

**The conservation status of the brook floater mussel, *Alasmidonta varicosa*, in the Northeastern United States: trends in distribution, occurrence, and condition of populations**

**Northeast Association of Fish and Wildlife Agencies (NEAFWA)  
Regional Conservation Needs Grant Program**

Topic 3. Identify NE species of greatest conservation need: data gaps, design data collection protocols, and collect data



Barry J. Wicklow, Ph.D. Professor of Biology Saint Anselm College  
100 Saint Anselm Drive Manchester, NH 03102-1310,  
Phone 603-641-7155, Fax 603-222-4012  
[bwicklow@anselm.edu](mailto:bwicklow@anselm.edu)

Susi von Oettingen, Endangered Species Biologist, US Fish and Wildlife Service,  
70 Commercial Street, Concord, NH 03301  
[Susi\\_vonOettingen@fws.gov](mailto:Susi_vonOettingen@fws.gov)

Tina A. Cormier, Principal and Senior Spatial Analyst, Black Osprey Geospatial,  
Inc., 17 Shorecrest Drive, East Falmouth, MA 02536  
[tinacormier@blackosprey.com](mailto:tinacormier@blackosprey.com)

Julie Devers, Fishery Biologist U.S. Fish and Wildlife Service,  
Maryland Fishery Resources Office  
177 Admiral Cochrane Drive, Annapolis, MD 21401  
[julie\\_devers@fws.gov](mailto:julie_devers@fws.gov)

Funds Requested from the NEAFWA RCN Program: 72,940  
Duration: January 2013-December 2014

Project Description: Brook floaters have declined rapidly throughout their range due to habitat loss, stream fragmentation, loss of riparian vegetation buffers, upstream land degradation, pollution, altered flow regimes, extreme spring floods, and summer droughts. While the northeast holds the largest brook floater populations range wide, our long-term research shows populations once large and robust have either declined by 50 to 95% or are gone completely. We are apprehensive that most populations are facing the same fate, but trends are often undetected because of the lack of long-term monitoring. Although the brook floater was petitioned recently for listing under the Endangered Species Act, serious data gaps remain. Under RCN Topic 3 we propose to gather occurrence records from 12 northeast states; build a comprehensive dataset that includes biological, habitat, and spatial parameters; map spatial distributions using GIS; analyze temporal trends using available long-term datasets and create an inventory of threats based on high-resolution aerial imagery and available land use data (RCN Topic 7). Deliverables will include a report presenting a regional status assessment documenting trends and occurrences of brook floater populations; an assessment of brook floater occurrence by state; a review of significant threats to populations; as well as a comprehensive GIS database and recommendations for high priority conservation areas in each state. Completion of this project will require two years (January 2013-December 2014).

## **1) The primary Priority RCN Topics addressed by this project:**

Topic 3. Identify NE species of greatest conservation need: data gaps, design data collection protocols, and collect data. Topic 7. Identify and assess threats to NE species of greatest conservation need is also addressed.

## **2) Justification and states where project will be conducted:**

The brook floater is considered globally vulnerable (G3) and listed as critically imperiled (S1) in 10 states (New Hampshire, Vermont, Massachusetts, New York, Connecticut, New Jersey, West Virginia, Virginia, North Carolina, and Maryland), imperiled (S2) in two states (Pennsylvania and Georgia), vulnerable (S3) in one state (Maine), extirpated (SX) in two states (Rhode Island and Delaware), and unranked (SNR) in one state (South Carolina). The species is listed as a species of greatest conservation need (SGCN) in State Wildlife Action Plans (SWAP) where it is extant. Several SWAPs noted sharp declines and extirpated populations and extant populations reduced to very low densities with no evidence of recruitment. In the New England states mussel surveys conducted over the past decade by biologists from BioDrawiversity, St. Anselm College, and local state agencies, have revealed a number of previously unknown populations (Nedeau 2008). However, over 70 percent of known populations have less than 30 individuals (Wicklow 2005). Within the last decade, surveys conducted at long-term study sites in several rivers in New England states show populations once large and robust have declined precipitously (Wicklow and Nadeau 2009). These affected populations are vulnerable to stochastic demographic, genetic, and environmental events.

