

**THE UNIONIDAE (MOLLUSCA:BIVALVIA) OF THE
WALHONDING RIVER, COSHOCTON COUNTY,
OHIO.**

By

Michael A. Hoggarth, Ph.D.
The Department of Life and Earth Sciences
Otterbein College
Westerville, Ohio 43081

For

The Ohio Department of Natural Resources
Division of Natural Areas and Preserves
1889 Fountain Square
Columbus, Ohio 43224

and

The U.S. Fish and Wildlife Service
Region 3
Federal Building, Fort Snelling
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ABSTRACT

The purpose of this study was to determine the distribution of the Unionidae, or pearly freshwater mussels, of the Walhonding River. It was known that this river had a diverse community at one time, but it was widely assumed that the fauna had been severely reduced by the construction of a flood control dam at Nellie by the Army Corps of Engineers in 1936. The river below the dam was presumably impacted by the increased siltation and substrate compaction associated with increased silt loads, while the river above the dam was supposedly impacted by the temporary closing of the dam and the flooding of river channel and adjacent upland habitats. Collections by the author in 1983 appeared to confirm this assumption. However, because the river is one of two major tributaries of the Muskingum River (the other being the Tuscarawas River), and because both tributaries, and the main stem of the Muskingum River, once supported diverse unionid faunas, it was determined that a thorough study of the unionid fauna of the river should be done. The present study was begun in 1991 when the state was experiencing a mild drought. It was continued through the summers of 1992 and 1993 as it was discovered that a diverse fauna remained. During the three years of the study, 8424 specimens representing 34 species or subspecies were collected. Included in this total are three species listed as endangered by the U.S. Fish and Wildlife Service and the Ohio Department of Natural Resources, Division of Wildlife (*Pleurobema clava*, *Cyprogenia stegaria*, and *Epioblasma obliquata obliquata*), five additional species listed as endangered in Ohio (*Quadrula cylindrica cylindrica*, *Fusconaia maculata maculata*, *Plethobasus cyphus*, *Villosa fabalis* (a Category 2 species being considered for federal listing as endangered), and *Lampsilis ovata*), two species listed as threatened in the state (*Ligumia recta* and *Epioblasma triquetra*), and three species of special interest in Ohio (*Cyclonaias tuberculata*, *Pleurobema sintoxia*, and *Lampsilis fasciola*). This represents the first time the federally endangered catspaw mussel (*E. o. obliquata*) has been collected in Ohio except as relic shells in Marietta over 150 years ago. The total number of rare species, along with the large number of other species, and the densities of the mussels in this river place it among the richest streams in Ohio.

INTRODUCTION

The Walhonding River is among the shortest rivers in the state. It begins in western Coshocton County at the confluence of the Mohican and Kokosing rivers and then flows to the west for a distance of 23.3 miles before joining the Tuscarawas River to form the Muskingum River in the city of Coshocton. Over that distance the river changes very little. It remains about the same width throughout its length and has a diversity of habitats from headwaters to mouth.

Although no published report on the unionid fauna of the Walhonding River has been done, museum records indicate that it had almost as diverse a fauna as did the Tuscarawas River. The unionid fauna of the Tuscarawas was extensively studied by Sterki earlier this century

and in the late 19th century (Sterki, 1894, 1900, 1907). From Sterki's records (reviewed by Stansbery et al., 1985) we know that the Tuscarawas River had a rich fauna second only to that of the Muskingum and Scioto rivers. It is unfortunate that the river has suffered so much degradation that only a remnant of that fauna remains. The Tuscarawas has been severely degraded by industrial development and acid mine runoff within the watershed. This is particularly apparent at the mouth of the river where it joins the Walhonding in the city of Coshocton. The water of the Walhonding is clear and relatively cool where it meets the brown warm water of the Tuscarawas. It is not that the Tuscarawas has a heavier silt load, but that the water is stained brown by industrial effluent entering the river. This brown stain not only discolors the water, but it has stained the substrate including the few mussels that occur in this substrate.

The Walhonding River has not suffered this same level of development or degradation. Still some development has occurred within the watershed and this development has had an effect on the biotic community of the river. The first six and a half miles of the river are behind Mohawk Dam, a mostly open flood control dam. Upstream of Mohawk Dam, the flood plain is in agricultural production, or in woods. State Route 715 crosses the stream at three locations but the most significant degradation occurs at the dam itself. Below the dam, the stream flows through mostly agricultural areas or through woodland habitats. Gravel mining occurs along the river at river miles 10.4, 5.0, and 2.9 and the only significant residential development adjacent to the river occurs at the towns of Nellie at river mile 15.5, and at Warsaw at river mile 10.0. Sixmile Dam impounds the river at river mile 8.8 but the effects of this low head dam on the unionid community are ameliorated within a half of a mile upstream. Below Mohawk Dam, U.S. Route 36 crosses the river three times and State Route 77 crosses the river once. Two county routes complete the road crossings for the river.

MATERIALS AND METHODS

Unionid mollusks were collected by hand from 18 June 1991 to 25 August 1993. Three prior collections, two on 15 July 1983, and the other on 19 September 1989 were included in this study. Appendix 1 lists all of the site specific collection records for the study.

An attempt was made to locate all concentrations of unionid mollusks throughout the length of the river. This was done by sight collecting along the shore combined with searches for living mussels by sight and by hand. A canoe was used to increase accessibility to the river. Throughout the three years of the study the entire length of the river was canoed at least once, and some reaches were canoed repeatedly. All living mussels, freshly dead shells, and old dead shells were collected. After being collected, the mollusks were identified, counted, and either returned (living mussels) or retained as vouchers (freshly dead shells and selected old dead shells). Specimens returned to the river were placed back into the river with the posterior margin up and the anterior margin in the substrate. The location of each mussel bed was indicated on an appropriate 7.5 minute topographic map and the location of each collection site was set by triangulation with nearby towns. Mussel beds were identified as

large assemblages of mixed species of mussels located in clearly delineated reaches of the river. Figure 1 demonstrates the location of the two dams on the river, bridge crossings, and the location of each mussel bed.

RESULTS

Table 1 lists the composition of the unionid community of the Walhonding River. Since so many living mussels occur in the river, it became apparent, that most of the effort used in this study should be directed toward locating living mussels since this would be of greater information value than the same type of data relative to dead shells. Hence, the collection of living mussels became the priority of the study and a large number of living mussels (7997) compared to dead and old dead shells (427) were taken. All freshly dead specimens found were collected and retained as vouchers, but only uncommon and rare old dead shells were retained on a regular basis. It should be noted that old dead shells of some otherwise more common species were taken if that species happened to be uncommon at the particular collection site (see Appendix 1).

The abundance data for the Unionidae of the Walhonding River demonstrates that the fauna is dominated by two species (*Actinonaias ligamentina carinata* and *Amblema plicata plicata*). These species are not among the most common members of the unionid fauna of the state, but can be abundant in fairly high quality streams throughout their range. The third most abundant species (*Lasmigona complanata complanata*) is quite adaptable, and can be found in fairly degraded water to fairly high quality water in larger stream. It is the only mussel the author found living in the Muskingum River at the mouth of the Tuscarawas River in the brown stained water. Other species that comprised one percent of this fauna or greater were *Lampsilis radiata luteola* (6.44%), *Lasmigona costata* (6.26%), *Lampsilis ventricosa* (2.25%), *Strophitus undulatus undulatus* (2.05%), *Tritogonia verrucosa* (1.81%), *Cyclonaias tuberculata* (1.54%), *Anodonta grandis grandis* (1.36%), and *Quadrula pustulosa pustulosa* (1.13%). This group of species consists of some of the most common and tolerant species of Unionidae that occur in the state as well as some of the most sensitive and uncommon species. This relationship is characteristic of good water quality and a diversity of habitats.

Another important indicator of habitat quality and water resource integrity, is the occurrence of rare and endangered species. The Walhonding River supports many such species of Unionidae. Three species listed as endangered by the U.S. Fish and Wildlife Service and the Ohio Department of Natural Resources, Division of Wildlife (*Pleurobema clava*, *Cyprogenia stegaria*, and *Epioblasma obliquata obliquata*) were located in this river. Five additional species listed as endangered in Ohio (*Quadrula cylindrica cylindrica*, *Fusconaia maculata maculata*, *Plethobasus cyphyus*, *Villosa fabalis* (a Category 2 species being considered for federal listing as endangered), and *Lampsilis ovata*), two species listed as threatened in the state (*Ligumia recta* and *Epioblasma triquetra*), and three species of special interest in Ohio (*Cyclonaias tuberculata*, *Pleurobema sintoxia*, and *Lampsilis fasciola*) also occur in this river. Rare species comprised 38% of the species that were found to occur in the river and

represented 2.99% of the living unionids located during this study.

