

**The Illinois-Missouri Cooperative Mussel Project-  
Report of 2003 Mussel Surveys of Eight Beds on Mississippi River Pool 25;  
Clarksville, Quiller, Sny Island, Coon Island, Maple Island,  
Carroll Island, Outer Stump, and Kelly  
Island**

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## INTRODUCTION

### OBJECTIVES

The objectives of this project were to: 1. Locate and determine the status of existing mussel beds in Mississippi River Pool 25; 2. Determine the status and location of rare and listed species within Pool 25, thus enabling the development of a management strategy for these species and their associated habitat; 3. Locate potential parent stocks of all species, especially federal and state listed species, for the purpose of future propagation; 4. Locate potential sites for possible future *Lampsilis higginsii* reintroduction.

### BACKGROUND

Fresh water mussels comprise the largest group of species listed as endangered or threatened by the U. S. Fish and Wildlife Service. Of the close to 300 mussel species once found in North America, over half are either extinct, watch listed or listed as endangered or threatened (both state and/or federally). Present day mussel populations in the Upper Mississippi River are experiencing serious declines due to habitat loss, introduction of exotic species, pollution, over harvest and illegal harvest. This is cause for great concern as to the future of these species.

There have been prior efforts by a number of state and federal agencies and universities to sample scattered locations in the Mississippi River over the last 20 - 25 years using various methods. Although mussel populations have been of concern on the river, concerted efforts are only now beginning to quantify existing mussel beds and to develop consistent monitoring programs.

The Illinois/Missouri Cooperative Mississippi River Mussel Program was created in 1997 to address the above issues and to develop a consistent, up-to-date mussel monitoring program on the Mississippi River bordering Illinois and Missouri. This program is/has been funded by both the Illinois Department of Natural Resources and the Missouri Department of Conservation. We are continually in search of funding for aide in this program's development.

This project, funded by the Wildlife Preservation - FY03 Large Projects Fund, concentrated on Mississippi River Pool 25. Dive sites to be sampled were chosen based on historical survey data, suggestions from former commercial shellers, and recent exploratory brailing and hand surveys. The data from these surveys will be used as a baseline for trend analysis in a five year monitoring program currently being developed for the Mississippi River pools 20 - 26.

## METHODS

Exploratory brailling and hand surveys were performed over a three year period by the Illinois Department of Natural Resources and the Missouri Department of Conservation to aid in choosing some of the suitable dive survey sites. The remaining sites were chosen based on conversations with a retired commercial mussel harvester. Two sites were chosen based on species number and diversity found in previous surveys, while six other sites were looked at without any previous sampling (Table 1 and 2). The eight sites surveyed were Clarksville, right descending bank at river miles 271.8 - 273; Quiller, left descending bank at river mile 259.0 - 260.2; Carroll Island, Illinois side of island at river mile 268.8 - 269.1; Sny Island, left descending bank at river mile 267.6 - 269.0; Coon Island, Illinois side of island at river mile 266.2 - 266.5; Maple Island, left descending bank at river mile 247.8 - 248.5; Outer Stump Lake, left descending bank (near channel) at river mile 250.4 - 250.8; and Kelley Island, left descending bank at river mile 255.9 - 256.9. An additional seven sites were also investigated, but were found to contain zero to few mussels.

For trend analysis, two representative beds from each pool are chosen and sampled quantitatively and qualitatively on a five year rotation. The Clarksville and Quiller beds were sampled in this manner as representatives of pool 25. The other six beds were timed dived with the diver retrieving all mussels encountered in a given period of time. Both the qualitative and quantitative statistics will be integral for detecting bed "health" trends and for the development of management schemes after subsequent sampling has occurred.

Quantitative sampling was used to determine species density and diversity for each bed. This was accomplished by laying a predetermined number of equally spaced transects perpendicular to the river bank. The number of transects was determined by bed length. Ten 0.25 M<sup>2</sup> substrate quadrat samples, 15 cm in depth, were collected along each transect and sent to the surface in 20L plastic buckets. Each sample was sorted through a nested sieve with decreasing mesh size (12mm, 6mm). Mussels were identified, counted, and returned to the river. A voucher of each species collected was taken and has been deposited into the Illinois State Museum.

Qualitative sampling was used to determine species diversity and presence of endangered and threatened species in each bed. Fifteen minute timed searches were conducted at predetermined points based on bed size and shape. All mussels were bagged and sent to the surface for processing. Live mussels were identified, tallied, recorded and returned to the river. Point locations were recorded using a GPS unit.

