

## In This Issue >>>

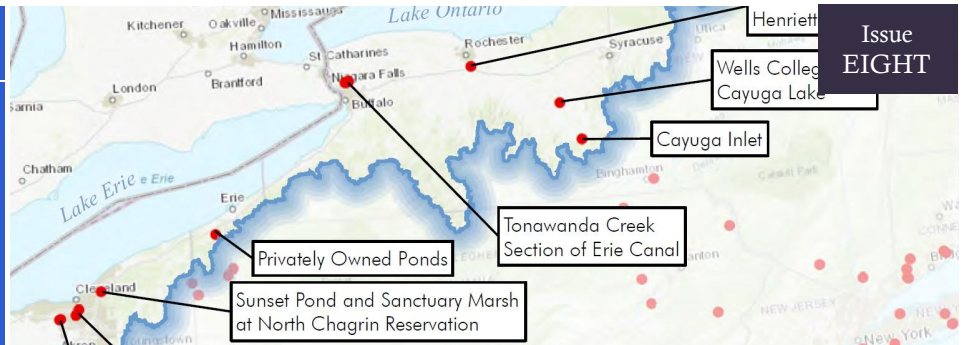
*Were Non-Native Species the Same 100 Years Ago?*

*Join the Wavyleaf Basketgrass Working Group*

*Risk Assessment of Hydrilla in the Great Lakes*

*Meeting with Legislators to Discuss Hydrilla*

*2018 Water Chestnut Chasers Challenge*



Winter 2017/2018

Providing Insight into the Benefits and Uses of the Pennsylvania iMapInvasives Database

# Tracking Invasive Species with Pennsylvania iMapInvasives

## *Were Non-Native Species the Same 100 Years Ago?*

*Story provided by Mason Heberling, Postdoctoral Research Fellow at the Carnegie Museum of Natural History*



Human activities, both in the past and continuing today, have led to the intentional and unintentional drastic modifications to the landscape. In fact, the impact of human activities on the environment is so profound that geologists are actively considering the formal recognition of a new geological time period, the “Anthropocene”. In other words, our current activities will have a recognizable footprint in the rock sediment thousands of years from now. These long-term signs include the manufacture of synthetic non-biodegradable products like plastics, radioactivity spikes from nuclear weapons testing, CO<sub>2</sub> increases and particulates from fossil fuel combustion, and ecological consequences to widespread environmental changes. Many of these examples are currently featured in a new forward-thinking exhibit “We Are Nature: Living in the Anthropocene” at the [Carnegie Museum of Natural History](#) in Pittsburgh. And among these examples of global environmental change is the exchange of plant species from across the world, resulting in non-native species invasions.

Some  
plants are  
moved



around intentionally as crops or ornamentals, and many others are merely accidental travelers along for the ride. In many respects, Pennsylvania can be considered a hotbed of invasion, including some of the most invaded forests in the world. Plant invasions in Pennsylvania present interesting scientific and cultural challenges. Some non-native species were introduced so long ago that the “Is that plant native?” question is often asked by both amateurs and professionals alike. Many non-native species introductions can be dated back to colonial days or before the American Civil War. Most species’ introduction histories are complicated, to say the least: multiple introductions in multiple locations, incomplete historical records, and often decades-long lags between dates of first introduction and eventual invasive spread. For these reasons, Pennsylvania iMapInvasives is a valuable resource for monitoring past and present spread of non-native plants (*continued on next page...*)

*“...PA iMapInvasives is a valuable resource for monitoring past and present spread of non-native plants and the early detection of new introductions.”*

## Feature Story (Continued from Page 1)



Garlic mustard (*Alliaria petiolata*) collected on May 21, 1964 (left) and May 21, 2017, (right) exactly 53 years apart.



and, forecasting to the future, the early detection of new introductions.

Mason Heberling is a postdoctoral research fellow at the Carnegie Museum of Natural History where he is being funded by the [National Science Foundation](https://www.nsf.gov/) to study whether non-native plant species in Pennsylvania have changed in their physical appearance and invasive ability since their introduction decades ago. From his research, Mason is asking questions including:

- How common and rapid are trait shifts in species following their introduction?
- Do non-native species adapt to the diversity of their new environments?