Many species were distributed throughout the length of the river (Table 2). Some of these species were found in impressive numbers, mostly in the mussel beds identified in Figure 1 (*L. costata*, *A. p. plicata*, *C. tuberculata*, *A. l. carinata*, *L. ventricosa*, and *L. fasciola*). Other species were common but not usually found in mussel beds (*A. g. grandis*, *S. u. undulatus*, *L. c. complanata*, *T. verrucosa*, and *L. r. luteola*). These species were generally more abundant along the margin of the river is slowly moving to slack water. Still other species were fairly uncommon but widely distributed (*Anodonta imbecillis*, *Lasmigona compressa*, *Quadrula quadrula*, *P. cyphus*, *Elliptio dilatata*, *Ptychobranhus fasciolaris*, and *Obovaria subrotunda*) while some species were more common in the upper reaches (*Q. c. cylindrica*, *F. m. maculata*, *Fusconaia flava*, *P. clava*, and *Villosa iris iris*) and others more common in the lower reaches (*Alasmidonta marginata*, *Quadrula pustulosa pustulosa*, *Leptodea fragilis*, *Potamihus alatus*, *L. recta*, *V. fabalis*, *L. ovata*, *E. triquetra*, and *E. o. obliquata*). The federally listed endangered fanshell, *C. stegaria*, was once fairly abundant in the lower reaches of the Walhonding River but only old dead shells of this species were found during this study indicating that the species is probably extirpated from the river.

Following are species accounts for all of the species of Unionidae that have been reported for the Walhonding River. All but *Quadrula metanevra*, *Pleurobema rubrum*, *Ligumia nasuta*, and *Epioblasma rangiana*, were found during the present study. These species have been recorded for the Walhonding River but they have not been found in the river in many years. Extant populations of all of the remaining species listed below, except *C. stegaria*, were located. This list includes many species never before recorded for the Walhonding River (according to Stansbery et al., 1985) including the first time the catspaw (*E. o. obliquata*) has been taken from Ohio except as relic shells over 150 years ago.

SPECIES ACCOUNTS

The purpose of this section is to describe the current distribution and abundance of each species in the Walhonding River at present and to compare that distribution and abundance to the historic values as described in the literature. To that latter end, Stansbery et al. (1985) has been an invaluable source. The scientific nomenclature and phylogenetic arrangement of taxa also follow Stansbery et al. (1985) while common names are from Turgeon et al. (1988).

Anodonta imbecillis Say, 1829 (paper pondshell) was sporadically encountered in the present study. It was located along the margin of the river away from the main current in a muck to silt substrate. It was generally found with *A. g. grandis* and *L. r. luteola*. Only four specimens of the paper pondshell were found during this study and the species only comprised 0.05% of the total number of unionid mollusks found. Within the Muskingum River system, literature records for this species indicate its occurrence only in the Muskingum and Tuscarawas rivers.

Anodonta grandis grandis Say, 1829 (giant floater) is one of the most widespread and abundant species in Ohio. Stansbery et al. (1985) state that museum records and literature accounts place this species throughout the Muskingum River system. The species occurred throughout most of the Walhonding River with a slightly larger population above Mohawk Dam (sites 1-7) than below the dam. The species comprised 1.45% of the unionids collected during this study with 109 living specimens found.

Strophitus undulatus undulatus (Say, 1817) (squafoot) was the sixth most abundant unionid mollusk found during this study. It comprised 2.42% of all the mollusks found with 164 living and 36 freshly dead specimens collected. It was found at most of the collection sites with no clear center of abundance (either above or below Mohawk Dam). Literature accounts and museum records place this species throughout the Muskingum River system.

Alasmidonta marginata Say, 1818 (elktoe) is distributed throughout the Muskingum River system (museum records) although the scarcity of literature records for this species in the watershed would tend to suggest that it is rare. Within the Walhonding River, the elktoe is found only in the lowermost 13 river miles and is common only at a riffle at river mile 7.3. This species was found completely buried in firm sand, gravel, and cobble substrate within a well developed riffle that extended the entire length of the river. Only 60 specimens were found during the current study and the species comprised only 0.71% of the fauna collected during this study.

Lasmigona complanata complanata (Barnes, 1823) (white heelsplitter) was one of the most abundant species encountered during the present study and was particularly abundant at two sites (river mile 7.3 in a slack water area behind a sand-gravel bar adjacent to the riffle located at the site, and river mile 22.2 where it was widely distributed but was most common along the depositional bank away from the main current). Stansbery et al. (1985) state that this species is widespread in the system. It is tolerant of silt and is becoming more widespread and more abundant in the state. In the current study it comprised 12.77% of the unionid fauna with 1056 living specimens collected. The species was collected alive at every station on the river.

Lasmigona costata (Rafinesque, 1820) (fluted-shell) was as widely distributed as the white heelsplitter but it was not as abundant. This species was generally encountered in swift current, in shallow (3 inches) to much deeper (3 feet) water. It was usually found almost entirely buried except that the posterior margin of the shell of older individuals was elevated an inch or more above the level of the substrate. Young individuals (less than 5 years of age) were generally completely buried. This species comprised 6.22% of the unionid fauna of the river with 501 living specimens collected. The species was most abundant at river mile 22.2 where it outnumbered the white heelsplitter in population density. Stansbery et al. (1985) found this to be a widespread species within the Muskingum River system.

Lasmigona compressa (Lea, 1829) (creek heelsplitter) is not a common species in the Muskingum River system (Stansbery et al., 1985) but it is relatively widespread. A few widely distributed specimens were found throughout the length of the Walhonding River with the most living individual encountered along the margin of the river at river mile 22.2. This species comprised 0.18% of the unionid fauna of the river and only 10 living specimens were found.

Tritogonia verrucosa (Rafinesque, 1820) (pistolgrip) was widely distributed but not very common in the Walhonding River. It was collected at every site except near the mouth of the river and was most abundant at river mile 4.8 where it was taken from run habitats, partially buried in gravel and sand, and from slack water habitats in silt and sand. This species comprised 1.86% of the unionid fauna of the river with 145 living specimens collected. Stansbery et al. (1985) found this to be a widely distributed species within the Muskingum River system but not a common species.

Quadrula quadrula (Rafinesque, 1820) (mapleleaf) is common throughout the length of the Muskingum River and the lower reaches of its larger tributaries, but it has not been recorded from the Walhonding River (Stansbery et al., 1985). During the present study 14 living specimens of the mapleleaf were collected. This species comprised 0.19% of the unionid fauna of the river and was most abundant at river mile 4.8. It was only encountered at four sites, one from above Mohawk Dam and others near the mouth of the river.

Quadrula cylindrica cylindrica (Say, 1817) (rabbitsfoot) is a state endangered species. Museum records indicate that it was once widely distributed in the Walhonding and Mohican rivers and although most Muskingum River records are for old dead shells, Bates (1970) and Stansbery and King (1983) record this species for the upper reaches of that river. In the present study the rabbitsfoot comprised 0.42% of the total unionid fauna collected and 0.25% of the living mussels found. It was most abundant upstream of Mohawk Dam with 12 living specimens found at river mile 22.2. Most of the specimens encountered were older individuals but two juvenile specimens were collected, one at river mile 22.2 and another at river mile 15.4 below the dam.

Quadrula metanevra (Rafinesque, 1820) (monkeyface) is a state endangered species. It was not taken during the present study but was reported from the Walhonding River by Lea (1862). Stansbery et al. (1985) stated that this record is of historic importance and that this species is restricted to the lower reaches of the main stem of the Muskingum River in Ohio.

Quadrula pustulosa pustulosa (Lea, 1831) (pimpleback) occurred throughout the Muskingum River and the lower reaches of its larger tributaries (Stansbery et al., 1985). In the present study this species was fairly common within the lower 7.5 miles of the river and was abundant at river mile 4.8 where it was found in swift current completely buried in sand, gravel, and cobble substrate. This species comprised 1.33% of the total unionid fauna of the river and 1.13% of the living mussels found with 90 living specimens collected.

Amblema plicata plicata (Say, 1817) (three-ridge) was the second most abundant mussel found during the present study (22.92% of the total fauna) with 1909 living specimens collected. Although common at every station except near the mouth of the river, this species was abundant upstream of Mohawk Dam in swift water in a cobble, gravel, and sand substrate to slack water in a silt and gravel substrate. Stansbery et al. (1985) state that this is a common and widespread species in the watershed.

Fusconaia maculata maculata (Rafinesque, 1820) (long-solid) is an endangered species in Ohio. Stansbery et al. (1985) state that the present range of this species in Ohio may be limited to the lower reaches of the Muskingum River although there are records for the species in the larger tributaries of that river. During the present study, the long-solid was taken alive at two sites and as old dead shells at seven other sites. Although rare within the river, it was frequently found in the fast riffle and run habitats at river mile 22.2. This species comprised 0.27% of the unionid fauna of the river but only 0.09% of the living mussels collected.

Fusconaia flava (Rafinesque, 1820) (Wabash pigtoe) occurs from the lower reaches of the Muskingum River to the smaller tributaries within this watershed (Stansbery et al., 1985). In the present study the Wabash pigtoe was collected sporadically both upstream and downstream of Mohawk Dam but was only common in the sand and gravel substrate of the run habitats at river mile 22.2. This species comprised 0.58% of the total fauna of the river with 37 living specimens collected.

Cyclonaias tuberculata (Rafinesque, 1820) (purple wartyback) was widely distributed in the Walhonding River and was fairly common at four sites on the river (river miles 22.2, 13.7, 7.5, and 4.8). This species comprised 1.57% of the total fauna of the river and 1.54% of the living mussels taken with 123 specimens collected. Stansbery et al. (1985) stated that the species occurred in the Walhonding River and that literature and museum records indicate that it is widely distributed in the system. This species is a state significant species and is listed as Special Interest in Ohio.

