STATUS OF FAT POCKETBOOK MUSSELS (Potamilus capax) THREE YEARS AFTER RE-INTRODUCTION TO THE UPPER MISSISSIPPI RIVER, MISSOURI

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INTRODUCTION

During 1989 a total of 2,301 fat pocketbooks, Potamilus capax, were transplanted to two sites in the Upper Mississippi River (Koch, 1990). Our objective was to establish reproducing populations of this federally endangered species in the Upper Mississippi River (Buchanan, Koch, and Sweet, 1989). We placed 1,049 mussels near Blackbird Island and 1,252 near Fox Island (Figures 1 and 2). Monitoring is necessary to determine the success of their survival and reproduction. I present results of a 1990 brailing survey and a 1992 qualitative dive survey.

METHODS

Brailing: 1990

A ten foot long metal brail equipped with 150 smooth-tipped crowfoot hooks was used to sample fat pocketbook populations. The smooth ends of each hook allowed easy removal of the hook from the mussel in order to minimize damage. The brail was dragged in a downstream direction. Duration of brail hauls ranged from 2 to 5 minutes over a distance of approximately 100 meters. Captured mussels were removed from the hooks, examined, then returned immediately to the area they were taken. Fresh dead shell material was retained. Transplant sites and areas immediately downstream were sampled.

Diving: 1992

Two divers with experience in collecting mussels in the Mississippi River sampled both transplant sites. An area approximately 100 meters long was sampled immediately below each transplant site. Sampling started at the upstream boundary of each site and proceeded in a downstream direction. Divers were supplied air through a hose attached to an air compressor in the boat. Living mussels of all species were collected. Dead shells of fat pocketbooks and species resembling fat pocketbooks were collected also. Divers placed all mussels and shells into quarter-inch mesh bags and transported them to the surface for species identification and recording of numbers on fat pocketbooks. A photograph and measurements of height, length, and width were recorded for each living fat pocketbook recovered. To assess growth, we measured the distance from the ventral edge mark made when the mussels were transplanted to the current ventral edge of the shell. Live fat pocketbooks were placed by hand back into the substrate of the transplant site. Shells of dead fat pocketbooks were retained and are archived at the Missouri Department of Conservation office in Palmyra.

RESULTS AND DISCUSSION

Fox Island

In 15 brail hauls conducted on September 9, 1990, we captured three living fat pocketbooks and found the shells of two which had died. The live mussels had grown 1 to 3.5 millimeters since 1989. Dead shells indicated that growth had occurred since the mussels were transplanted. No fat pocketbooks were captured in ten brail hauls conducted immediately downstream of the transplant site. Nine other mussel species were recorded from this area, all similar to those captured during pre-transplant brailing (Table 1). Additional fat pocketbooks may have been present at this site but were buried too deeply for capture by brail. Also, if living mussels moved or were swept downstream, we would not expect to recover very many by brailing.

On September 21, 1992, divers found 13 live fat pocketbooks in 6.1 hours of dive time. Post-transplant growth was variable (Table 2). Shells of 61 dead individuals were recovered; 21 percent exhibited some growth. Live mussels and empty shells were distributed throughout the transplant site, suggesting that post-transplant movement was minimal. Where live mussels were found, substrate varied from mud to pea gravel. Most live fat pocketbooks were recovered from a mud to mud/sand mixture among woody debris. This type of substrate was somewhat contiguous throughout the longitudinal axis of the site. No fat pocketbooks were found below the site for a distance of approximately 100 meters. Other mussels collected by divers are found commonly in this type of substrate in this portion of the river (Table 1).

We found no evidence that surviving fat pocketbooks had reproduced. If we assume that all of the mussels and shells of dead individuals transplanted in 1989 were still at the transplant site in 1992, then the ratio of live to dead specimens recovered would indicate there were approximately 200 live fat pocketbooks present in 1992. However, it is possible that individuals have moved or been carried some distance from the site, so no reliable estimate of actual number is available.