To answer these questions, Mason began by looking at the specimens in the Carnegie Museum herbarium, a collection of over 530,000 dried plants collected over the past 150 years. Mason measures a set of traits from these museum specimens such as leaf size/shape, leaf chemistry, plant height, and

reproductive output. With that many collections, he is sometimes able to pair historical and present-day specimens collected at the same location to study changes in plant structure and appearance over time at the same place. This information may provide insights into managing the plant invasions and predicting changes to the plants' characteristics in the future.

As part of this project, Mason has been collecting new specimens of some of the most common invasive species such as garlic mustard (*Alliaria petiolata*), knotweed (*Fallopia spp.*), and Japanese stiltgrass (*Microstegium vimineum*), and revisiting the original sites where botanists first recorded these species in the greater Pittsburgh area. He is also using existing records from PA iMapInvasives to locate contemporary populations for comparison.



Quickweed (*Galinsoga quadriradiata*) was at one time well known locally as "Pittsburgh weed".

That is because Pittsburgh was one of the earliest sites of introduction, recorded back as early as the late 1870s. This specimen was collected in 1869 in Pittsburgh (formerly Allegheny City). The species remains a common urban weed today.

Stemming from Mason's research, plans are underway to include historical herbarium records from the Carnegie Museum into the PA iMapInvasives database. Records from the Carnegie herbarium will not only add to the range of invasive plant records the database currently contains, but will also more accurately depict the range and history of invasive plants in Pennsylvania.

Studying invasions over time gives invasive species professionals information about managing problem species. With PA iMapInvasives, citizen scientists and professionals alike can easily track new invasions and revisit old invaded sites to monitor spread through time. Mapping changes via observation records over the course of an invasion can be useful for understanding the spread of a non-native species.

To learn more about Mason's research, visit his website at <https://www.masonheberling.com/>. More information on the Carnegie Museum herbarium and the "We are Nature" exhibit can be found at <http://midatlanticherbaria.org/portal/> and <https://carnegiemn.org/>.



One of the earliest records of Japanese knotweed in the Pittsburgh area, collected in Frick Park in 1937.



## Join the Wavyleaf Basketgrass Working Group

Story provided by Art Gover, Research Support Associate at The Pennsylvania State University



Art Gover, PSU

Are you interested in helping to prevent the spread of a high priority invader in Pennsylvania? If so, you may be interested in a recently developed group whose focus is to find, manage, and stay abreast of action being taken to combat wavyleaf basketgrass (*Oplismenus hirtellus* ssp. *undulatifolius*, WLBG) in Pennsylvania. The group was formed in 2018 and is being led by [Art Gover](#) of The Pennsylvania State University.

Wavyleaf basketgrass is an exotic, cool-season, shade-tolerant, stoloniferous grass than can completely cover a forest floor, providing competition against native forest species. By causing declines in native plant diversity, WLBG may harm wildlife dependent on native plants. Because it is still relatively new in the United States, its ecological impacts are mostly unknown

([Mid-Atlantic Field Guide to Aquatic Invasive Species \[2016\]](#)), though many concerned conservationists have placed WLBG on their list of species to watch.



Wavyleaf basketgrass (*Oplismenus hirtellus* ssp. *undulatifolius*)

Photo credit: Art Gover, PSU



One confirmed report of wavyleaf basketgrass at Codorus State Park (York County) made by Penn State staff.

Screenshot from the Pennsylvania iMapInvasives database.

