

# **Pennsylvania Zebra Mussel Monitoring Network**

## *Zebra and Quagga Mussel Survey Protocol*

Zebra and quagga mussels are capable of harming native mussels, disrupting aquatic food chains, and clogging utility pipes and industrial water intakes. Because zebra mussels and quagga mussels are so mobile and can be transported in many ways, they have great potential to proliferate. However, by monitoring Pennsylvania's rivers, streams and lakes, we can alert water users if these invasive mussels are found so that appropriate steps can be taken - for example - to let recreational boaters know that an infestation has been found, and they should take extra care to remove plants from their boat and trailer, and drain their boat and live well before moving to a new waterbody. In other cases, early warning may be useful in developing control measures.

The protocols below were designed to provide practical and efficient techniques to track the population dynamics and range of mussels. These methods rely on observing and monitoring natural and artificial environments (such as marinas) in still and slow moving waters with currents from 0.5 to 2.0 meters per second.

### ***Data Reporting***

We ask that you gather data monthly when the water temperature is warmer than 8°C (46°F). For most areas of Pennsylvania, this period would be from April to October. While monthly sampling is recommended, any monitoring would be of value, particularly from a lake, quarry, or reservoir. If you are doing field work near a high risk area like a boat ramp or marina, please take a quick look around and report to us if mussels are present. If you have limited time, we recommend that you survey after August when young-of-the-year are larger and easier to observe.

Please record all the data requested, along with any other relevant information, in the Excel datasheet entitled *Zebra & Quagga Mussel Survey Form*. Print a copy and record your field observations, one datasheet for each monitoring site. Please use pencil or indelible pens to write in the field; retain your original field records in your files as a back-up.

When you return from the field, enter your data in digital form in the Excel spreadsheet and submit the document as an e-mail attachment to [invasivespecies@psu.edu](mailto:invasivespecies@psu.edu). The *Zebra & Quagga Mussel Survey Form* spreadsheet has been customized so that it will easily and accurately pool everyone's data in a common Access database and Google Earth map. We will e-mail you to acknowledge that we've received your survey(s). You may send these surveys as often as you like, and you may send multiple worksheets in the same workbook if you like. Please indicate in the body of your e-mail how many surveys you attached.

### ***Prime Areas to Search***

Since recreational boating is the main way that quagga and zebra mussels are spread, boat ramps and public access areas along waterways are the most likely places for mussels to inhabit. Hence, inland lakes, large ponds, and reservoirs are very important areas to monitor. Another important place to survey is downstream from a known population of mussels. Mussels have also spread to Pennsylvania scuba diving quarries through recreational diving activities, so freshwater diving locations are also important places to monitor.

Zebra and quagga mussels are seldom found in streams smaller than about fourth order, and can only colonize in slow moving water along the margins of large streams and rivers. River or creek locations that are not near boat access areas and are not close to an infestation are probably not worth surveying since the risk of invasion is relatively low. Quagga and zebra mussels prefer dark, shaded areas. Pick monitoring locations near boat ramps, docks, marinas, and under bridges.

## Visual and Tactile Search for Zebra and Quagga Mussels

We suggest using polarized sunglasses to reduce glare and improve vision into the water. Inspect all hard and soft substrates. Zebra and quagga mussels do not like direct sunlight so are found in water deeper than 15 to 30 cm; search objects located in dark, shaded areas. Be sure and check underneath objects like driftwood and the dark crevices between rocks. Gently run your fingers over smooth surfaces checking for mussels too tiny to see easily. Newly settled mussels feel like the grit on sandpaper. Larger mussels will feel coarser, like a small pebble or sunflower seed. Mussels can attach to a wide variety of objects such as:

- pilings and dock floats
- buoys, mooring lines or cable
- rocks and concrete
- logs or drift wood
- vegetation
- just about anything that has been in the water for a long time
- quagga mussels are able to attach to hard surfaces and soft sediments

Fan areas covered with silt to expose mussels. Spend as much time as it takes to examine all hard-surfaced objects. Look until you're confident that no mussels occur at the site. You are searching adequately if you are finding snails. On the data sheet, record the amount of time you spent looking.

## Additional Physical and Chemical Data (Optional)

Since the general habitat requirements for zebra and quagga mussels are now pretty well described in the literature, the following water quality information is optional.

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Temperature C	pH	Dissolved Oxygen (mg/l)	Conductivity (umhos/cm3)
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Total Calcium (mg/l)	Secchi Depth (m)	Current Velocity (m/sec)	Water Depth (m)

## If You Find a Zebra Mussel or Quagga Mussel

If you think you found a zebra mussel in a new location, we need to know about it immediately. Contact Sarah Whitney to make arrangements to have the specimen's identification confirmed. Call 610-304-8753, or e-mail [invasivespecies@psu.edu](mailto:invasivespecies@psu.edu) with your name, phone number, and location of the sighting. Place 10 to 15 of the largest specimens in a jar with isopropyl alcohol (rubbing alcohol found in supermarkets and pharmacies). We'll be in touch with you to tell you where to mail the samples. **Early detection and action can help slow the spread of these mussels, so report new sightings as quickly as possible.**

This protocol was adapted from procedures from the Pennsylvania DEP, the Virginia Department of Game and Inland Fisheries, <http://www.dgif.state.va.us/wildlife/zebramussels.asp>, the Missouri Stream Team, [www.mostreamteam.org/pdfs/zebra.pdf](http://www.mostreamteam.org/pdfs/zebra.pdf), and the California Department of Water Resources, <http://www.dfg.ca.gov/quaggamusel>.