Blackbird Island

In nine brail hauls conducted on September 13, 1990, only one shell of a dead fat pocketbook was collected. A subsequent 30-minute examination of the transplant site by a commercial mussel diver revealed no live fat pocketbooks. However, twenty shells of dead fat pocketbooks were recovered near shore at the lower end of the transplant site. Only two other mussel species were captured by brail at this site on this date (Table 3).

Only one live fat pocketbook was recovered by divers on September 19, 1992 (Table 2). New growth from the 1989 ventral edge mark was not evident on this individual. Shells from 28 dead individuals were recovered; 11 percent exhibited some growth. The live fat pocketbook was found at the uppermost portion of the transplant site. Most empty shells were recovered near the shoreline and towards the lower portion of the site. None were found below the transplant site. Other mussels collected at this site occur in similar habitat in this portion of the Mississippi River (Table 3).

Substrate at Blackbird Island varied from mud to sand, but sand predominated in the lower half of the site away from the shore. We have wondered whether fat pocketbooks performed better at Fox Island than at Blackbird Island because there was less sand at the Fox Island site. However, many of the fat pocketbooks were originally collected from a sand substrate.

Estimating from the ratio of live to dead specimens, there could be approximately 40 live fat pocketbooks remaining at this transplant site. The brailing effort and the brief examination by a commercial mussel diver at this site seemed to indicate the absence of live fat pocketbooks at this site; however, the diver did not spend time searching under the surface of the substrate. If additional fat pocketbooks were present to any great extent at this site they were probably buried deep enough to avoid being brailed or felt on the surface of the substrate by the mussel diver. It seems more likely they have moved or been swept out of the transplant site.

CONCLUSIONS

Brailing and diving surveys revealed that fat pocketbooks survived much better at Fox Island than at Blackbird Island. There was no evidence of recruitment at either site. Diving was superior to brailing in capturing fat pocketbooks at both sites. Also, diving resulted in a more complete record of other species than brailing. It is uncertain whether differences in substrate composition were responsible for the differential performance of fat pocketbooks at these sites.

Most of the empty shells recovered exhibited no post-transplant growth, suggesting that mortality occurred soon after transplant. Examination of live fat pocketbooks indicated much variation in growth after a three-year period. We do not know why some individuals grew so much better than others.

RECOMMENDATIONS

1) Brailing for adult fat pocketbooks should be discontinued. However, it may be interesting to try brailing the Fox Island site specifically for juveniles with byssal threads still attached. Several species of juvenile mussels of the subfamily Lampsilinae, including Potamilus alatus, the pink heelsplitter, and P. ohiensis, the fragile paper shell, have been brailed successfully in soft substrates of the Mississippi River during July and August.

2) Sample both sites again by diving in 1995.

3) Prior to 1995, if at least 1,000 fat pocketbooks become available, consider transplanting them to a Bootheel ditch.

4) If 1995 sampling indicates that a substantial number of adult fat pocketbooks have survived at Fox or Blackbird islands, and that they have reproduced, look for other opportunities to transplant them at sites similar to those which exhibit the best success in this experiment.

LITERATURE CITED

Buchanan A.C., L.M. Koch, and M.J. Sweet. 1989. A proposal for introducing Potamilus capax into portions of the Upper Mississippi River and Bootheel ditches in Missouri. Missouri Department of Conservation, Jefferson City, Missouri. 12 pp.

Koch, L.M. 1990. Reintroduction of Potamilus capax to portions of the Upper Mississippi River in Missouri. Missouri Department of Conservation, Jefferson City, Missouri. 10 pp.

Figure 1. Location of Blackbird Island fat pocketbook transplant site.

