

## WILDLIFE AND ECOLOGY



*Blanding's turtle rests by a vernal pool. Photo by Jon Bromley.*

### Background

The Lamprey River and its tributaries drain a land area of 212 square miles. This is the largest watershed of the Great Bay Estuary, a National Estuarine Research Reserve. Compared to other rivers in the region, the Lamprey River watershed is still relatively intact. This largely forested and relatively undeveloped area supports important floodplain forests, remarkably natural shorelines, extensive shrub and emergent marsh wetlands, and scattered openings and fields among the forested uplands. These terrestrial and aquatic habitats are home to a great diversity of resident and migratory wildlife including significant populations of Blanding's, spotted, and wood turtles, each of which is a species of conservation concern in New Hampshire.

The ecology of the Lamprey, as summarized above, was found by the NPS to represent an "outstandingly remarkable value" worthy of recognition and protection through the National Wild and Scenic Rivers System (1995 *Lamprey Wild and Scenic River Study Draft Report*). In 2011, the NH Rivers Management and Protection Program designated the entire Lamprey River and its five major tributaries into the state's program, citing many of the same values.

The ecological integrity of the river corridor is challenged by several issues: the human population is increasing; the landscape is rapidly being developed resulting in fragmented or degraded habitat; invasive, non-native plant species are becoming more common; fish passage is obstructed by dams and numerous culverts; demand for public water supply is high; stormwater runoff is carrying sediments and nutrients into the rivers; and climate change is exacerbating many of these problems. Monitoring, conserving, and wisely managing diverse natural areas protect habitats that are critical to the indigenous plants and animals they support and provide a cost-effective way to ensure the services they provide to people, such as clean, abundant water, flood control, and quality of life.

Despite these significant challenges, diverse habitats remain and many threatened or endangered species are still present. Determining or estimating exact numbers for most species of animals and plants is difficult, but such information is essential to determine long-term population trends and assess overall ecological integrity. Since the *Lamprey River Resource Assessment* was published in 1994, the LRAC has funded research about freshwater mussels, tributary fish, and dragonflies. No concerns were noted for dragonflies. Studies of tributary fish have shown that most species, including naturally reproducing brook trout, are holding their own; however, the same study found that bridge shiners (New Hampshire species of concern) seem to have been extirpated from an area upstream of the Wild and Scenic section that appears to provide ideal habitat. (<http://www.lampreyriver.org/about-river-studies-2>) Additional surveys for the most vulnerable species need to be updated.

The freshwater mussel populations found in the Lamprey River are regionally significant; only one other river in New Hampshire supports a greater diversity of species; however, populations of several mussel species have plummeted since baseline studies were conducted by biologists in 1993-1994 and rare mussels are now the species of greatest concern to the LRAC. Recent studies found only older individuals, in very poor condition, and in areas far removed from other individuals. Although the exact cause is unclear, the mussels seem to have succumbed to displacement or burial by sediments transported by three large floods in the last decade, as well as potential acidic conditions that might have led to extremely fragile shells. Eastern eliptio mussels continue to be abundant and well distributed.

[www.lampreyriver.org/UploadedFiles/Files/LRAC\\_Mussel\\_Report\\_Redacted\\_2015.pdf](http://www.lampreyriver.org/UploadedFiles/Files/LRAC_Mussel_Report_Redacted_2015.pdf)

The State of New Hampshire is actively engaged in surveying and protecting wildlife and habitats. The [New Hampshire Wildlife Action Plan](#), most recently updated in 2015, offers guidance for conserving the Species of Greatest Conservation Need and their habitats in New Hampshire. This reference is used extensively by the LRAC in its land protection efforts, setting priorities for research, and informing development project reviews. The New Hampshire Fish and Game Department (NHFGD) recently conducted several Lamprey River studies, including several pertaining to river herring and barriers to fish passage. Trout Unlimited has begun work adding woody material to non-navigable sections of the river in an attempt to improve cold-water fish habitat.

## River Profiles

### *Wildlife and Ecology Surveys*

The LRAC Wildlife and Ecology Workgroup leads efforts to monitor and protect the indigenous plants and animals found in the Lamprey River watershed, and works closely with other LRAC workgroups to protect exemplary natural communities, migration corridors, and habitat for species of concern. The Workgroup also conducts periodic wildlife surveys, including long-term monitoring of freshwater mussels which can live more than fifty years and are among the most imperiled species found in the Lamprey River. Long-term studies can detect subtle population trends among these long-lived animals, and reveal valuable information about overall watershed health and ecological integrity.



