Layzer 1995

Dick
for your info
Dick

QUARTERLY REPORT

JULY 1 - SEPTEMBER 30,1995

# ZEBRA MUSSEL IMPACTS ON ENDANGERED UNIONIDS

JAMES B. LAYZER
TENNESSEE COOPERATIVE FISHERY RESEARCH UNIT
TENNESSEE TECHNOLOGICAL UNIVERSITY
PO BOX 5114
COOKEVILLE TN 38505

cc: Dick Biggins, USFWS
Rob Todd - TVRA
Richard Kirk, TVRA
} 11/20/95

Quarterly Report

Zebra Mussel Impacts on Endangered Unionids

Because this project is jointly funded by Tennessee and Kentucky and much of the work is interrelated, all data collected in both states during this quarter has been consolidated in this report.

## MUSSEL SAMPLING

Four sampling sites were established on the Tennessee River in 1993: TRM 18.3 (below Kentucky Dam), TRM 67.5 (near Paris Landing), TRM 109.3 (near mouth of the Duck River), and TRM 197.5 (near Diamond Island). In September 1995, 20 quadrat (0.25 $m^2$) samples were collected at two sites by hand excavating the substrate to a depth of about 10 cm. All excavated material was placed into 6 mm mesh dive bags, brought to the surface and sieved. Except for some small (<10 mm) juvenile unionids, all mussels were measured and identified. In 1995, mussel densities ranged from 3.20 to 135.0 individuals/$m^2$ (Table 1). A total of 16 species were collected. No zebra mussels were found in any sample. In addition to mussels collected during quadrat sampling, we also collected a total of 668 mussels at TRM 197.5 in August for transplanting to Shoal Creek. During this qualitative sampling, we found 1 zebra mussel attached to a *Fusconaia ebena* and a second zebra mussel attached to a rock. We cancelled sampling two of our sites on the Tennessee River on three occasions in September due to weather conditions, generation schedules, and physical condition of a diver. These two sites will be sampled in the spring.

## EXPERIMENTAL HOLDING OF UNIONIDS

With the exception of the Frankfort Hatchery in Kentucky, survival of mussels has remained high during this quarter at the other three holding facilities. In July 1995, we collected 602 mussels of 12 species from the Duck River and transported them to the Normandy Hatchery (Table 2). About one-third of the mussels were placed in a raceway that we previously added a 15 cm layer of a sand-gravel mix. The remaining mussels were divided into two groups; one group is being held in suspended pocket nets in a pond and the other group was broadcast throughout the pond. Survival of mussel in the raceway and pocket nets has been good; we are awaiting drawdown of the pond to assess survival of the mussels that were broadcast. In september, we collected 198 *Pleurobema cordatum*, 11 *P. pyramidatum*, and 9 *P. coccineum* from the Barren River, KY and transporyted them to the Minor Clark Hatchery where they were placed in a raceway containing a sand-gravel substrate.

Table 1. Numbers and species of unionids collected in quantitative samples at two sites on the Tennessee River in September 1995.

| Species | Site | |
|---|---|---|
| | TRM 67.5 | TRM 197.5 |
| Amblema plicata | 10 | -- |
| Cyclonaias tuberculata | -- | 19 |
| Ellipsaria lineolata | -- | 2 |
| Elliptio crassidens | -- | 3 |
| Fusconaia ebena | -- | 518 |
| Fusconaia flava | -- | 1 |
| Leptodea fragilis | 1 | 2 |
| Ligumia recta | -- | 2 |
| Megalonaias nervosa | -- | 1 |
| Obliquaria reflexa | 3 | 34 |
| Potamilus alatus | -- | 1 |
| Quadrula nodulata | 1 | -- |
| Quadrula metanevra | -- | 10 |
| Quadrula pustulosa | -- | 73 |
| Quadrula quadrula | 1 | 1 |
| Truncilla donaciformis | -- | 6 |
| Unidentified juveniles | -- | 2 |
| Total | 16 | 675 |
| Density (#/$m^2$) | 3.20 | 135.00 |

Table 2. Number and species of mussels collected from the Duck River in July 1995 and held at the Normandy Hatchery.