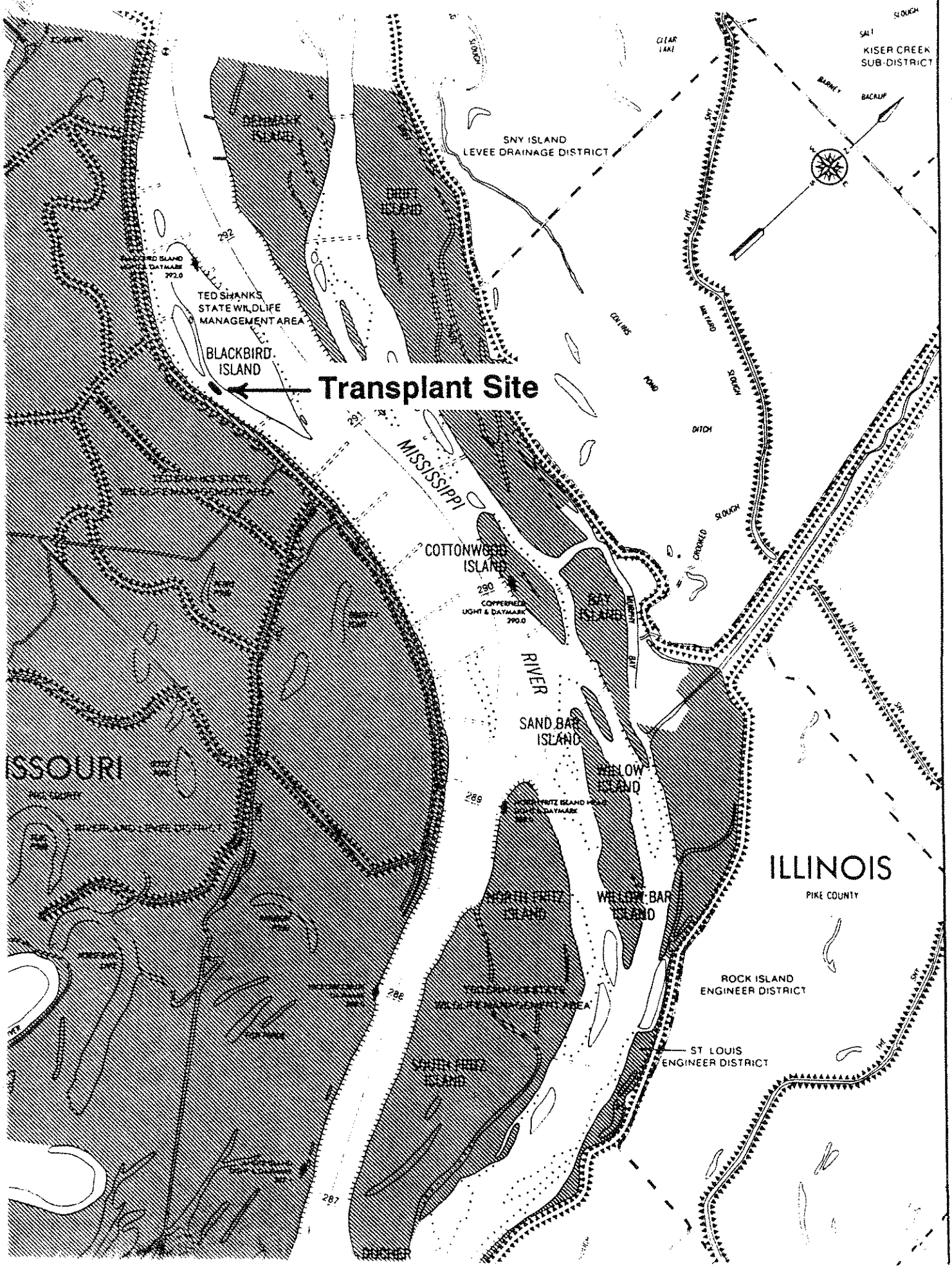

Figure 2. Location of Fox Island fat pocketbook transplant site.

