

A SURVEY OF AQUATIC SNAILS IN THE ST. CROIX NATIONAL SCENIC RIVERWAY: ARE THEY NATIVE, EXOTIC, INVASIVE OR JUST GREAT BIO-INDICATORS?

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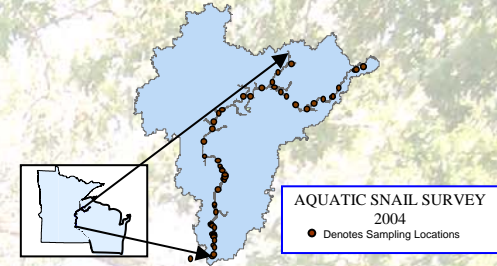
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INTRODUCTION

- **Freshwater snails** and mussels belong to the second most speciose animal phylum – the Mollusca – and also have the dubious distinction of being one of the **most imperiled groups of animals** (Lydeard et al. 2004).
- The plight of these animals has received far **less attention** than the loss and decline of many charismatic vertebrate species. Although it is clear that freshwater molluscan faunas are at grave risk, it is difficult to assess the precise level of threat – particularly for snails. Worldwide, it is estimated that **fewer than 2%** of molluscan species have had their conservation status **adequately assessed** (Lydeard et al. 2004).
- Mollusks **play a pivotal role** within their freshwater communities as grazing herbivores and filtering suspension feeders—freshwater mollusks often comprise significant proportions of the biomass in communities where they occur and occupy an important trophic level **at the base of the food chain** (van Bruggen 1995).
- Freshwater **snails are critical** in the energy flow within aquatic ecosystems (Kay 1995b).
- They are often sensitive to changes in their environment and can be **excellent indicator organisms**.
- Thorough **field studies and surveys** across the U.S. are **desperately required** in order to determine the status of many native molluscan species. The Upper Midwest is no exception.
- The **St. Croix National Scenic Riverway** is a **remarkable and outstanding river** resource of the Upper Midwest, renowned for its bivalve diversity. Yet, while great emphasis has been given to documenting the distribution, abundance, and life history of freshwater mussels, **little is known about snail abundance and diversity** within this Riverway.



METHODS

- A total of **66 locations** were sampled from July to August of 2004, throughout the St. Croix National Scenic Riverway (The Riverway comprises 244 km of the St. Croix River and 160 km of its largest tributary, the Namekagon.)
- Locations were spread **throughout the Riverway**—generally near access points and often associated with other sampling efforts (see map upper right).
- **Sampling** occurred in a **wide variety of habitats**, from shore to a depth of 5m, and included a diversity of habitats and substrates (e.g. mud, sand and gravelly substrates, stones and rocks, submerged and emergent vegetation, lotic and lentic reaches, etc).
- Most specimens were hand collected while wading, snorkeling or with scuba. Some dip netting and Hester-Dendy sampling was employed. On select locations on the lower St. Croix, quantitative data were gathered, though those results are not reflected here. **Specimens were preserved in 95% ethyl alcohol and delivered to the Bell Museum** for sorting, identification, and storage.
- Specimens were generally **identified to species** using *Burch 1982*, and entered into an Access database with the associated geospatial referencing, general habitat, and collection information.
- Data were **arranged by species and location** to determine geographic distribution (**Table 1**.)

Table 1. Taxa List including river mile collected and total locations.