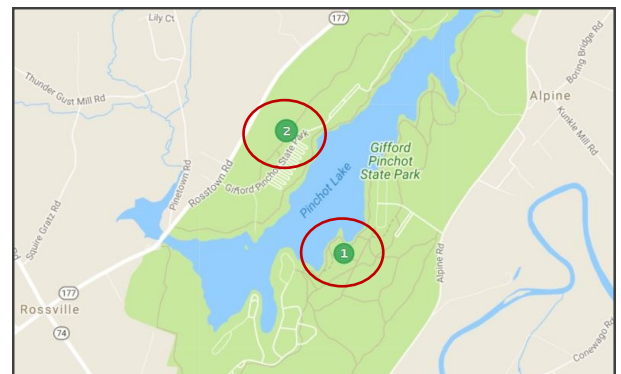
WLBG was first discovered in Pennsylvania at Codorus and Gifford Pinchot State Parks in 2016. Known from Maryland since 1996, it has long been anticipated that WLBG would eventually make its way to Pennsylvania. Observed positive findings have been documented in the Pennsylvania iMapInvasives database, and plans are in place to incorporate locations where several surveys for WLBG found only absence data. Surveys done by the DCNR-State Parks and Penn State in 2017 suggest that the infestation boundaries at Codorus are locally limited to the original observations, while additional sites were identified at Pinchot, leaving its infestation edges currently unclear. At present, there are no additional reports of WLBG in Pennsylvania other than the aforementioned findings in York County; however, searches in other parts of the state are crucial now and in the following years to ensure a full understanding of impacted locations and native habitats.

Plans are in place in 2018 to complete the survey of Pinchot, conduct an ID/treatment workshop and work day at Pinchot in early May, survey additional sites in south central Pennsylvania, and develop outreach materials targeting hikers, disc golfers, and equestrian trail riders.

An initial invitation to join the WLBG group was sent to land stewardship agencies in Pennsylvania and select groups in Maryland. Other invitees included preserve managers and conservancies, regulators, academics, and Cooperative Extension. Though the WLBG working group is currently comprised (mostly) of natural resource professionals, citizen scientists and anyone else with an interest in joining the group is welcome. To join the group, register with the official listserve by sending an email to: [WLBG-PAWorkGroup-L-subscribe-request@lists.psu.edu](mailto:WLBG-PAWorkGroup-L-subscribe-request@lists.psu.edu).

As of February 20, 2018, the WLBG working group has 31 members.

To stay informed of new findings and survey efforts for WLBG in Pennsylvania, stay attentive to emailed messages sent through the designated WLBG listserve. Additionally, registered users of iMapInvasives can set up a Continual email alert and receive a notification directly to your inbox whenever a confirmed finding of WLBG is reported to the database. For assistance in setting up an email alert in iMapInvasives, please contact Amy Jewitt at [ajewitt@paconserve.org](mailto:ajewitt@paconserve.org).



Three confirmed reports of wavyleaf basketgrass at Gifford Pinchot State Park (York County) made by Penn State and DCNR staff. Screenshot from the Pennsylvania iMapInvasives database.

## ***Risk Assessment of Hydrilla in the Great Lakes***

Story provided by Kris Erickson, Principal Scientist, Restoration Specialist, and Project Manager at Ecology and Environment, Inc.

Over the past several years, the invasive aquatic plant hydrilla (*Hydrilla verticillata*) has been discovered in several locations in Pennsylvania including Pymatuning Reservoir, Lake Arthur, and several privately-owned ponds in Erie County. It has also been documented in waterbodies in western New York and Ohio, which has raised concerns about the spread of this highly invasive species throughout the Great Lakes Basin.

Hydrilla infestations can result in adverse economic and ecological impacts because it exhibits rapid growth, growing up to one inch per day. It can spread rapidly through several different methods such as fragments transported by recreational boats and trailers.



*Hydrilla (Hydrilla verticillata)*

Photo credit: © Maryland Department of Natural Resources

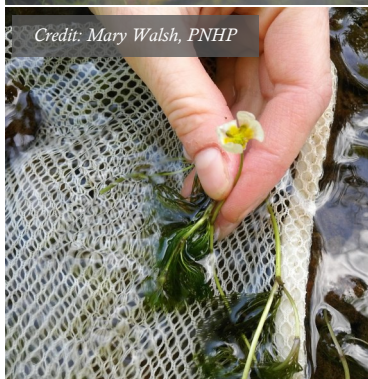
To address these growing concerns, the U.S. Army Corps of Engineers (USACE) - Buffalo District began a study to evaluate the possibility of hydrilla becoming established in the Great Lakes. Potential impacts associated with hydrilla introduction and establishment were also assessed. A risk assessment framework for aquatic nuisance species was adopted for this project, and modeled was developed for studying whether hydrilla could become introduced, and subsequently established, in the Great Lakes. Potential impacts associated with hydrilla introduction and establishment were also assessed. A risk assessment framework for aquatic nuisance species was adopted for this project, and modeled after the ecological risk assessment framework developed by the U.S. Environmental Protection Agency (USEPA). The Risk Assessment consists of four main elements: (1) Problem formulation; (2) Analysis, including characterization of exposure and effects; (3) Risk characterization, and (4) Risk management. The project is funded by the Great Lakes Restoration Initiative (*Story continued on page 5 ...*)