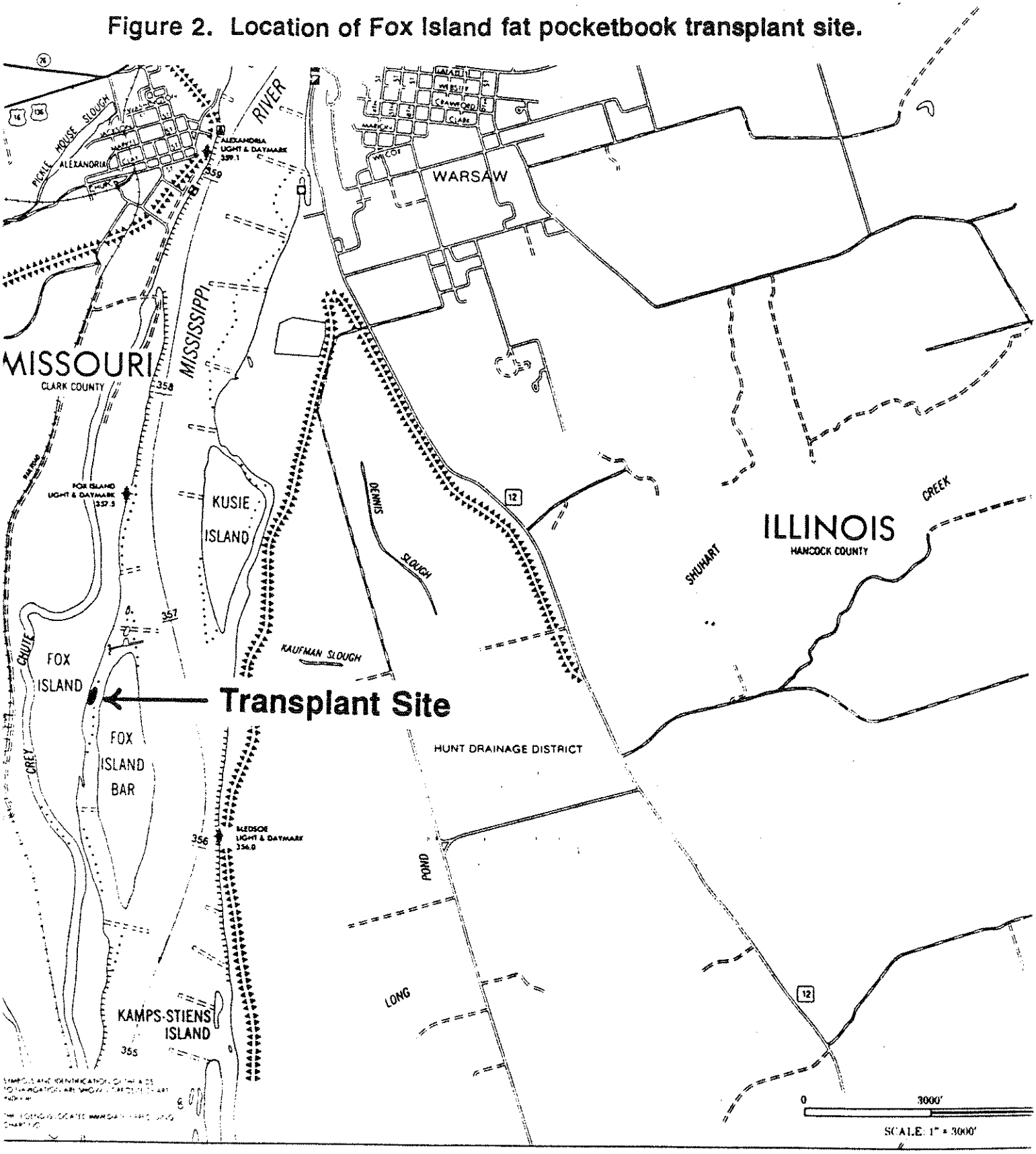

Chart 81

Chart No.	Mileage AOR	Location	Owner or Operator	Type of Service	Shelter or Warehouse	Cargo Handling Equipment	R/R Connect	Remarks
81	359.2 R	Alexandria Mo	Morgan Oil Co	Transfer & storage of petroleum products	2 steel tanks 1 827,000 gals cap	6" pipeline 700 gal / min	None	None
81	359.7	Warsaw Ill	Hancock grain	Storage & shipment	Cement elevator 120,000 bu cap	Loading spout 1,250 bu / hr	T P & W	None

Table 1. Mussel species, not including *Potamilus capax*, recorded from the Fox Island transplant site by brailing on September 9, 1990 and by diving on September 21, 1992.

