

REPORT

**Freshwater Mussel Survey in the Hudson River and Normanskill for the
Port of Albany Project in Bethlehem, New York (Albany County)**

prepared for

McFarland-Johnson, Inc.

60 Railroad Place, Suite 402, Saratoga Springs, NY 12866

prepared by



Biodrawversity LLC
206 Pratt Corner Road
Leverett, MA 01054

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Hudson River shoreline along the proposed Port of Albany development project.

INTRODUCTION

Biodiversity LLC conducted a freshwater mussel survey in the Hudson River and Normanskill for the proposed Port of Albany development project in Bethlehem, New York. The New York State Department of Environmental Conservation (NYSDEC) required the mussel survey as part of the planning and permitting for the project. The mussel survey included a general habitat assessment and a systematic survey of the project area to determine the presence, density, distribution, and habitat of any state-listed (Endangered [E] or Threatened [T]) or state-ranked (S1, S1/S2, or S2) mussel species. In these areas of the Hudson River and Normanskill, potential target species included *Anodonta implicata* (alewife floater, S-rank = S1/S2) and *Leptodea ochracea* (tidewater mucket, S-rank = S1). Ethan Nedeau was the point of contact and lead field biologist for this project; Ethan is recognized as a freshwater mussel expert in the region by the NYSDEC and the United States Fish and Wildlife Service.

SURVEY DATE AND CONDITIONS

The survey was completed on five consecutive days, from June 15-19, 2020. Weather was sunny and warm on all five

days, with air temperature in the mid-80s to low 90s. Water clarity was variable depending on the tidal cycle, but generally turbid (no more than 2-3 ft visibility) in the Normanskill and moderately turbid (usually 6-10 ft visibility) in the Hudson River. Water temperature was in the low 70s. Low tide, which was the optimal time for surveying deeper subtidal areas, was at approximately 7:30 am on June 15 and then an hour later each day, which was ideal timing for conducting the mussel surveys.

SURVEY AREA

In the Hudson River, the survey spanned 900 meters of shoreline, from near the transmission line crossing at the downstream end to the mouth of the Normanskill (Figure 1). This area was divided into 11 sections. Surveys extended outward as far as 50 meters from the shoreline, though biologists were constantly vigilant for commercial shipping vessels that passed through these areas regularly. Biologists surveyed to a maximum water depth of 8 meters (26 feet) at low tide, or closer to 9.5 meters (31 ft) below mean high tide. The survey area also included a 350-meter reach of the lower Normanskill, from upstream of a proposed new bridge out to its confluence with the Hudson River, including the entire channel (bank to bank) (Figure 1, Section 12).



Normanskill near the proposed bridge, looking downstream toward its confluence with the Hudson River.

METHODS

Due to deep and turbid water, biologists conducted surveys of the subtidal areas of the Hudson River and Normanskill almost entirely by SCUBA diving. Three SCUBA divers worked together to systematically survey each section, and stopped to record data after each section was completed. In addition, the entire length of the Hudson River shoreline,



Biologists stopping to record data and photographs.

and both shorelines of the Normanskill, were surveyed during low tide to look for live or dead mussels on shore, in the intertidal zone, and in the shallow (<2 ft) subtidal zone. Biologists focused on finding state-listed or S-ranked species, but all mussel species and non-native bivalves encountered during the survey were identified and counted. Biologists intended to record the shell lengths, habitat, and locations of state-listed, S1, S1/S2, and S2 species. Although no species with these ranks were found, biologists did record shell lengths of all species except *Elliptio complanata*. Biologists record general habitat conditions and survey duration for each section, and photographed the survey area, representative habitats, and mussel species found.

