteers plan field surveys of ponds, streams, and tidal waters near known colonies. [Distribution map https://nas.er.usgs.gov/](https://nas.er.usgs.gov/)
The 2019 priority maps and other maps shown are available upon request.

If the pond you targeted is private, do not go on private property but determine a contact and an address, if possible, and provide outreach materials to pond owners by mail or email.



Source: ACME Mapper
(mapper.acme.com)



Aerial imagery offers some clues of where populations are located (sources <http://mapper.acme.com/> or Google map)

Source: Google Maps
(maps.google.com)



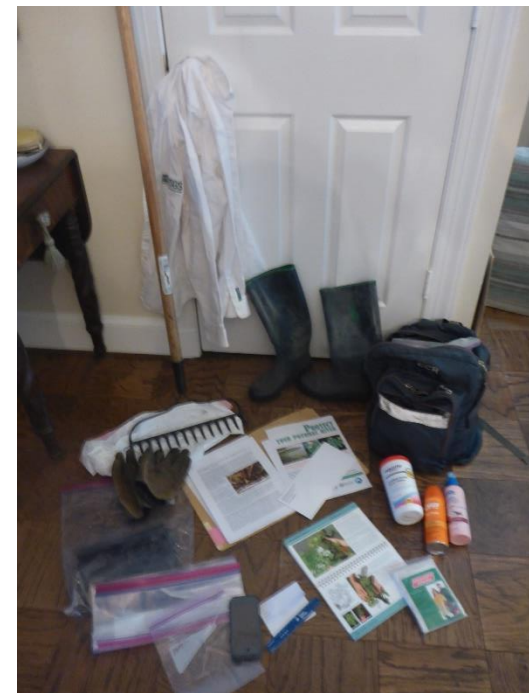
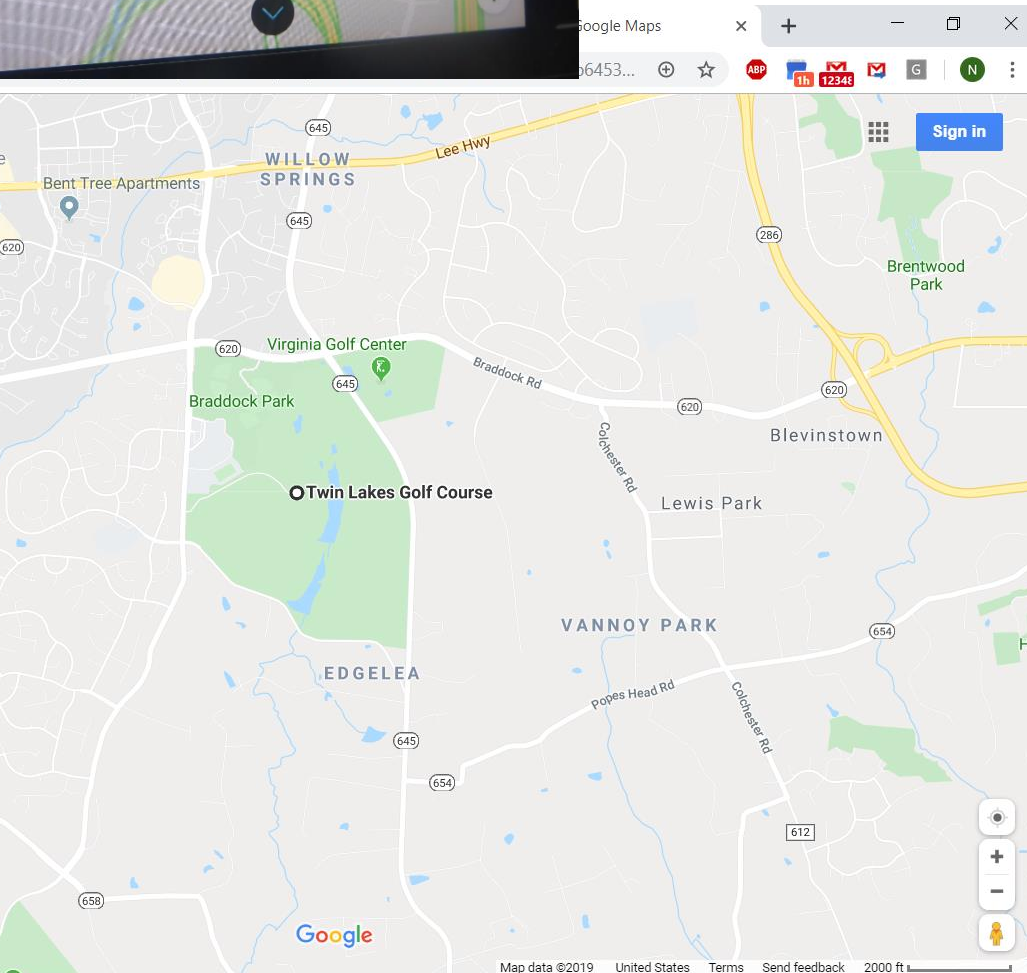
Water chestnut visible along the perimeter of the lake at Twin Lakes Golf Course