| Species | Location and Number | | |
|---|---|---|---|
| | Raceway | Pond Cages | Pond Bottom |
| *Amblema plicata* | -- | 50 | 50 |
| *Cyclonaias tuberculata* | -- | 99 | 100 |
| *Elliptio dilatata* | 52 | -- | -- |
| *Fusconaia barnesiana** | 5 | -- | -- |
| *Lasmigona costata* | 29 | -- | -- |
| *Leptodea fragilis* | 7 | -- | -- |
| *Lexingtonia dolabelloides** | 45 | -- | -- |
| *Obliquaria reflexa* | -- | 6 | -- |
| *Quadrula cylindrica** | 1 | -- | -- |
| *Quadrula pustulosa* | -- | 51 | 50 |
| *Tritogonia verrucosa* | 41 | -- | -- |
| *Truncilla truncata* | -- | 16 | -- |

*Species is a candidate for federal listing

QUARTERLY REPORT

JULY 1 - SEPTEMBER 30,1995

# REESTABLISH POPULATIONS OF ENDANGERED AND THREATENED SPECIES IN SHOAL CREEK

James B. Layzer

Tennessee Cooperative Fishery Research Unit
Tennessee Technological University
Cookeville, TN

cc: Dick Biggers } 11/20/95
Robb Todd
Richard Kirk
David McKinney

Quarterly Report

July 1 - September 30,1995

Reestablish Populations of Endangered and Threatened Species
in Shoal Creek

Mussel Introductions

During the summer, we intensively searched 1.5-km-long sections of creek downstream of each transplant site. Although we found relatively few dead shells, we only located about 10 % of the mussels translocated in 1994. Apparently high flows dispersed many of the mussels. In August 1995, we translocated an additional 483 adult mussels of 13 species to the site near Lawrenceburg, TN (Table 1).

Fish Distributions

In 1995, an intensive fish survey of the Shoal Creek drainage was initiated. Fish were collected at 81 sites. All fish collected at 14 sites in Alabama have been identified (Table 2). A total of 56 species of fish were collected from these 14 sites (Table 3). The fish fauna was dominated by cyprinids (21 species), darters (12 species) and centrarchids (8 species). We are in the process of identifying the remainder of the fish samples collected from the Tennessee portion of the drainage.

Table 1. Numbers and species of adult mussels translocated to Shoal Creek in 1995.

| Species | Number |
|---|---|
| *Amblema plicata* | 15 |
| *Cyclonaias tuberculata* | 85 |
| *Ellipsaria lineolata* | 47 |
| *Elliptio crassidens* | 23 |
| *Ligumia recta* | 7 |
| *Megalonaias nervosa* | 2 |
| *Obliquaria reflexa* | 1 |
| *Potamilus alatus* | 13 |
| *Quadrula cylindrica* | 3 |
| *Quadrula metanevera* | 97 |
| *Quadrula pustulosa* | 149 |
| *Quadrula quadrula* | 34 |
| *Tritogonia verrucosa* | 7 |
| TOTAL | 483 |

Table 2. Fish collection sites in Shoal Creek drainage, Alabama.

| Site | Location |
|---|---|
| Brotherick Branch | immediately upstream of the Rt 37 bridge |
| Keithly Branch (left branch) | immediately upstream of ford east off of Rt 94 |
| Keithly Branch (left branch) | immediately upstream of Rt 37 bridge near Canerday cemetery |
| Indian Camp Creek | along the Indian Camp Creek Campground just upstream of the bridge located 3.5 miles north of St. Florian, and 0.3 miles east of Rt 61 behind the Mt. Zion Church |
| Indian Camp Creek | downstream of the most eastern dead end dirt road bridge north off of Rt 83 |
| Cowpen Creek | immediately downstream of the Rt 8 bridge near Goose Shoals |
| Cowpen Creek | upstream of the Rt 34 bridge at the Rt 8 intersection |
| Cowpen Creek | immediately downstream of the Rt 94 bridge |
| Butler Creek | upstream from the dead end dirt road which turns northeast off of Rt 8 |
| Little Butler Creek | just upstream of the Rt 61 bridge |
| Sour Branch (of Little Butler Creek) | collected just downstream of the Rt 11 bridge, just northeast of the Mt. Tabor Church |
| Little Butler Creek | immediately upstream of the Rt 11 bridge northeast of Mt. Tabor Church |
| Butler Creek | just downstream of the Rt 61 bridge |
| Shoal Creek | at the old ford west off of Rt 130 just south of the Alabama-Tennessee state line |