Plethobasus cyphus (Rafinesque, 1820) (sheepnose) is a state endangered species. Literature records indicate that this species was present in the Tuscarawas River until the early 1900's (Sterki, 1907) and still exists in the lower Muskingum River (Stansbery and King 1983). Stansbery et al. (1985) state that, "...this species made up part of the high unionid diversity in the Mohican and Walhonding Rivers before the closing of Mohawk Dam during a period of high flow. It has not been seen living there since that time." During the present study, five living specimens were collected including one two year old specimen collected from a riffle habitat near White-Woman Rock, upstream of the C.R. 23 bridge. This species comprised 0.14% of the total unionid fauna and only 0.09% of the living mussels collected.

Pleurobema clava (Lamarck, 1819) (clubshell) is listed as endangered in Ohio and by the U.S. Fish and Wildlife Service. Stansbery et al. (1985) state that museum records show that this species has recently lived in the Walhonding and Mohican rivers, but that no living or freshly dead specimens have been taken in the past decade from anywhere in the Muskingum River system. During the present study, one freshly dead specimen was collected from shallow water at river mile 22.2. This site is within the potential reservoir of Mohawk Dam. The specimen had just recently died as the adductor muscles were still attached to the shell. This species was once common in the Walhonding River as the 14 old dead shells suggest, but it is very rare today.

Pleurobema sintoxia (Rafinesque, 1820) (round pigtoe) is a widespread but uncommon species in the Muskingum River system (Stansbery et al., 1985). Only one living specimen of this state significant species (Special Interest in Ohio) was collected, and only 4 other shells were taken from the entire river.

Pleurobema rubrum (Rafinesque, 1820) (pyramid pigtoe) once occurred in the Ohio River and many of its larger tributaries in Ohio including the Muskingum, Scioto, Tuscarawas, Mohican and Walhonding rivers. It has not been taken in any of these recently except in the lower Muskingum River (Stansbery et al., 1982). It is listed as endangered in Ohio.

Elliptio dilatata (Rafinesque, 1820) (spike) is a widespread but uncommon species in the Muskingum River system (Stansbery et al., 1985). This species comprised 0.44% of the unionid fauna of the river but only 0.20% of the living specimens collected. It was fairly widely distributed in the river and was most abundant at river mile 22.2.

Ptychobranhus fasciolaris (Rafinesque, 1820) (kidneyshell) is a widespread but uncommon species in the Muskingum River system (Stansbery et al., 1985). It was fairly widely distributed in the walhonding River but it was not common at any one site. The kidneyshell comprised 0.29% of the total unionid fauna of the river and only 0.13% of the living mussels collected.

Cyprogenia stegaria (Rafinesque, 1820) (fanshell) is an Ohio and Federal Endangered species. It was once fairly abundant in the Walhonding River at Camp Tonowanda (Site 10, river mile 13.7) but it has not been collected there since Mohawk Dam was constructed (Stansbery et al., 1985). During the present study only old dead shells of this species were found. All of these shells were found from Camp Tonowanda downstream. This species has apparently been extirpated from the Walhonding River but still persists in the lower Muskingum River in Ohio.

Actinonaias ligamentina carinata (Barnes, 1823) (mucket) has replaced its sister species *A. l. ligamentina* over the last 100-150 years. Both subspecies were present in the Muskingum River system during the early 1800's but today only *A. l. carinata* persists in this drainage basin. This subspecies is widely distributed in the Muskingum River system (Stansbery et al.,

1985) and is widely distributed and abundant in the Walhonding River. It comprised the largest percentage of the unionid mollusks collected during the present study (38.22%) with 3187 living specimens found. This subspecies was common at many sites on the river, but was very abundant at river mile 22.2, at river mile 13.7, and at river mile 4.8. At each location this mussel was found in fairly swift current in a substrate of cobble, gravel, and sand.

Obovaria subrotunda (Rafinesque, 1820) (round hickorynut) was found sporadically from river mile 22.2 to river mile 0.0. It was never common, with one living specimen located at each of five sites, and two living specimens located at one site. This species comprised 0.24% of the total unionid fauna collected from the river. Stansbery et al. (1985) reported this species from the Muskingum River main stem, and Sterki (1894) found this to be a common species in the Tuscarawas River.

Leptodea fragilis (Rafinesque, 1820) (fragile papershell) is common in the main stem of the Muskingum River (Stansbery et al., 1985) but it had not been reported for any tributary of that river. This species comprised 0.43% of the unionid fauna found during this study with a total of 17 specimens taken between river mile 7.5 and 6.8. This species was only found in the lower 7.5 miles of the Walhonding River.

Potamilus alatus (Say, 1817) (pink heelsplitter) is another common main stem Muskingum River species that also has been found in some lower Muskingum River tributaries (Stansbery et al., 1985). It apparently has not been recorded for the Tuscarawas River (Sterki, 1907; Ortmann, 1924) and has just recently moved into the Walhonding River. During the present study two living individuals were located at river mile 4.8. No other specimens of this species were taken. The species comprised only 0.02% of the total unionid fauna collected during this study.

Ligumia recta (Lamarck, 1819) (black sandshell) is an uncommon species in the Muskingum River (Stansbery et al., 1985) but was fairly common in the Walhonding River. This species is listed as threatened by the state of Ohio. It comprised 0.39% of the total fauna collected during this study with 25 living specimens taken. It was found alive from the headwaters of the river to its mouth, but the largest number of individuals were taken near the C.R. 23 bridge at river mile 4.8. This species was commonly taken in six inch to one foot of water, near the bank, in slack or slowly moving water. It was usually found slightly buried in the substrate with a large area of the posterior margin exposed. Both adult and juvenile specimens were taken. The younger specimens were generally more deeply buried in the substrate.

Ligumia nasuta (Say, 1817) (eastern pondmussel) occurs in Lake Erie, the upper Cuyahoga River, and in Muzzy Lake of the Cuyahoga River drainage. It was once found in the Portage River but no recent records confirm its continued existence in that river. Sullivant (1838) recorded this species from the Walhonding River and Eggleston found it in the Muskingum

River in 1929 (Stansbery et al., 1982). This state endangered species has not been found in the Muskingum River system since.

Villosa fabalis (Lea, 1831) (rayed bean) is listed as endangered in Ohio and as a category 2 species by the U.S. Fish and Wildlife Service. This species was taken alive at only one site, at river mile 6.8 near a muskrat burrow. The freshly dead specimen collected at this same site had been eaten by the muskrat and the shell was discarded with other species near the mouth of this burrow. This species was reported for the Muskingum River system by Sterki (1894, 1900) and Ortmann (1919) but has not been recorded from the system since. This species is rare in the Walhonding River and only comprised 0.07% of the total fauna collected.

Villosa iris iris (Lea, 1829) (rainbow) has been taken from Muskingum River tributaries but not the Muskingum River itself (Stansbery et al., 1985). It has a fairly wide distribution in the Walhonding River but was only common in the shallow, slow water adjacent to the run habitats at river mile 22.2. This species comprised 0.41% of the unionids collected and was found alive at four sites.

Lampsilis radiata luteola (Lamarck, 1819) (fatmucket) is one of the most common species of unionid mollusks in Ohio. It inhabits slow run to pool habitats and is often found along the margins of streams. This species comprised 6.36% of the total fauna collected with 515 live specimens found. This is a widespread species within the Muskingum River system (Stansbery et al. 1985).

Lampsilis ventricosa (Barnes, 1823) (plain pocketbook) was as widely distributed in the Walhonding River as the last species but it was not as common. This species comprised 2.30% of the unionids collected but it was not abundant except at river mile 22.2 and at river mile 4.8. This species was found in fairly swift to moderately flowing water in a substrate of gravel and sand. Specimens were often buried except for the posterior end of the shell. This species is widespread within the Muskingum River system (Stansbery et al. 1985).

Lampsilis ovata (Say, 1817) (pocketbook) is a state endangered species. It has been reported from the Muskingum River (Stansbery and King, 1983) and from the Walhonding and Mohican rivers (Putnam, 1971). It is still extant in the Walhonding River but it is not a common member of the fauna. It was taken alive at six sites on the river although the most taken at any one site was two individuals. The species comprised 0.13% of the fauna and only 8 living specimens were collected.

Lampsilis fasciola Rafinesque, 1820 (wavy-rayed lampmussel) is a special interest species in the state of Ohio. This species is widespread in the Muskingum River system but it is not common in the system (Stansbery et al., 1985). Forty two living specimens were collected during this study and the species comprised 0.59% of the unionid fauna. It was usually taken in very swift current, completely buried in the cobble and gravel substrate.

Epioblasma triquetra (Rafinesque, 1820) (snuffbox) is a threatened species in Ohio. It is never a common member of the fauna and is quite often only found as single individuals. In the present study living snuffbox were collected at two sites, both in the lower reaches of the river. Two living specimens were taken at river mile 4.8 near the C.R. 23 bridge, and six living specimens were taken at river mile 6.8 near the mouth of Killbuck Creek. This species has been reported from the Tuscarawas and Muskingum rivers (Stansbery et al., 1985) although it is questionable whether it still exists in the Tuscarawas River given the age of the records (1890's and early 1900's) and the condition of the river.

