SVC 51

Survey of the St. Francis River for the Endangered Fat Pocketbook (*Potamilus capax*) at the Proposed Crossing for the Oklahoma - Arkansas Pipeline Project, St. Francis County, Arkansas

23 August 1990

John L. Harris, Ph.D.
12301 Pleasant Forest Drive
Little Rock, Arkansas 72212

Survey of the St. Francis River for the Endangered Fat Pocketbook (*Potamilus capax*) at the Proposed Crossing for the Oklahoma - Arkansas Pipeline Project, St. Francis County, Arkansas

Introduction

The fat pocketbook [*Potamilus capax* (Green,1832)] is a federally protected endangered species with viable populations known to occur only in the St. Francis River drainage of Arkansas. It has occurred historically in larger streams throughout the Mississippi and Ohio River systems with verified records from the upper Mississippi River (above St. Louis) and the Wabash River, Indiana (Dennis, 1984; Ahlstedt and Jenkinson, 1987; Harris and Gordon, 1987). Apparently, the fat pocketbook occurred in the White River, Arkansas, although no specimens have been collected since the 1960's (Harris and Gordon, 1987; Harris and Gordon, 1990).

The fat pocketbook has been the subject of intensive field surveys during the 1980's including the efforts of Bates and Dennis (1983), Ecosearch, Inc. (1985), Ahlstedt and Jenkinson (1987), Jenkinson and Ahlstedt (1987). Construction and/or maintenance projects required relocations of fat pocketbook populations with the results summarized in Harris (1986) and Jenkinson (1989).

Project Area

The St. Francis River is located in northeast Arkansas and southeast Missouri between Crowley's Ridge to the west and the Mississippi River to the east. The river system has been substantially altered by local drainage districts and the U. S. Army Corps of Engineers in the process of protecting agricultural land. An elaborate system of ditches and levees has been constructed, and presently the drainage system consists of two parts from near Marked Tree, Poinsett County, Arkansas, to River Mile 10 near the mouth. The original river drains the eastern half of the watershed while the Oak Donnick - St. Francis Floodway drains the western half (Ahlstedt and Jenkinson, 1987). The floodways and their tributaries are manmade, whereas river reaches upstream and downstream of Marked Tree include both unmodified areas and dredged/straightened areas (Ahlstedt and Jenkinson, 1987).

The Oklahoma - Arkansas Pipeline Project proposes to construct a trans-Arkansas natural gas pipeline which will cross the St. Francis River Floodway approximately 1.5 miles (2.4 km) downstream of Clark Corner Cutoff and 3.5 miles (5.6 km) upstream of the Interstate 40 crossing near Madison, St. Francis County, Arkansas (mid-Sec 32;T6N;R4E). The project area and survey area are illustrated in Figures 1 and 2.

The survey area for this project is apparently unmodified original river channel with conditions very similar to those described by Jenkinson (1989). The descending right hand (RHB) and descending left hand (LHB) banks were steep sided, composed

