Issue **THREE**

Didymo (Didymosphenia geminata)
Photo credit: B.Beltran - J.Butt (PA DEP)
Source: Pennsylvania iMapInvasives

Spring/Summer 2016

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

Tracking Invasive Species with

Pennsylvania *i*MapInvasives

Susquehanna River Basin Commission Uses iMapInvasives to Track Didymo in Mid-Atlantic Region

Matt Shank (SRBC Aquatic Biologist) holds a rock covered with didymo at West Branch Pine Creek. Photo taken June 8, 2016.

Staff from the Susquehanna River Basin Commission have recently led efforts to study a species known as didymo (*Didymosphenia geminata*). Commonly referred to as "rock snot", didymo is a single-celled diatom that is able to form algal blooms on stream bottoms, up to eight inches thick when conditions are suitable. These thick benthic mats have the potential to alter physical and biological conditions in streams and rivers and can also hinder recreational activities such as fishing, boating, and swimming.

Didymo is (globally) considered to be one of the most problematic species currently threatening freshwater ecosystems; however, scientists are not yet certain if didymo is truly an introduced invasive species or simply a species that is exhibiting invasive characteristics in its native range due to human-induced changes to the environment such as widespread nutrient applications or climate change.

Historically, didymo has been found in pristine lakes, streams, and rivers located in northern latitudes; however, in the last few years, didymo has been observed expanding both its geographic range and ecological tolerances in parts of the mid-Atlantic region.

In Pennsylvania, didymo occurs in several locations including the Delaware River (East and West Branches and upper mainstem), Pine Creek (West Branch and mainstem), the Youghiogheny River, and in East Branch Dyberry Creek. Didymo has also been found in Gunpowder Falls, a stream located in Maryland with a small portion of its watershed lying within Pennsylvania. Each of these locations (excluding the Maryland finding) are documented and viewable to registered users of the Pennsylvania *i*MapInvasives database.

In response to the arrival of didymo, scientists from the SRBC are currently studying this species throughout the mid-Atlantic region with the goal of understanding where didymo is currently found and what factors are controlling its distribution. These efforts, led by Aquatic Biologist Matt Shank (SRBC), are made easier with the help of *i*MapInvasives, a database which tracks invasive species locations and is available in several mid-Atlantic states including Pennsylvania, New York, Virginia, and West Virginia. Distribution information from the Pennsylvania and New York *i*MapInvasives programs aided this effort. (*See the full list of participating iMapInvasives programs here.)*

> **"The *i*MapInvasives database is a useful and intuitive interface that allows researchers and managers ready access to distribution data for invasive species…"**
>
> -Matt Shank, SRBC Aquatic Biologist

Photo credit: Mark Hoddle, University of California - Riverside, Bugwood.org

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(story continued from first page)

Matt Shank had the following to say regarding his use of *i*MapInvasives: "*The iMapInvasives database is a useful and intuitive interface that allows researchers and managers ready access to distribution data for invasive species. The database serves as a great repository for the information compiled as part of this and other research, in effect serving as a convenient interface for providing and retrieving distribution data that facilitates information exchange and fosters informed aquatic research and management decisions.*"

To support the work of scientists studying didymo from the SRBC, funding was provided from Pennsylvania Sea Grant which helped to facilitate collaborations with an interdisciplinary group of scientists including:

- **Dale Honeyfield**, Ph.D., Emeritus
  Research Chemist
  U.S. Geological Survey
  Leetown Science Center Northern Appalachian Research Laboratory

- **Kelly Maloney**, Ph.D.
  Research Ecologist
  U.S. Geological Survey
  Leetown Science Center Northern Appalachian Research Laboratory

- **Daniel Spooner**, Ph.D.
  Contract Research Ecologist
  U.S. Geological Survey
  Leetown Science Center Northern Appalachian Research Laboratory

- **Marina Potapova**, Ph.D.
  Assistant Professor/Curator of Diatoms
  Academy of Natural Sciences, Drexel University

- **Stephen Keller**, Ph.D.
  Assistant Professor of Plant Biology
  University of Vermont

Didymo observed by Andrew Leakey (SRBC) at West Branch Pine Creek and recorded in Pennsylvania iMapInvasives. Photo credit: Matt Shank (SRBC).

Initial findings from this team of scientists (led by Matt Shank, SRBC) indicate that didymo is present in several places in Pennsylvania (*refer to first page for details on exact locations*) and that suitable habitat may exist in streams where didymo is not currently found.

