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FRESHWATER BIVALVES IN NORTH AMERICA

In addition to the following articles, see the article by Robert Forsyth and Dwayne Lepitzki about conservation assessments of molluscs in Canada in 2010 (p. 31-33), which includes both a terrestrial species and freshwater bivalves.

A new threat to conservation of North American freshwater mussels: Chinese Pond Mussel (*Sinanodonta woodiana*) in the United States

By Arthur E. Bogan, Jeanette Bowers-Altman & Morgan E. Raley

North America is home to a very diverse unionid fauna (Bogan & Roe, 2008). This fauna is being threatened by pollution and habitat modification as well as the continued introduction of freshwater bivalves including the Asian clam (*Corbicula fluminea*), zebra mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena bugensis*) (Ricciardi *et al.*, 1996, 1998). Each of these species exhibit a different threat to the health and conservation of native unionoid species: competing for space, food and/or encrusting shells of native species.

Fig. 1. The shell of one of the specimens collected from fish ponds, Hunterdon County, New Jersey. NCSM 46965-3.

The Chinese pond mussel, *Sinanodonta woodiana* (Lea, 1834), is probably the most widely introduced unionid around the world. Watters (1997), and see numerous publications by H.K. Mienis in *Ellipsaria* (1987-2010), surveyed the countries in which this invasive species had been documented as established, reporting them from 15 countries in Europe, as well as Indonesia, Costa Rica and the Dominican Republic, but reported no records from the United States. The native range of this species was considered to be eastern Russia and China.

Watters (1997) observed that 'it is likely that *A. woodiana* eventually will invade North America and other countries.' This species apparently has been introduced as a byproduct of the import of its commercially sold host fish.

Three live specimens of an anodontine bivalve subsequently identified as *Sinanodonta woodiana* were collected from the New Jersey Conservation Foundation's fish ponds, Franklin Township, Hunterdon County, New Jersey by the New Jersey Endangered and Nongame Species Program staff on 7 June 2010 (Fig. 1). These specimens were sent to the North Carolina State Museum of Natural Sciences, Raleigh, and cataloged (number NCSM 46965) into the Mollusc Collection. These specimens were identified as *Sinanodonta woodiana* based on shell characters. Identification was confirmed based on a comparison of cytochrome oxidase subunit 1 (CO1) DNA sequences (Bogan *et al.*, 2011).

New Jersey Conservation Foundation staff lowered the ponds, fish were killed with Rotenone and all fish have been removed from the ponds. Shells of the Chinese Pond Mussel have also been found in Wickecheoke Creek downstream of the ponds. This creek is a tributary of the Delaware River. The extent of the invasion is unclear at this time.

Future conservation impacts of this species on native freshwater mussels are unclear. *Sinanodonta woodiana* grows to large size and will be a competitor for food and may compete for space at least in lakes and ponds.

The molecular work presented here is a contribution from the North Carolina State Museum's Molecular Genetics Laboratory.

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Persistence of unionids in a region of significantly increased urbanization: a comparative analysis of two historic collections

By Joan P. Jass

Separated by a span of seven decades, researchers Chadwick (1905, 1906) and Mathiak (1979) reported the results of their surveys of Wisconsin freshwater mussels (Unionidae). In this region of the Midwestern United States, the unionid fauna has been known for its rich diversity, but now many of the species are classified as endangered, threatened, or species of special concern. However, a comparison of the results of these two surveys from Wisconsin's southeastern corner shows a surprising persistence of these unionids. This is especially notable because the region is the most intensively urbanized section of the state and includes the city of Milwaukee, the population of which doubled to exceed 600,000 during that time period.

Data for this comparison come from two sources: the Chadwick and Mathiak publications and the voucher specimens documenting their findings, which they both deposited in the Mollusk Collection of the Milwaukee Public Museum. Chadwick (1906) described a total of 93 collecting stations, listing those relevant under each species he recorded, and Mathiak (1979) included detailed spot maps for each species he collected throughout the state. The geographic focus for this current comparison was narrowed down to waterways in the Lake Michigan drainage of five counties in southeastern Wisconsin, enabling the total area compared to be the same (though sampling points were not identical). In this focus region, Mathiak recorded 13 unionids in 1976-7 from 24 localities along Cedar Creek and the Des Plaines, Milwaukee, Pike, and Root rivers, reporting from one to nine species at these sites.

Table 1. Comparison of Chadwick (1900s) and Mathiak (1970s) surveys of unionids in the Lake Michigan drainage of a five county area of southeastern Wisconsin. Presence indicated by 'X'.

Species	1900s	1970s
Actinonaias ligamentina mucket	X	-
Alasmidonta marginata elktoe	X	X
Alasmidonta viridis slippershell mussel*	X	-
Anodontoides ferussacianus cylindrical papershell	X	X
Elliptio dilatata spike	X	X
Fusconaia flava Wabash pigtoe	X	X
Lampsilis cardium plain pocketbook	X	X
Lampsilis siliquoidea fatmucket	X	X
Lasmigona complanata white heelsplitter	X	X
Lasmigona compressa creek heelsplitter	X	X
Lasmigona costata flutedshell	X	X
Pyganodon grandis giant floater	X	X
Strophitus undulatus creeper	X	X
Toxolasma parvus lilliput	-	X
Truncilla donaciformis fawnsfoot	X	-
Venustaconcha ellipsifomis ellipse	X	X
Villosa iris rainbow	X	-

The mussels recorded are listed alphabetically (Table 1), with nomenclature following Turgeon *et al.* (1998). With regard to the failure of Chadwick to report *Toxolasma parvus*, Mathiak (1979) hypothesized that, due to the ease of overlooking specimens because of their small size, this mussel would prove to be much more common than earlier records had indicated. Of those missing from the Mathiak listing, only *Actinonaias ligamentina* has an 'apparently secure' conservation status in the state, while *Alasmidonta viridis* is imperiled and both *Truncilla donaciformis* and *Villosa iris* (Fig. 1) are critically imperiled, as designated by NatureServe. While the apparent loss of these four species from the area is significant, the good news for conservation is that 76 % of the fauna survived the considerable changes to the environment that took place in this region during the first seven decades of the last century.

Fig. 1. *Villosa iris*, a critically imperiled Wisconsin species (Milwaukee Public Museum Mollusk 4715, collected Milwaukee River, opposite Lindwerm, Milwaukee County, Wisconsin, Chadwick Survey prior to 1905).

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