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Survey of the pearly freshwater mussels (Unionidae: Bivalvia) of the
Susquehanna River in a reach between Exits 14 and 15 of Interstate 88,
Oneonta, NY¹

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INTRODUCTION

Although long impacted by anthropogenic activities, the Susquehanna drainage basin provides habitat for about a dozen species of unionids (Clark and Berg, 1959; Harman, 1970; Strayer and Fetterman, 1999) including four "Species of Greatest Conservation Need (SGCN)" as determined by the United States fish and Wildlife Service (Bell, 2007). They are *Alasmidonta varicosa* (brook floater), *A. marginata* (elktoe), *Lasmigona subviridis* (green floater) and *Lampsilis cariosa* (Yellow lamp mussel).

Previous channelization of the Susquehanna River in the Oneonta area has resulted in destabilization of gravel substrates typical of widespread activities in nearby drainage systems (Harman, 1974) resulting, in unionid habitat degradation and destabilization of banks threatening Interstate 88, therefore requiring additional stream bed disturbance to mitigate concerns (O'Brian and O'Reilly, 2007). Because of the potential presence of the SGCN at the Oneonta work site, the New York State Department of Environmental Conservation (DEC) required the New York State Department of Transportation (DOT) to sponsor this study in order to: 1. Ascertain the presence of any unionids, including any SGCN, and if found either 2. Remove the populations to local refugia (returning them after construction) or 3. Protect them by mitigation via in stream engineering.

PHYSICAL CHARACTERIZATION OF THE SITE

The site includes a pool, riffles and an extensive run approximately 450 m in length in the proposed area of DOT activity. Upon first observation the entire area appeared to be poor unionid habitat, unsuitable for colonization because of substrate instability. The pool area (referred to as "Upper Pool" in a survey dated Oct 10-12, 2004, prepared by the DOT) was about 6000 m² in area with superficial substrates predominately, in order of abundance, of cobbles, gravel and a few boulders, covered

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addition, 7 other locations were documented, as shown on Figure 1, to aid in delineating habitat types and the surveyed area of the tributary.

On 6/19/07 three experienced staff and 5 interns spent about 7 hours on the river. One SCUBA diver dove for about 5 hours in the deeper water of the run. All areas were classified as riffle/run or pool habitat as described above following modified protocols of Hankin and Reeves (1988). Dominant substrates were classified into categories: boulder, cobble, gravel, sand, or silt. Substrates not visible to waders were characterized by direct observations by the diver. A thorough search was made for the presence of any unionids. Care was taken to search all suitable accessible habitat as per Clark and Berg (1959), Harman (1970), Strayer and Fetterman (1999) and Strayer and Jirka (1997). Terrestrial areas adjacent to the stream banks were searched for muskrat middens. Everyone except the diver used glass bottomed buckets scanning all shallower substrates and carrying out 134 excavations (approximated by yellow on Figure 1.). Excavation sites of about 0.25 m² were determined by the utilization of a random numbers table after assigning one meter quadrants over the entire surface of the study area. We did not attempt to spatially locate every excavation site with a GPS unit, but approximated locations visually. The diver excavated additional sites, the majority much larger than 0.25 m² while stabilizing his positions in deep water for substrate observation. In areas of coarse gravels and cobbles excavating tools included long and short handled "clam rakes" typical of those used by northeastern salt water "clambers" which also work well for divers to maintain their positions in rapid currents, but result in extensive linear excavations. Since the first priority of this work was to determine the presence of unionid populations, quantitative sampling (e.g. Smith, et al, 2001; Strayer and Smith, 2003) was not deemed necessary. All living mollusks species and unionid shell fragments found were determined and recorded.

RESULTS

Aside from some finger nail clams (Sphaeriidae) the only living bivalves found were the aggressive, exotic zebra mussels *Dreissena polymorpha* (Dreissenidae). A well established population is present the entire length of the project site where loose channery occurs (channery defined as flattened cobbles and boulders derived from sedimentary rock) at a density of about one specimen per 100 cm². By far the majority of the specimens were found on the undersides of rocks, often two or more rocks from the surface (0 – 10 cm) while excavating for unionids. We found the following unionid empty valves and shell fragments in the study area, many of them very old:

<i>Strophitus undulatus</i>	Squawfoot	8 specimens
<i>Lampsilis cariosa</i>	Yellow lamp mussel	2 specimens
<i>Elliptio complanatus</i>	Eastern elliptio	4 specimens
<i>Alasmidonta marginata</i>	Elktoe	1 specimen (recently dead)

Four specimens of *Venus mercenaria* (Veneridae) (the salt water hard clam) were also found, indicating something about the validity of using shell fragments to determine species distributions.

DISCUSSION

Unfortunately, the situation prevailing at this site is all too typical of the larger streams in our area. Many have had their channels modified by road construction and channelization for various reasons (Harman, 1974). That phenomena, combined with the change of land use and cover in flood plains due to development, and anecdotally more violent meteorological patterns has resulted in destabilized substrates with which our unionid fauna is unable to cope. Add to that the zebra mussels, and their problems become practically insurmountable.

Despite my remark about the hard clams, shell fragments of local unionids found probably do represent evidence of the local situation: *Elliptio complanatus*, our most ubiquitous freshwater mussel, and *Lampsilis cariosa*, were abundant along this reach of the river in the 1960's (SUNY Oneonta, Biol 384 collections). All the fragments we found were very old and weathered implying those species absence for a long period. *Strophitus undulatus* prefers, or at least is more easily found on, compact substrates often covered with a rather heavy layer of silt, although it does well in clean, stable riffle substrates as does *Alasmidonta marginata*. Both of those species, and several others, regularly still occur in riffles and partial backwaters in 2nd and 3rd order streams locally. I believe the specimens we found were recently washed into this site from similar habitats and that diligent searches would find the listed mussels in those same locations.

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