Dive services were provided by Ecological Specialists, Inc. (ESI). Samples were processed by Chuck Howard of ESI, Dean Corgiat and Tim Kelley of the Illinois Department of Natural Resources, and Travis Moore of the Missouri Department of Conservation.

## RESULTS AND DISCUSSION

The survey was conducted between 1 October, 2003 and 4 October, 2003. A total of 2,132 native mussels were observed. Three species stood out as most numerous over all samples; the mapleleaf (comprising 15 % of the total sample), the threehorn wartyback (22 % of the total sample), and the threeridge (28 % of the total sample). These three species together accounted for 65 % of the total sample for all eight sites.

A total of 22 species were collected from the eight survey sites (Tables 1 and 2). Of these, five species are listed as either threatened, endangered, or watch listed in Illinois and/or Missouri (Table 3). The Illinois state listed butterfly mussel showed up in Pool 25 with much more regularity than expected. Two of the eight beds surveyed contained these mussels with numbers ranging from 21 to 123 individuals found per bed (Tables 1 and 2). The butterfly mussel made up 6 % of the mussels sampled on the Clarksville Bed (Table 4) and 23 % on the Quiller Bed (Table 5).

### QUALITATIVELY AND QUANTITATIVELY SAMPLED SITES

#### Clarksville Bed

The Clarksville bed was sampled between UTM points N 4359954.600, E 680717.382 and N 4359189.603, E 681589.038 along the shore side and N 4360016.423, E 680793.369 and N 4359274.325, E 681639.909 along the channel side. The water depth ranged from 5 to 13 feet. The substrate ranged from a 80 % gravel, 20 % sand mixture to a 90 % sand, 10 % gravel mixture. Most of the bed's substrate was dominated, overall, by gravel.

Due to previous sampling (brailling), this site was chosen as one of the two to be monitored regularly on a five year rotation. Because of this, both qualitative and quantitative sampling was performed.

With respect to species diversity, this site falls in the mid to high range when compared to other beds sampled in Pools 24 (1999) and 25. There were 11 different species collected during quantitative sampling and 12 species taken during qualitative sampling (Table 4). There was a total of 15 species collected during all sampling types combined.

Based on the quantitative sample, the threeridge, the mapleleaf, and the threehorn wartyback were the most dominant species in the bed. Total unionid density was 2.76 animals per M<sup>2</sup> (Table 4). This is a fair number of animals for the lower part of the Upper Mississippi River.

Table 1. Species and number of unionids collected during quantitative and qualitative sampling of Pool 25 sites.

Species	Total # of Animals	Clarksville Bed	Quiller Bed
Black Sandshell	4	0	4
Butterfly	144	21	123
Deertoe	2	1	1
Fawnsfoot	2	0	2
Fragile papershell	5	1	4
Giant Floater	3	2	1
Hickorynut	159	52	107
Mapleleaf	209	83	126
Monkeyface	18	6	12
Mucket	3	0	3
Paper Pondshell	0	0	0
Pimpleback	57	11	46
Pink Heelsplitter	1	1	0
Pink Papershell	0	0	0
Pocketbook	31	13	18
Rock Pocketbook	5	0	5
Threehorn Wartyback	347	132	215
Threeridge	194	81	113
Wabash Pigtoe	10	1	9
Wartyback	10	5	5
Washboard	89	7	82
White Heelsplitter	1	0	1
Yellow Sandshell	21	0	21
Total # of Unionids	1315	417	898
Total # of Species	21	15	20

Table 2. Species and number of unionids collected during timed dive sampling of Pool 25 sites

Species	Total # of Animals	Carroll Island	Sny Island	Coon Island	Maple Island	Outer Stump	Kelly Island
Black Sandshell	1	0	0	1	0	0	0
Butterfly	0	0	0	0	0	0	0
Deertoe	1	0	1	0	0	0	0
Fawnsfoot	1	1	0	0	0	0	0
Fragile papershell	11	2	7	0	1	0	1
Giant Floater	30	7	11	5	4	2	1
Hickorynut	17	0	9	2	4	0	2
Mapleleaf	112	10	26	5	42	6	23
Monkeyface	0	0	0	0	0	0	0
Mucket	1	0	0	0	1	0	0
Paper Pondshell	0	0	0	0	0	0	0
Pimpleback	21	1	13	0	3	1	3
Pink Heelsplitter	3	0	2	0	0	0	1
Pink Papershell	3	1	2	0	0	0	0
Pocketbook	5	1	1	0	2	0	1
Rock Pocketbook	2	1	1	0	0	0	0
Threehorn Wartyback	132	25	37	3	32	23	12
Threeridge	405	33	110	12	159	4	87
Wabash Pigtoe	10	2	0	0	7	0	1
Wartyback	15	4	1	1	5	0	4
Washboard	18	0	8	0	7	0	3
White Heelsplitter	7	1	2	1	0	0	3
Yellow Sandshell	19	4	5	1	1	0	8
Total # of Unionids	907	93	236	31	268	36	150
Total # of Species	20	14	16	9	13	5	14