Street View does a little better

Find a public water body to monitor.



Ponds are easy to locate on Google Maps on your phone or GPS.



Pack your field equipment: Phone, rake, poncho, long sleeve shirt, gloves, boots, bags, sun and tick protection, outreach information on *Trapa*, notebook and camera. File a travel plan with a partner or travel with a partner. Be cautious. Follow Covid-19 safety protocols.

Ask permission to make observations, record contact's name. If water chestnut is present, take notes on date, location, contact info, and extent of colony; take photographs of the landscape showing the % cover, and close up photos of the seeds, flowers, and top and underside of the plant. Inquire about the initial year of sighting.

Trapa colonies should be reported to online invasive species database platforms, such as <https://nas.er.usgs.gov/SightingReport.aspx>



nas.er.usgs.gov/SightingReport.aspx

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NAS - Nonindigenous Aquatic Species

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Report a Sighting

Sighting Report Form

Please fill in all entries then click the **Send Report** button below. Your attention to detail in the *Location* section will help in maintaining a high level of precision when registering this observation. Further details and descriptions regarding this report can be included within the *Comments* entry area.

Are you a natural resource professional with multiple observations to submit? Please email a [NAS staff member](#) for assistance.

Please do not fill in any special characters such as the degree signs (characters that are allowed are ',,,:())

What are you reporting?

Type: Plant

Common Name: water chestnut

Genus: (If known)

Species: (If known)

Number Observed:

When was it found?

Date of the Observation (MM/DD/YYYY): 10/31/2019

Where was the observation made?

State: virginia

County: fairfax

Decimal Degrees Degrees, Minutes, Seconds

Latitude: -or- N

Type:

Common Name:

Genus: (if known)

Species: (if known)

Number Observed:

When was it found?

Date of the Observation (MM/DD/YYYY):

Where was the observation made?

State:

County:

Decimal Degrees

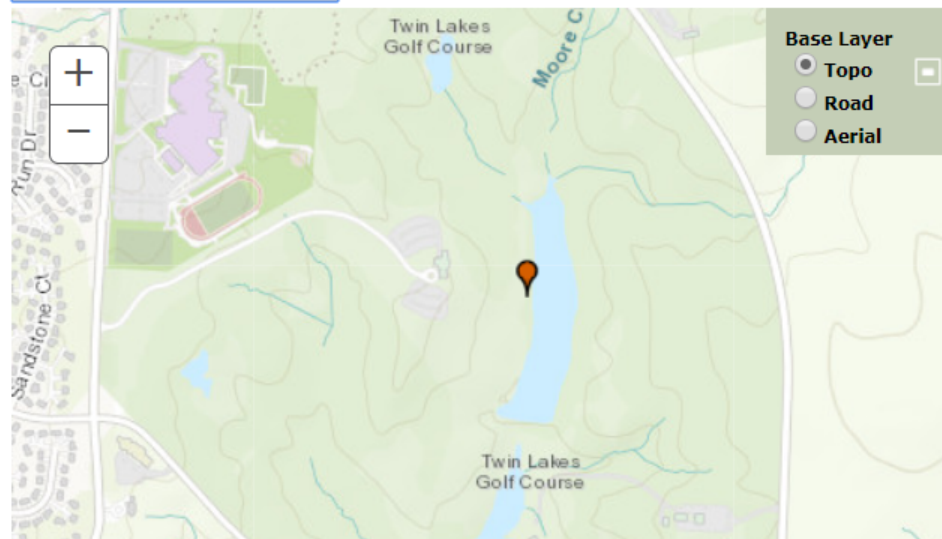
Degrees, Minutes, Seconds

Latitude: -or- ° ' "

Longitude: -or- ° ' "

If you are typing the coordinates, please use the button below to verify that they are correct.
If you are using the map to find coordinates, please zoom in as much as possible to ensure accuracy.