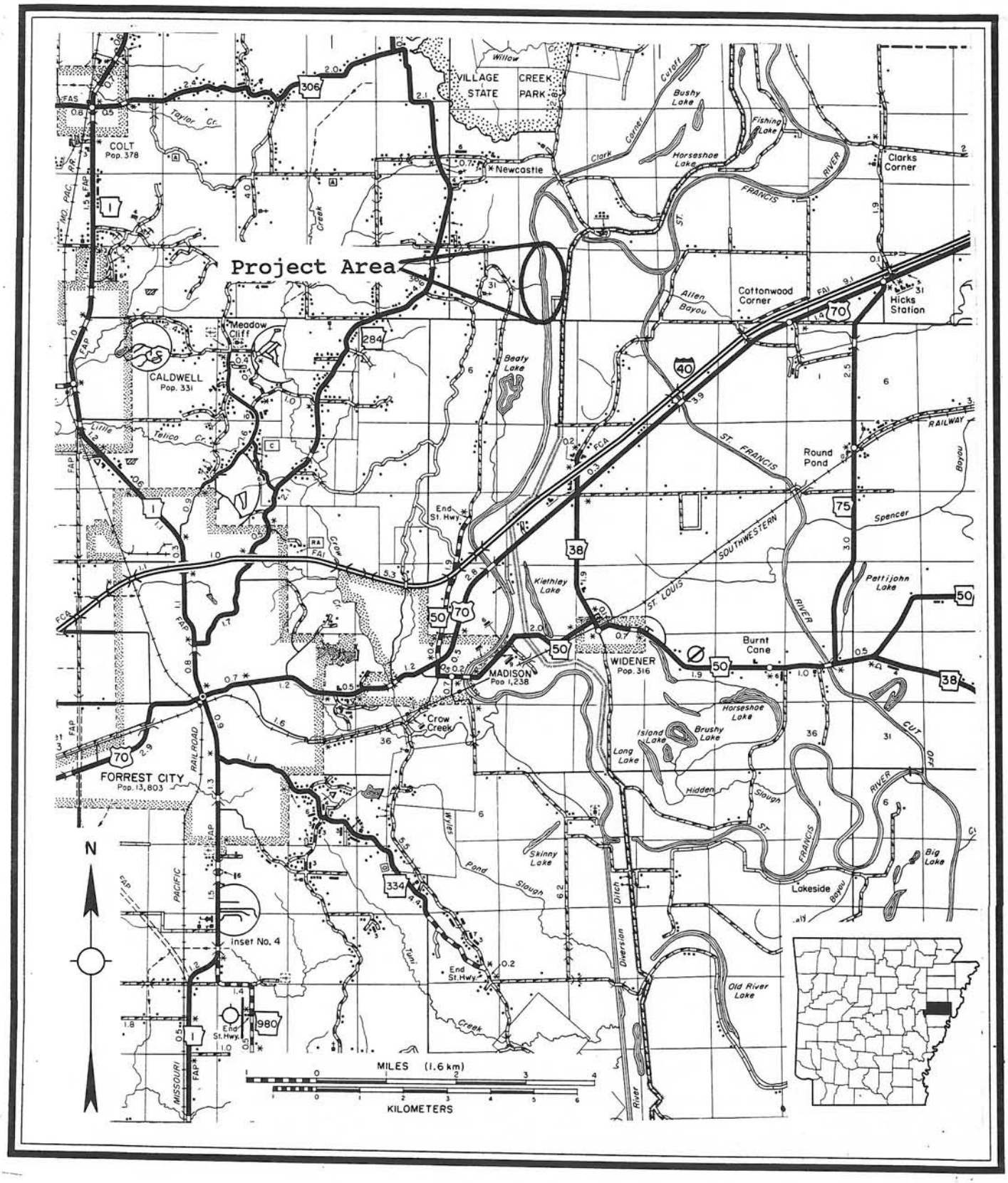

Figure 1. Project location area.