Table 3. Illinois and Missouri species of concern collected from Pool 25, Oct., 2003. (\*See appendix A)

<b>Species</b>	<b>Number of Animals</b>	<b>Bed Name</b>	<b>Illinois Status</b>	<b>Missouri Status *</b>
Black Sandshell	4	Quiller Bed	Threatened	S1 - S2
Black Sandshell	1	Coon Island	Threatened	S1 - S2
Butterfly	123	Quiller Bed	Threatened	
Butterfly	21	Clarksville Bed	Threatened	
Hickorynut	107	Quiller Bed		S2 - S3
Hickorynut	52	Clarksville Bed		S2 - S3
Hickorynut	2	Coon Island		S2 - S3
Hickorynut	9	Sny Island		S2 - S3
Hickorynut	4	Maple Island		S2 - S3
Hickorynut	2	Kelley Island		S2 - S3
Rock Pocketbook	5	Quiller Bed		S3
Rock Pocketbook	1	Sny Island		S3
Rock Pocketbook	1	Carroll Island		S3
Wartyback	5	Quiller Bed		S3
Wartyback	5	Clarksville Bed		S3
Wartyback	1	Coon Island		S3
Wartyback	1	Sny Island		S3
Wartyback	5	Maple Island		S3
Wartyback	4	Kelley Island		S3
Wartyback	4	Carroll Island		S3
<b>Total</b>	<b>357</b>			



Table 4. Species collected by sample type and density of unionids from Clarksville Bed, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample	Qualitative	Quantitative	Number/M <sup>2</sup>
Butterfly	21	6	19	2	0.06
Deertoe	1	<1	0	1	0.03
Fragile papershell	1	<1	0	1	0.03
Giant Floater	2	1	2	0	
Hickorynut	52	13	42	10	0.29
Mapleleaf	83	19	61	22	0.63
Monkeyface	6	2	5	1	0.03
Pimpleback	11	3	9	2	0.06
Pink Heelsplitter	1	<1	0	1	0.03
Pocketbook	13	4	13	0	
Threehorn Wartyback	132	31	100	32	0.91
Threeridge	81	18	58	23	0.66
Wabash Pigtoe	1	<1	1		
Wartyback	5	1	4	1	0.03
Washboard	7	2	7	0	
<b>Total</b>	<b>417</b>	<b>100</b>	<b>321</b>	<b>96</b>	<b>2.76</b>

Table 5. Species collected by sample type and density of unionids from Quiller Bed, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample	Qualitative	Quantitative	Number/M <sup>2</sup>
Black Sandshell	4	<1	2	2	0.06
Butterfly	123	14	100	23	0.66
Deertoe	1	<1	1	0	0
Fawnsfoot	2	0	0	2	0.06
Fragile papershell	4	0	0	4	0.11
Giant Floater	1	<1	1	0	0
Hickorynut	107	13	93	14	0.4
Mapleleaf	126	14	98	28	0.8
Monkeyface	12	1	9	3	0.09
Mucket	3	<1	3	0	0
Pimpleback	46	3	25	21	0.6
Pocketbook	18	2	17	1	0.03
Rock Pocketbook	5	1	4	1	0.03
Threehorn Wartyback	215	24	174	41	1.17
Threeridge	113	13	98	15	0.43
Wabash Pigtoe	9	1	7	2	0.06
Wartyback	5	1	4	1	0.03
Washboard	82	10	70	12	0.34
White Heelsplitter	1	<1	1	0	0
Yellow Sandshell	21	3	19	2	0.06
<b>Total</b>	<b>898</b>	<b>100</b>	<b>726</b>	<b>172</b>	<b>4.93</b>

### Quiller Bed

The Quiller bed was sampled between UTM points N 4247700.429, E 696116.584 and N 4346955.582, E 696435.849 along the shore side and N 4347659.642, E 696018.747 and N 4346922.089, E 696340.640 along the channel side. The water depth ranged from 3 to 26 feet. The substrate was composed predominately of sand with cobble, gravel, silt and clay mixed at different percentages throughout the bed.

