

# Providing Conservation Information for the Most At-Risk Aquatic Animal Taxa in Michigan (Unionid Mussels, Gastropods, and Sphaeriid Clams)



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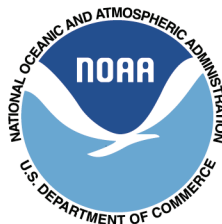
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Cover photographs - Top left: Round hickorynut (*Obovaria subrotunda*), by Peter Badra. Top right: Thicklip rams-horn (*Planorbula armigera*), by Rachel Osborn. Bottom: Fingernail clam (Sphaeriidae), by Kurt Stepnitz, MSU.



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## Purpose of the Project

The goal of this project was to better integrate rare aquatic animal occurrence data into decision making related to the management of Great Lakes coastal ecosystems. This was accomplished by gathering and entering occurrence data on Michigan's most at-risk aquatic animal species into the Natural Heritage Database (a.k.a Biotics GIS database). This database is the primary source of spatial information on Michigan's endangered, threatened, and special concern species. It is used in MDEQ, MDNR, and MDOT environmental assessment, U.S. Fish and Wildlife Service range wide species assessments, local government landuse planning, and a wide variety of other efforts by government and non-governmental organizations.

A large information gap existed within the Natural Heritage Database for mussel, gastropod, and fingernail clam species that were elevated to state endangered, threatened, or special concern status in April of 2009. Since they were not previously tracked in the database many of these species had very few or no records entered, and therefore were not being considered during environmental assessments and other resource management decision making and planning efforts. The project addressed this data gap to improve the integration of rare aquatic animal occurrence data into Great Lakes coastal management and planning.

The Natural Heritage Database is populated with occurrence data from many types of sources including field surveys by Michigan Natural Features Inventory (MNFI), academic research/literature, non-published data from researchers, state agency staff, and museum collections. MNFI maintains this database and strives to keep it as complete and up-to-date as possible. MNFI is part of a larger network of Natural Heritage Programs located throughout North America and the Caribbean. More information on Natural Heritage Methodology can be found at <http://www.natureserve.org/prodServices/heritage-methodology.jsp>. This report documents the occurrence records gathered, the resulting element occurrences that were entered, and the sources used to gather the occurrence information.

## Summary of Products

“Occurrence records”\* for mussels (Unionidae), fingernail clams (Sphaeriidae), and snails (Gastropoda) were gathered from a variety of sources, including literature, museum collections, unpublished reports, researchers, and MNFI reports. These are summarized in Table 1. A total of 1037 occurrence records were gathered and entered into the Natural Heritage Database to determine if they fell within the coastal zone. A ten mile buffer was used to define the coastal zone. Occurrences falling outside the coastal zone

were either entered under a project from a different funding source, or were set aside to be entered at a future date. Occurrence records for fingernail clams and gastropods were not available in digital form from the University of Michigan, Museum of Zoology (UMMZ) mollusk collection. MNFI staff transcribed these records manually from specimen labels at the UMMZ.

Overall, a total of 276 new element occurrences falling within the coastal zone were entered, and 96 updates to existing element occurrences were made representing 44 species. Twenty-three unionid mussel species were represented with occurrences within the coastal zone (10mi. buffer) and were entered into the Natural Heritage Database. Eight of these species were newly listed or designated a species of special concern as of April 2009. A total of 209 new “element occurrences”\* for unionid mussels falling within the coastal zone (10mi. buffer) were entered. An additional 92 updates were made to existing element occurrences. See Table 2 for a breakdown of element occurrences entered for each unionid mussel species.

Sixteen gastropod species were represented with occurrences within the coastal zone and were entered into the database. Eight of these species were newly listed or designated a species of special concern as of April 2009. Occurrences falling outside the coastal zone were either entered under a project from a different funding source, or were set aside to be entered at a future date. A total of 46 new element occurrences for gastropods falling within the coastal zone were entered. An additional four updates were made to existing element occurrences. Both aquatic and terrestrial gastropod species that utilize habitats associated with the Great Lakes coast were included. See Table 3 for a breakdown of element occurrences entered for each gastropod species.

Five fingernail clam species were represented with occurrences within the coastal zone and were entered into the database. All five of these were designated species of special concern as of April 2009. A total of 21 new element occurrences for fingernail clams falling within the coastal zone were entered. See Table 4 for a breakdown of element occurrences entered for each sphaeriid clam species.

\* “Occurrence records”, as defined in this report, are data representing one observed occurrence of a species as recorded in a museum, literature, unpublished report, etc. An “element occurrence” (EO) consists of one or more occurrence records that have been mapped and entered into the Natural Heritage Database. Element occurrences are created from a single occurrence record, or multiple

occurrence records if they are located within a certain minimum distance from each other. This separation distance is set on a species-by-species basis. For example, separation distance for unionid mussels is ten river kilometers with suitable habitat in between occurrence records, or two river kilometers when there is a barrier or poor habitat between occurrence records.