Epioblasma rangiana (Lea, 1839) (northern riffleshell) is listed as endangered by the U.S. Fish and Wildlife Service and by the Ohio Department of Natural Resources, Division of Wildlife. Stansbery et al. (1982) stated that this species has been found as subfossil shells in the Walhonding River. Today this species is apparently restricted to Big Darby Creek and Fish Creek in Ohio (U.S. Fish and Wildlife Service, 1993).

Epioblasma obliquata obliquata (Rafinesque, 1820) (catspaw) is a federally listed endangered species that has never before been reported for Ohio. It may have lived in the Muskingum River well over 150 years ago but it is not clear whether relic shells collected in Marietta came from the Ohio River or from the Muskingum River. The single freshly dead specimens collected during this study is the only confirmed record for the state. It was collected from a sand bar adjacent to a riffle at river mile 6.8, downstream of the mouth of Killbuck Creek. No other specimens (old dead, fresh, or living) were collected but abundant suitable habitat is present at this site, and downstream to support this species. The only other populations of this species occurs in two isolated sites on the Green River in Kentucky and the Cumberland River in Tennessee (Stansbery et al., 1982).

DISCUSSION

Recent studies of the Unionidae of complete river systems in Ohio have demonstrated that these rivers support a strikingly different fauna today than in the past (Hoggarth, 1990a, 1990b, 1991, 1992; Watters, 1992). Generally, these studies have shown that the fauna is much less diverse today than in the past, that the more tolerant members of the community have become dominant in the system, and that more tolerant species have invaded areas where they had not been recorded previously. This has not been the case with Ohio's less disturbed watersheds (Hoggarth, 1986; Watters, 1988, 1990). The Walhonding River appears to be among the latter group of streams.

The fauna of the Walhonding River today is similar to its historic assemblage of species. Thirty eight species have been reported from the Walhonding River (these collections, museum records, and literature records). Of this total fauna, 33 species still maintain extant populations in the river. Not only are many of its original species still part of its current fauna, but the Walhonding River supports a large number of rare and endangered species. Both of these aspects of the rivers unionid fauna suggest that this river is among the most

diverse and stable in the state.

Two sites on the river are particularly diverse. The river above the State Route 715 bridge immediately downstream of the confluence of the Kokosing and Mohican rivers, supports a large number of species and an impressive number of individuals. A well defined bed is located at this site. It begins at the head of a fast riffle that stretches across the entire length of the river and extends upstream for approximately one tenth of a mile. It is located along the southern boarder of the stream and extends approximately one half the width of the river throughout much of its length. A total of 24 species, all of them extant, were collected from this bed. This list includes four state endangered species, one of which is also listed as endangered by the U.S. Fish and Wildlife Service.

The other diverse site is located downstream of the mouth of Killbuck Creek. This bed consists of a total of 25 species, all but three extant, including four state endangered species, one of which is listed as endangered by the U.S. Fish and Wildlife Service, and another that is currently being considered for listing (Category 2). This bed is located on and adjacent to an extensive riffle that extends across the river. Many of the living mussels were taken from a run along the northern boarder of the riffle. Other specimens were taken from the riffle and from the extensive run habitats upstream of this riffle.

Other beds, located throughout the length of the river, were less diverse but were often quite densely populated by mussels. Many of these beds were dominated by *A. l. carinata* and *A. p. plicata*, but were also found to contain rare and endangered species. Only very short reaches of the river were devoid of unionid mollusks. The longest reach, containing only silt tolerant species or no species, was the reach from Mohawk Dam to approximately one half mile downstream of the State Route 715 bridge (the first bridge upstream of the dam). The impoundment behind Sixmile Dam also was devoid of unionid mollusks. The unionid fauna recovers rapidly upstream of the head of that impoundment.

Given the large number of unionid species in this river, the number of rare and endangered species, the wide ranging distribution of many of these species, and the small number of threats to this riverine environment, this river and its fauna may provide many opportunities for studying the biology of the Unionidae. This author would encourage research activity in this watershed.

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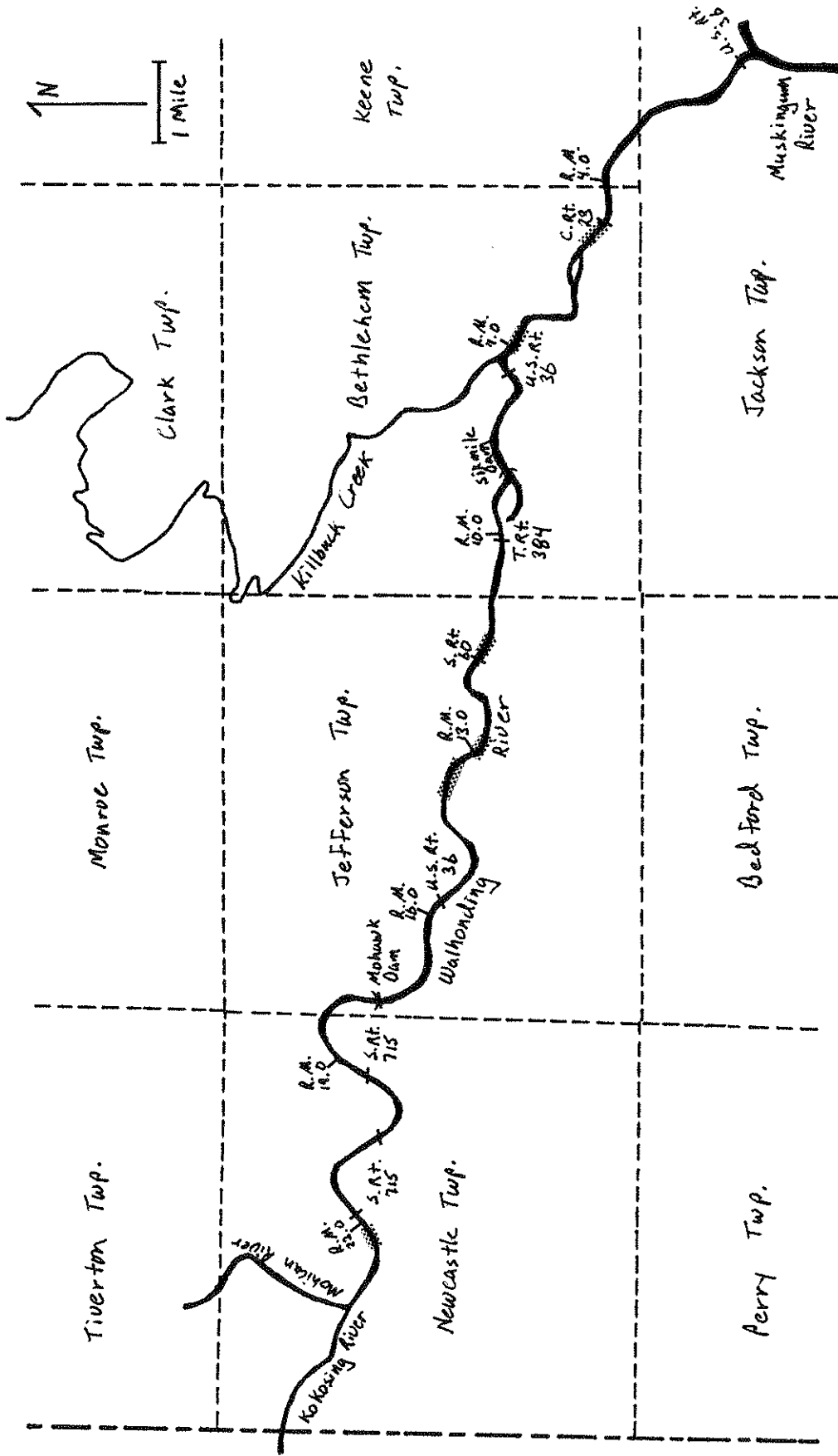


Figure 1. Map of the Wauhatchie River in Coshocton County, Ohio showing its major tributary streams. Bridge sites are identified as solid cross bars, River Mile markers as hatch marks, and mussel beds by stippling. The Wauhatchie and Tuscarawas rivers join in the city of Coshocton to form the Muskingum River.

Table 1. Unionidae collected from the Walthonding River 1991-1993. Live = collected alive during this study. Dead = collected as freshly dead shells (dead approximately one year or less). Historic = collected as weathered or subfossil shells (dead longer than five years).