This site was also chosen to be monitored on a five year rotation due to information gathered via brailling and on the recommendation of "retired" commercial sheller. Qualitative and quantitative sampling was performed at this bed.

With respect to species diversity, this site falls in the high range when compared to other beds sampled in Pools 24 (1999) and 25. There were 16 different species collected during quantitative sampling and 18 species taken during qualitative sampling (Table 5). There was a total of 20 species collected during all sampling types combined.

Based on the quantitative sample, the threehorn wartyback, the mapleleaf, and the Illinois state threatened butterfly mussel were the most dominant species in the bed. Total unionid density was 4.93 animals per M<sup>2</sup> (Table 5). This is a fairly high number of animals for the lower part of the Upper Mississippi River.

### TIME SEARCHED SITES

The last six beds sampled were chosen based on tips from former commercial shellers. We have found that these people harbor a wealth of information on mussel bed location and composition. They have been an invaluable asset for our surveys in terms of saving an untold amount of time and money spent per return.

### Carroll Island

This bed was surveyed between UTM points N 4357088.452, E 686872.499 at the upper end and N 4356996.833, E 686951.699 at the lower end. Water depth ranged from between 4 and 5 feet. The substrate composition ranged from 90 % clay, 5 % silt, and 5 % sand to 45 % clay, 45 % sand, and 10 % silt. The dominant substrate type throughout was clay.

A timed search of 35 minutes was done at this site. A total of 93 individuals were collected. The overall assemblage of unionids was indicative to the more common species found in this reach of the river. The most abundant species encountered were the threehorn wartyback, the threeridge, and the mapleleaf. One rock pocketbook, a Missouri S3 category species (Appendix A), was the only rare unionid found.

The species diversity stands out somewhat in that a total of 14 species were collected (Table 6). The catch per unit effort was 2.65 mussels collected per minute. This makes for a fair site, in terms of density, when compared with the other beds sampled in this study and others done throughout the lower pools of the Upper Mississippi River.

### **Sny Island**

The survey was conducted from between UTM points N 4356752.444, E 687689.685 at the upper end to N 4356533.463, E 688011.088 at the lower end. All collecting was done within 5 to 10 M from the bank. The water depth ranged from 4 to 5 feet. The substrate ranged from an even mixture of sand, silt, and clay to 60 % sand, 20 % silt, and 20 % clay. Sand was the predominate substrate type.

A time search of 1 hour and 2 minutes was performed at this site. A total of 236 individuals were collected. The threeridge made up almost half the sample (47 %), while the second and third most abundant species were the threehorn wartyback and the mapleleaf respectively (Table 7). Nine hickorynuts and one rock pocketbook, both Missouri S3 category species (Appendix A), were the rare unionids found at this site (Table 3).

A total of 16 species were collected (Table 7). Only one other bed sampled had more species. This great a diversity is not all that common on this stretch of the river. The catch per unit effort was approximately 4.0 mussels per minute. Indicating good density. This bed will need to be sampled in more detail in the near future in order to quantify it's significance.

### **Coon Island**

This survey was conducted from UTM point N 4354218.596, E 689855.368 to 100 yards upriver. All collecting was done from 3 to 7 M from the bank. Water depth ranged from 4 to 5 feet. The substrate was comprised of sand, silt and clay, with sand dominating the mixture. Most mussels were found in a substrate of 80 % sand, 10 % clay, and 10 % silt.

A time search of 15 minutes was performed at this site (Cut short due to time constraints). A total of 31 individuals were collected. The threehorn wartyback, the threeridge, and the giant floater were the three most common species found (Table 8). One Illinois state threatened black sandshell and two Missouri S3 category species, one wartyback and two hickorynut, were the rare mussels that were encountered (Table 3).

A total of nine species were collected (Table 8). Although this number is low compared to the other sites, it was only sampled for 15 minutes. The catch per unit effort was approximately 2.0 mussels collected per minute. This number may seem low. However, with a more in-depth look at this bed, due to the number of species found in such a short time, I believe it would be found to be more diverse and densely populated. A more concentrated effort in sampling needs to be done at this site.