Species List	# of Location	St. Croix or Namekagon (N) River Mile Present
<i>Acella haldemani</i>	1	152
<i>Ammnicola</i> sp.	16	10, 14, 20, 50.5, 54, 63, 70, 87, 97, 117, 130, 137, 144, 152
<i>Bulimea megasoma</i>	3	N100, N81
<i>Campeloma crassula</i>	9	16.5, 28.5, 54, 56, 70, 79, 87, 152, N100
<i>Campeloma decisa</i>	22	14, 16.5, 17, 20, 28.5, 52, 56, 59, 63, 70, 87, 92, 117, 137, 152, N32, N38, N50, N58, N74, N81
<i>Campeloma</i> sp.	13	1, 4, 15, 16.5, 20, 23, 24, 35, 50.5, 54, 79, N66,
<i>Cipangopaludina chinensis</i>	4	54, 56, 152, N32
<i>Cipangopaludina japonica</i>	6	N32, N50, N66, N67, N74
		16.5, 35, 44, 50, 50.5, 53, 54, 63, 70, 79, 85, 87, 92, 97, 117, 122, 130, 137, 144
<i>Ferrissia rivularis</i>	21	
<i>Ferrissia</i> sp.	1	54
<i>Fossaria obrussa</i>	5	15, 28.5, 35, 44, 70, 50.5
<i>Fossaria parva</i>	1	50.5
<i>Fossaria</i> sp.	4	6, 15, 63, 130
Gastropoda	1	54
<i>Gyraulus deflectus</i>	7	14, 53, 54, 63, 87, 117
<i>Gyraulus</i> sp.	1	35
<i>Helisoma anceps</i>	11	10, 14, 15, 20, 23, 56, 152, N58, N67, N74, N92
<i>Lymnaea stagnalis</i>	2	N81, N100
<i>Physella gyrina</i>	18	10, 28.5, 35, 44, 63, 79, 92, 117, 130, 137, 144, N22, N5, N50, N58, N66, N74, N100
<i>Physella heterostropha</i>	2	54, 152
		4, 14, 15, 16.5, 53, 54, 56, 70, 87, 97, 152, N32, N38, N58, N67, N91
<i>Physella</i> sp.	17	
<i>Planorbella campanulata</i>	6	152, N32, N67, N81, N100
<i>Planorbella pilsbryi</i>	4	52, 79, 152, N100
<i>Planorbella trivolvis</i>	3	87, N81, N100
		1, 4, 6, 10, 14, 16.5, 20, 23, 24, 25, 28.5, 35, 50.5, 52, 56, 59, 70, 79, 87, N22
<i>Pleurocera acuta</i>	22	
<i>Pomatopsis lapidaria</i>	1	1
Porifera spp.	1	56
<i>Pseudosuccinea columella</i>	3	35
<i>Somatogyrus</i> sp.	10	4, 6, 16.5, 20, 35, 56, 70, N5, N58
<i>Stagnicola catascopium</i>	3	N22, N5, N50
<i>Stagnicola elodes</i>	3	63, 79, N81
<i>Stagnicola emarginata</i>	8	15, 130, N32, N38, N66, N67, N74
<i>Stagnicola exilis</i>	1	N100
<i>Stagnicola walkerana</i>	1	N58
<i>Stagnicola woodruffi</i>	4	N38
<i>Stylommatophora</i>	4	144, N74, N91, N92
<i>Valvata tricarinata</i>	1	63
<i>Viviparus georgianus</i>	1	152



RESULTS

- Nearly 1000 snails were individually counted, 1000's more morphologically similar specimens were grouped into **38 taxa**.
- At least **two invasive species** were discovered (both Mystery Snail species used in the Aquarium trade)
- The presence of individual taxon ranged from **1 location**, to as many as **22 locations**. Several taxa were **restricted geographically**, or **found sporadically** throughout the Riverway. A number of taxa were found **consistently** throughout both the St. Croix and Namekagon Rivers.
- Further results are pending.

DISCUSSION and CONCLUSION:

- The National Park Service's Inventory and Monitoring Program does not, at the current time, include invertebrates.
- As such, the relative diversity and abundance of select invertebrate species, including snails, can now provide park resource managers **critical baseline information** for devising management priorities that will best make use of staff and public funds in **conserving and protecting natural resources**.
- Minnesota snails deposited in the Bell Museum of Natural History (University of Minnesota) date back to the late 1800's, few surveys of snail diversity have been completed. The rare exceptions include the surveys of Baker (1929, 1935) and Charlotte Webster Dawley (1944, 1947). However, these were limited in scope, completed over half a century ago, used taxonomy that is now woefully out of date, and are fraught with many misidentifications. Important material has now been added for reference and comparison.
- Thus, animals collected for this study represent a **new key component of the Bell's** Minnesota and Wisconsin **snail collection** and suggests spatial patterns that might indicate rare or restricted species.
- The Riverway has been invaded by at least **two non-native snail species**. There are also several native species that are widespread. It is not yet understood whether the species found at only 1 location, or only certain river reaches, are habitat dependent, generally intolerant, or are at the edge of their range. This data will allow us to start to answer these questions.
- While assessment of all the data has yet to be analyzed, the species collected suggest gastropods could be used as **indicators** of both a healthy and degraded system.

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