

**ASSESSMENT OF DWARF WEDGEMUSSEL (ALASMIDONTA
HETERODON) DISTRIBUTION AND HABITAT IN LARGE
TRIBUTARIES TO THE CONNECTICUT RIVER**

1999 PERFORMANCE REPORT

by

Mark Ferguson

Nongame & Natural Heritage Program
Vermont Fish and Wildlife Department
103 S. Main Street
Waterbury, VT 05671-0501

for the

U. S. Fish & Wildlife Service
Region 5 Office
300 Westgate Center Drive
Hadley, MA 01035-9589

Introduction

The dwarf wedgemussel (*Alasmidonta heterodon*) is currently known to occur in three separate portions of the Connecticut River drainage in and adjacent to Vermont. The northern population is confined to a reach of the Connecticut River from Guildhall to Lunenburg, VT. Another section is defined from Hartland to Weathersfield, VT. In 1998, a small, separate population was discovered in the lower section of the Black River in Springfield, VT. Some portions of the Connecticut River within these reaches are now impounded by dams and often undergo severe daily water level fluctuations. Presumably, this habitat loss and instability resulting from hydro-dam operations has rendered sections of the river unsuitable for dwarf wedgemussels. Historical records (pre-1950) indicate that this species was indeed more widespread within the Connecticut River at one time (Clarke 1983).

The discovery of the Black River population is particularly interesting because this river empties into an impounded section of the Connecticut River where there is no known suitable habitat for the dwarf wedgemussel. If indeed this section of the mainstem is uninhabitable, the lower Black River may be serving as a refugium where habitat, although limited, is still adequate for survival and successful reproduction to occur. Further support of this concept is the occurrence as recently as 1992 of dwarf wedgemussels in the lower Ottauquechee River, which also empties into an impounded section of the Connecticut River.

If tributaries do serve as refugia where the Connecticut River mainstem has been rendered unsuitable, these small, isolated populations could be of extreme importance for recolonization if adequate habitat improvements occur in the mainstem in the future. It is necessary, however, to determine how widespread the occurrence of habitat refugia may be within the system if this approach is to be used in conservation management. Therefore, the focus of this study is to identify potential habitat refugia within the Vermont tributaries to the Connecticut River and attempt to determine presence/absence of the dwarf wedgemussel and suitable habitat within these areas.

Study Area and Methods

This study was limited to surveying the mouths and lower reaches of rivers and streams that empty directly into the Connecticut River along the Vermont border. Prior to conducting field surveys, existing information was used to identify potential survey sites along Connecticut River tributaries. This information included current and historical collection records (Fichtel and Smith 1995; unpublished reports within the VT Nongame and Natural Heritage files), current vs. historical distributional patterns of the dwarf wedgemussel, habitat potential (as assessed from topographical maps and personal knowledge of Vermont streams), and occurrence of impoundments and the resulting impacted river reaches. Particular importance was placed on streams that emptied into impounded sections of the Connecticut River, as they could serve as habitat refugia for the dwarf wedgemussel. The Black River, where dwarf wedgemussel were discovered in 1998, was also included in the survey. From this information, an initial list of 13 rivers and streams were identified as potential survey sites (Table 1). Each stream on this list was then visited to determine whether a field survey was warranted. Nine of the initial 13

streams were selected for field surveys (see map at end of report for locations); those not included were ruled out on the basis of small stream size and/or low potential for favorable habitat.

River reaches were accessed by canoe, road crossings, or adjacent public lands. Each site was surveyed for suitable substrate (sand and gravel, gravel, or clay) and current (slow to moderate) to determine the most likely areas for mussel occurrence. Where potential habitat occurred, the area was searched for mussels either by use of a plexiglass-bottomed viewing bucket or by unaided inspection of the stream bed. All mussels or empty shells found were identified to species and recorded. Observations of stream habitat conditions were also recorded.

Table 1. Initial rivers and streams identified as potential survey sites.

Site	Town	Mussel Survey Conducted?	Comments
West River	Brattleboro	yes	
Waits River	Bradford	yes	
Passumpsic River	Barnet	yes	
Bloody/New Boston Brook	Norwich	no	stream is small; unlikely to support mussels
White River	Hartford	yes	
Ottaquechee River	Hartland	yes	
Mill Brook	Weathersfield	no	stream is small; unlikely to support mussels
Williams River	Rockingham	yes	
Ompompanoosuc River	Norwich	yes	
Wells River	Newbury	no	no suitable habitat observed
Stevens River	Barnet	no	all potential habitat appears inundated by Connecticut River
Broad Brook	Vernon	yes	small stream; very limited habitat
Black River	Springfield	yes	DWM found here in 1998

Results

With the exception of the Black River, no live dwarf wedgemussels or shells were observed during the course this survey. Potential habitat was identified in several streams, but was often limited to small areas where moderate water currents tended to keep silt from building up over the substrate. Other mussels species were rarely encountered and included Pyganodon cataracta, Elliptio complanata, and possibly Lampsilis radiata. In the Black River, mussels were common (E. complanata and L. radiata) and also included Strophitus undulatus and Alasmidonta undulata.