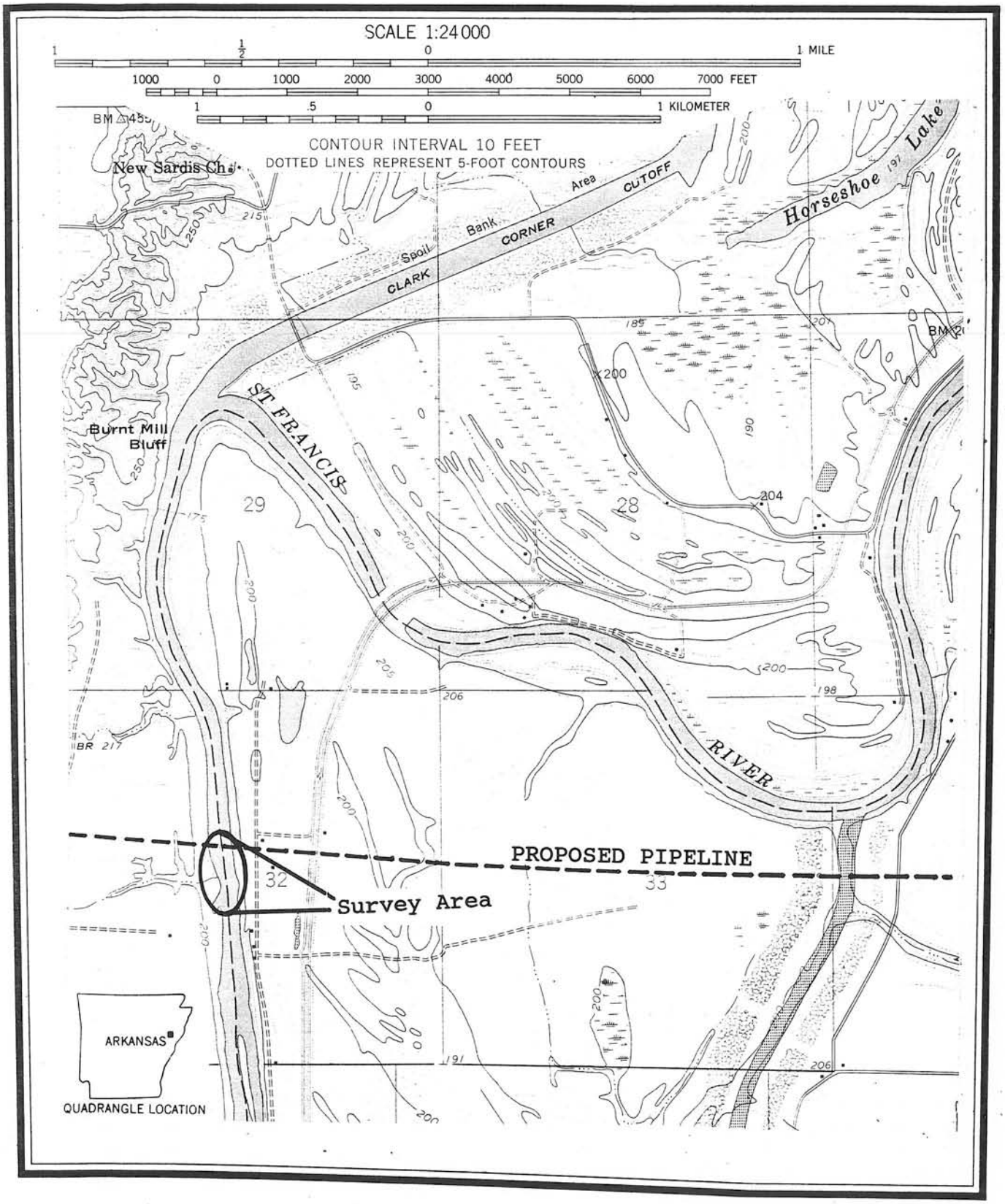

Figure 2. Project survey area.

of clay, and covered with shrubby vegetation (RHB) or mature bottomland riparian vegetation (LHB). Substrate along the LHB graded from solid clay to compact silt-sand-organics to shifting sand as one moved toward mid-river, and water depths ranged from 2 - 7 meters maximum. Along the RHB, the substrate transitioned similarly except at the downstream terminus of the project area where a substantial gravel bar extended past mid-river. Depths ranged from 1.5 - 5 meters. The mid-section of the river consisted almost exclusively of loose, shifting sand substrate with a maximum water depth of approximately eight meters.

The water was very turbid and visibility was poor. Below two meters depth, there was no visibility of the substrate. Water levels were at summer lows with Madison gauge readings at 2.3 and 2.4 (Flood Stage = 32.0) during the survey period.

Survey Methods

The survey was conducted by a single diver using a Sherwood - Hookah regulator connected by a 30 meter length of hose to a Brownie Third Lung compressor. Searches were conducted by feeling/digging the substrate with bare hands. Rectangular cells with long axis parallel to the river bank were searched in a back and forth pattern such that cell width averaged 10 - 12 meters and length averaged 25 - 30 meters on the LHB, 50 - 60 meters along the RHB, and >100 meters along the mid-river. Cells were co-terminous such that they formed transects located at RHB, LHB, and mid-river. The transects began approximately 30 meters upstream of the proposed pipeline construction centerline and

extended approximately 300 meters downstream of the centerline. Location of the search cells and transects is depicted in Figure 3.

All mussels encountered during cell searches were bagged, brought to the surface and identified, and all specimens of the fat pocketbook were measured to the nearest 0.5 millimeter for length, width, and height with dial calipers. Semi-quantitative samples were taken from square meter areas delineated by PVC pipe grids placed on the river bottom. Five square meter samples were taken from an area of relative dense shell concentration along the LHB. All live specimens were subsequently relocated along LHB, approximately 50 meters usptream of the proposed construction centerline.

The survey was conducted on August 4 - 5, 1990. Approximately 11 dive hours were spent searching for mussels within the specified survey area.