## ***Invasive Species Profile >>>***

Credit: Sherry Leap, PA DEP



Credit: Mary Walsh, PNHP



### ***Fanwort (Cabomba caroliniana)***

**Species at a Glance:** Fanwort is a submersed freshwater perennial that can often be found rooted or floating. Stems may reach lengths of up to 6 meters (20 feet). It is persistent, aggressive, and competitive, bringing with it the potential to take over Pennsylvania's waterways.

**Identification:** Fanwort has both floating and submersed leaves. Its flowers are small with a diameter less than 0.5 inches and comes in white, pink, and purple. Flowers grow from the tips of the stems and float on the water's surface. Stems/roots are usually green and sometimes reddish brown. Shoots are upturned extensions of the horizontal rhizomes and may reach lengths of up to 20 feet.

**Similar Species:** Fanwort is often confused with other leafy milfoils, Beck's water-marigold (*Megalodonta beckettii*), some bladderworts, hornworts, mermaid weeds, and water crowfoots. The leaves of watermilfoils are whorled, and the plants have small flowers growing from where the leaves meet the stem. Beck's water-marigold has yellow, composite flowers and sessile leaves, while fanwort has white flowers and slender leaves. Water marigold also has opposite leaves that attach directly to the stem with no petiole between the leaf and stem.

**Habitat:** This very hardy plant is usually found rooted in muddy areas of slow moving waters such as streams, small rivers, lakes, and ponds. It can establish in a wide variety of environments and tolerate a wide range of temperatures, allowing it to overwinter in frozen lakes.

**Spread:** Fanwort is thought to have spread from intentional and unintentional release in the aquarium trade. Its fragile stems break off easily, and most pieces can re-sprout and grow into new plants.

**Distribution:** Native to the sub-tropic areas of North and South America, and Gulf of Mexico regions of the United States, fanwort has been introduced to regions in the Northeast and Pacific Northwest. It is present in both the eastern and western counties of Pennsylvania.

**Environmental Impacts:** Fanwort is highly competitive and persistent, forming dense mats at the water's surface that block sunlight into the water column, negatively impacting native plant species, biodiversity, and water quality. It can also clog waterways, impacting recreational activities such as boating, fishing, and swimming.

**Note:** Content for this invasive species profile comes from "[Pennsylvania's Field Guide to Aquatic Invasive Species \(2015\)](#)".



## Great Lakes Hydrilla Risk Assessment (Story continued from Page 4)



*Hydrilla tangled in boat motor.*

*Photo credit: Louisiana Sea Grant*

and is being conducted under the USACE's Aquatic Plant Control Research Program authority.

The principal objective of the Great Lakes Hydrilla Risk Assessment is to identify locations in the Great Lakes Basin most vulnerable to invasion based on likelihood of introduction and environmental suitability. Other key components of the project include: (1) developing an improved understanding of the effects of photo-period, temperature, and interspecies competition on growth of monoecious hydrilla (i.e., the type better adapted to survive at high latitudes) through laboratory and field studies; (2) assessing economic, sociocultural, and environmental impacts of hydrilla establishment in the Great Lakes; (3) providing recommendations for prevention, early detection, and rapid response to reduce risk of hydrilla spread; and (4) identifying best management practices for hydrilla control.

The Project Team providing the array of expertise needed to execute the Risk Assessment is comprised of a number of agencies, specialists, and universities including the USACE Buffalo District; USACE—Engineer Research and Development Center; Ecology and Environment, Inc.; Texas Tech University; University of Toledo; and North Carolina University.

