MASSACHUSETTS WILDLIFE

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Massachusetts Endangered Species Act

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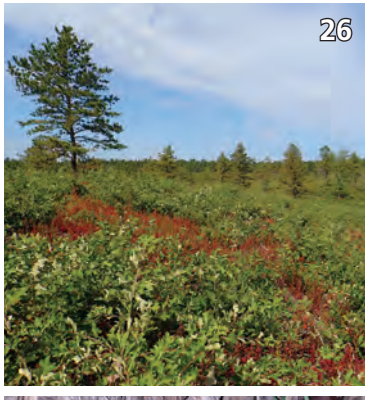

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MASSACHUSETTS WILDLIFE

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On the Cover: There is perhaps no greater reminder of the vulnerability of species listed under the Massachusetts Endangered Species Act (MESA) and the great progress MassWildlife has made over the past 30 years under MESA than this recently hatched, ground-nesting seabird facing the dawn of a new day on a Bay State beach. This Least Tern (*Sternula antillarum*, Special Concern) is the smallest of our four breeding tern species. You can hear its squeak-toy calls on the sparsely vegetated coastal beaches where it nests. Photo © Dean Cerrati

FLEXING FRESHWATER MUSSELS

The Brook Floater (*Alasmidonta varicosa*, Endangered) may not be among the most charismatic animals on the Massachusetts Endangered Species Act (MESA) list. This freshwater mussel only grows to about three inches long and could easily be mistaken by the casual observer as one of the rocks surrounding it on the streambed. Nevertheless, this state-listed species has found itself at the center of research and conservation partnerships in Massachusetts and wherever this mussel lives in North America. Work conducted by MassWildlife to protect and restore Brook Floater is an example of how we use scientific research, targeted management and restoration, and critical collaborations to protect both endangered and common species throughout the Commonwealth.

A Brook Floater filtering stream water.

Despite its unassuming appearance, new populations of the Brook Floater and information about its biology are sought by conservation biologists throughout the species' range from New Brunswick, Canada, south to Georgia. In Massachusetts, the Brook Floater is one of three freshwater mussels listed as Endangered under MESA and was recently reviewed for listing under the federal Endangered Species Act. Once common in cool freshwater streams and rivers along the Atlantic coast, the Brook Floater's populations are now found only in small isolated remnants of its historical range.

The Brook Floater and the native fishes that share the same habitat are inextricably linked. Like all native freshwater mussels, the Brook Floater is a filter feeder that removes algae and bacteria from streams, thereby improving water quality and concentrating nutrients. These actions provide the foundation of the food web for stream fish. In return, the mussels rely on the fish to reproduce. All native mussels in the state have parasitic larvae (called glochidia) that undergo metamorphosis on the gills or fins of fish. These baby mussels typically don't harm the fish but catch a free ride to new areas of the waterway to start their life on the riverbed. Some relationships between mussels and their host fish are so specific that a single mussel species may only use a few different species of fish as hosts. Brook Floater on the other hand may use more than 13 fish species as hosts.

Recent management, restoration, and research efforts to preserve the remaining four populations of Brook Floater in the Commonwealth further demonstrate the need for environmental partnerships within and across states. MassWildlife has fostered strong partnerships across the Brook Floater's range, including here at home, to better ensure the persistence of this mussel into the future.

by Peter Hazelton

Jason Carmignani, Aquatic Ecologist for MassWildlife's NHESP, digs for buried mussels in the Nissitissit River. MassWildlife has been monitoring the changes to mussel habitat following the removal of the Millie Turner Dam in 2015.

Ecological Restoration Benefits Rare Species and Recreational Fisheries

Among the greatest threats to freshwater mussels and our native fishes is the fragmentation of habitats by dams. The majority of dams in the Commonwealth are historical and have no current use for power generation. These structures can be barriers to fish and mussel migration between suitable habitats along the river. In some cases, dams are the major cause of declines in diadromous fishes like Alewife, Blueback Herring, and American Shad that migrate between freshwater and the ocean for breeding. Dams also limit movements of fish that stay in rivers throughout their lives, and further alter river habitat by limiting the natural erosion and accretion of sediments. On the other hand, dams can provide some stabilization of local habitats that are beneficial to freshwater mussels, and the act of removing a dam could result in an immediate loss of habitat for some animals.

In 2015, MassWildlife worked with state, federal, and local partners to remove the Millie Turner Dam on the Nissitissit River in Pepperell. The goal of the dam removal was to restore connectivity for migrating river herring and other native freshwater fishes, and to increase habitat for Brook Floater and four other freshwater mussels found in the river. Despite immediate recognizable benefits to the fish community, MassWildlife was faced with the challenge of offsetting immediate habitat changes and the possibility of losing some of the mussels versus the possible long-term benefits of increased habitat for Brook Floater. To ensure that Brook Floater were not harmed during the removal process, MassWildlife's Natural Heritage & Endangered Species Program (NHESP) enlisted the help of volunteers and partners to scour the river to find rare mussels and carefully relocate them to stable habitats away from the short-term changes following dam removal. In all, partners translocated over 200 rare freshwater mussels—nearly half of which were Brook Floater.

Following the dam removal, NHESP has continued to monitor Brook Floater and other mussels relocated on the Nissitissit River. NHESP has also monitored changes to the habitat immediately above and below the dam removal site, and initial results indicate that the dam removal will create more habitat for Brook Floater.

MassWildlife employs scientific research and monitoring in cases like this to better understand the impact and benefit of management actions. By understanding how Brook Floater and other mussels respond to the dam removal and translocation, MassWildlife can alter approaches to provide better conservation and management of mussels during future dam removals.