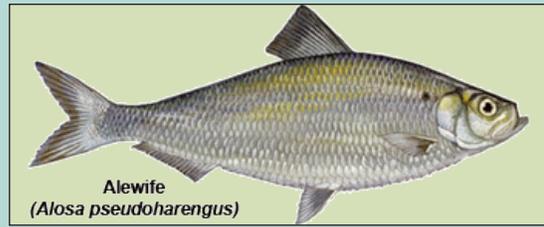
*Photo by Ethan Nedeau*

Field surveys conducted in 1993-1994 found six freshwater mussel species, including the state-endangered brook floater (*Alasmidonta varicosa*), and established a baseline for comparison. Freshwater mussels were resurveyed in 2010-2011 and again in 2014. The good news is that biologists during both follow-up surveys found the same six species reported in the early 1990s as well as one additional species, the alewife floater (*Anodonta implicata*). The scientists also found that eastern elliptio (*Elliptio complanata*) occurred in high densities throughout the watershed. The bad news is that for most other species, biologists found low densities, limited distributions, or minimal/non-existent recruitment of offspring, and experts now are questioning the viability of these populations.

Why certain mussel populations in the Lamprey River are decreasing isn't known; some possibly already were in decline when baseline studies were conducted in the early 1990s. Similar trends are being observed among mussel populations in river systems throughout North America, likely due to diminished water quality, habitat degradation/fragmentation, or the loss of host fish species. It's uncertain whether efforts by the LRAC to conserve riparian lands, improve water quality, and reconnect/ restore critical habitats can create more favorable conditions for freshwater mussels and reverse apparent population trends. However, it is more certain that continuing these efforts will likely help to support the existing mussel populations until the causes of the observed declines are better understood.

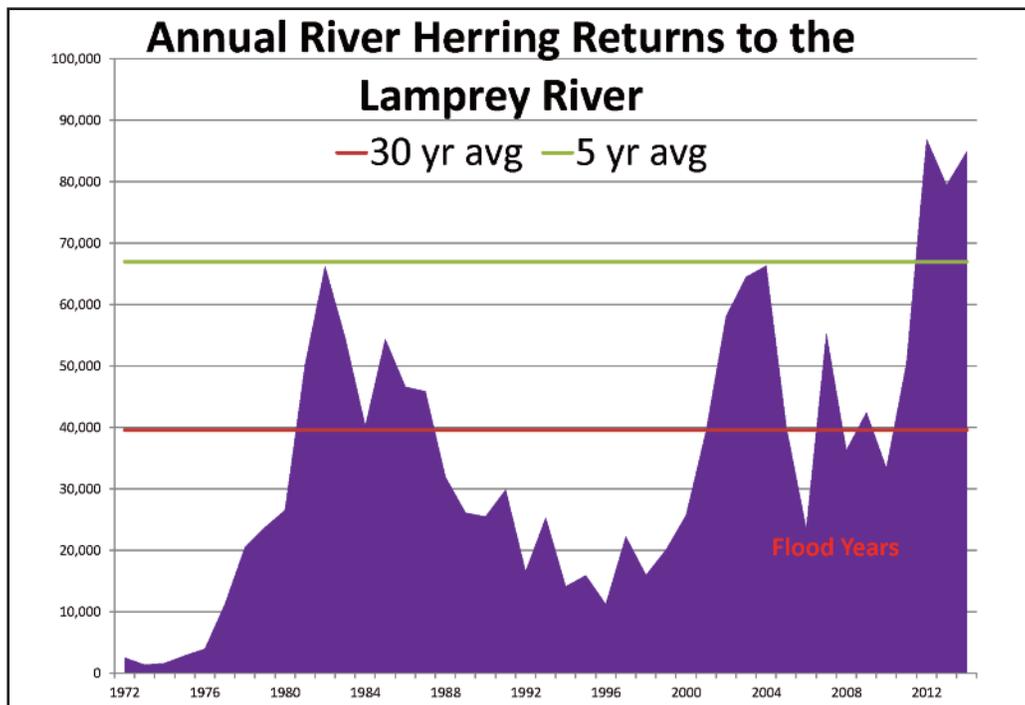
contributed by Jim MacCartney, National Park Service

The Lamprey is New Hampshire's most significant river for anadromous river herring. The abundance of these fish was noted as an outstandingly remarkable value in the Wild and Scenic River designation. River herring continue to thrive and historical spawning habitat was reopened to them with the installation of the Wiswall Dam fish ladder in 2011.