Concentrations of dissolved phosphorus in rivers and streams appear to be an important factor controlling the distribution of didymo in the region. Additional environmental variables such as stream flow, pH, and water temperature were also found to exert control over didymo bloom formation in Pine Creek.

Didymo (Didymosphenia geminata)
Photo credit: B.Beltran - J.Butt (PA DEP)
Source: Pennsylvania iMapInvasives

Continuing research is focused on examining historical evidence of didymo presence that is currently locked up in lake sediments across the region which could inform the debate on whether didymo is native or introduced to the mid-Atlantic region.

To learn more about the study of didymo in Pennsylvania, please request a copy of the 2016 report entitled "***Didymosphenia geminata* in Pennsylvania: an investigation of current and historic distribution, habitat suitability, and nutritional content**." Requests can be directed to Matt Shank at mshank@srbc.net or (717) 238-0423 x1113.

To learn more about how your organization can begin utilizing *i*MapInvasives or to view didymo locations reported in Pennsylvania, please contact us at *i*MapInvasives@paconserve.org or review information found on the Pennsylvania *i*MapInvasives homepage.

Spotlight on Pennsylvania's High Priority Invasive Species

Photo credit: Robert Vidéki, Doronicum Kft., Bugwood.org

In Pennsylvania, there are many invasive species which are considered "high priority", meaning they are found in Pennsylvania but are not yet widespread (reported in less than 1/3 of Pennsylvania counties).

The following are a sampling of species considered to be high priority invasive threats to Pennsylvania. If you find any of these species, be sure to report them to *i*MapInvasives so that the appropriate management actions can be initiated. All species profiles are provided from information in **"***Pennsylvania's Field Guide to Aquatic Invasive Species***"**.

♦ **Hydrilla** (*Hydrilla verticillata*) - Hydrilla's dense mats interfere with commercial activities by clogging water intake pipes and filters and hindering irrigation. It also restricts recreational uses and prevents sunlight from reach other species growing beneath it. As the mats die and decay, bacteria deplete oxygen from the water, impacting fish and other aquatic organisms.

♦ **European frog-bit** (*Hydrocharis morsus-ranae*) - European frog-bit populations increase rapidly, forming dense mats that decrease the amount of nutrients, dissolved oxygen, and light penetration into the water, limiting the growth of any native vegetation beneath. These mats can also inhibit the movement of waterfowl and fish, and limit recreational activities; however, it can serve as a food source for some types of water birds, fish, and insects.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

♦ **Lesser celandine** (*Ficaria verna*) - Lesser celandine emerges before most native species in the spring, giving it a competitive advantage and allowing it to form a thick blanket of leaves across the forest floor, preventing native species from penetrating.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

♦ **Starry stonewort** (*Nitellopsis obtusa*) - Dense mats of starry stonewort can completely cover the lake bottom and greatly reduce the diversity of aquatic plants. These mats can be up to 2 m (7 ft) thick, and can impede the movement of fish and other animals, decrease available habitat for successful spawning activities, reduce water flow, and prevent recreational activities.
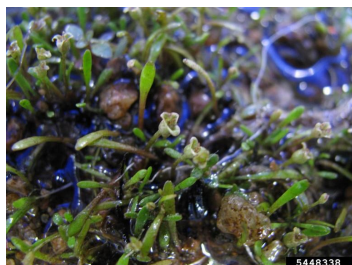

Photo credit: Jim Grazio, PA DEP, 2015

♦ **Mudmat** (*Glossostigma cleistanthum)* - Mudmat forms thick carpet-like mats that smother the lake bottom from the shoreline to depths of greater than 2 m (6.6 ft). It spreads very rapidly, covering prime shoreline habitat, reducing biodiversity, and threatening native plant and animal communities.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

♦ **Flowering rush** (*Butomus umbellatus*) - Flowering rush can easily crowd out native species. The large amount of underground rhizomes can harm fish and other wildlife by destroying food sources and habitats. It can also interfere with recreational activities such as swimming and boating.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Photo credit: T. Thorney, Bugwood.org

♦ **Didymo** (*Didymosphenia geminata*) - Didymo cells can create large amounts of stalk material that form thick mats that are capable of completely engulfing a stream bottom, covering substrates, smothering aquatic organisms, and ultimately reducing fish habitat and food. Didymo does not appear to affect the safety of drinking water, does not produce an odor, and while aesthetically unappealing, does not appear to be a threat to human health.

