

Eastern Pondmussel

Ligumia nasuta

Federal Listing	N/A
State Listing	SC
Global Rank	
State Rank	S1
Regional Status	Very High



Photo by Ethan Nedeau

Justification (Reason for Concern in NH)

Freshwater mussels are the most imperiled fauna in North America, having suffered steep declines in diversity, abundance, and distribution within the last 200 years (Richter et al. 1997, Master et al. 2000, Lydeard et al. 2004). The Eastern pondmussel is distributed from Ontario, Canada, along the Atlantic coast to Virginia and west into Pennsylvania and New York. It is stable and abundant in many locations and is expanding its range into the Allegheny basin in New York (Strayer and Jirka 1997). Nevertheless, the Freshwater Mussel Subcommittee of the American Fisheries Society's Endangered Species Committee listed it as a species of special concern (Williams et al. 1992), and the Northeast Endangered Species and Wildlife Diversity Technical Committee listed it as a species of regional conservation concern (Therres 1999). It is listed as threatened in New Jersey and endangered in Delaware. In Maine, Massachusetts, and Connecticut it is listed as Special Concern (Nedeau et al. 2000, Nedeau and Victoria 2002). The Eastern pondmussel was ranked as a priority candidate for status under the Committee on the Status of Endangered Wildlife in Canada, COSEWIC (Metcalf-Smith 1998). In New Hampshire, Eastern pondmussels are found in only 6-7 ponds and rivers in the southeast part of the state, only one of which had high eastern pond mussel numbers detected during recent surveys (Nedeau 2011).

Distribution

The only extant populations of Eastern pondmussels occur in 7 locations in the coastal watershed: Golden Brook near the outflow of Simpson Pond in Windham, Cobbetts Pond in Windham, Country Pond in Kingston/Newton, Little Island Pond in Pelham, Wash Pond in Hampstead, Great Pond in Kingston, and Powwow Pond in East Kingston (Clench and Russell 1938, Master 1990, Cutko and Johnson 1992, Nedeau 2009, Nedeau 2011). There is 1 historic record for Keene in the Connecticut River watershed (Clench and Turner 1938). Eastern pondmussels were not found during surveys of the Ashuelot River from Keene to Hinsdale between 2001 and 2004 (Nedeau and Werle 2003) or more recently. However, it is found in the Connecticut River watershed in Massachusetts and Connecticut, and recently in a Connecticut River tributary as far north as Whately, Massachusetts (von Oettingen, USFWS, personal communication).

Habitat

Eastern pondmussels inhabit ponds, lakes, and the low velocity segments of streams and rivers. They are often found in fine sands and other soft sediments (Strayer and Jirka 1997). Mussels are suspension feeders, subsisting on phytoplankton, bacteria, fine particulate matter, and dissolved organic matter (Strayer 2004).

Unionid mussels have complex life cycles. Larvae called glochidia must attach and encyst on a host

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species – usually a fish – to complete development disperse. Little is known about the reproductive biology of the Eastern pondmussel, and host fish species for glochidia have not been determined. They are long-term brooders, spawning in summer, then releasing glochidia the following spring or summer.

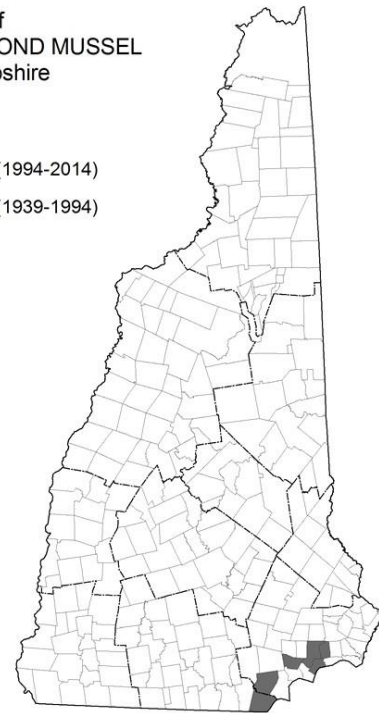
Mantle displays in eastern pondmussel function to attract hosts; papillae line the mantle edge, rhythmic movements of which elicit attacks by potential host fish (Corey 2003). Glochidia are discharged during the attack.