Species	Live	Dead	Historic	Total
<i>A. imbecillis</i>	3 0.04%	1	0	4 0.05%
<i>A. g. grandis</i>	109 1.36%	9	4	122 1.45%
<i>S. u. undulatus</i>	164 2.05%	36	4	204 2.42%
<i>A. marginata</i>	47 0.59%	5	8	60 0.71%
<i>L. c. complanata</i>	1056 13.21%	18	2	1076 12.77%
<i>L. costata</i>	501 6.26%	9	14	524 6.22%
<i>L. compressa</i>	10 0.13%	2	3	15 0.18%
<i>T. verrucosa</i>	145 1.81%	2	10	157 1.86%
<i>Q. quadrula</i>	14 0.18%	0	2	16 0.19%
<i>Q. c. cylindrica</i>	20 0.25%	0	15	35 0.42%
<i>Q. p. pustulosa</i>	90 1.13%	5	17	112 1.33%
<i>A. p. plicata</i>	1909 23.87%	16	6	1931 22.92%
<i>F. m. maculata</i>	7 0.09%	0	16	23 0.27%
<i>F. flava</i>	37 0.46%	9	3	49 0.58%
<i>C. tuberculata</i>	123 1.54%	4	5	132 1.57%
<i>P. cyphus</i>	5 0.06%	0	7	12 0.14%
<i>P. clava</i>	0 0.00%	1	14	15 0.18%
<i>P. sintoxia</i>	1 0.01%	0	4	5 0.06%
<i>E. dilatata</i>	16 0.20%	1	20	37 0.44%
<i>P. fasciolaris</i>	10 0.13%	3	11	24 0.29%
<i>C. stegaria</i>	0 0.00%	0	13	13 0.15%
<i>A. l. carinata</i>	3187 39.85%	27	6	3220 38.22%
<i>O. subrotunda</i>	7 0.09%	1	12	20 0.24%
<i>L. fragilis</i>	25 0.31%	9	2	36 0.43%
<i>P. alatus</i>	2 0.03%	0	0	2 0.02%
<i>L. recta</i>	24 0.30%	1	8	33 0.39%
<i>V. fabalis</i>	1 0.01%	1	4	6 0.07%
<i>V. i. iris</i>	31 0.39%	2	2	35 0.41%
<i>L. r. luteola</i>	515 6.44%	20	1	536 6.36%
<i>L. ventricosa</i>	180 2.25%	8	6	194 2.30%
<i>L. ovata</i>	8 0.10%	0	3	11 0.13%
<i>L. fasciola</i>	42 0.53%	1	7	50 0.59%
<i>E. triquetra</i>	8 0.10%	1	5	14 0.17%
<i>E. o. obliquata</i>	0 0.00%	1	0	1 0.01%
Totals	7997	193	234	8424

Table 2. Distribution of the Unionidae of the Walhonding River, 1991-1993.

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>A. imbecillis</i>		1		2												1			
<i>A. g. grandis</i>	2	16	2	2	6	12	5	2		3	5	5	1		2	7	7		X
<i>S. u. undulatus</i>	5	20	3	32	11	5	8	9	5	20	36	13	7			13	3	X	
<i>A. marginata</i>										X	2		1		3	34	6	7	1
<i>L. c. complanata</i>	36	181	27	87	81	36	15	29	22	67	52	27	15	8	28	77	216	30	28
<i>L. costata</i>	19	216	8	18	16	14	1	7	10	47	37	28	28	3	8	8	35	4	3
<i>L. compressa</i>	1	5	1	2											1	1		1	
<i>T. verrucosa</i>	3	19	17	3	1	2	1	6	3	12	1	9	6	1	14	10	34	3	
<i>Q. quadrula</i>		3													1		10		1
<i>Q. c. cylindrica</i>	2	12	2	2		1	X		2	3		1	X			X			
<i>Q. p. pustulosa</i>		2								4			X		10	10	51	18	5
<i>A. p. plicata</i>	101	674	101	104	212	61	75	46	62	128	105	47	56	9	12	5	117	5	
<i>F. m. maculata</i>	X	6	X				X			X		X	X			1		X	
<i>F. flava</i>	1	24	2	3	5		3		1	2			1			4			
<i>C. tuberculata</i>	1	18		1	5		1	2	1	35	1	5	X		13	1	41	2	
<i>P. cyphus</i>		1		X	1		1			X	1				1				
<i>P. clava</i>		1		X			X			X	X								
<i>P. sintoxia</i>				X			X												1
<i>E. dilatata</i>	1	8		X			1			1	1	1	1			1	2		
<i>P. fasciolaris</i>		1				X	X	1		5	X	1	1		1	X	3	X	X
<i>C. stegaria</i>										X	X		X		X	X	X	X	X
<i>A. l. carinata</i>	104	676	103	105	270	100	106	83	134	549	102	162	106	9	10	19	470	56	57
<i>O. subrotunda</i>		1	X	X	1		1			X	1		X					2	1
<i>L. fragilis</i>															2	17	6	4	5
<i>P. alatus</i>																		2	
<i>L. recta</i>	1			X	2		X			2	X		X	1		2	14	2	1
<i>V. fabalis</i>							X									2	X		X
<i>V. i. iris</i>		23	X	X	1		1					X	2						
<i>L. r. luteola</i>	34	136	36	56	40	17	25	10	10	16	5	18	19	2	2	17	74	11	7
<i>L. ventricosa</i>	3	39	3	8	5	3	2	6	2	4	7	4	3	3	7	19	55	14	7
<i>L. ovata</i>										1	2			1	1	1	2	X	X
<i>L. fasciola</i>		12			4		2	2		5	3	9	2		2	1	1	X	
<i>E. triquetra</i>											X	X				6	2	X	X
<i>E. o. obliquata</i>																1			
1 = R.M. 23.3-21.9	6 = R.M. 19.3-17.4				11 = R.M. 13.0-12.9				16 = R.M. 7.5-6.8										
2 = R.M. 22.2-22.1	7 = R.M. 19.3-19.1				12 = R.M. 11.3-11.1				17 = R.M. 4.8-4.6										
3 = R.M. 21.9-20.5	8 = R.M. 16.9-16.5				13 = R.M. 11.1-10.0				18 = R.M. 3.3-1.8										
4 = R.M. 20.5-20.2	9 = R.M. 15.5-15.4				14 = R.M. 8.7-7.5				19 = R.M. 1.0-0.0										
5 = R.M. 19.6-19.3	10 = R.M. 13.7-13.3				15 = R.M. 7.5-5.6				X = Old dead shells only										

Appendix 1. Site specific collection records. These data are arranged from the headwaters of the Walhonding River to its mouth.

Site #1 - River Mile 23.3-21.9

Walhonding River, R.M. 23.3-21.9, from the confluence of the Mohican and Kokosing rivers to SR 715 bridge, 0.3 mi. SE of Walhonding, 3.8 mi. WNW of Nellie, Newcastle Twp., Coshocton Co., Ohio.

MAH:1991:41 1 September 1991 M.A. Hoggarth, Karen Cook-Hoggarth & Mark Hoggarth.

<i>Anodonta grandis grandis</i>	2 live
<i>Strophitus undulatus undulatus</i>	5 dead
<i>Lasmigona complanata complanata</i>	33 live, 3 dead
<i>Lasmigona costata</i>	15 live, 4 dead
<i>Lasmigona compressa</i>	1 live
<i>Tritogonia verrucosa</i>	3 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	2 live, 2 weathered
<i>Amblema plicata plicata</i>	100 live, 1 dead, 1 weathered
<i>Fusconaia maculata maculata</i>	2 weathered
<i>Fusconaia flava</i>	1 live, 1 weathered
<i>Cyclonaias tuberculata</i>	1 live, 1 weathered
<i>Elliptio dilatata</i>	1 dead
<i>Actinonaias ligamentina carinata</i>	100 live, 4 dead
<i>Ligumia recta</i>	1 dead
<i>Lampsilis radiata luteola</i>	33 live, 1 dead
<i>Lampsilis ventricosa</i>	3 live

Site #2 - River Mile 22.2-22.1

Walhonding River, R.M. 22.2-22.1, upstream of SR 715 bridge, 0.3 mi. SE of Walhonding, 3.8 mi. WNW of Nellie, Newcastle Twp., Coshocton Co., Ohio.

MAH:1991:40 31 August 1991 M.A. Hoggarth.
MAH:1992:24 15 June 1992 M.A. Hoggarth and Mark Hoggarth.
MAH:1992:31 29 June 1992 M.A. Hoggarth and Mark Hoggarth.
MAH:1992:33 3 July 1992 M.A. Hoggarth and Mark Hoggarth.
MAH:1992:34 4 July 1992 M.A. Hoggarth.
MAH:1992:36 17 August 1992 M.A. Hoggarth.
MAH:1992:37 24 August 1992 M.A. Hoggarth and Dan Rice.
MAH:1992:41 12 September 1992 M.A. Hoggarth and Chuck Boucher.
MAH:1992:42 26 September 1992 M.A. Hoggarth, D. Best, L. Grieszmer & C. Mattingly.
MAH:1993:56 23 August 1993 M.A. Hoggarth, D. Rice, S. Lewis, C. Divilbiss, Y. Alley, B. Orsdorf & S. Roloson.