Project analyses involved documenting the extent of current hydrilla infestations and estimating the likelihood of introduction, establishment, and spread of hydrilla into new areas. Identifying areas of current and potential future infestations allows for an estimation of the magnitudes of potential ecological, economic, and social/cultural impacts of hydrilla on the Great Lakes Basin. Primary questions driving the analyses include:

- Where is hydrilla currently found in the Great Lakes Basin?
- Where is suitable habitat for hydrilla in the Great Lakes Basin?
- What is the likelihood of hydrilla spreading into other areas of the Great Lakes Basin?
- How does hydrilla grow in northern climates and waters?

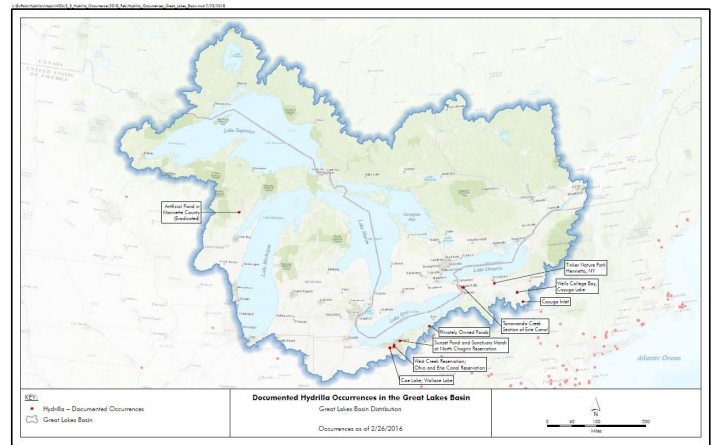
The answers to the four questions outlined above informed the project team about the locations in the Great Lakes Basin that are vulnerable to hydrilla invasion. The Pennsylvania iMapInvasives program has specifically been involved with helping to address the first question, providing the Project with records of existing hydrilla infestations in 24 counties in Pennsylvania.

The types of potential environmental, economic, and sociocultural impacts caused by hydrilla infestations are being assessed based on literature and reports from other regions in the United States where hydrilla has become established. Similar impacts are anticipated in areas in the Great Lakes Basin that are vulnerable to hydrilla invasion. Understanding the extent of those potential impacts is a critical element of this project.

The draft risk assessment is currently near completion. Using the information generated from the analyses described above, the final elements of the process will include a characterization of risks associated with hydrilla introduction and establishment, and management of those risks. Characterizing risks involves estimating

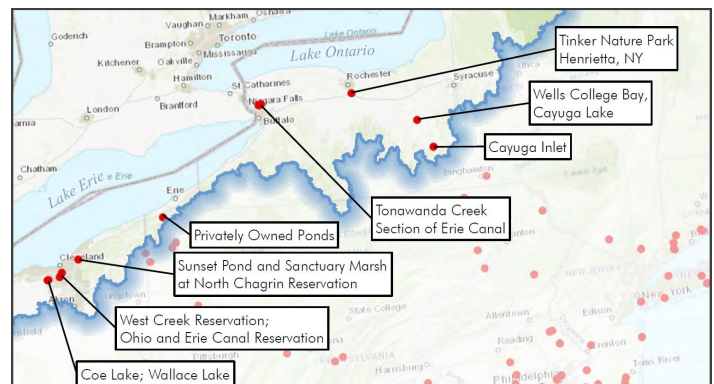
risk by integrating the results of all the analyses to identify the locations most vulnerable to invasion and ranking them either low, medium, or high. It also includes describing limitations and uncertainties associated with the various analyses (e.g., modeling and plant growth studies) and summarizing their effects on the results and conclusions of the assessment.

Finally, the Risk Assessment addresses risk management which focuses on developing recommendations for prevention, early detection, and rapid response to reduce the potential of hydrilla spread, and to identify best management practices for hydrilla control. Higher-risk areas are likely to be priorities of outreach to prevent or minimize hydrilla introduction and, if hydrilla is introduced, to ensure early detection and effective management. The results of the Risk Assessment will be widely communicated with stakeholders throughout the Great Lakes Basin.



*Above: Hydrilla occurrences in the Great Lakes Basin.*

*Below: Close-up view of hydrilla occurrences in and near Pennsylvania as well as surrounding states.*



*Kris Erickson,  
Ecology & Environment*

For more information on the Project, contact Michael Greer, U.S. Army Corps of Engineers at [michael.j.greer@usace.army.mil](mailto:michael.j.greer@usace.army.mil); and Kris Erickson, Ecology and Environment, Inc. at [kerickson@ene.com](mailto:kerickson@ene.com).