RESULTS

I. Hudson River

Mussels: Live mussels of only two native species were found: *E. complanata*, and *Leptodea fragilis* (fragile paper-shell). *E. complanata* is common in New York, and *L. fragilis* has a state-rank of S3 and has rarely been observed in the tidal Hudson River where it is not native. A total of 113 *E. complanata* were found (Table 1); most of these were found in deeper water (15-25 ft) of Sections 1-3 at the downstream end of the study area. Very few were found

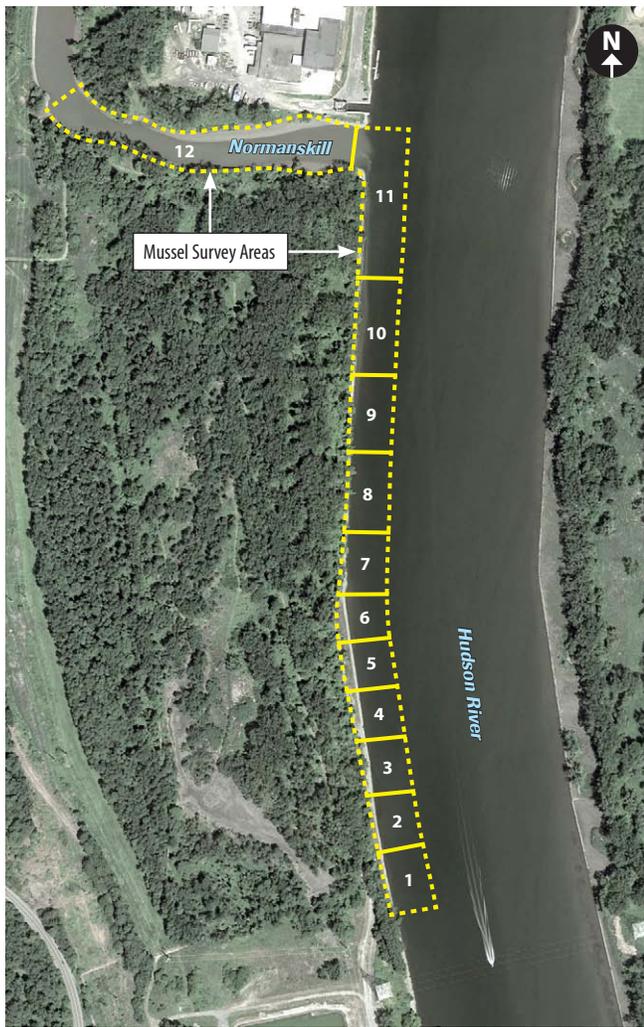


Figure 1. Freshwater mussel survey area in the Hudson River and Normanskill for the proposed Port of Albany development project.

in shallower subtidal areas. Nearly all *E. complanata* were fouled to some extent by the non-native zebra mussel (*Dreissena polymorpha*). A total of 36 *L. fragilis* were found; these occurred at low densities at variable depths in the subtidal zone, along nearly the entire length of the Hudson

River shoreline. *L. fragilis* preferred to embed themselves deeply in fine sediment (silt and sand), a trait which may allow them to escape heavy fouling by zebra mussels. *L. fragilis* ranged in length from 63.0 to 122.0 mm (average = 94.5 mm). In addition to these two species, several old relic shells of *Anodonta implicata* (alewife floater) were found, and one shell of *Lampsilis radiata* (eastern lampmussel) was found. Zebra mussels existed at moderate to high densities in subtidal areas, and were exceptionally abundant on hard substrates in deep water. The non-native Asian clam (*Corbicula fluminea*) was observed throughout the Hudson River, but usually only shells. No mussel shells were found on the shoreline, and few were found in the intertidal zone.

Habitat Summary: Overall, the most important habitat features in the Hudson River include a large tidal range, and a heavily modified/armored shoreline. An old timber retaining wall runs nearly the entire length of the study area, and there are various types of shoreline armoring (stone, concrete). These features have greatly altered intertidal and nearshore subtidal habitats, and helped to create a steep depth gradient with very little shallow subtidal habitat. Substrate is primarily coarse rock and silt/muck out into deep water, with more sand and gravel in deeper areas. Flow velocities vary with tides, but are generally slow. Submerged aquatic vegetation is generally absent or sparse; only two small patches were observed where there was some shallow subtidal habitat. Turbidity likely limits the depth distribution of submerged aquatic vegetation, since sunlight barely penetrates more than 5-6 ft. Although the habitats we observed are generally suitable for several native mussel species that occur in the lower Hudson River, zebra mussels likely decimated native mussels and will prevent native mussels from ever reestablishing populations.