River/stream: **West River**

Date: August 27, 1999

Location surveyed: Area from upstream end of Retreat Meadows and upstream about 1.5 km.

Method: Canoe and wading with a viewing bucket.

Mussels: No dwarf wedgemussels were observed. Live P. cataracta was found in shallow areas in sand in the upper end of Retreat Meadows.

Habitat description: Habitat appeared very limited. Shallow sandy channels in the upstream end of Retreat Meadows did support another mussel species, but substrate in this area is entirely sand or sand and silt, with no gravel and appears of limited suitable for dwarf wedgemussels.

Upstream of this, the river changes into a deep, slow moving pool which extends upstream of the I-91 overpass. No suitable habitat was observed in this reach, although some may exist in deep water if adequate current is present to prevent heavy silt deposition. At the upstream end of this pool, the habitat quickly changes to a shallow, cobble-bottom river with fairly swift current.

There is very little gravel and no sand in this section. No suitable habitat occurred in this section of river.

River/stream: **Waits River**

Date: September 1, 1999

Location surveyed: Canoeed from mouth of river upstream to the dam, which is located at the Rt. 5 overpass.

Method: Canoe and wading with a viewing bucket.

Mussels: No dwarf wedgemussels or other mussels were observed.

Habitat description: Most of this reach had a sand bottom with no noticeable flow; The substrate was generally covered with a thin layer of silt and periphyton, with a thick covering of algae in some areas. Other than riprap along the sides, there was no larger substrate than sand except in the riffles located immediately downstream of the dam. The riffles consisted of mostly jagged rock (large gravel to boulder in size) with very little interstitial sand or small gravel. Interstitial silt was heavy in all areas of the river surveyed. No suitable dwarf wedgemussel habitat appeared to exist in the Waits River.

River/stream: **Passumpsic River**

Date: September 15, 1999

Location surveyed: Canoeed from the mouth upstream to the first dam in East Barnet.

Method: Canoe and wading with a viewing bucket.

Mussels: No dwarf wedgemussels were observed. Three fragments of shells were found; reliable identification could not be made, however one fragment was likely P. cataracta and another was either Elliptio complanata or Lampsilis radiata.

Habitat description: The entire river up to the dam was at lake level (Connecticut River impoundment). Two gravel and sand islands were focused on, due to suitable substrate; the shell fragments were found on one of these. Sandy gravel shoals and shorelines were also searched. There were some areas of gravel or sand river bottom that were free of silt; however, these appeared to be above the low water line much of the time, judging by the presence of terrestrial

plants in flower that were in the water. This water fluctuation is due to impoundment of the Connecticut River and likely occurs daily. The water rose enough (about 5-6 inches) during my site visit to cover one of the two islands. Based on the observable habitat, this river might be able to support some mussel species, including the dwarf wedgemussel, although no shells were found to support this. The current water level regime reduces the potential for the occurrence of the dwarf wedgemussel.

River/stream: **White River**

Date: September 8, 1999

Location surveyed: Canoeed from mouth of White River upstream to about 0.4 km downstream of the I-91 overpass.

Method: Canoe and wading.

Mussels: No dwarf wedgemussels were observed. One freshly dead shell of *E. complanata* was found near the mouth.

Habitat description: The White River is free-flowing throughout the survey area. The Connecticut River is also free-flowing where the White River empties in. The current was moderate throughout this reach, with many shallow expanses and riffle gravel bars that stretch across most of the river. Sand and gravel bars were common. The predominant substrate type of the river bed was a mixture of gravel and cobble, with interstitial sand. There were also many areas of purely sand. The surface of the bed was free of any silt or algae layer; interstitial silt was slight to moderate. Much of the river appeared to have appropriate habitat for mussels, including the dwarf wedgemussel. It was surprising that more mussels or shells were not located. The river appeared to be at a very low level (based on newly establishing vegetation and lack of established vegetation); it was therefore not possible to determine how habitat suitability might appear during more normal flow conditions. Although no dwarf wedgemussels or their shells were found, this lower section of the White River appears to have extensive potential habitat.

River/stream: **Ottawaquechee River**

Date: October 6, 1999

Location surveyed: Canoeed from first dam above the mouth downstream to the mouth.

Method: Canoe and wading with a viewing bucket.

Mussels: No dwarf wedgemussels or other mussels were found.

Habitat description: This stretch of river appears to undergo regular water level fluctuations due to the Connecticut River impoundment and possibly impoundments on the Ottawaquechee River itself. On this date, the entire stretch of river surveyed was at Connecticut River level, with little observable current, preventing a reliable search of potential habitat. There are records of dwarf wedgemussels in this lower section as recently as 1992, which indicates that appropriate habitat is likely still present but was not surveyed during the present study.

