

**Report on July 2002 monitoring of *Lampsilis higginsii* placed in cages in the
Wisconsin River near Orion in 2001.**

Wisconsin Department of Natural Resources.

16 September 2003.

This is a report on the 2002 monitoring of *Lampsilis higginsii* placed on caged fish in the Wisconsin River, Wisconsin during June of 2001. This effort was part of mussel propagation related to the continued operation and maintenance of the Mississippi River System Navigation project by the U. S. Army Corps of Engineers in cooperation with associated, multi-agency Mussel Coordination Team.

Persons involved in the 2002 monitoring were staff from the Wisconsin Department of Natural Resources including Ronald Benjamin, Mark Endris, Kenneth Von Ruden and David Heath.

During 2001, nine cages were placed at Wisconsin rivermile 48.42 (T9N, R1E, Sec. 34, NE of SW of SW, 43° 12' 28.6" N, 90° 21' 59.8" W), 8 meters (m) off right descending bank, Richland County, Wisconsin (Heath, 2001.). All cages were placed within several meters of each other, in a line about 20m downstream of some obvious shoreline rip-rap associated with State Highway 60 (see Figure 1).

Figure 1. View from SW of location of 9 cages containing *L. higginsii* inoculated fish, lower Wisconsin R. 13 June 2001.



On 13 June 2001, a total of 445 smallmouth bass and 150 walleye were distributed into the cages. On 5 July 2001, 22 days after placement of fish, fish and cages were removed (Heath, 2001). Based on initial inoculation loads and numbers of glochidia remaining on released host fish, the host fishes dropped a minimum of 11,800 glochidia into the Wisconsin River.

On 16 and 25 July 2002, a total of 36 0.25m² hand-excavated bottom quadrat samples were taken in and around the cage locations and up to 14m downstream. In these quadrat samples, we found 15 living and 158 dead unionid mussels (Table 1). No *L. higginsii* were found.

Total mussel population density was 1.67/m². This compares to 1.34/ m² for the entire 5-mile long Orion mussel bed sampled randomly in 2002.

Following placement of cages in 2001, we anticipated that 1 year-old *L. higginsii* would be at least 16mm total length. The smallest mussel found in the 2002 monitoring was 11mm in total length, the largest 111mm (Tables 2, 3). The mean

total length was 45.3mm. Five of the fifteen mussels (33%) were less than 23mm in total length suggesting that although the sample may have been biased against the collection of small mussels, small mussels were not entirely missed. It is unclear why no *L. higginsii* were found during the 2002 monitoring of the cage locations. We can think of two possible explanations for the absence of juvenile *L. higginsii* in our samples.

The first is that these juveniles or glochidia did not survive. Glochidia on fishes' gills may have perished, possibly due to the fishes condition factor or due to water quality conditions in the lower Wisconsin River. Shells left behind by juvenile mussels or glochidia would be nearly impossible to recover.

The second possibility is that newly dropped juveniles may have drifted farther downstream than our quadrat sampling extended. We sampled quadrats up to 14m downstream of the downstream-most cage location. Some preliminary, rough estimates of *Lampsilis* glochidia by D. Kelner (U.S. Army Corps of Engineers, Pers. Comm.) suggests that glochidia can drift about 23m at a current velocity of 0.5 fps, 46m at 1.0 fps and 70m at 1.5 fps.

At the Orion bed on the Wisconsin River, it would not be surprising to find current velocities during average discharges of 0.2 to 1.5 fps. During 2003, we measured current velocities at a similar location in the Orion bed, about 1 mile away from the 2001 mussel cage station. At a discharge of 8250 cfs, which was 75% of mean daily flow for the 89-year period of record, we measured velocity at 0.4-1.2 fps at 6 inches off the bottom and mid-depth, respectively. Presumably, velocity would be greater at higher flows such as was observed when the cages were in the river in June and July of 2001 (Figure 2). During this period, the mean flow was 14,400 cfs. Therefore, likely velocities at the 2001 cage site were high enough during the period when fish were in the cages, to allow for juvenile drift farther downstream than we sampled in 2002.

Future monitoring at this location should include samples from 40m to 100m downstream of the cage locations. This may provide some insight into the fate of the juveniles dropped from their caged host fishes.

Table 1. Mussels Found and Mean Population Density in 36 0.25m² Quadrats at the 2001 *L. Higginsii* Release Site, Wisconsin River Near Orion. July 2002.