Table 6. Unionid species collected during timed search at Carrol Island, Pool 25, Oct. 2003

Species	Number of Animals	Percent of Sample
Fawnsfoot	1	1
Fragile papershell	2	2.5
Giant Floater	7	8
Mapleleaf	10	11
Pimpleback	1	1
Pink Papershell	1	1
Pocketbook	1	1
Rock Pocketbook	1	1
Threehorn Wartyback	25	27
Threeridge	33	35
Wabash Pigtoe	2	2.5
Wartyback	4	4
White Heelsplitter	1	1
Yellow Sandshell	4	4
<b>Total</b>	<b>93</b>	<b>100</b>

Table 7. Unionid species collected during timed search at Sny Island, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample
Deertoe	1	<1
Fragile papershell	7	3
Giant Floater	11	5
Hickorynut	9	4
Mapleleaf	26	11
Pimpleback	13	6
Pink Heelsplitter	2	1
Pink Papershell	2	1
Pocketbook	1	<1
Rock Pocketbook	1	<1
Threehorn Wartyback	37	16
Threeridge	110	47
Wartyback	1	<1
Washboard	8	3
White Heelsplitter	2	1
Yellow Sandshell	5	2
<b>Total</b>	<b>236</b>	<b>100</b>

Table 8. Unionid species collected during timed dive search at Coon Island, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample
Black Sandshell	1	3
Giant Floater	5	16
Hickorynut	2	7
Mapleleaf	5	16
Threehorn Wartyback	3	10
Threeridge	12	39
Wartyback	1	3
White Heelsplitter	1	3
Yellow Sandshell	1	3
<b>Total</b>	<b>31</b>	<b>100</b>

## Maple Island

This bed was found somewhat by accident. Historically, there was a large and diverse bed located just outside of the Batchtown Waterfowl Management Area. Several years prior to this survey, an off bank-line revetment was built at the site of the bed. We began sampling along the revetment (UTM coordinates N 4328573.583, E 700628.650) and encountered no mussels but large amounts of sand. We therefore assumed that this bed had been covered by sand due to the construction of the revetment. We then started sampling at the upriver end of the revetment and worked upstream from that point. We began encountering mussels almost immediately.

The survey was conducted from UTM points N 4328573.583, E 700628.650 upriver to N4330086.337, E 701467.807 (behind Maple Island). All samples were taken from 1 to 30 M from the shoreline. The substrate was predominately silt and clay, ranging from 80 % clay, 20 % silt to 50 % silt, 40 % clay, and 10 % gravel.

A total time search of 1 hour 34 minutes was performed at this site. Two hundred sixty-eight individuals were collected. The three most encountered species were the threeridge, comprising over half the sample, the mapleleaf, and the threehorn wartyback (Table 9). Two Missouri S3 category species were found, five wartyback and four hickorynut mussels (Table 3).

A total of 13 different species were collected (Table 2). The catch per unit effort was approximately 3.0 mussels per minute. This indicates fair to "above average" density when compared to the other beds sampled in this manner.

## Outer Stump Lake

This site turned out to be the least significant site sampled that contained a statistically measurable amount of mussels. The site consisted of three consecutive dikes. The area sampled was between the dikes, on the channel ends. The average depth was approximately 10 feet. The substrate was dominated by sand.

A 25 minute search resulted in 36 individuals. The most common specie collected was the threehorn wartyback, whose numbers made up well over half of the sample (Table 10). No rare species were found.

Five different species were collected. The catch per unit effort was 1.4 mussels per minute, indicating low density. Species diversity was also poor. The unionids at this site were few and randomly spaced. This indicates that though there is no "mussel bed," there still is a measurable population. These types of sites are fairly common throughout the lower pools of the Upper Mississippi River. Though they are not deemed as significant, based on species diversity and population density, they still call for attention when making management decisions.



Table 9. Unionid species collected during timed dive search at Maple Island, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample
Fragile papershell	1	<1
Giant Floater	4	1.25
Hickorynut	4	1.25
Mapleleaf	42	16
Mucket	1	<1
Pimpleback	3	1.25
Pocketbook	2	1.25
Threehorn Wartyback	32	12
Threeridge	159	59
Wabash Pigtoe	7	3
Wartyback	5	2
Washboard	7	3
Yellow Sandshell	1	<1
<b>Total</b>	<b>268</b>	<b>100</b>

Table 10. Unionid species collected during timed dive search at Outer Stump, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample
Giant Floater	2	5
Mapleleaf	6	17
Pimpleback	1	3
Threehorn Wartyback	23	64
Threeridge	4	11
<b>Total</b>	<b>36</b>	<b>100</b>

### Kelley Island

This site was sampled between UTM point N 4340768.144, E 697724.348 up river to N 4341988.265, E 698017.368 (The Illinois side of Kelly Island). All samples were taken from 2 to 30 M from shore. Water depth ranged from 5 to 8 feet. The substrate was comprised of a mixture of various amounts of sand, silt, clay, gravel, and detritus. Sand and clay were the more dominate substrate types.