River/stream: **Williams River**

Date: August 3, 1999

Location surveyed: Canoeed from Connecticut River upstream to the first set of riffles, which is located about 200 m upstream of the I-91 overpass.

Method: Canoe and wading.

Mussels: No dwarf wedgemussels or other mussels were observed.

Habitat description: This river reach has almost an entirely sand bottom without much silt. The Williams River is entirely at lake level (Connecticut River impoundment) with no observable current upstream to the first riffle. There is a large island at the lower end, which was searched for mussels and shells. Upstream of I-91 near the riffle, the bottom becomes sand and cobble, with cobble being dominant where there is observable current. No sandy areas with observable flow were found. The presence of “clean” sandy areas may indicate potential dwarf wedgemussel habitat, although lack of associated current makes this less likely. Muskrat tracks were seen in the lower end of this study reach, but no middens were found. The only mussel shells (*E. complanata* and *L. radiata*) found were along the Connecticut River in muskrat middens upstream of the Williams River.

River/stream: **Ompompanoosuc River**

Date: July 23 and August 31, 1999

Location surveyed: Canoeed from I-91 overpass upstream to the first riffle, located by a roadside pulloff upstream of the lowermost R. 132 bridge. This reach is about 0.6 km in length.

Method: Canoe and wading with a viewing bucket.

Mussels: No dwarf wedgemussels or other mussels were observed.

Habitat description: The section from the I-91 overpass upstream to the first riffle did not appear to contain any suitable habitat for the dwarf wedgemussel. The river bottom was almost entirely a mixture of silt, mud, and sand, covered by a layer of silt and periphyton. There were a few isolated patches of cobble and boulder, which were also covered with silt and periphyton. Continuing upstream, the substrate became more rocky near the first riffle, but the silt persisted. Directly below the riffle, there were small patches of substrate that could represent potential dwarf wedgemussel habitat (stable sand), but surface and interstitial silt was too great for use by this species. Within the riffle, the substrate quickly changed to cobble, with insufficient amounts of smaller substrates to support dwarf wedgemussels.

River/stream: **Broad Brook**

Date: September 9, 1999

Location surveyed: Rt. 142 crossing immediately upstream of the mouth.

Method: Wading with a viewing bucket.

Mussels: No dwarf wedgemussels or other mussels were observed.

Habitat description: This crossing contained the only section of substrate observed to have substrate larger than silt within the lower portion of the brook. This is a small stream, and the area that was of interest was limited to a small patch of gravel downstream of the bridge no greater than 15 m in length. However, even in this area the amount of interstitial silt was too great

and the bottom too unstable to support dwarf wedgemussels. Even without consideration of the impacts of the silt, this stream is likely too small to have ever supported dwarf wedgemussels.

Discussion

This study focused on the major Vermont tributaries to the Connecticut River from Barnet to Vernon. Limited areas within this portion of the Connecticut River are currently known to support population(s) of dwarf wedgemussels. Historical collections indicate that a wider distribution of this species once occurred here; however, impoundment of much of the Connecticut River has presumably reduced the extent of suitable habitat within the mainstem.

The findings of this study indicate that suitable habitat may occur in a few lower sections of large tributaries, but is usually limited in size or is only marginal habitat. Only the White River was observed to contain extensive, varied suitable habitat. The lack of any evidence of dwarf wedgemussels at any of the survey sites (except the Black River) does not lend support to the idea that tributary mouths may regularly provide habitat refugia for mussels that have been extirpated or excluded from the Connecticut River mainstem by impoundment.

The only Vermont rivers currently known to serve this function are the Black River, where this species was discovered in 1998, and possibly the Ottauquechee River, where it was observed in 1992. It is important to note that no live dwarf wedgemussels were found in the Black River (fewer than six live mussels were found in 1998) or in the Ottauquechee River during this study. Variable survey conditions due to precipitation, high flows, and water level manipulation can result in reduced sampling efficiency. The high potential for overlooking such a rare and small species when it is actually present precludes the conclusion that it does not occur in any of the survey sites included in this study.

While several of the sites in this study did not appear to contain suitable habitat, and do not warrant further investigation, it is important to have habitat descriptions for those rivers which could now or at one time have supported dwarf wedgemussels. This information can be used to further investigate the potential for occurrence of this species in the more promising tributaries. Rivers that may warrant more survey work in the future include the West, Passumpsic, White, Ottauquechee, and Black rivers.

Literature Cited

Clarke, A. H. 1983. Determination of the present geographical distribution of Alasmidonta heterodon (Lea) in the Connecticut River system in Vermont and New Hampshire. Final report to The Nature Conservancy, Eastern Regional Natural Heritage Program.

Fichtel, C., and D. G. Smith. 1995. The freshwater mussels of Vermont. Nongame and Natural Heritage Program, Vermont Fish and Wildlife Department, Waterbury, VT. Technical Report 18. 54pp.