[Plot coordinates on map](#)



Email: (This will allow us to contact you if we have questions.)

Address:

MS 430, USGS reston va 20192

The entire perimeter of the lake has a dense bed of water chestnut for 30 ft from shore (photo), mature two horn fruits (photo), the underside of the rosette was reddish (photo), flowers were pink (photo). Contact- name, email, phone. Jurisdiction- Fairfax County Park Authority

Choose File No file chosen

Choose File No file chosen

Choose File No file chosen

Choose File No file chosen

In connection with submitting to the U.S. Geological Survey the text, image(s), audios, videos, and/or audio-visual materials, I agree that all such items were either created in my capacity as a Federal Government employee and are therefore in the U.S. public domain or do not automatically qualify for a U.S. copyright. If a U.S. copyright presently applies to any item listed above, I agree to waive my right to claim copyright protection for it and its contents in the public domain. As a result, the USGS, or anyone else, may freely publish, reproduce, use and/or distribute these creations without restriction. If the USGS uses any of these creations in its products or services, it agrees to credit the provider of the creation. Any disclaimer concerning copyright ownership are determined to be incorrect or false, resulting in the USGS or the U.S. Government being liable for the USGS and/or the U.S. Government for any resulting out-of-pocket expenses arising from defending and/or litigating against such claims.

What color is the navy flag? 🔄

Erase Report



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Query

Species

Layers

Search

▼ Search

Add a New Search Field

(Select search fields) ▼

Search by Area

☐ Draw Polygon ?
 ☐ Draw Circle ?
 ☐ Polygon from WKT ?

