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**Freshwater mussel (Unioidea) survey of three sites in Duck and Kearsley  
Creeks, Genessee and Oakland Counties, Michigan.**

**Prepared by:**

**Peter Badra**

**Michigan Natural Features Inventory**

**Michigan State University Extension**

**P.O. Box 30444**

**Lansing, MI 48909-7944**

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## Introduction

There are four families of freshwater mussel that occur in Michigan. The Sphaeriidae (pea clams or fingernail clams) and Unionidae are native to North America, while the Corbiculidae (Asian clams) and Dreissenidae (zebra mussels) are exotics that were introduced in the 1980s. Unionids, commonly known as mussels or clams, are characterized by their relatively large size (1-10 inches) and reliance on fish hosts in order to complete their life cycle. There are 45 species native to Michigan. Though they occur throughout the State's river and lake systems, this family has undergone drastic reductions in status and over its global range (Williams *et al.* 1993). Several species are listed as threatened or endangered in Michigan. Reasons for their sharp decline over the last century include habitat degradation, loss of fish hosts, pollution, and impact from exotic species (Fuller 1974, Williams *et al.* 1993, Strayer 1999).

The purpose of this survey was to determine the community composition and density of unionids present at three sites within an area that would be directly affected by expansion of M-15.

## Methods

Visual surveys were performed with the aid of glass bottomed buckets. Length and width of the reaches surveyed were recorded to estimate the area surveyed at each site. Stream reaches were surveyed in the upstream direction. Live individuals were identified on site and returned to the location they were found. Survey sites were identified by Tilton and Associates, Inc. and included M-15 crossings. Site 1 was a 186m long reach located between Granger Rd. and Wolf Rd. (T5N R9E sec. 18 SW1/4), Site 2 was a 118m reach located approximately 400m north of Granger Rd. (T5N R9E sec. 18 NW1/4), and Site 3 was a 122m reach just upstream of the Goodrich Millpond (T6N R8E sec. 22 SE1/4). In addition, a 15 minute qualitative meander search was done at Site 1, and a 33 minute meander search was done directly upstream from Site 3 (Table 1.). Tamara Lipsey (MNFI) and Joseph Leonardi (DNR-Fisheries) assisted with field work.

## Results

A total of four species were found in Duck and Kearsley Creeks, including two empty valves of a species of special concern, *Alasmidonta viridis* (slippershell) at Site 1 (Table 2.). Substrate composition at Site 1 ranged from 50% gravel and 50% sand at the downstream end of the site to 100% sand with some woody debris at the upstream end. Stream morphology included riffles and runs. Other taxa noted at the site were crayfish, pea clams, mottled sculpin (*Cottus bairdi*), and Johnny darter (*Etheostoma nigrum*).

Substrate composition at Site 2 was approximately 50% gravel, 25% sand, and 25% silt. Stream morphology included riffles and runs. Other taxa noted at the site were crayfish, mottled sculpin (*Cottus bairdi*), Johnny darter (*Etheostoma nigrum*), and creek chub (*Semotilus atromaculatus*).

Substrate composition at Site 3 ranged from 50% sand and 50% silt, to 50% gravel and 50% silt. Stream morphology was a pool at the beginning of the site and a straightened channel along side of M-15. Other taxa noted at the site were crayfish, pea clams, mottled sculpin (*Cottus bairdi*), Johnny darter (*Etheostoma nigrum*), and carp (*Cyprinus carpio*).

## Discussion

Density of the unionid community was relatively low. This is likely due to the small size of Duck and Kearsley creeks. Diversity of the unionid community at a particular site is positively correlated to drainage size (Watters 1992). Considering the very small size of these streams it is somewhat remarkable to find four unionid species. The relatively high fish diversity (MDNR, Fisheries Division data provided by Joseph Leonardi) of Duck and Kearsley Creeks provides an abundance of potential hosts to support unionid reproduction. The species found are either typically associated with headwater habitats (*A. viridis* and *L. compressa*) or occur in a wide variety of stream sizes (*E. dilatata* and *S. undulatus*).

*Strophitus undulatus* is a habitat generalist that is often tolerant of silt, turbid water, and slow current. The other three unionids found at this site are typically more sensitive to degraded habitat conditions such as increased silt and slow current. Impacts and/or modifications to stream habitats from construction projects often involve a decrease in vegeta-

tive cover along the stream bank. Increased sun exposure raises water temperature and reduces dissolved oxygen levels. This can have negative impacts on the stream ecosystem, including unionids, at or downstream of a construction site. Exposure to reduced levels of dissolved oxygen ( $1.32 \pm 0.20$  mg/L for 1 week) can cause greater than 50% mortality in juvenile unionids (Sparks and Strayer 1998)

There were no exotic bivalves (zebra mussels and Asian clams) found at the three sites. Zebra mussels have been known to drastically reduce unionid density due to fouling of their shells and competition for food (Strayer 1999). They are transported almost exclusively by boats and stream currents, and have been established in many lakes and streams of south-east Michigan. Since they are too small for boating, small creeks like Duck and Kearsley Creeks could act as a refuge for unionids.

### Literature Cited

Fuller, S.L.H. 1974. Clams and mussels. Pages 215-273 in C.W. Hart and S.L.H. Fuller eds.. Pollution ecology of freshwater invertebrates. Academic Press, New York.

Sparks, B.L. and D.L. Strayer 1998. Effects of low dissolved oxygen on juvenile *Elliptio complanata* (Bivalvia: Unionidae). Journal of the North American Benthological Society 17:129-134.

Strayer, D.L. 1999. Effects of alien species on freshwater mollusks in North America. Journal of the North American Benthological Society 18:74-98.

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris & R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18:6-22.

**Table 1.** Survey effort and habitat characteristics.

	Duck Creek, Site 1	Duck Creek, Site 2	Kearsley Creek, Site 3
Date of survey	7/31/2002	8/9/2002	8/9/2002
Person*search minutes	238	87	116
Area searched	405m <sup>2</sup>	331m <sup>2</sup>	634m <sup>2</sup>
Person*search minutes (meander)	30	-	66
Average stream width	2.0m	2.8m	5.2m
Current speed (approx.)	0.2m/second	0.2m/second	0.05m/second
Water clarity	very clear	very clear	very clear until silt is stirred up

**Table 2.** Unionid species found in Duck and Kearsley Creeks, 31 July 2002 and 9 August 2002. (SpC = Species of special concern)

Species	Common name	Duck Creek, Site 1	Duck Creek, Site 2	Kearsley Creek, Site 3
<i>Alasmidonta viridis</i> (SpC)	Slippershell	2 empty valves	-	-
<i>Elliptio dilatata</i>	Spike	-	-	4 live
<i>Lasmigona compressa</i>	Creek heelsplitter	1 live	-	-
<i>Strophitus undulatus</i>	Strange floater	3 live, 1 empty valve	-	-
Density (live indivs./m <sup>2</sup> )		0.01	-	0.006