[www.greateratlantic.fisheries.noaa.gov](http://www.greateratlantic.fisheries.noaa.gov)

The Lamprey currently has the strongest river herring run among the six rivers that feed Great Bay and currently serves as a source of river herring to rebuild populations in the nearby Merrimack River. The best run so far occurred in 2016 with over 92,000 alewife passing through the Macallen Dam fish ladder. (Runs regionally were low in 2006 due to the inability of river herring to pass fish ladders during high flows caused by a historic flood.)



Graph courtesy of Kevin Sullivan, NH Fish and Game Department

Shad and Atlantic salmon restoration programs were conducted by the New Hampshire Fish and Game Department beginning in the early 1970s (1994 *Lamprey River Resource Assessment*). Restocking efforts using fish eggs from other rivers yielded eight Atlantic salmon passing through the Macallen Dam fish ladder in 1992 and three in 1993. According to Mike Dionne at NHFGD, shad stocking efforts were discontinued in the Lamprey River in 1989 and Atlantic salmon stocking ended in 2003 due to low returns.

## Goals

- Work with towns and landowners to expand existing wildlife habitat inventories and conservation plans for the Lamprey River watershed area.
- Protect, restore, and reconnect critical habitat and the ecological functions and resources of the Lamprey River that are important to wildlife and humans.

## Key Accomplishments

- Worked with NHFGD and the US Fish and Wildlife Service to advocate for fish passage at the Wiswall Dam in Durham. In 2011, a fish ladder was installed and more than 30,000 river herring were able to travel past the dam and access breeding areas that had been unavailable to them for 200 or more years.
- Worked with partners to test methods for managing invasive Japanese knotweed.
- Worked with the Outreach Workgroup to fund a Small Grant that led to the creation of a lending library of tools to eradicate invasive plants in the Great Bay Estuary drainage area. As of 2016, the original tool inventory has been expanded and has been used on 136 restoration projects. The library is housed at the Great Bay Discovery Center in Greenland, NH.
- Worked with high school students to study vernal pools and produced [\*Spring into Vernal Pools\*](#) DVD to educate the public about these special ecological habitats.
- Offered “Herring Aid” events at the Macallen Dam fish ladder with NHFGD personnel to inform the public about river herring, sea lampreys, and American eels.
- Commissioned the following wildlife or ecological research:
  - [\*Mussel Survey 2010\*](#)
  - [\*Tributary Fish Survey 2010-2011\*](#)
  - [\*Dragonfly and Damselfly Inventory 2011\*](#)
  - [\*Dams of the Lower Lamprey 2013\*](#): highlighting opportunities to improve fish passage
  - [\*Rothwell Reserve Bioinventory and Management Plan 2014\*](#)
  - [\*Mussel Survey 2015\*](#)



Wildlife biologist Kitty Miller has been with the LRAC since its inception. Her work on the 1994 *Lamprey River Resource Assessment* was essential to the Lamprey’s Wild and Scenic designation as well as state designation. Her passion for protecting wildlife and habitats is legendary and unwavering. She has led the Wildlife and Ecology Workgroup for years and also imparts her knowledge on land protection projects and development project reviews.

*Photo by Richard H. Lord*

## Key Future Actions

- Encourage sustained ecological integrity in the watershed.
  - Support research to discern why bridle shiners are missing from otherwise suitable habitat as identified in [Lamprey River Watershed Fish Surveys from 2012](#).
  - Seek out and conserve land that increases the degree of connectedness for aquatic organism and wildlife passage within the watershed.
  - Work with partners to conduct programs that inform riverfront landowners about wildlife needs on their property.
  - Promote wide riverfront buffers as important to wildlife and water quality.
  - Work with towns to enact riparian buffer protection regulations.
  - Help people to understand their connection to nature and wildlife: how to maintain wildlife habitat and how to safeguard soil and clean water.
  - Protect headwater streams and beaver dams.
- Provide outreach that encourages the public to appreciate the importance of wildlife and ecology.
- Identify projects and funding sources for research and restoration projects.
- Work with partners to create a pocket park near Macallen Dam in Newmarket that includes a kiosk highlighting river herring and ecological issues associated with dams.

## By the Numbers: Wildlife and Ecology

Item Description	Count
wildlife surveys or ecological research commissioned	6