
Implementation of a Monitoring Program to Track the Recovery of Endangered Freshwater Mussels in the Sydenham River, Ontario

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Extended Abstract: The occurrence of 14 COSEWIC-listed species (8 fishes, 5 freshwater mussels, and 1 turtle) in the Sydenham River, Ontario prompted the development of an aquatic ecosystem recovery strategy for the river—the first of its kind in Canada. The long-term goal of the recovery strategy is to sustain and enhance the native aquatic communities of the Sydenham River through an ecosystem approach that focuses on species at risk. Short-term objectives include mitigating threats and promoting good stewardship to maintain current distributions and abundances of aquatic species at risk. Another objective is to establish a broad-based monitoring program to track changes in the physical, chemical, and biological characteristics of the system as recovery actions are implemented. The purpose of this project, which was funded by the Interdepartmental Recovery Fund and the Department of Fisheries and Oceans' Species at Risk Program, was to establish a 15-site monitoring network for 8 listed or soon-to-be listed mussel species at risk throughout the river and collect baseline data on their distributions, population demographics, and habitat requirements.

Fifteen sites were selected as monitoring stations based on the results of timed search surveys conducted at 17 sites on the river in 1997 and 1998. The sampling protocol was developed in consultation with experts from the Guidelines and Techniques Committee of the Freshwater Mollusk Conservation Society. Quantitative sampling was conducted using 1-m² quadrats and a systematic sampling design with three random starts. A 400-m² area was sampled at each site over a 2–3 day period using 20% coverage. Quadrats were excavated to ensure recovery of juvenile mussels which tend to burrow deeply. All mussels of all species found alive in each quadrat were counted, measured, and sexed (where possible), and depth, current velocity, substrate composition, and percent macrophyte cover were recorded.

A total of 5455 mussels of 30 species were found alive at the 15 sites sampled between 27 July 1999 and 4 September 2003. Richness ranged from 2 to 23 species per site and density

¹NatureServe Explorer (version 4.0, July 2004) lists the common name of *Simpsonaias ambigua* as the salamander mussel.

ranged from 0.12 to 14 mussels/m². Two target species, the wavy-rayed lampmussel (*Lampsilis fasciola*) and round hickorynut (*Obovaria subrotunda*), were not found alive at any site. The status of the remaining six target species is as follows:

- A total of 645 live rayed beans (*Villosa fabalis*) were found at 10 sites on the East Sydenham River. The ratio of males to females was roughly 1:1, and size frequency analysis showed that the species is successfully reproducing at a minimum of four sites.
- Sixty-nine kidneyshells (*Ptychobranthus fasciolaris*) were found alive at nine sites on the East Sydenham River. The size frequency distribution was skewed towards larger animals, and there was evidence of significant recruitment at only two sites. The sex ratio could not be determined because this species is not sexually dimorphic.
- The snuffbox (*Epioblasma triquetra*) was found alive at 7 sites on the East Sydenham River, but only 17 specimens were collected. The sex ratio was nearly 4:1 (M:F), and only a few of the animals were juveniles.
- Forty-six northern riffleshells (*Epioblasma torulosa rangiana*) of a wide range of sizes were found at seven sites in the middle reaches of the East Sydenham River. Recruitment was apparent at two of the sites, but the sex ratio was again 4:1 (M:F).
- Only 11 mudpuppy mussels (*Simpsonaias ambigua*) were found alive at 4 sites in the East Sydenham River. Mudpuppy mussels are very difficult to find due to their specialized habitat (under large flat rocks or debris).
- Twenty-six round pigtoes (*Pleurobema sintoxia*) were found alive at eight sites, including one site on Bear Creek. Several size classes were represented in the overall data, but recruitment was only apparent at one site on the East Sydenham River. This species is not sexually dimorphic.

In summary, the rayed bean and northern riffleshell appear to be 'holding their own' in the Sydenham River, whereas populations of the kidneyshell, snuffbox, and round pigtoe may be declining. The wavy-rayed lampmussel is believed to be extirpated from the system, and the round hickorynut nearly so (a few live specimens have been encountered during other work on the river over the past few years). There are too few data available on the mudpuppy mussel to determine its status, and we may need to come up with a different approach for monitoring this species.

Kriging and hierarchical cluster analysis were used to examine associations between mussels and habitat features. The rarity of most target species required that we pool the data from all 15 monitoring sites to determine habitat preferences. The greatest density and diversity of mussels occurred in relatively shallow habitats with moderate flows and a high proportion of sand substrate coupled with moderate amounts of gravel and rubble (for stability) and silt (to facilitate movement, especially burrowing). Nevertheless, there were differences in habitat preference among the target species. Furthermore, some of the more common species appeared to have similar habitat preferences to some of the target species. The discovery of associations between

target species and common species is important for two reasons: (1) the common species could serve as indicators of the potential occurrence of target species, and (2) if these 'surrogate' species have environmental requirements similar to the target species, they should respond in similar ways to recovery actions. And since they are more abundant, it may be easier to detect changes in their populations. These data will help the recovery team identify critical habitat for mussel species at risk, direct recovery actions where they are needed most, and track the species' responses to these actions. The design of this monitoring program could be applied to other similar-sized river systems in Canada.

References

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