<i>Anodonta imbecillis</i>	1 live
<i>Anodonta grandis grandis</i>	16 live
<i>Strophitus undulatus undulatus</i>	17 live, 3 dead
<i>Lasmigona complanata complanata</i>	180 live, 1 dead
<i>Lasmigona costata</i>	216 live
<i>Lasmigona compressa</i>	4 live, 1 dead
<i>Tritogonia verrucosa</i>	19 live
<i>Quadrula quadrula</i>	3 live
<i>Quadrula cylindrica cylindrica</i>	10 live, 2 dead, 1 weathered
<i>Quadrula pustulosa pustulosa</i>	2 live
<i>Amblema plicata plicata</i>	673 live, 1 dead
<i>Fusconaia maculata maculata</i>	6 live
<i>Fusconaia flava</i>	23 live, 1 dead
<i>Cyclonaias tuberculata</i>	17 live, 1 dead
<i>Plethobasus cyphus</i>	1 live
<i>Pleurobema clava</i>	1 dead
<i>Elliptio dilatata</i>	8 live, 1 weathered
<i>Ptychobranhus fasciolaris</i>	1 dead
<i>Actinonaias ligamentina carinata</i>	672 live, 4 dead
<i>Obovaria subrotunda</i>	1 live
<i>Villosa iris iris</i>	23 live
<i>Lampsilis radiata luteola</i>	134 live, 2 dead
<i>Lampsilis ventricosa</i>	37 live, 2 dead
<i>Lampsilis fasciola</i>	12 live

Site #3 - River Mile 21.9-20.5

Walhonding River, R.M. 21.9-20.5, from S.R. 715 bridge, 0.3 mi. SE of Walhonding, 3.8 mi. WNW of Nellie, to S.R. 715 bridge, 1.2 mi. ESE of Walhonding, 2.7 mi. WNW of Nellie, Newcastle Twp., Coshocton Co., Ohio.

MAH:1992:42 1 September 1992 M.A. Hoggarth.

<i>Anodonta grandis grandis</i>	1 live, 1 dead
<i>Strophitus undulatus undulatus</i>	3 dead
<i>Lasmigona complanata complanata</i>	25 live, 2 dead
<i>Lasmigona costata</i>	7 live, 1 dead
<i>Lasmigona compressa</i>	1 dead
<i>Tritogonia verrucosa</i>	17 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	2 live, 1 weathered
<i>Amblema plicata plicata</i>	100 live, 1 dead
<i>Fusconaia maculata maculata</i>	2 weathered
<i>Fusconaia flava</i>	1 live, 1 dead
<i>Actinonaias ligamentina carinata</i>	100 live, 3 dead
<i>Obovaria subrotunda</i>	1 weathered
<i>Villosa iris iris</i>	1 weathered
<i>Lampsilis radiata luteola</i>	33 live, 3 dead
<i>Lampsilis ventricosa</i>	2 live, 1 dead

Site #4 - River Mile 20.5-20.2

Walhonding River, R.M. 20.5-20.2, at S.R. 715 bridge, 1.2 mi. ESE of Walhonding, 2.7 mi. WNW of Nellie, Newcastle Twp., Coshocton Co., Ohio.

MAH:1983:15 15 July 1983 M.A. Hoggarth & G.T. Watters.

MAH:1991:45 9 September 1991 M.A. Hoggarth.

<i>Anodonta imbecillis</i>	2 live
<i>Anodonta grandis grandis</i>	42 live, 1 dead
<i>Strophitus undulatus undulatus</i>	32 live
<i>Lasmigona complanata complanata</i>	83 live, 4 dead
<i>Lasmigona costata</i>	17 live, 1 dead
<i>Lasmigona compressa</i>	2 live, 2 weathered
<i>Tritogonia verrucosa</i>	3 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	2 live, 8 weathered
<i>Amblema plicata plicata</i>	100 live, 4 dead
<i>Fusconaia flava</i>	1 live, 2 dead
<i>Cyclonaias tuberculata</i>	1 live
<i>Plethobasus cyphus</i>	1 weathered
<i>Pleurobema clava</i>	4 weathered
<i>Pleurobema sintoxia</i>	1 weathered
<i>Elliptio dilatata</i>	4 weathered
<i>Actinonaias ligamentina carinata</i>	101 live, 4 dead
<i>Obovaria subrotunda</i>	4 weathered
<i>Ligumia recta</i>	2 weathered
<i>Villosa iris iris</i>	1 weathered
<i>Lampsilis radiata luteola</i>	53 live, 3 dead
<i>Lampsilis ventricosa</i>	6 live, 2 dead

Site #5 - River Mile 19.6-19.3

Walhonding River, R.M. 19.6-19.3, above S.R 715 bridge, 2.4 mi. WNW of Nellie, 14.2 mi. WNW of Coshocton, Newcastle Twp., Coshocton Co., Ohio.

MAH:1993:55 20 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Anodonta grandis grandis</i>	6 live
<i>Strophitus undulatus undulatus</i>	11 live
<i>Lasmigona complanata complanata</i>	81 live
<i>Lasmigona costata</i>	16 live
<i>Tritogonia verrucosa</i>	1 live
<i>Amblema plicata plicata</i>	212 live
<i>Fusconaia flava</i>	5 live
<i>Cyclonaias tuberculata</i>	5 live
<i>Plethobasus cyphus</i>	1 live
<i>Actinonaias ligamentina carinata</i>	270 live
<i>Obovaria subrotunda</i>	1 live
<i>Ligumia recta</i>	2 live
<i>Villosa iris iris</i>	1 live
<i>Lampsilis radiata luteola</i>	40 live
<i>Lampsilis ventricosa</i>	5 live
<i>Lampsilis fasciola</i>	4 live

Site #6 - River Mile 19.3-17.4

Walhonding River, R.M. 19.3-17.4, from S.R. 715 bridge, 2.1 mi. E. of Walhonding, 2.0 mi. WNW of Nellie, to Mohawk Dam, 3.0 mi. E. of Walhonding, 0.8 mi. NW of Nellie, Newcastle/Jefferson Twp., Coshocton Co., Ohio.

MAH:1991:47 15 September 1991 M.A. Hoggarth, K. Cook-Hoggarth, Mark Hoggarth, Mike Austin, Lori Austin & Nancy Henry.

<i>Anodonta grandis grandis</i>	12 live
<i>Strophitus undulatus undulatus</i>	3 live, 2 dead
<i>Lasmigona complanata complanata</i>	32 live, 4 dead
<i>Lasmigona costata</i>	13 live, 1 dead
<i>Tritogonia verrucosa</i>	2 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	1 live
<i>Amblema plicata plicata</i>	59 live, 2 dead, 2 weathered
<i>Ptychobranhus fasciolaris</i>	1 weathered
<i>Actinonaias ligamentina carinata</i>	100 live
<i>Lampsilis radiata luteola</i>	15 live, 2 dead
<i>Lampsilis ventricosa</i>	3 live

Site #7 - River Mile 19.3-19.1

Walhonding River, R.M. 19.3-19.1, at S.R. 715 bridge, 2.4 mi. WNW of Nellie, 14.2 mi. WNW of Coshocton, Newcastle Twp., Coshocton Co., Ohio.

MAH:1983:17 15 July 1983 M.A. Hoggarth & G.T. Watters.

MAH:1989:123 19 September 1989 M.A. Hoggarth.

MAH:1991:16 18 June 1991 M.A. Hoggarth & James Koren.

<i>Anodonta grandis grandis</i>	2 live, 3 dead, 2 weathered
<i>Strophitus undulatus undulatus</i>	5 live, 3 dead
<i>Lasmigona complanata complanata</i>	15 live, 1 weathered
<i>Lasmigona costata</i>	1 live, 10 weathered
<i>Tritogonia verrucosa</i>	1 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	5 weathered
<i>Amblema plicata plicata</i>	72 live, 3 dead, 2 weathered
<i>Fusconaia maculata maculata</i>	4 weathered
<i>Fusconaia flava</i>	1 live, 2 dead, 1 weathered
<i>Cyclonaias tuberculata</i>	1 live, 1 weathered
<i>Plethobasus cyphus</i>	1 live, 3 weathered
<i>Pleurobema clava</i>	8 weathered
<i>Pleurobema sintoxia</i>	3 weathered
<i>Elliptio dilatata</i>	1 live, 12 weathered
<i>Ptychobranchnus fasciolaris</i>	3 weathered
<i>Actinonaias ligamentina carinata</i>	102 live, 4 dead, 1 weathered
<i>Obovaria subrotunda</i>	1 live, 4 weathered
<i>Ligumia recta</i>	1 weathered
<i>Villosa fabalis</i>	2 weathered
<i>Villosa iris iris</i>	1 live
<i>Lampsilis radiata luteola</i>	20 live, 5 dead
<i>Lampsilis ventricosa</i>	2 live
<i>Lampsilis fasciola</i>	2 live, 1 weathered

Site #8 - River Mile 16.9-16.5

Walhonding River, R.M. 16.9-16.5, below Mohawk Dam, 1.3 mi. NW OF Nellie, 4.7 mi. WNW of Warsaw, Jefferson Twp., Coshocton Co., Ohio.

MAH:1991:35 19 August 1991 M.A. Hoggarth, Dan Rice & Mac Albin.