Occurrence records collected from museums, literature, and other sources generally consist of a date, location, surveyor, individuals observed, etc. Element occurrences follow a more strict definition. If an element occurrence already exists in the database within a certain separation distance of the newly collected occurrence data (e.g. 10km for unionid mussels), that occurrence data is entered into the database as an update of the existing EO. A polygon, point, or line representing the updated location is mapped in the database, and updated information (including date, surveyor, number observed, etc.) is entered for each occurrence record within the separation distance and associated with the original EO.

Table 1. Sources used to gather occurrence records for mussels (Unionidae), snails (Gastropoda), and fingernail clams (Sphaeriidae). These records were assessed in a GIS to determine whether they fell within a 10 mile buffer of the Great Lakes coast. Numbers reported are occurrence records gathered, including those falling within the coastal zone and outside of the coastal zone. Those falling outside the coastal zone were entered into the Natural Heritage Database (a.k.a Biotics GIS Database) under funding from other projects. Records that will be entered in the future under different funding sources are noted. Element occurrences consist of one or more occurrence records depending on the distance separating them.

| Source   | Mussels<br>(Unionidae) | Snails<br>(Gastropoda) | Fingernail<br>clams<br>(Sphaeriidae) | Entered | To be<br>entered |
|--|------------------------|------------------------|--------------------------------------|---------|------------------|
| Canadian Museum of Nature  | 17                     |                        |                                      | x       |                  |
| Carnegie Museum of Natural History   | 18                     | 3                      |                                      | x       |                  |
| Field Museum, Chicago  |                        | 19                     | 1                                    | x       |                  |
| Harvard Museum of Comparative Zoology  | 14                     | 2                      | 1                                    | x       |                  |
| Marine Science Institute, University of California Santa Barbara   |                        |                        | 1                                    | x       |                  |
| North Carolina State Museum of Natural Science   | 2                      |                        | 1                                    | x       |                  |
| New Brunswick Museum   | 1                      |                        |                                      | x       |                  |
| Philadelphia Academy of Natural Science  |                        | 1                      | 2                                    | x       |                  |
| Smithsonian  | 22                     |                        |                                      | x       |                  |
| University of Michigan, Museum of Zoology Mollusk Collection   | 172                    | 182                    | 65                                   | x       |                  |
| University of Michigan, Museum of Zoology Mollusk Collection   |                        | 100                    |                                      |         | x                |
| Dr. Ashley Moerke, Final report - Exploratory freshwater mussel surveys in streams of the central and western Upper Peninsula of Michigan, 2010-2011 | 2                      |                        |                                      | x       |                  |
| S.J. Nichols et al., Status of freshwater unionid populations at Sleeping Bear Dunes National Lakeshore, 2000-2003                                   | 6                      |                        |                                      | x       |                  |
| Dr. James Atkinson, MSU Invertebrate Zoology Collections, 2007   | 15                     |                        |                                      | x       |                  |
| Dave Dortman, unpublished data, 2007-2011  | 4                      |                        |                                      | x       |                  |
| Thomas Freitag, unpublished data, 1980's   | 14                     |                        |                                      | x       |                  |
| Dr. Randy Hoeh, unpublished data, 1980's   | 18                     |                        |                                      | x       |                  |
| Sarah Koppin (McRae), MS Thesis Univ. of Michigan, 2002  | 30                     |                        |                                      | x       |                  |
| MNFI reports (including previously non-listed/non-tracked species), 1999-2011  | 213                    |                        |                                      | x       |                  |
| Randal Piette, Wisconsin DNR report, Lower Menominee River Freshwater Mussel Survey, 2011  | 26                     |                        |                                      |         | x                |
| Joe Rathbun et al., unpublished data, 2007-2011  | 12                     |                        |                                      | x       |                  |
| Dr. Richard Trdan, scientific collector's permit report, 2008  | 4                      |                        |                                      | x       |                  |
| Dr. Dave Zanatta, unpublished data, 2005 and 2011  | 69                     |                        |                                      | x       |                  |
| Total  | 659                    | 307                    | 71                                   |         |                  |

Table 2. Number of new element occurrences (EOs) and updates to EOs completed for mussels (Unionidae). Species whose occurrences are newly tracked as of April 2009 are noted. (fed E = federally endangered, E = state endangered, T = state threatened, SC = species of special concern)