Results

A summation of species and number of specimens collected from search cells is presented in Table 1, and Table 2 summarizes the results of the square meter samples. Table 3 summarizes length, width, and height of the fat pocketbooks collected. Figure 4 illustrates specimens of the fat pocketbook and assorted other species taken from the LHB area.

Two hundred twenty-two specimens representing 16 species were collected alive during this survey. An additional three species were found as dead shells only. Thirty-one live specimens of the fat pocketbook were recovered and semi-

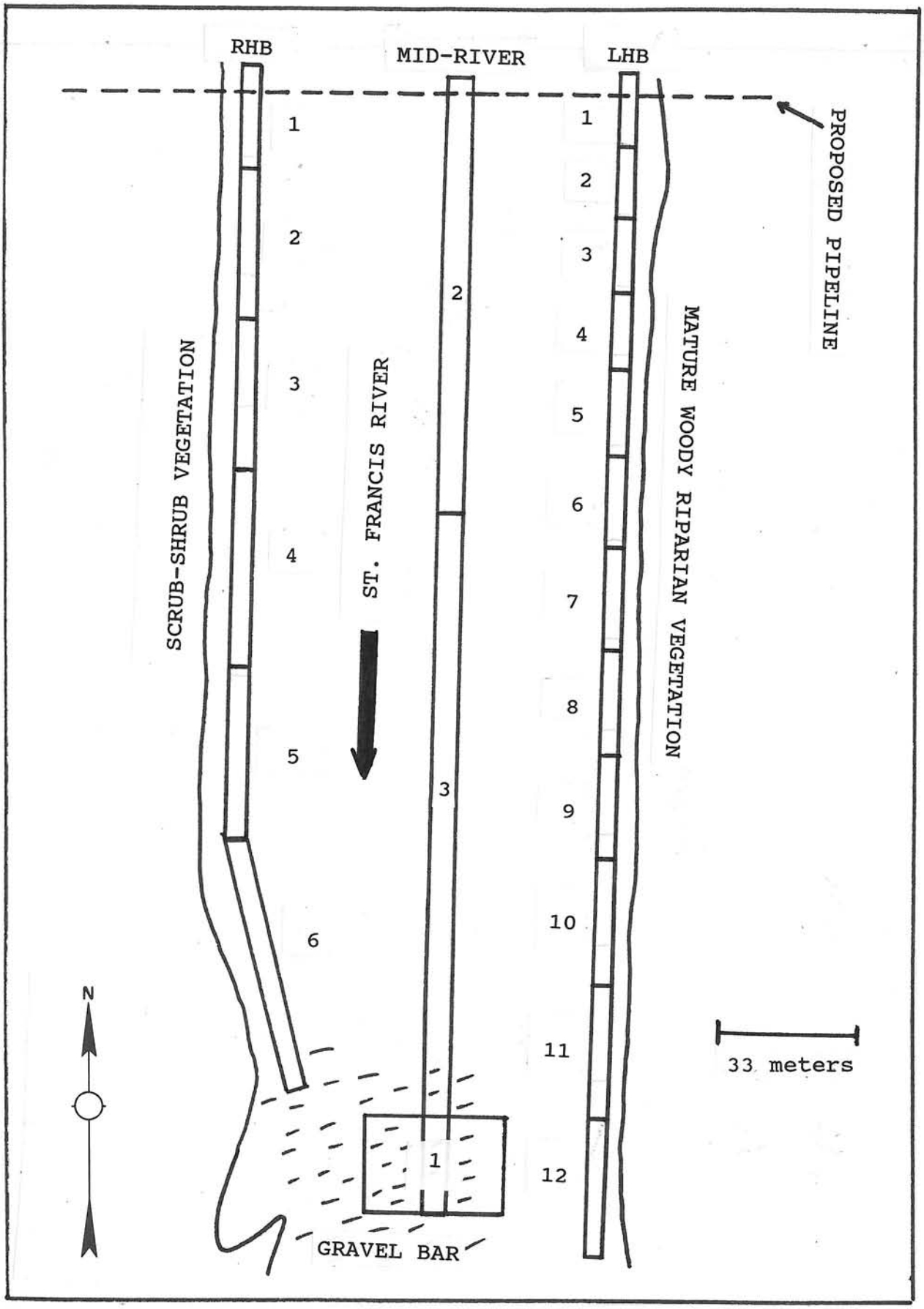

Figure 3. Location of search cells and transects.