NH Wildlife Action Plan Habitats

- Warmwater Lakes and Ponds
- Warmwater Rivers and Streams

Distribution of
EASTERN POND MUSSEL
in New Hampshire

■ Current (1994-2014)
■ Historic (1939-1994)



Distribution Map

Current Species and Habitat Condition in New Hampshire

Information that is needed to assess relative abundance, size, density, or recruitment of Eastern pondmussel populations is limited. During surveys targeting eastern pond mussels in southeastern New Hampshire, eastern pond mussels were detected in 6 of 18 waterbodies surveyed, despite apparently suitable habitat being present at some undocumented sites (Nedeau 2011). Wash Pond in Hampstead had the largest number of individual mussels during quantitative surveys, including evidence of recruitment (Nedeau 2011). The species was also documented in lower densities at Cobbetts Pond, Country Pond, Little Island Pond, Great Pond, and Powwow pond. Eastern pond mussels appear to be at low densities in Powwow pond as the species was found in only 2 of 10 plots surveyed (Nedeau 2009, Nedeau 2011). The species was not detected in Golden Brook during 2 recent qualitative surveys sites, despite having been documented there previously (Nedeau 2011).

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Population Management Status

There is no population management of the Eastern pondmussel. Additional survey information is needed in order to identify potential conservation opportunities. Asian clams have been documented in Wash pond and Cobbetts Pond and it isn't known what impact the Asian clams or the associated management of Asian clams will have on eastern pond mussels.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Comprehensive Shoreland Protection Act - NHDES
- Clean Water Act-Section 404

Quality of Habitat

Very little habitat information exists. Some ecological attributes have been measured for occupied sites (Nedeau 2011) but additional monitoring and research is needed to determine population size, density, and recruitment and to assess habitat. Mussel populations in Powwow pond may have been adversely influenced by previous pond management (e.g., drawdowns) as all mussel species had particularly low densities in areas of shallow water (Nedeau 2009). A similar observation was noted for several other ponds (Nedeau 2011). In Wash pond, the most robust eastern pond mussel population known, eastern pond mussels were more common in shallow plots than in deep plots which is consistent with some of the healthiest lake populations of eastern pond mussels in Massachusetts (Nedeau 2011). In all other ponds where eastern pond mussels were detected, mussel densities (all species) were more abundant in deeper water. At Island Pond where eastern pondmussels were not detected, only 1 of 962 mussels occurred in shallow plots suggesting lake drawdowns may be having an impact on mussel populations (Nedeau 2011). The Department of Environmental Service Limnology Bureau monitors water quality at all occurrence locations.

Habitat Protection Status

Sites occupied by eastern pond mussels are public waterbodies. Land conservation of shorelines vary.

Habitat Management Status

There are no habitat management efforts for Eastern pondmussel populations. Asian clams have been documented in Wash Pond and Cobbetts Pond and it isn't known what impact the Asian clams or the associated management of Asian clams will have on eastern pond mussels.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality from drawdowns for plant control and waterbody management (Threat Rank: High)

Freshwater mussels have variable and generally limited ability to move from rapid drawdowns. Drawdowns during the spring-fall can leave animals vulnerable to desiccation and predation. Drawdowns during the winter can leave animals exposed to freezing conditions resulting in mortality to individuals exposed.

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Mussel populations in Powwow pond may have been adversely influenced by previous pond management (e.g., drawdowns) as all mussel species had particularly low densities in areas of shallow water (Nedeau 2009). A similar observation was noted for several other ponds in southern NH (Nedeau 2011). In Wash Pond, the most robust eastern pond mussel population known, eastern pond mussels were more common in shallow plots than in deep plots which is consistent with some of the healthiest lake populations of eastern pond mussels in Massachusetts (Nedeau 2011). In all other ponds where eastern pondmussels were detected, mussel densities (all species) were more abundant in deeper water. At Island Pond where eastern pondmussels were not detected, only 1 of 962 mussels occurred in shallow plots suggesting lake drawdowns may be having an impact on mussel populations (Nedeau 2011).

Habitat degradation and mortality from development of shorelines (Threat Rank: Medium)

Riparian corridors and adjacent lands are being rapidly developed in New Hampshire. Lakeshores are highly valued for the recreation potential they offer, and lakeside development, docks, and motorized boat traffic degrade habitat, lower water quality, and increase pollution.

Habitat destruction, pollution, and water degradation are considered the most likely causes for the decline of freshwater mussels (Neves 1997, Strayer et al. 2004). The east and south shores of Great Pond are developed, and development continues on the southwest shore of Powwow Pond and around most of Wash Pond. Additional on-site threat evidence needs to be gathered.

Habitat degradation and mortality from impervious surface run-off that contains excess nutrients, sediment and toxins (Threat Rank: Medium)

Runoff from municipalities, industrial waste, sewage outfalls, golf courses, and poorly managed agricultural and silvicultural lands degrades water and leads to sedimentation and organic pollution. As rapid development increases, impervious surfaces increase the volume and velocity of runoff, causing erosion, sedimentation, and toxic pollution in streams and rivers. Riparian vegetation is critical in retarding these effects.