♦ **Round goby** (*Neogobius melanostomus)* - The round goby is thriving at the expense of native populations, many of which are important sport fish. It outcompetes native species including sculpin, logperch, lake trout, and darters for food sources, habitat, and spawning sites. It also spawns more frequently and feeds on their eggs and young.

Photo credit: U.S. Geological Survey,

Photo credit: U.S. Geological Survey, Bugwood.org

♦ **Northern snakehead** (*Channa argus*) - With no natural enemies, northern snakeheads can devastate populations of native fish and wildlife. They compete directly with native fish, altering feeding habits, food availability, and behaviors of other members of the ecosystem.

♦ **European rudd** (*Scardinius erythrophthalmus*) - Although the rudd's impacts are mostly unknown, it may compete with native fish for invertebrate food sources and influence the population dynamics of various ecosystems.

Photo credit: U.S. Geological Survey, Bugwood.org

Predict the Success (or Failure) of an Invasive Plant Control Project

Are you planning to conduct invasive plant treatment efforts this year or next? If so, start by utilizing the Invasive Plant Management Decision Analysis Tool (IPMDAT).
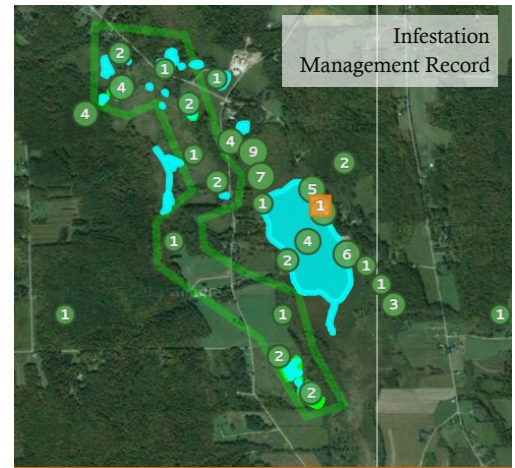
The Invasive Plant Management Decision Analysis Tool, more easily referred to as the "IPMDAT", is a tool developed by The Nature Conservancy which aids natural resource managers in determining if an invasive plant control project is likely to be successful and if it warrants an investment of an agency's resources. The aim of the IPMDAT is to guide decision makers so their projects ultimately have a high likelihood of success and provide a good return on investment. The IPMDAT is available as an online tool and can be found at www.ipmdat.org.

In creating the IPMDAT, The Nature Conservancy and the New York Natural Heritage Program worked with the developers of *i*MapInvasives to create a web-based, step-by-step process to select and document the most strategic option for individual users. This tool is freely available to everyone and uses your internet browser's cache to save and print up to three projects at a time. If you have an *i*MapInvasives account, you have the option to save the results of your project evaluation for others to view.

Please visit www.ipmdat.org to begin thinking through your potential projects, whether large scale management decisions or backyard issues.

Help notes for the online tool can be found at http://ipmdat.org/help_1.html. Additional questions can be directed to imapinvasives@nynhp.org.

ENCOURAGING WORDS >>>

Dan Nydick, Citizen Scientist & Board Member at the Western PA Conservancy

"I see a lot of value in the iMapInvasives program as it has encouraged me to share my observations of invasive species for the benefit of others engaged in invasive species management efforts ."

Learn More About iMapInvasives by Attending an Upcoming Webinar

Take an opportunity this fall to learn more about *i*MapInvasives by registering to attend a webinar training. The following list describes each available training. To register, please send an email to imapinvasives@paconserve.org.

♦ **August 30, 2016—Basic Training:** This is a general course providing information on observation data entry, viewing data on the map, setting up email alerts, and performing custom observation queries. This webinar is recommended for anyone with little to no knowledge of iMapInvasives and those wishing to receive a general overview. Natural resource professionals and the general public are encouraged to register.

♦ **September 28, 2016—Advanced Training:** This course will provide a focus on how to enter advanced records including assessment, survey, treatment, and infestation management records (and will briefly discuss observation data entry). Attendees will also be shown how to perform queries for observation records and advanced record types. Guidance will be provided on setting up email alerts, viewing data on the map and table, and downloading data. This webinar is recommended for natural resource professionals and those individuals that already possess a basic understanding of *i*MapInvasives.

♦ **October 26, 2016—Examples of Using iMapInvasives:** This course is designed to provide users with a better understanding of the many ways in which iMapInvasives can be put to use. Examples include a park manager learning what species impact the properties he manages and a CWMA group creating an infestation management record to manage data for a large project.