Although classified as a candidate species for listing under the Endangered Species Act until the candidate category was eliminated by congress in 1995, the brook floater was recently petitioned for listing under the Endangered Species Act. The 90-day listing found enough evidence to move forward with a status review; nevertheless, occurrence, habitat use, and life history data gaps remain. A workgroup made up of state and federal mussel biologists from mid-Atlantic states met in 2009 and articulated a need for a range-wide assessment of brook floater populations. Communication between state and federal agencies regarding this project was facilitated by the Chesapeake Bay Freshwater Mussel Workgroup Meeting held January 19, 2012. Biologists from the following state agencies agreed to participate in information sharing and coordination: Virginia Game and Inland Fisheries, West Virginia Division of Natural Resources, Pennsylvania Fish and Boat Commission, Maryland Department of Natural Resources, Delaware Department of Natural Resources and Environmental Control, New Jersey Division of Fish and Wildlife, Massachusetts Natural Heritage and Endangered Species Program, New Hampshire Fish and Game Department, and Maine Department of Inland Fisheries and Wildlife. New Jersey Division of Fish and Wildlife, Pennsylvania Fish and Boat Commission, Maryland Department of Natural Resources, and Maine Department of Inland Fisheries and Wildlife also agreed to contribute a portion of their time as in-kind match to this project.

We propose to close data gaps by completing an assessment of brook floater in 12 northeast states (Maine, New Hampshire, Massachusetts, Vermont, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, and Virginia). We anticipate that the completed brook floater status assessment will provide the information in northeast states necessary to determine if the species warrants federal listing under the Endangered Species Act. Results from this project will also be used to inform decisions by state and federal agencies in determining priority conservation areas for brook floater. The database will help agencies determine site-specific threats and identify and implement conservation actions needed to maintain the species' regional viability.

**3) Start, end date, and schedule:**

January 2013 – December 2014

Conference call or meeting of collaborators in August 2013 and June 2014

First draft of products to be reviewed by collaborators in September 2014

**4) Goals and Objectives:**

Goals:

- a) Identify data gaps, build a dataset from existing data, map and show trends in distribution and occurrence.
- b) Compile and review a list of significant threats to populations
- c) Draft an assessment of the brook floater for the 12 northeast states.
- d) Recommend locations for future surveys that will help fill data gaps.

Objectives:

- a) Gather and review all available occurrence data for each of 12 northeast states.
- b) Build a comprehensive dataset that includes biological, habitat, and spatial parameters.
- c) Map the spatial distribution of brook floaters using GIS.
- d) Using GIS, direct observations, and high resolution imagery analyze both natural features (e.g., hydrology and geology) and anthropogenic modifications (e.g., land use, transportation infrastructure, and dams) within watersheds where brook floater occur to identify key conservation areas and threats to populations.
- e) Analyze temporal trends using all available long-term datasets.

## **5) Methods:**

Barry Wicklow (Saint Anselm College) will, collect, review, and interpret data and trends over time, and prepare reports. Occurrence data and threat information will be gathered from state biologists, researchers, Natural Heritage Bureau records, and museums. Tina Cormier (Black Osprey Geospatial) will create maps showing occurrences, distribution and trends, change in land use patterns and threats, provide summary statistics, and help to prepare reports, In addition a variety of distribution maps and summary statistics, a habitat suitability analysis will be conducted as part of the GIS tasks. This analysis will identify environmental associations of brook floater populations (eg. riparian cover, distance to impervious surfaces, slope, etc.), as well as to map suitable habitats throughout the range. The resulting model will aid in the identification and reporting of threats to populations. The modeling approach will be dependent on the type of occurrence data available (Breimen 2001, Phillips et al. 2006); Susi von Oettingen (USFWS) and Julie Devers (USFWS) will advise in the grant implementation in addition to reviewing data and reports. Saint Anselm College will manage the grant. All work will be conducted between January 2013 and December 2014.

## **6) Measureable products and outcomes:**

- a) A regional status assessment documenting trends and occurrences of brook floater populations
- b) An assessment of brook floater occurrence by state
- c) A review of significant threats to populations
- d) A list of research and inventory priorities
- e) A comprehensive GIS database.