TAXON	MEAN # LIVE/m ²	STD DEV	COEF. OF VAR.	NO. LIVE	NO. DEAD
<i>Amblema plicata plicata</i>	0.11	0.67	6.00	1	16
<i>Elliptio dilatata</i>	0.22	0.93	4.18	2	17
<i>Fusconaia flava</i>	0.00	0.00	.	0	36
<i>Lampsilis cardium</i>	0.67	1.51	2.27	6	4
<i>Leptodea fragilis</i>	0.11	0.67	6.00	1	0
<i>Ligumia recta</i>	0.00	0.00	.	0	4
<i>Obliquaria reflexa</i>	0.00	0.00	.	0	5
<i>Obovaria olivaria</i>	0.22	0.93	4.18	2	15
<i>Plethobasus cyphus</i>	0.00	0.00	.	0	3
<i>Pleurobema coccineum</i>	0.00	0.00	.	0	3
<i>Quadrula metanevra</i>	0.00	0.00	.	0	40
<i>Quadrula pustulosa pustulosa</i>	0.11	0.67	6.00	1	8
<i>Tritogonia verrucosa</i>	0.00	0.00	.	0	3
<i>Truncilla donaciformis</i>	0.22	0.93	4.18	2	1
<i>Truncilla truncata</i>	0.00	0.00	.	0	3
ALL TAXA	1.67	2.41	1.45	15	158

Figure 2. Length Frequency of All Mussels Found in 36 0.25m² Quadrats at the 2001 L. Higginsii Release Site, Wisconsin River Near Orion. July 2002.