Mussels are sensitive to chronic and acute exposure to heavy metals introduced through runoff and atmospheric deposition as well as to toxins, such as chlorine and ammonia (Naimo 1995, Augsburg et al. 2003). Glochidia and juveniles are considered the life stages most sensitive to pollutants. Juveniles burrow into and feed within the sediments; adult mussels may also deposit feed. Low sediment pore-water oxygen and high sediment levels of toxins put infaunal juveniles at risk. Hence, sediments may represent a major contamination pathway for mussels (Newton et al. 2003, Poole and Downing 2004).

The effect of acute pollution on freshwater mussels is well-documented (Neves et al. 1997), and chemical and agricultural waste spills cause direct mussel mortality. For instance, hundreds of mussels, some state and federally listed, were killed by waste runoff from a small farm in the Connecticut River watershed (USFWS 2002). The most widely reported sources of pollution are poor land use practices (Neves et al. 1997, Poole and Downing 2004). The effect of sediment toxicity is not well understood. However, recent toxicity tests for total residual chlorine showed that juvenile mussels are much more sensitive to toxins than glochidia (Cherry et al. 2005).

List of Lower Ranking Threats:

Habitat degradation and mortality from streambank stabilization

Species impacts from reduction or loss of host fish from degraded habitat and species composition

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changes

Mortality from recreational activities within a stream that can crush mussels

Mortality from the introduction and spread of problematic diseases and parasites

Species impacts from introduced or invasive animals that result in competition, predation, and reduced habitat quality

Habitat impacts from introduced or invasive plants

Habitat degradation and mortality from increased flooding that destroys mussel beds

Habitat impacts (fragmentation) from dams that cause inhospitable stream conditions

Habitat impacts and disturbance from development of riparian habitats that increases stream temperature

Mortality from chemical treatments for nuisance plant control in waterbodies

Habitat degradation and mortality from dams that alter hydrology upstream and downstream

Actions to benefit this Species or Habitat in NH

Monitor mussel populations

Objective:

Monitor the distribution, condition, and threats to eastern pond mussel populations.

General Strategy:

Eastern pond mussels have a limited distribution in New Hampshire. The distribution and condition of populations needs to be assessed periodically to determine species status. Potential threats to the species such as water drawdowns, aquatic herbicide treatments, invasive species, and shoreline development should be monitored for impacts to populations.

Political Location:

Hillsborough County, Rockingham County

Watershed Location:

Merrimack Watershed

Review projects that have potential to harm eastern pondmussel populations

Primary Threat Addressed: Habitat degradation and mortality from development of shorelines

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:

Review projects that have potential to harm eastern pondmussel populations and develop guidelines for minimizing impacts.

General Strategy:

Eastern pond mussels are listed as special concern in New Hampshire and the species warrants consideration as endangered or threatened. As such, NHFG will review any proposed activities (residential, commercial, water level management, dam maintenance, lake management, recreation, herbicide applications, dam licensing) that has the potential to harm eastern pond mussels. NHFG will work with applicants and permitting staff from other state and federal agencies, primarily Department of Environmental Services (Wetlands Bureau) and U.S. Army Corps of Engineers, to

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identify avoidance and minimization conditions for permit applicants. NHFG will develop guidelines for consistent and effective review of projects potentially impacting eastern pond mussels. Guidelines will consider scenarios where impacts should be avoided and scenarios where impact minimization of mitigation may be appropriate. Pre- and post- construction monitoring of eastern pond mussels and associated habitat should be considered as a component of project review.

Political Location:

Hillsborough County, Rockingham County

Watershed Location:

Merrimack Watershed

References, Data Sources and Authors

Data Sources

Information on the life history, habitat requirements, and distribution of Eastern pondmussel was obtained from the scientific literature, unpublished reports, databases, and expert consultation. Two targeted surveys in New Hampshire (Nedeau 2009, Nedeau 2011) provided all distribution and condition information for the previous 10 years.

The threat assessment was conducted by Michael Marchand, Barry Wicklow, and Susi von Oettingen.

Data Quality

Information of the Eastern pondmussel in New Hampshire is sparse, and data are limited to occurrence locations: Wash pond Hampstead, 9 living individuals, 1992; Golden Brook near the outflow of Simpson Pond, Windham, 1 individual, 1990; Powwow Pond, East Kingston, 1 individual, 2004; Great pond, Kingston, 1 live individual in 2 hours of searching on the southwestern shore, 1992. In 2000, on the eastern shore of Great Pond several dozen individuals were observed embedded in fine sand (von Oettingen, USFWS, personal observations).

Quantitative data on the condition of Eastern pondmussel populations is limited.

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2005 Authors:

Barry Wicklow, Saint Anselm College

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