| Species                                     | Common name          | New EOs | EO updates | Newly tracked |
|---|----------------------|---------|------------|---------------|
| <i>Alasmidonta marginata</i> (SC)           | Elktoe               | 17      | 8          |               |
| <i>Alasmidonta viridis</i> (T)              | Slippershell         | 33      | 7          |               |
| <i>Cyclonaias tuberculata</i> (T)           | Purple wartyback     | 6       | 13         |               |
| <i>Epioblasma torulosa rangiana</i> (fed E) | Northern riffleshell | 1       | 1          |               |
| <i>Epioblasma triquetra</i> (fed E)         | Snuffbox             | 3       | 6          |               |
| <i>Lampsilis fasciola</i> (T)               | Wavyrayed lampmussel | 3       | 11         |               |
| <i>Ligumia nasuta</i> (E)                   | Eastern pondmussel   | 14      | 4          | x             |
| <i>Ligumia recta</i> (E)                    | Black sandshell      | 31      |            |               |
| <i>Obliquaria reflexa</i> (E)               | Threehorn wartyback  | 3       | 1          | x             |
| <i>Obovaria olivaria</i> (E)                | Hickorynut           | 1       | 2          |               |
| <i>Obovaria subrotunda</i> (E)              | Round hickorynut     | 5       | 10         |               |
| <i>Pleurobema sintoxia</i> (SC)             | Round pigtoe         | 16      | 6          |               |
| <i>Ptychobranhus fasciolaris</i> (SC)       | Kidney shell         | 18      | 1          | x             |
| <i>Pyganodon lacustris</i> (SC)             | Lake floater         | 2       |            | x             |
| <i>Pyganodon subgibbosa</i> (T)             | Round lake floater   |         | 1          |               |
| <i>Simpsonaias ambigua</i> (E)              | Salamander mussel    |         | 1          |               |
| <i>Toxolasma parvus</i> (E)                 | Lilliput             | 1       | 1          | x             |
| <i>Truncilla donaciformis</i> (T)           | Fawnsfoot            | 3       | 2          | x             |
| <i>Truncilla truncata</i> (SC)              | Deertoe              | 20      | 1          | x             |
| <i>Utterbackia imbecillis</i> (SC)          | Paper pondshell      | 6       |            | x             |
| <i>Venustaconcha ellipsiformis</i> (SC)     | Ellipse              | 2       |            |               |
| <i>Villosa fabalis</i> (fed E)              | Rayed bean           |         | 2          |               |
| <i>Villosa iris</i> (SC)                    | Rainbow              | 24      | 14         |               |
| Number of species = 23                      |                      | 209     | 92         | 8             |

Table 3. Number of new element occurrences (EOs) and updates to EOs completed for snails (Gastropoda). Species whose occurrences are newly tracked as of April 2009 are noted. (E = state endangered, T = state threatened, SC = species of special concern)

| Species                                 | Common name           | New EOs | EO Updates | Newly tracked |
|---|-----------------------|---------|------------|---------------|
| <i>Appalachina sayanus</i> (SC)         | Spike-lip crater      |         | 1          |               |
| <i>Carychium nannodes</i> (SC)          | File thorn            | 1       |            | x             |
| <i>Cincinnatia cincinnatiensis</i> (SC) | Campeloma spire snail | 24      |            | x             |
| <i>Fossaria galbana</i> (SC)            | Boreal fossaria       | 2       |            | x             |
| <i>Mesodon clausus</i> (SC)             | Yellow globelet       | 2       |            | x             |
| <i>Mesodon pennsylvanicus</i> (SC)      | Proud globelet        | 3       |            | x             |
| <i>Oxyloma peoriense</i> (SC)           | Depressed ambersnail  | 1       |            | x             |
| <i>Pallifera fosteri</i> (T)            | Foster mantleslug     | 1       |            | x             |
| <i>Physella magnalacustris</i> (SC)     | Great Lakes physa     | 4       |            | x             |
| <i>Planogyra asteriscus</i> (SC)        | Eastern flat-whorl    | 2       |            |               |
| <i>Planorbella smithi</i> (E)           | (no common name)      |         | 1          |               |
| <i>Pyrgulopsis letsoni</i> (SC)         | Gravel pyrg           |         | 1          |               |
| <i>Vertigo bollesiana</i> (T)           | Delicate vertigo      | 3       |            |               |
| <i>Vertigo elatior</i> (SC)             | Tapered vertigo       | 1       |            |               |
| <i>Vertigo nylanderi</i> (E)            | Deep-throat vertigo   | 1       |            |               |
| <i>Vertigo paradoxa</i> (SC)            | Mystery vertigo       | 1       | 1          |               |
| Number of species = 16                  |                       | 46      | 4          | 8             |

Table 4. Number of new element occurrences (EOs) and updates to EOs completed for fingernail clams (Sphaeriidae). Species whose occurrences are newly tracked as of April 2009 are noted. (SC = species of special concern)

| Species                        | Common Name               | New EOs | EO Updates | Newly tracked |
|--------------------------------|---------------------------|---------|------------|---------------|
| <i>Pisidium amnicum</i> (SC)   | Greater European pea clam | 3       |            | x             |
| <i>Pisidium cruciatum</i> (SC) | Ornamanted peaclam        | 3       |            | x             |
| <i>Pisidium idahoense</i> (SC) | Giant northern pea clam   | 10      |            | x             |
| <i>Pisidium simplex</i> (SC)   | (no common name)          | 3       |            | x             |
| <i>Sphaerium fabale</i> (SC)   | River fingernail clam     | 2       |            | x             |
| Number of species = 5          |                           | 21      | 0          | 5             |

## **Acknowledgments**

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