Table 3. Numbers and species of fish collected at 14 sites in the Shoal Creek drainage, AL.

| Species | Site | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| *Ambloplites rupestris* | | | | 14 | | 31 | | | 7 | 9 | 3 | 4 | 9 | 19 |
| *Amieurus melas* | | | | | | | | 2 | | | | | | |
| *A. natalis* | | | | | | 1 | | | | | | | 1 | 2 |
| *Campostoma anomalum* | 5 | 278 | 40 | 91 | 100+ | 100+ | 4 | 26 | 288 | 202 | 37 | 124 | 232 | 155 |
| *Catostomus commersoni* | | | | | | | | 3 | | | | | | |
| *Clinostomus funduloides* | 134 | 19 | 50 | 14 | 24 | | 5 | 58 | | 7 | 57 | 31 | | |
| *Cottus carolinae* | 42 | 81 | 3 | 22 | 15 | 47 | 14 | 35 | 24 | 24 | 22 | 34 | 16 | 14 |
| *Cyprinella galactura* | | | | | | | | | 5 | 6 | | | 1 | 1 |
| *Dorosoma cepedianum* | | | | | | | | | | | | | | 20+ |
| *Erimystax dissimilis* | | | | | | | | | | | | | | 2 |
| *E. insignis* | | | | | | | | | | | | | | 1 |
| *Etheostoma blennioides* | | 5 | | | 1 | 9 | | | 5 | 3 | 3 | 8 | 3 | 2 |
| *E. blennius* | | | | | | | | | 3 | | | | | |
| *E. caeruleum* | | 43 | | 35 | 25 | 24 | 1 | 9 | 13 | 27 | 10 | 8 | 20 | 5 |
| *E. duryi* | | 2 | | 7 | 27 | 2 | 29 | 13 | 6 | 15 | 19 | 23 | 3 | 6 |
| *E. flabellare* | | | | 9 | 1 | 4 | | | 1 | | 2 | 12 | 2 | |
| *E. rufilineatum* | | | | 1 | | 12 | | | 60 | 12 | | | 56 | 41 |
| *E. simoterum* | | 1 | | 3 | | 13 | | | 11 | 10 | | 3 | 14 | 28 |
| *E. sqaumiceps complex* | | | 10 | | 10 | | 9 | 3 | 2 | 1 | | 4 | | |
| *E. zonale* | | | | | | | | | | | | | | 3 |
| *Fundulus catenatus* | | | | 3 | | 2 | | | 9 | 1 | 1 | | 10 | 6 |
| *F. olivaceus* | | | | | | 1 | | | 1 | 2 | | | 3 | 3 |
| *Gambusia affinis* | | | | | | 3 | | | | | | | | |
| *Hybopsis* sp. | | 12 | | 14 | | 48 | | | 12 | 3 | | | 2 | 37 |
| *Hypentilium nigricans* | | | 1 | 7 | 8 | 6 | 8 | 12 | 4 | 10 | 4 | 4 | 8 | 11 |
| *Ichthyomyzon* spp. (larval) | | | | | | | | | 2 | | | | 1 | |
| *Ictalurus punctatus* | | | | | | | | | | | | | | 2 |