MAH:1993:46 13 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Anodonta grandis grandis</i>	2 live
<i>Strophitus undulatus undulatus</i>	9 live
<i>Lasmigona complanata complanata</i>	29 live
<i>Lasmigona costata</i>	7 live
<i>Tritogonia verrucosa</i>	6 live
<i>Amblema plicata plicata</i>	46 live
<i>Cyclonaias tuberculata</i>	2 live
<i>Ptychobranthus fasciolaris</i>	1 live
<i>Actinonaias ligamentina carinata</i>	83 live
<i>Lampsilis radiata luteola</i>	10 live
<i>Lampsilis ventricosa</i>	6 live
<i>Lampsilis fasciola</i>	2 live

Site #9 - River Mile 15.5-15.4

Walhonding River, R.M. 15.5-15.4, below U.S.R. 36 bridge, 0.3 mi. NE of Nellie, 3.4 mi. W of Warsaw, Jefferson Twp., Coshocton Co., Ohio.

MAH:1993:47 13 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Strophitus undulatus undulatus</i>	5 live
<i>Lasmigona complanata complanata</i>	22 live
<i>Lasmigona costata</i>	10 live
<i>Tritogonia verrucosa</i>	3 live
<i>Quadrula cylindrica cylindrica</i>	2 live
<i>Amblema plicata plicata</i>	62 live
<i>Fusconaia flava</i>	1 live
<i>Cyclonaias tuberculata</i>	1 live
<i>Actinonaias ligamentina carinata</i>	134 live
<i>Lampsilis radiata luteola</i>	10 live
<i>Lampsilis ventricosa</i>	2 live

Site #10 - River Mile 13.7-13.3

Walhonding River, R.M. 13.7-13.3, at Camp Tonowanda, 1.5 mi. E of Nellie, 2.0 mi. W of Warsaw, Jefferson Twp., Coshocton Co., Ohio.

MAH:1991:38 26 August 1991 M.A. Hoggarth, Dan Rice, Dave Ross & Mac Albin.

MAH:1993:53 19 August 1993 M.A. Hoggarth, Dan Rice, Stacy Xenakis & Bob Gable.

<i>Anodonta grandis grandis</i>	3 live
<i>Strophitus undulatus undulatus</i>	17 live, 3 dead
<i>Alasmidonta marginata</i>	1 weathered
<i>Lasmigona complanata complanata</i>	66 live, 1 dead
<i>Lasmigona costata</i>	47 live
<i>Tritogonia verrucosa</i>	12 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	3 live, 2 weathered
<i>Quadrula pustulosa pustulosa</i>	4 live, 1 weathered
<i>Amblema plicata plicata</i>	128 live
<i>Fusconaia maculata maculata</i>	4 weathered
<i>Fusconaia flava</i>	2 live
<i>Cyclonaias tuberculata</i>	33 live, 2 dead
<i>Plethobasus cyphus</i>	1 weathered
<i>Pleurobema clava</i>	1 weathered
<i>Elliptio dilatata</i>	1 live, 1 weathered
<i>Ptychobranhus fasciolaris</i>	4 live, 1 dead
<i>Cyprogenia stegaria</i>	1 weathered
<i>Actinonaias ligamentina carinata</i>	549 live, 2 weathered
<i>Obovaria subrotunda</i>	1 weathered
<i>Ligumia recta</i>	2 live, 1 weathered
<i>Lampsilis radiata luteola</i>	16 live
<i>Lampsilis ventricosa</i>	4 live
<i>Lampsilis ovata</i>	1 live, 1 subfossil
<i>Lampsilis fasciola</i>	5 live

Site #11 - River Mile 13.0-12.9

Walhonding River, R.M. 13.0-12.9, off of C.R. 61, 2.2 mi. E of Nellie, 1.3 mi. W of Warsaw, Jefferson Twp., Coshocton Co., Ohio.

MAH:1991:53 28 September 1991 M.A. Hoggarth.

MAH:1992:40 12 September 1992 M.A Hoggarth & Chuck Boucher.

<i>Anodonta grandis grandis</i>	4 live, 1 dead
<i>Strophitus undulatus undulatus</i>	35 live, 1 dead, 1 weathered
<i>Alasmidonta marginata</i>	2 live, 1 weathered
<i>Lasmigona complanata complanata</i>	52 live
<i>Lasmigona costata</i>	37 live
<i>Tritogonia verrucosa</i>	1 live
<i>Amblema plicata plicata</i>	105 live
<i>Cyclonaias tuberculata</i>	1 live
<i>Plethobasus cyphus</i>	1 live, 2 weathered
<i>Pleurobema clava</i>	1 weathered
<i>Elliptio dilatata</i>	1 live
<i>Ptychobranhus fasciolaris</i>	1 weathered
<i>Cyprogenia stegaria</i>	1 weathered, 1 subfossil
<i>Actinonaias ligamentina carinata</i>	102 live
<i>Obovaria subrotunda</i>	1 live
<i>Ligumia recta</i>	1 weathered
<i>Lampsilis radiata luteola</i>	5 live
<i>Lampsilis ventricosa</i>	7 live
<i>Lampsilis ovata</i>	2 live, 1 weathered
<i>Lampsilis fasciola</i>	3 live
<i>Epioblasma triquetra</i>	1 weathered

Site #12 - River Mile 11.3-11.1

Walhonding River, R.M. 11.3-11.1, at S.R. 60 bridge, 0.3 mi. S of Warsaw, Bethlehem/Jefferson Twp., Coshocton Co., Ohio.

MAH:1991:49 22 September 1991 M.A. Hoggarth.

MAH:1992:38 5 September 1992 M.A. Hoggarth.

<i>Anodonta grandis grandis</i>	5 live
<i>Strophitus undulatus undulatus</i>	12 live, 1 dead, 1 weathered
<i>Lasmigona complanata complanata</i>	27 live
<i>Lasmigona costata</i>	28 live, 1 weathered
<i>Tritogonia verrucosa</i>	9 live, 1 weathered
<i>Quadrula cylindrica cylindrica</i>	1 live, 4 weathered
<i>Amblema plicata plicata</i>	47 live
<i>Fusconaia maculata maculata</i>	1 weathered
<i>Cyclonaias tuberculata</i>	5 live
<i>Elliptio dilatata</i>	1 live
<i>Ptychobranhus fasciolaris</i>	1 live, 1 weathered
<i>Actinonaias ligamentina carinata</i>	162 live
<i>Villosa iris iris</i>	1 weathered
<i>Lampsilis radiata luteola</i>	17 live, 1 dead
<i>Lampsilis ventricosa</i>	4 live, 1 weathered
<i>Lampsilis fasciola</i>	9 live, 2 weathered
<i>Epioblasma triquetra</i>	1 weathered

Site #13 - River Mile 11.1-10.0

Walhonding River, R.M. 11.1-10.0, from S.R. 60 bridge, 0.3 mi. S of Warsaw, to T.R. 384 bridge, 1.4 mi. E of Warsaw, Bethlehem/ Jefferson Twp., Coshocton Co., Ohio.

MAH:1991:50 23 September 1991 M.A. Hoggarth & Dan Rice.

<i>Anodonta grandis grandis</i>	1 live
<i>Strophitus undulatus undulatus</i>	3 live, 4 dead
<i>Alasmidonta marginata</i>	1 live
<i>Lasmigona complanata complanata</i>	15 live
<i>Lasmigona costata</i>	27 live, 1 dead
<i>Tritogonia verrucosa</i>	5 live, 1 dead
<i>Quadrula cylindrica cylindrica</i>	2 weathered
<i>Quadrula pustulosa pustulosa</i>	1 weathered
<i>Amblema plicata plicata</i>	53 live, 3 dead
<i>Fusconaia maculata maculata</i>	1 weathered
<i>Fusconaia flava</i>	1 dead
<i>Cyclonaias tuberculata</i>	1 weathered
<i>Elliptio dilatata</i>	1 live, 1 weathered
<i>Ptychobranthus fasciolaris</i>	1 live, 1 weathered
<i>Cyprogenia stegaria</i>	3 weathered
<i>Actinonaias ligamentina carinata</i>	100 live, 6 dead
<i>Obovaria subrotunda</i>	1 weathered
<i>Ligumia recta</i>	1 weathered
<i>Villosa iris iris</i>	1 live, 1 dead
<i>Lampsilis radiata luteola</i>	17 live, 2 dead
<i>Lampsilis ventricosa</i>	3 live
<i>Lampsilis fasciola</i>	2 live, 1 weathered
<i>Corbicula fluminea</i>	3 live

Site #14 - River Mile 8.7-8.5

Walhonding River, R.M. 8.7-7.5, from Sixmile Dam 2.2 mi. E of Warsaw, to U.S.R. 36 bridge, 3.5 mi. ESE of Warsaw, 5.7 mi. NW of Coshocton, Bethlehem Twp., Coshocton Co., Ohio.

MAH:1992:39 6 September 1992 M.A. Hoggarth.

<i>Lasmigona complanata complanata</i>	8 live
<i>Lasmigona costata</i>	3 live
<i>Tritogonia verrucosa</i>	1 live
<i>Amblema plicata plicata</i>	9 live
<i>Actinonaias ligamentina carinata</i>	9 live
<i>Ligumia recta</i>	1 live
<i>Lampsilis radiata luteola</i>	2 live
<i>Lampsilis ventricosa</i>	3 live
<i>Lampsilis ovata</i>	1 live

Site #15 - River Mile 7.5-5.6

Walhonding River, R.M. 7.5-5.6, from U.S.R. 36 bridge 3.5 mi. ESE of Warsaw, 5.7 mi. NW of Coshocton, to C.R. 23 bridge, 5.5 mi. ESE of Warsaw, 3.5 mi. NW of Coshocton, Bethlehem Twp., Coshocton Co., Ohio.