This site was sampled for approximately 60 minutes. A total of 150 individuals were collected. The three most dominant species in the sample were the threeridge, comprising over 50 % of the total sample, the mapleleaf, and the threehorn wartyback (Table 11). The hickorynut (2 individuals) and the wartyback (4 individuals), both Missouri S3 category species, were the rare unionids collected (Table 3).

Fourteen different species were found during sampling (Table 2). The catch per unit effort was 2.5 mussels per minute, indicating an average density when compared to the other beds sampled in this format.

### CONCLUSIONS AND RECOMMENDATIONS

The data gathered during this survey will be invaluable in the future. We now have hard baseline data that will enable us to determine how mussels are fairing in Mississippi River, Pool 25 in the future. We will use both the Quiller and Clarksville beds as indicators for the total mussel population of Pool 25. It is our hope to survey these sites on a five year rotation. We will now also be able to re-sample the other sites much more quickly and with little to no monetary needs. This is vital due to budgetary conditions of most governmental bodies at this time.

This survey resulted in the designation of four new category VI and one new category I Illinois Natural Areas. An already existing natural area, Quiller Bed, had numerous threatened listed species added to it's original species list. A total of five black sandshells (Illinois listed), 144 butterfly mussels (Illinois listed) and 208 Missouri Category S2 and S3 mussels were collected and documented during this survey (Table 3).

One objective of this study was to locate potential parent stocks for future propagation. This objective was met above and beyond our expectations. Large concentrations of individual species (both common and rare) were found. These could easily be tapped for propagation if the time and need arises. Efforts are now underway in several Missouri universities and fish hatcheries to develop programs that will enable us to go to low density areas and actually "restock" them with mussels.

Our final objective was to locate potential sites for possible future *Lampsilis higginsii* reintroduction. At the time of writing this report, several beds that were surveyed during this project are being evaluated and considered for *L. higginsii* reintroduction sites.

Table 11. Unionid species collected during timed dive search at Kelly Island, Pool 25, Oct., 2003

Species	Number of Animals	Percent of Sample
Fragile papershell	1	1
Giant Floater	1	1
Hickorynut	2	1
Mapleleaf	23	15
Pimpleback	3	2
Pink Heelsplitter	1	1
Pocketbook	1	1
Threehorn Wartyback	12	8
Threeridge	87	58
Wabash Pigtoe	1	1
Wartyback	4	2
Washboard	3	2
White Heelsplitter	3	2
Yellow Sandshell	8	5
<b>Total</b>	150	100

Although this is a few years off, valuable information from this survey has led to potential expansion of the Federal *L. higgisi* reintroduction program. It is our hope that at least one bed will be utilized in this program.

Other pertinent information gathered during this project were the sites we surveyed where no mussels were found. "Historic" data showed several good beds that, upon inspection, revealed they were no longer in existence. Four sites now seem to be either almost or totally devoid of mussels. These were: Pecan Island, left descending bank from river mile 270.0 to 270.5; Rip Rap Landing, left descending bank from river mile 265.4 to 265.7; Dead Man's Bed, left descending bank at river mile 263.7; and the channel side of Kelly Island from river mile 256.6 to 257.0.

One final note, very few zebra mussels were encountered during this survey. This exotic specie has experienced major declines in the last five years. In a 1999 survey done in Mississippi River Pool 24 (done by the authors and funded through the Illinois Wildlife Preservation Fund), it was shown that there was little to no zebra mussel infestations. In 2000 - 2001, biologists on the upper pools of the Upper Mississippi River also began to note this specie's decline. We want to monitor this specie's population closely and hope to see this trend continue.

Through this work and other surveys that have been done on the Illinois/Missouri boundary waters of the Upper Mississippi River, we are another step closer to completing initial baseline data gathering on known high quality beds. This continued monitoring will allow us to better manage and preserve these species. We have been able to accomplish a lot with minimal financial support thanks to the hard work of all individuals involved. "Thank you" to all that assisted in this worthwhile endeavor.

## Appendix A

Missouri State Status Symbols: S1 - Extremely rare and critically imperiled (Less than 5 occurrences in the state), S2 - Rare and imperiled (6 - 20 occurrences in the state), S3 - Rare and uncommon (21 - 100 occurrences in the state)