Search

Reset

Map

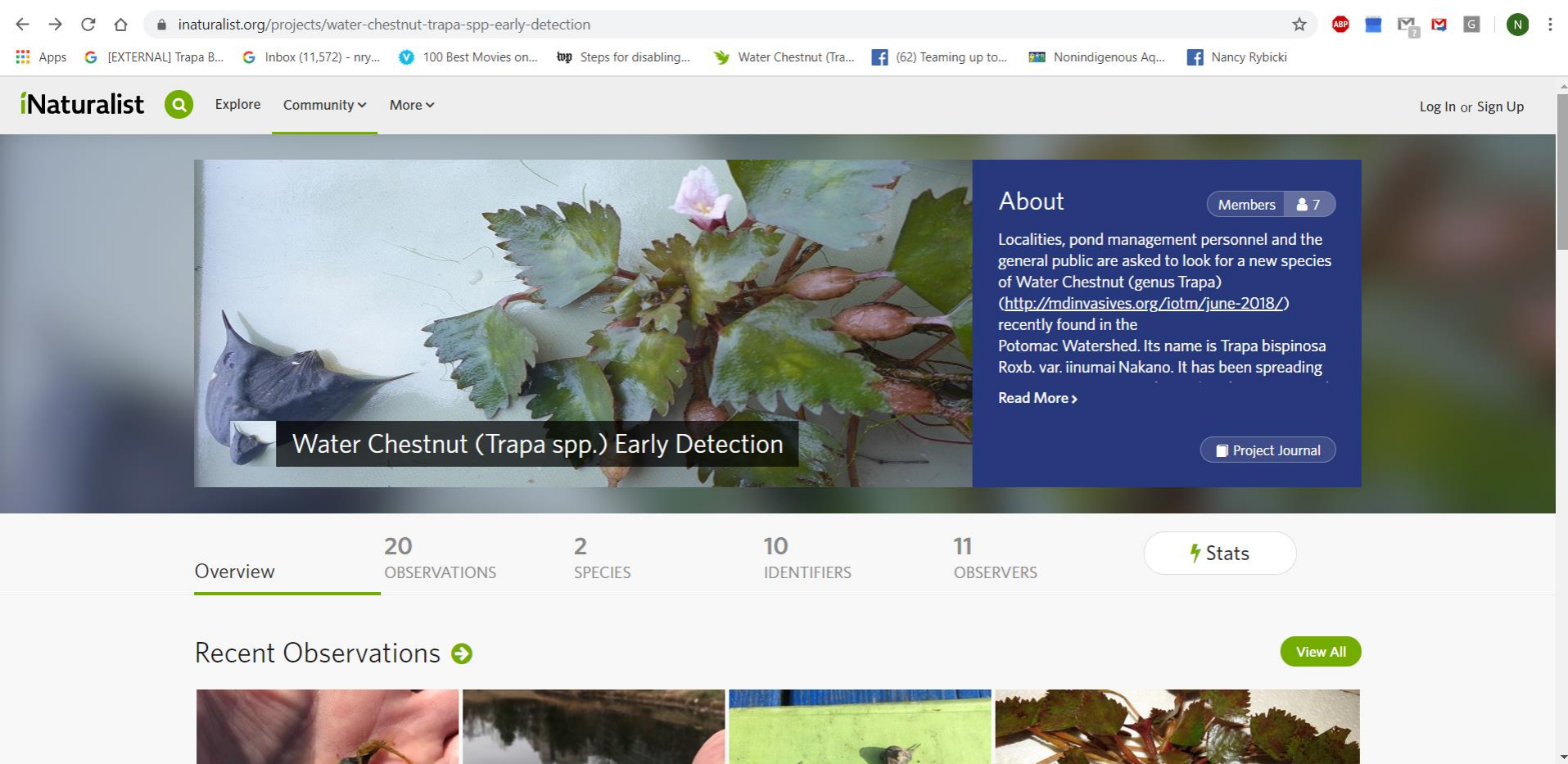
Records

Reported sightings will contribute to the distribution maps and our understanding of the spread of water chestnut. Early detection of colonies helps to reduce removal costs and ecological impacts.

Map updated Thu Nov 14 2019. Data Disclaimer: Number of records does not imply species abundance. These maps represent collection records only and may not reflect the actual distribution of established populations. These data are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. The data have not received final approval by the U.S. Geological Survey. The U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data. Please contact [NAS staff](#) for a custom query.

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Visit our iNaturalist project to report water chestnut (<https://www.inaturalist.org/projects/water-chestnut-trapa-spp-early-detection>)



Trapa bispinosa has a facebook page.
Like us on our Facebook page!


facebook.com/pg/TackleTrapa/posts/?ref=page_internal


Apps [EXTERNAL] Trapa B... Inbox (11,572) - nry... 100 Best Movies on... Steps for disabling... Water Chestnut (Tra... (62) Teaming up to... Nonindigenous Aq... Nancy Rybicki Wat


Teaming up to Tackle Two-Horned Trapa

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WHAT TO LOOK FOR THROUGHOUT THE YEAR
in any slow-moving or still bodies of freshwater in the Potomac River Watershed

FIRST HARD FROST - MARCH

1.5 - 2 inch horned, barbed, dark brown seeds floating in the water or on the shoreline

APRIL - MAY

Seedlings just beginning to come to the surface in shallow water; leaves presenting in a 3" diameter rosette

JUNE - FIRST HARD FROST

Triangular, toothed, green leaves floating on the surface in a 14" diameter rosette pattern

REPORT SIGHTINGS TO: <https://nas.er.usgs.gov/SightingReport.aspx>

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Teaming up to Tackle Two-Horned Trapa
Published by Nancy Rybicki [?] · December 26, 2019 ·

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Nancy Rybicki
April 3 at 7:42 PM
See photo

<https://www.facebook.com/TackleTrapa/photos/a.108913843953706/108913777287046/?type=3>

Discussion:

Discussion of potential volunteer efforts for outreach and monitoring water chestnut.

What questions do you have and what can you do for early detection and rapid response efforts for water chestnut?

nrybicki@usgs.gov



The End