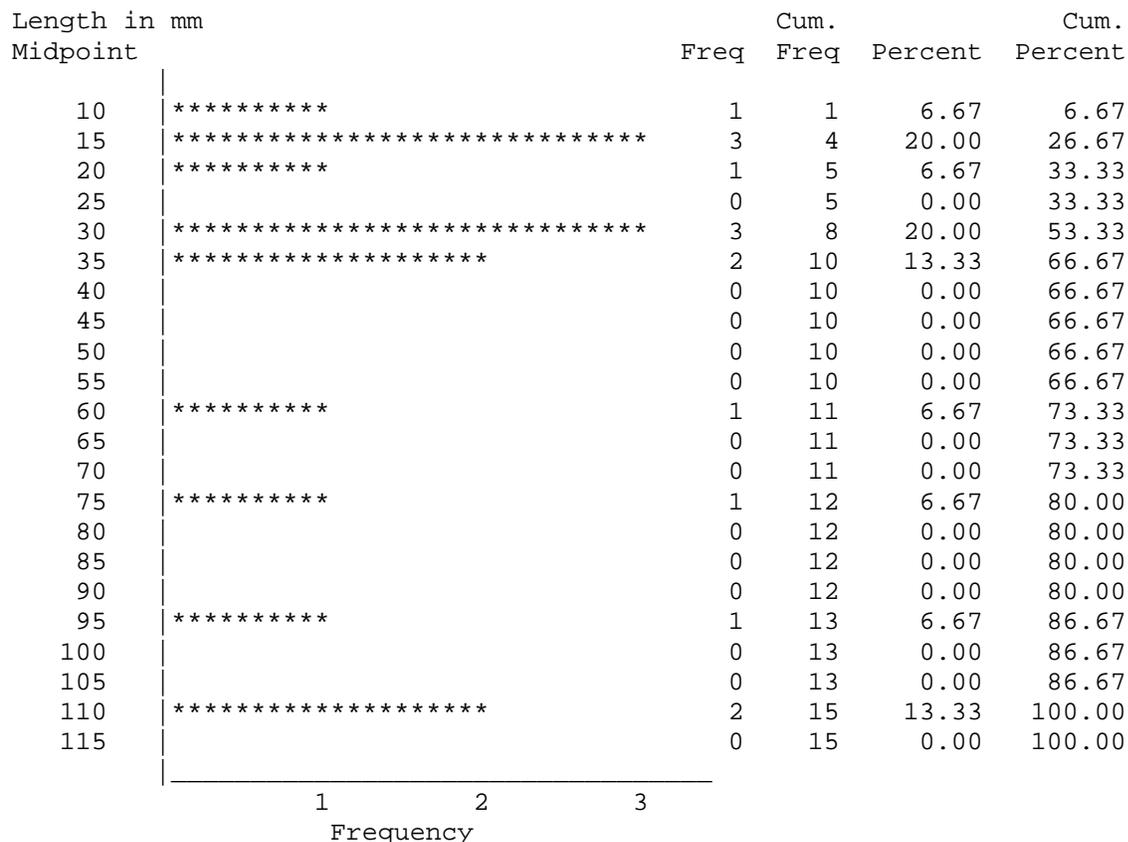
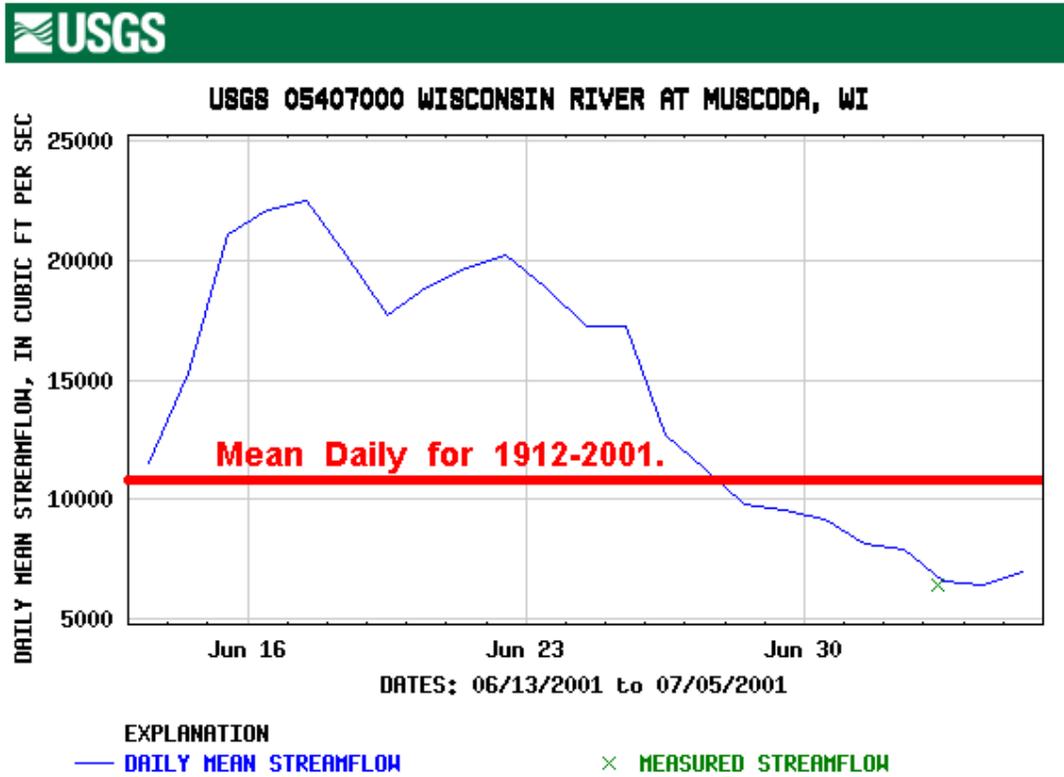


Table 2. Lengths and Ages of All Living Mussels Found in 36 0.25m² Quadrats at the 2001 L. Higginsii Release Site, Wisconsin River Near Orion. July 2002.

TAXON	LENGTH	AGE
Amblema plicata plicata	22	3
Elliptio dilatata	58	5
Elliptio dilatata	28	5
Lampsilis cardium	11	1
Lampsilis cardium	111	14
Lampsilis cardium	29	3
Lampsilis cardium	14	1
Lampsilis cardium	111	16
Lampsilis cardium	94	7
Leptodea fragilis	35	3
Obovaria olivaria	31	5
Obovaria olivaria	36	4
Quadrula pustulosa pustulosa	73	14
Truncilla donaciformis	13	4
Truncilla donaciformis	13	1

Figure 2. Mean Daily Streamflow in cfs, for the lower Wisconsin River at Muscoda, 13 June - 5 July 2001 (Modified from USGS).



References Used

Heath, David J. 2001. December 26, 2001 letter to Mr. Dennis Anderson U. S. Army Corps of Engineers, St. Paul, MN
re. Report on placement of *L. higginsii* inoculated fish in cages and free-ranging fish, lower Wisconsin R., 2001.