II. Normanskill

Mussels: No live mussels were found in the Normanskill. A few *E. complanata* shells were found in deep water, but none were found along the shoreline or in the intertidal zone. Zebra mussels were prevalent on hard surfaces in the

Table 1. Summary of survey section lengths, survey duration, species counts, and non-native species presence in the Hudson River and Normanskill.

Section	River	Length (m)	Duration (hrs)	<i>Elliptio complanata</i>	<i>Leptodea fragilis</i>	<i>Anodonta implicata</i>	<i>Lampsilis radiata</i>	<i>Corbicula fluminea</i>	<i>Dreissena polymorpha</i>
1	Hudson River	70	2.25	41	2	Shell	0	X	X
2	Hudson River	70	2.25	31	2	0	0	X	X
3	Hudson River	60	2.25	27	3	Shell	0	X	X
4	Hudson River	60	2.25	7	1	Shell	0	X	X
5	Hudson River	50	2.25	2	5	0	0	X	X
6	Hudson River	50	2.25	1	3	0	0	X	X
7	Hudson River	70	2.75	1	5	0	Shell	X	X
8	Hudson River	90	3.00	0	3	0	0	X	X
9	Hudson River	100	3.00	1	4	0	0	X	X
10	Hudson River	105	3.00	1	3	0	0	X	X
11	Hudson River	175	3.75	1	5	0	0	X	X
12	Normanskill	350	5.00	Shell	0	0	0	0	X



Representative Hudson River shoreline at low tide, Sections 8-9.



Intertidal mudflat in the Normanskill, river-right.



Representative Hudson River shoreline at low tide, Sections 5-6.



Intertidal mudflat in the Normanskill, river-left.



Representative Hudson River shoreline at high tide, near Sections 1-2.



Confluence of the Normanskill and Hudson River, Section 11.



Fragile papershell (*Leptodea fragilis*) found during the survey.



Eastern elliptio (*Elliptio complanata*) found during the survey.



Fragile papershell (*Leptodea fragilis*) fouled with zebra mussels.



Zebra mussels (*Dreissena polymorpha*) encrusting a rock in deep water.

subtidal zone, especially the large stone riprap on the outside bend of the Normanskill near the proposed location of the new bridge. Asian clam shells were also found.

Habitat Summary: The Normanskill also has a large tidal range and a modified shoreline, although it also has extensive intertidal mudflats along portions of the shoreline that were not historically armored. Aside from large riprap near its confluence with the Hudson River and along its southern shoreline, substrate was primarily silt/muck, sand, and gravel in intertidal and subtidal areas. Flow velocities vary with the tides but are generally slow to moderate. No submerged aquatic vegetation was observed and there were only small amounts of emergent aquatic vegetation in the upper intertidal zone. The Normanskill is very turbid, and reduced sunlight cannot support submerged aquatic vegetation in the subtidal zone. Overall, subtidal areas of the Normanskill do appear to provide suitable mussel habitat for several species, but the abundance of zebra mussels and possibly historical water quality issues may have contributed to the absence of native mussels in these areas.

CONCLUSION

The primary objective of this mussel survey was to determine the presence, density, distribution, and habitat of any state-listed (Endangered [E] or Threatened [T]) or state-ranked (S1, S1/S2, or S2) mussel species in areas of the Hudson River or Normanskill that would be affected by the proposed Port of Albany development project. No E, T, S1, S1/S2, or S2 mussel species were found. Biologists documented a low density of one common native species in the Hudson River (*E. complanata*), and a low density of one species that is native to New York but not native to the Hudson River (*L. fragilis*), and shells of two other native species (*A. implicata* and *L. radiata*). No live native mussels were found in the Normanskill. It is likely that the combined effects of zebra mussels, historic habitat alteration, and water quality have contributed to the paucity of native mussels in these areas. We do not recommend further freshwater mussel surveys or monitoring for this project.