**7) Budget:**

|                             | NE RCN Grant |          | Non-Federal Match (incl waived cost) | TOTAL     |
|-----------------------------|--------------|----------|--------------------------------------|-----------|
|                             | Year 1       | Year 2   |                                      |           |
| <b>Personal Service</b>     |              |          |                                      |           |
| B. Wicklow                  | \$17,500     | \$17,500 | \$33,866                             | \$68,866  |
| Students(2)                 | \$4,000      | \$4,000  |                                      | \$8,000   |
| <b>Fringe Benefits</b>      | \$3,045      | \$3,045  | \$8,727                              | \$14,817  |
| <b>Supplies/Mat.</b>        | \$300        |          |                                      | \$300     |
| <b>Travel</b>               | \$1,800      | \$400    |                                      | \$2,200   |
| <b>Contractual Services</b> |              |          |                                      |           |
| T. Cormier                  | \$10,675     | \$10,675 | \$5,350                              | \$26,700  |
| NJ DFW                      |              |          | \$3,200                              | \$3,200   |
| MDNR                        |              |          | \$1,500                              | \$1,500   |
| MEIFW                       |              |          | \$1,000                              | \$1,000   |
| <b>Total Direct Costs</b>   | \$37,320     | \$35,620 | \$53,643                             | \$126,583 |
| Indirect/Overhead           |              |          | \$36,105                             | \$36,105  |
| <b>TOTAL</b>                | \$37,320     | \$35,620 | \$89,748                             | \$162,688 |

Personal Service of B. Wicklow consists of 2 summer months of effort that includes an in-kind contribution of roughly 30%. During the academic year he will contribute 15% effort in-kind. Fringe benefit rates are 7.65% for students and 15.65% for faculty on summer salary. Under Contractual Services the fee for T. Cormier is based on 427 hours at \$50/hr with additional 107 hours in-kind. Travel expenses are based on 3 trips of \$600 each in Year 1 and one regional trip in Year 2 costing \$400.

Literature Cited

- Breimen, B. 2001. Randon Forests. *Machine Learning* **45**:5-32.
- Nedeau, E. J. 2008. Freshwater mussels and the Connecticut River Watershed. Connecticut River Watershed Council, Inc., Greenfield, MA.
- Phillips, S. J., R. P. Anderson, and R. E. Schapire. 2006. Maximumentropy modelling of species geographic distributions. *Ecological Modeling* **190**:231-259.
- Strayer, D. L. and D. R. Smith. 2003. *A Guide to Sampling Freshwater Mussel Populations*. American Fisheries Society, Bethesda, MD.
- Wicklow, B. J. and E. J. Nadeau. 2009. Status of the Brook Floater (*Alasmidonta varicosa*) in the Northeast. International Symposium of the Freshwater Mollusk Conservation Society, Baltimore, MD.
- Wicklow, W. J. 2005. Species profile of the Brook Floater, *Alasmidonta varicosa*. in N. H. F. a. G. Department, editor. *New Hampshire Wildlife Conservation Plan*.

## Principal Investigators

**Barry Wicklow**, Ph.D., Professor of Biology, Saint Anselm College and Affiliate Professor of Biological Sciences, University of New Hampshire. Professor Wicklow teaches Aquatic Ecology and Conservation Biology and has studied the ecology and life history of the dwarf wedgemussel *Alasmidonta heterodon* and the brook floater *Alasmidonta varicosa* and conducted intense surveys of each during the last 18 years.

**Julie Devers**, M.S., is a Fishery Biologist in the Maryland Fishery Resources Office of the U.S. Fish and Wildlife Service. She started her career with the Service over 10 years ago in the Southwest Virginia Regional Field Office where the mission is freshwater mussel restoration. She went on to study freshwater mussels at Virginia Tech. After receiving a Master's degree in Fisheries Science, she worked at White Sulphur Springs National Fish Hatchery where she helped jumpstart the freshwater mussel propagation program. She has spent the past 5 years at the Maryland Fishery Resources Office where her work with mussels has been focused on the host fish relationship between American eels and the freshwater mussel, eastern elliptio.

**Tina A. Cormier**, M.S., is a Senior Spatial Analyst at Black Osprey Geospatial, Inc. Ms. Cormier has over 7 years of experience in using Geographic Information Systems (GIS) and remotely sensed imagery to spatially and statistically model environmental phenomenon, such as habitat/suitability, deforestation, and land cover/land cover change. Most recently, she worked with her team at the Woods Hole Research Center to generate the first ever high-resolution maps of forest height and biomass for the U.S. Other projects include spatio-statistical models of vernal pool locations in Massachusetts and evapotranspiration estimates and high-resolution land cover maps used for water resource decisions in central Nevada. Ms. Cormier earned her H.B.A. in Environmental Science from Saint Anselm College and her M.S. in Natural Resources from the University of New Hampshire.

**Susi von Oettingen**, Susi von Oettingen is an endangered species biologist with the U.S. Fish and Wildlife Service's New England Field Office. Susi has been working with freshwater mussels of New England since 1992. She is the national recovery coordinator for the federally endangered dwarf wedgemussel and has been providing technical assistance to the New England states on brook floaters for over a decade.