The Nissitissit River and its tributaries are home to exemplary wild and stocked trout fisheries in MassWildlife's Northeast District. MassWildlife's collaborations with the Division of Ecological Restoration, the Squan-a-Tissit Chapter of Trout Unlimited, and the town of Pepperell to improve fish passage on the Nissitissit River, Gulf Brook, and Sucker Brook will benefit these fisheries. Trout are not the only beneficiaries of these restoration efforts. The habitat of several MESA-listed species within these tributaries and the federally designated Wild and Scenic portion of the Nissitissit River will benefit from increased stream continuity and restored river reaches. The Millie Turner Dam removal project highlights that ecological restoration can serve to benefit many native rare species, but also benefits recreational opportunities for anglers. Such projects would not be possible without strong partners and close coordination among MassWildlife staff.

Coordinated Research and Multistate Partnerships

Monitoring the changes to habitat and mussels on the Nissitissit River is only one aspect of Brook Floater research in Massachusetts. In 2016, MassWildlife was the lead state on a State Wildlife Grant awarded by the U.S. Fish & Wildlife Service (USFWS) to MassWildlife, the United States Geological Survey's Massachusetts Cooperative Fish and Wildlife Research Unit (USGS Coop Unit), and four other states. The primary objective of the grant was to identify conservation and restoration needs of Brook Floater throughout its range. As part of this initiative, MassWildlife and the USGS Coop Unit have formed the Brook Floater Working Group, consisting of cooperators from fish and wildlife conservation agencies from 15 states, two federal agencies, colleges and universities, and environmental consulting groups.

Partners of the Brook Floater Working Group have worked diligently over the past four years to develop standard survey methods that can be used to map the extent of Brook Floater populations throughout its range. By developing shared survey protocols, the working group is able to more clearly compare data collected in different states and better identify the Brook Floater's habitat needs. Previously, researchers in different states or regions were using different survey methods, and the resulting data were not comparable. Moreover, by incorporating updated scientific approaches and standard survey methods, it will be easier to track the status of the species across its broad range and make conservation plans at scales beyond state boundaries.

Habitat data collected throughout the Brook Floater's range help scientists and managers identify new areas to search for unknown populations of Brook Floater and to find potential areas for habitat restoration or reintroductions. The Brook Floater Working Group has used mussel data to develop predictive models of potential habitat using a network of river data in a geographic information system. The resulting predictions do not show us where Brook Floater are located, but rather show us which rivers are most like those where Brook Floater exist. Such information allows managers to target rivers for surveys that are more likely to provide the right kind of habitat. This can greatly reduce the cost of unproductive surveys by eliminating areas that are not likely habitat.

Ayla Skorupa, a Ph.D. student at the University of Massachusetts, Amherst, has been further evaluating the specific water chemistry needs of Brook Floater in Massachusetts. Her work is funded in part by the State Wildlife Grant and also by a Massachusetts Environmental Trust grant awarded to the Connecticut

River Conservancy in collaboration with the USGS Coop Unit, MassWildlife, and the USFWS. Under the direction of Dr. Allison Roy at the USGS Coop Unit, Skorupa has been working to identify what water temperatures, nutrients, and water chemistry are needed for young Brook Floater to grow and thrive in Massachusetts. Her research has been conducted at the USFWS's Cronin Aquatic Resource Center in Sunderland, where she has also worked to identify fish hosts used by Brook Floater, and developed methods to grow mussels in the lab for future restoration efforts. MassWildlife has provided technical expertise, and the lessons learned from this important collaboration will aid agencies in developing conservation plans for Brook Floater throughout its range.

Knowing the host fish used by Brook Floater and habitat needs throughout its life cycle will allow MassWildlife and partners to evaluate the feasibility of population restoration. Population restoration consists of the introduction of captive-raised or translocated plants or animals to new locations or currently occupied locations in need of higher numbers. This is a conservation and management technique used successfully by MassWildlife for Bald Eagles, Peregrine Falcons, and the Northern Red-bellied Cooter. These conservation projects can be very successful at recovering populations of rare and endangered species but are intricate and require considerable planning and ongoing management. Captive-raising and stocking of endangered mussels has been successful in other states but has not yet been attempted in New England. The information collected by the Brook Floater Working Group and MassWildlife's collaborations with the USFWS, the USGS Coop Unit, and the University of Massachusetts, Amherst, are critical to knowing whether a population restoration effort for Brook Floater will be feasible in our state.

One-year old Alewife moving downstream in the Nissitissit River. River herring restoration was a driving force in the removal of the Millie Turner Dam in Pepperell.

A Look Toward the Future

For the past five years, MassWildlife and partners have invested considerable effort to research approaches for conservation and restoration of Brook Floater in the Commonwealth and throughout its range. We are now at a point where our knowledge of the Brook Floater will allow us to make decisions and plan future conservation actions. Information obtained from well-directed research is critical to making sound conservation decisions, for the Brook Floater and many other wildlife conservation and management projects by MassWildlife and partners. Design and execution of important research and restoration projects are significant endeavors that require considerable collaboration from partners with common conservation goals. Partnerships with citizens of the Commonwealth through public support and donations to MassWildlife's NHESP help support these projects and are vital to ensure the persistence of all 432 species currently listed under MESA.

About the Author

Peter Hazelton, Ph.D., served with MassWildlife's NHESP for seven years as the Aquatic Ecologist and then as Chief of Conservation Science. He recently took a position as a professor of Aquatic Ecosystem Health at the University of Georgia.

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TRUE GREEN

Can you identify these MESA-listed species? See answers on page 41.

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