Table 3 (continued)

| Species | Site | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| *Lepomis cyanellus* | | 2 | 12 | 1 | 100+ | 36 | 37 | 21 | 6 | 11 | 2 | 2 | 3 | |
| *L. gulosus* | | | | | | 3 | | | | | | | | |
| *L. macrochirus* | | 2 | | 23 | 50+ | 20 | 1 | 13 | 1 | 1 | | 1 | | 7 |
| *L. megalotis* | | 3 | | 27 | 50+ | 34 | 7 | | 25 | 12 | 1 | | 9 | 45 |
| *Luxilus chrysocephalus* | | 6 | | 15 | | 29 | | | 43 | 25 | 23 | 5 | 13 | 9 |
| *L. coccogenis* | | | | 36 | 1 | 2 | | | 16 | 13 | 15 | 5 | 12 | |
| *Lythrurus ardens* | | | | 13 | 1 | | | | | | | | | |
| *L. lirus* | | | | | | | | | | | | | | |
| *Micropterus dolomieu* | | | | 1 | | | | | 1 | | | | 1 | |
| *M. punctulatus* | | | | 1 | | | | | 3 | | | | | 2 |
| *M. salmoides* | | | | | 5 | 1 | | | | | | | | |
| *Minytrema melanops* | | | | | | 2 | | | | | | | | 1 |
| *Moxostoma duquesnei* | | | | 2 | | 3 | | | 4 | | | | | 1 |
| *M. erythrurum* | | | | | | | | | 2 | | | | | 6 |
| *Nocomis micropogon* | | | | | | | | | 4 | | | | | 1 |
| *Notropis anthrinoides* | | | | | | | | | 8 | | | | | |
| *N. leucoides* | | | | | | 4 | | | 54 | 14 | | | 6 | |
| *N. telescopus* | | | | 3 | | | | | 3 | 6 | | | 3 | 3 |
| *N. volucellus* | | | | | | | | | | | | | | 4 |
| *N. sp. "sawfin shiner"* | | | | | | | | | 1 | | | | | |
| *Noturus flavens* | | | | | | | | | | | | | | |
| *Percina caprodes* | | 1 | | 1 | 2 | 8 | | | 4 | 1 | | | 1 | 5 |
| *P. evides* | | | | | | | | | 1 | | | | | 1 |
| *P. sciera* | | | | | | 1 | | | | | | | | |
| *Phoxinus erythrogaster* | 1 | | 10 | | 1 | | | 1 | | | 1 | 3 | | |
| *Pimephales notatus* | | | | 1 | | 1 | | | 3 | | | | | 1 |
| *Phenacobius uranops* | | | | | | | | | 1 | | | | | 1 |

Table 3 (continued)

| | Site | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| *Rhinichthys atractulus* | 53 | 1 | 32 | | 9 | | 4 | 30 | | | 1 | 15 | | |
| *Semotilus atromactulatus* | 5 | 9 | 50 | 3 | 12 | | 14 | 34 | 3 | 9 | 26 | 12 | 1 | |
| Species Richness | 6 | 15 | 9 | 25 | 19 | 29 | 12 | 14 | 36 | 24 | 17 | 18 | 25 | 33 |
| Total Fish Collected | 240 | 465 | 208 | 347 | 442+ | 447+ | 133 | 260 | 636 | 424 | 227 | 298 | 430 | 445 |

QUARTERLY REPORT

JULY 1 - SEPTEMBER 30,1995

# DEVELOPING TECHNOLOGY FOR LONG-TERM HOLDING OF MUSSELS IN CAPTIVITY

JAMES B. LAYZER
TENNESSEE COOPERATIVE FISHERY RESEARCH UNIT
TENNESSEE TECHNOLOGICAL UNIVERSITY
PO BOX 5114
COOKEVILLE TN 38505

cc: Dick Biggins - 11/20/95
Robb Todd

Quarterly Report

DEVELOPING TECHNOLOGY FOR LOMG-TERM HOLDING OF MUSSELS IN CAPTIVITY

In 1995, we began using a 30-day quarantine period for all mussels collected from waters known to contain zebra mussels to avoid the possible introduction of zebra mussels into any facility being used to hold adult mussels. Mussels have had variable survival rates during the quarantine period; overall, survival has been about 80%. The cause of mortality is unknown; and the initial trial of varying mussel density produced unexplainable results i.e. the high density tank had higher survival. Several 300 gallon plastic stock tanks and aerators were purchased to conduct concurrent replicate experiments which will begin in the spring.