Brailing	Diving
Amblema plicata	*Amblema plicata*
Fusconaia flava	*Anodonta grandis*
Lampsilis ventricosis	*A. imbecillis*
Obliquaria reflexa	*Arcidens confragosus*
Obovaria olivaria	*Fusconaia flava*
Quadrula nodulata	*Lasmigona complanata*
Q. pustulosa	*Lampsilis teres*
Q. quadrula	*L. ventricosa*
Truncilla truncata	*Leptodea fragilis*
	Megalonaias nervosa
	Obliquaria reflexa
	Obovaria olivaria
	Potamilus alatus
	P. ohiensis
	Quadrula metanevra
	Q. nodulata
	Q. pustulosa
	Q. quadrula
	Truncilla donaciformis
	T. truncata

Table 2. Growth of live fat pocketbook mussels transplanted to Blackbird Island and Fox Island in the Upper Mississippi River in 1989 and recovered in 1992.

BLACKBIRD ISLAND

Mussel No.	Year Measured	Length (mm)	Height (mm)	Width (mm)	New Growth*
150	1992	107.2	78.0	66.7	not
	1989	104.1	73.4	63.6	measured
	Growth	3.1	4.6	3.1	

FOX ISLAND

Mussel No.	Year Measured	Length (mm)	Height (mm)	Width (mm)	New Growth*
808	1992	91.3	68.0	59.6	4.6
	1989	87.7	64.0	56.9	
	Growth	3.6	4.0	2.7	
1232	1992	89.9	66.6	61.1	17.2
	1989	78.9	57.6	53.6	
	Growth	11.0	9.0	7.5	
1106	1992	108.4	69.1	67.1	1.0
	1989	108.2	71.4	65.5	
	Growth	0.2	-2.3**	1.6	
281	1992	108.0	75.5	70.3	9.3
	1989	102.7	72.2	67.0	
	Growth	5.3	3.3	3.3	
742	1992	94.8	71.2	60.0	5.1
	1989	94.1	70.1	58.0	
	Growth	0.7	1.1	2.0	
749	1992	97.9	70.0	58.9	5.2
	1989	93.9	66.4	55.6	
	Growth	4.0	3.6	3.3	
835	1992	89.5	66.3	60.1	6.1
	1989	86.2	63.7	58.1	
	Growth	3.3	2.6	2.0	
842	1992	125.4	92.1	73.2	none
	1989	125.5	91.6	72.5	
	Growth	-0.1**	0.5	0.7	

Table 2 continued...

Mussel No.	Year Measured	Length (mm)	Height (mm)	Width (mm)	New Growth
703	1992	101.5	73.1	61.9	4.5
	1989	98.1	69.9	59.1	
	Growth	3.4	3.2	2.8	
509	1992	92.1	65.1	60.9	23.6
	1989	70.6	49.2	45.8	
	Growth	21.5	5.9	5.1	
901	1992	104.6	72.5	63.4	8.9
	1989	99.1	69.4	60.0	
	Growth	5.5	3.1	3.4	
956	1992	117.6	83.6	66.1	1.7
	1989	117.1	83.7	64.8	
	Growth	0.5	-0.1**	1.3	
918	1992	111.2	78.1	70.6	29.7
	1989	89.9	60.8	55.0	
	Growth	21.3	17.3	15.6	

* In 1989 the ventral edge was marked on one valve, and this measurement refers to the distance from the 1989 ventral edge to the new ventral edge of the mussel in 1992. Since fat pocketbooks are relatively "round" in shape, this measurement may be considerably different than the difference in the height measurements given.

** This probably reflects slight differences in positioning of calipers, resulting in different readings.

Table 3. Mussel species, not including *Potamilus capax*, recorded from the Blackbird Island transplant site by brailing on September 13, 1990 and by diving on September 19, 1992.

Brailing	Diving
Obliquaria reflexa	*Amblema plicata*
Quadrula nodulata	*Anodonta grandis*
	A. imbecillis
	Arcidens confragosus
	Fusconaia flava
	Lampsilis teres
	L. ventricosus
	Leptodea fragilis
	Megalonaias nervosa
	Obliquaria reflexa
	Obovaria olivaria
	Potamilus alatus
	P. ohiensis
	Quadrula nodulata
	Q. pustulosa
	Q. quadrula
	Toxolasma parvus
	Truncilla donaciformis
	T. truncata