MAH:1993:45 12 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Anodonta grandis grandis</i>	2 live
<i>Alasmidonta marginata</i>	3 live
<i>Lasmigona complanata complanata</i>	28 live
<i>Lasmigona costata</i>	8 live
<i>Lasmigona compressa</i>	1 live
<i>Tritogonia verrucosa</i>	14 live
<i>Quadrula quadrula</i>	1 live
<i>Quadrula pustulosa pustulosa</i>	10 live
<i>Amblema plicata plicata</i>	12 live
<i>Cyclonaias tuberculata</i>	13 live
<i>Plethobasus cyphus</i>	1 live
<i>Ptychobranchnus fasciolaris</i>	1 live
<i>Cyprogenia stegaria</i>	1 weathered
<i>Actinonaias ligamentina carinata</i>	10 live
<i>Leptodea fragilis</i>	2 live
<i>Lampsilis radiata luteola</i>	2 live
<i>Lampsilis ventricosa</i>	7 live
<i>Lampsilis ovata</i>	1 live
<i>Lampsilis fasciola</i>	1 live, 1 dead

Site #16 - River Mile 7.5-6.8

Walhonding River, R.M. 7.5-6.8, below the U.S.R. 36 bridge, 3.5 mi. ESE of Warsaw, 5.7 mi. NW of Coshocton, Bethlehem Twp., Coshocton Co., Ohio.

MAH:1991:54 5 October 1991 M.A. Hoggarth.
MAH:1991:59 19 October 1991 M.A. Hoggarth, D.H. Stansbery & Dave Ross.
MAH:1992:35 17 August 1992 M.A. Hoggarth.
MAH:1993:11 30 June 1993 M.A. Hoggarth, Mark Hoggarth, Dan Rice & Stacy Xenakis.
MAH:1993:54 20 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Anodonta imbecillis</i>	1 dead
<i>Anodonta grandis grandis</i>	4 live, 3 dead, 1 weathered
<i>Strophitus undulatus undulatus</i>	11 live, 2 dead
<i>Alasmidonta marginata</i>	30 live, 4 dead, 4 weathered
<i>Lasmigona complanata complanata</i>	77 live
<i>Lasmigona costata</i>	7 live, 1 dead
<i>Lasmigona compressa</i>	1 live, 1 weathered
<i>Tritogonia verrucosa</i>	9 live, 1 dead
<i>Quadrula cylindrica cylindrica</i>	1 weathered
<i>Quadrula pustulosa pustulosa</i>	10 live, 5 weathered
<i>Amblema plicata plicata</i>	4 live, 1 dead, 1 weathered
<i>Fusconaia maculata maculata</i>	1 live
<i>Fusconaia flava</i>	2 live, 2 dead, 1 weathered
<i>Cyclonaias tuberculata</i>	1 live
<i>Pleurobema sintoxia</i>	1 live
<i>Elliptio dilatata</i>	1 live
<i>Ptychobranthus fasciolaris</i>	2 weathered
<i>Cyprogenia stegaria</i>	2 weathered
<i>Actinonaias ligamentina carinata</i>	18 live, 1 dead, 1 weathered
<i>Leptodea fragilis</i>	11 live, 6 dead, 1 weathered
<i>Ligumia recta</i>	2 live
<i>Villosa fabalis</i>	1 live, 1 dead
<i>Lampsilis radiata luteola</i>	17 live
<i>Lampsilis ventricosa</i>	18 live, 1 dead, 1 weathered
<i>Lampsilis ovata</i>	1 live
<i>Lampsilis fasciola</i>	1 live, 1 weathered
<i>Epioblasma triquetra</i>	5 live, 1 dead
<i>Epioblasma obliquata obliquata</i>	1 dead

Site #17 - River Mile 4.8-4.6

Walhonding River, R.M. 4.8-4.6, at C.R. 23 bridge, 3.5 mi. NW of Coshocton, 5.5 mi. ESE of Warsaw, Bethlehem Twp., Coshocton Co., Ohio.

MAH:1991:51 23 September 1991 M.A. Hoggarth & Dan Rice.

MAH:1991:56 14 October 1991 M.A. Hoggarth & Dave Ross.

MAH:1993:57 24 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

MAH:1993:60 25 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Anodonta grandis grandis</i>	7 live
<i>Strophitus undulatus undulatus</i>	3 live
<i>Alasmidonta marginata</i>	5 live, 1 dead
<i>Lasmigona complanata complanata</i>	215 live, 1 dead
<i>Lasmigona costata</i>	35 live
<i>Tritogonia verrucosa</i>	34 live
<i>Quadrula quadrula</i>	10 live, 1 weathered
<i>Quadrula pustulosa pustulosa</i>	46 live, 5 dead
<i>Amblema plicata plicata</i>	117 live
<i>Cyclonaias tuberculata</i>	40 live, 1 dead, 2 weathered
<i>Elliptio dilatata</i>	2 live, 1 weathered
<i>Ptychobranthus fasciolaris</i>	2 live, 1 dead, 1 weathered
<i>Cyprogenia stegaria</i>	3 weathered
<i>Actinonaias ligamentina carinata</i>	470 live, 1 weathered
<i>Obovaria subrotunda</i>	2 live, 1 weathered
<i>Leptodea fragilis</i>	6 live
<i>Potamilus alatus</i>	2 live
<i>Ligumia recta</i>	14 live
<i>Villosa fabalis</i>	1 weathered
<i>Lampsilis radiata luteola</i>	74 live
<i>Lampsilis ventricosa</i>	55 live, 2 weathered
<i>Lampsilis ovata</i>	2 live
<i>Lampsilis fasciola</i>	1 live, 1 weathered
<i>Epioblasma triquetra</i>	2 live, 1 weathered

Site #18 - River Mile 3.3-1.8

Walhonding River, R.M. 3.3-1.8, at and upstream of Lake Park, 1.6 mi. NW of Coshocton, Tuscarawas Twp., Coshocton Co., Ohio.

MAH:1991:46 14 September 1991 M.A. Hoggarth.

MAH:1993:59 25 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Strophitus undulatus undulatus</i>	2 weathered
<i>Alasmidonta marginata</i>	7 live
<i>Lasmigona complanata complanata</i>	28 live, 2 dead
<i>Lasmigona costata</i>	4 live, 3 weathered
<i>Lasmigona compressa</i>	1 live
<i>Tritogonia verrucosa</i>	3 live, 3 weathered
<i>Quadrula quadrula</i>	1 live, 1 weathered
<i>Quadrula pustulosa pustulosa</i>	18 live, 8 weathered
<i>Amblema plicata plicata</i>	5 live, 1 weathered
<i>Fusconaia maculata maculata</i>	2 weathered
<i>Cyclonaias tuberculata</i>	2 live, 1 weathered
<i>Ptychobranhus fasciolaris</i>	1 weathered
<i>Cyprogenia stegaria</i>	1 weathered
<i>Actinonaias ligamentina carinata</i>	51 live, 2 dead
<i>Leptodea fragilis</i>	3 live, 1 dead, 1 weathered
<i>Ligumia recta</i>	2 live, 1 weathered
<i>Lampsilis radiata luteola</i>	11 live, 1 weathered
<i>Lampsilis ventricosa</i>	14 live, 2 weathered
<i>Lampsilis ovata</i>	1 weathered
<i>Lampsilis fasciola</i>	1 weathered
<i>Epioblasma triquetra</i>	1 live, 1 weathered

Site #19 - River Mile 1.0-0.0

Walhonding River, R.M. 1.0-0.0, from Lake Park 1.6 mi. NW of Coshocton, to the mouth of the Walhonding River in Coshocton, Tuscarawas/Jackson Twp., Coshocton Co., Ohio.

MAH:1991:60 19 October 1991 M.A. Hoggarth, D.H. Stansbery & Dave Ross.

MAH:1993:58 25 August 1993 M.A. Hoggarth, Dan Rice & Stacy Xenakis.

<i>Anodonta grandis grandis</i>	1 weathered
<i>Alasmidonta marginata</i>	1 live, 2 weathered
<i>Lasmigona complanata complanata</i>	28 live, 1 weathered
<i>Lasmigona costata</i>	3 live
<i>Quadrula quadrula</i>	1 live
<i>Quadrula pustulosa pustulosa</i>	5 live, 1 weathered
<i>Ptychobranhus fasciolaris</i>	1 weathered
<i>Cyprogenia stegaria</i>	1 weathered
<i>Actinonaias ligamentina carinata</i>	54 live, 3 dead
<i>Obovaria subrotunda</i>	1 live, 1 weathered
<i>Leptodea fragilis</i>	3 live, 2 dead
<i>Ligumia recta</i>	1 live, 1 weathered
<i>Villosa fabalis</i>	1 weathered
<i>Lampsilis radiata luteola</i>	6 live, 1 dead
<i>Lampsilis ventricosa</i>	5 live, 2 dead
<i>Lampsilis ovata</i>	1 weathered
<i>Epioblasma triquetra</i>	1 weathered