## Meeting Held with State Legislators to Discuss Action Against Hydrilla

Story provided by Jeff Wagner, Director of the Pennsylvania Natural Heritage Program



Jeff Wagner, PNHP

The state of Pennsylvania currently has an [Invasive Species Management Plan](#) in place developed by the [Pennsylvania Invasive Species Council \(PISC\)](#), a governor-appointed body charged with reporting on and helping coordinate invasive species efforts in the state. With goals and actions in the plan that include the development of policy and funding sources for invasive species management, PISC coordinated a special in-person meeting with key legislators and their staffs late last year.

The purpose of the meeting, held December 12, 2017, was to alert legislators about the issues surrounding aquatic invasive species, and one species in particular—hydrilla (*Hydrilla verticillata*). With hydrilla control efforts already underway in several lakes in Pennsylvania, the Council felt

it would be a good representative species to begin a conversation with legislators about the topic of invasive species. The northern corners of the state, rich in glacial lakes and wetlands, seemed an obvious focus area and so representatives from northwestern and northeastern Pennsylvania were invited to attend.

Present at the meeting were numerous PISC member organizations and agencies. Legislators attending included [Representative Jonathan Fritz](#) (R-111), [Representative Parke Wentling](#) (R-17), [Senator Lisa Baker](#) (R-20), and staff representatives from three other offices. The group was fortunate to also have a representative from the [Joint Legislative Conservation Committee](#) attend as well.

The PISC representatives came prepared with packets of material, mostly focused on hydrilla, and a number of talking points. The legislators engaged with the group and asked a lot of questions. They recommended other legislators to bring into the conversation and pointed toward some funding sources that could be accessed to accomplish some of the action items mentioned by PISC members.

This successful meeting represented a long-planned goal of PISC to begin raising awareness among elected officials about invasive species impacts and issues. If Pennsylvania's agencies and organizations who are members of PISC are to make continued progress, dedicated invasive species management funds will have to be brought to bear. Informing the governor and the legislature and encouraging them to take action will be the ongoing work of PISC.

**Note:** [Senator Scott Hutchinson](#) (R-21) highlighted the meeting and the importance of managing hydrilla in Pennsylvania on the front page of [The Environmental Synopsis](#) (December 2017 edition), a monthly newsletter published by the Joint Legislative Conservation Committee.



Water chestnut (*Trapa natans*) is a high priority invasive species in Pennsylvania because it causes significant harm to the environment and is not yet widespread within the state. Staff of the Pennsylvania iMapInvasives program encourage observers to enter records of water chestnut in iMapInvasives to document the spread of this species. If new infestations are documented and managed effectively, further spread could be limited.

This summer, consider participating in the 2018 Water Chestnut Chasers Challenge. This event invites participants to search for water chestnut in the month of July at your local lake, pond, stream, or river. Participants are asked to record both presence and absence findings in iMapInvasives using a desktop computer or mobile device. At the end of the month, all findings recorded in iMapInvasives will be tallied and a grand prize will be awarded to the person with the most records documented in iMapInvasives.

Findings from the challenge are used to aid early detection and rapid response (EDRR) efforts to rid infested waterbodies of this harmful aquatic species. For example, an annual water chestnut pull is held each summer at Lake Towhee in Bucks County, conducted entirely by volunteers. Meghan Rogalus of the [Bucks County Conservation District](#) coordinates this initiative to ensure Lake Towhee's native plants and animals can once again thrive without competition from invasive water chestnut. If additional (new) findings of this invader are discovered in Pennsylvania, more EDRR efforts can be initiated.

Sign up for the 2018 Water Chestnut Chasers Challenge at:

<https://www.paimapinvasives.org/webinar-registration-page>.

### Encouraging Words >>>



**Michael Hartshorne, Senior Limnologist at [Princeton Hydro](#)**

*"iMapInvasives has proven invaluable in documenting new occurrences of invasives in the state and developing a comprehensive database on shifts in these species over time. This data is critical in helping to inform policy and management decisions in Pennsylvania and beyond."*