SPECIES Common Name	SEARCH CELL - LHB 1	2	3	4	5	6	7	8
Amblema plicata threeridge	0	8	9,2	4	5,7	9	3	5
Anodonta imbecillis paper pondshell	0	0	0	0	1*	0	0	0
Fusconia ebena ✓ ebonyshell	0	0	0	0	0	0	0	0
Fusconia flava Wabash pigtoe	0	0	0	0	0	0	0	0
Lampsilis cardium plain pocketbook	0	0	0	0	0	0	0	0
Lampsilis hydiana ✓ Louisiana fatmucket	0	0	0	0	0	0	0	1*
Lampsilis teres yellow sandshell	0	0	0	1	0	1	2,13	1*
Leptodea fragilis fragile papershell	0	0	2*	3*	1	0	0	0
Megalonaias nervosa washboard	0	0	1	0	1*	3,1	0	0
Obliquaria reflexa threehorn wartyback	0	0	0	0	0	0	0	0
Plectomerus dombeyanus bankclimber	0	0	0	0	0	0	0	0
Potamilus capax ✓ fat pocketbook	0	0	1,1	0	1	1*	1*	1,2
Potamilus ohiensis pink papershell	0	2*	2*	1	1,1	0	0	1,2
Potamilus purpuratus bleufer	0	1*	1	1,1	0	0	0	2
Quadrula nodulata wartyback	0	0	0	0	0	0	0	0
Quadrula pustulosa pimpleback	0	0	0	0	2	0	0	0
Quadrula quadrula mapleleaf	0	0	0	0	0	1	0	0
Tritogonia verrucosa pistolgrip	0	0	0	0	0	0	0	0
Truncilla truncata deertoe	0	0	0	0	1	0	0	0
TOTAL	0	8,3	11,8	7,3	12,11	14,2	3,1	11,18

Table 1. Species and specimens recovered from search cells. Numbers with asterisks and following commas refer to dead shells.

SPECIES Common Name	SEARCH CELL - LHB 9	10	11	12
Amblema plicata threeridge	35,5	4	33	0
Anodonta imbecillis paper pondshell	0	0	0	0
Fusconia ebena ebonyshell	0	1	2	0
Fusconia flava Wabash pigtoe	0	0	1	0
Lampsilis cardium plain pocketbook	1	0	0	0
Lampsilis hydiana Louisiana fatmucket	0	0	0	0
Lampsilis teres yellow sandshell	1*	0	2	0
Leptodea fragilis fragile papershell	2	0	1	0
Megalonaias nervosa washboard	1	0	0	0
Obliquaria reflexa threehorn wartyback	0	0	1	0
Plectomerus dombeyanus bankclimber	0	0	1*	0
Potamilus capax fat pocketbook	2	1*	0	1
Potamilus ohiensis pink papershell	1*	0	0	0
Potamilus purpuratus bleufer	0	0	1	0
Quadrula nodulata wartyback	0	0	0	0
Quadrula pustulosa pimpleback	0	0	0	0
Quadrula quadrula mapleleaf	0	0	1	0
Tritogonia verrucosa pistolgrip	1*	0	1	0
Truncilla truncata deertoe	0	0	0	0
TOTAL	41,8	5,1	43,1	1

Table 1 (Cont). Species and specimens recovered from search cells. Numbers with asterisks and following commas refer to dead shells.

SPECIES Common Name	SEARCH CELL - RHB 1	2	3	4	5	6
Amblema plicata threeridge	0	1	2	0	2	0
Anodonta imbecillis paper pondshell	0	0	0	0	0	0
Fusconia ebena ebonyshell	0	0	0	0	0	0
Fusconia flava Wabash pigtoe	0	0	0	0	0	0
Lampsilis cardium plain pocketbook	0	1	0	0	0	0
Lampsilis hydiana Louisiana fatmucket	0	0	0	0	0	0
Lampsilis teres yellow sandshell	0	2	1	2,2	1	0
Leptodea fragilis fragile papershell	0	1,1	1	1	1	0
Megalonaias nervosa washboard	0	0	0	0	0	0
Obliquaria reflexa threehorn wartyback	0	0	0	1	1	0
Plectomerus dombeyanus bankclimber	0	0	0	0	0	0
Potamilus capax fat pocketbook	0	4,2	4	3,2	9,1	0
Potamilus ohiensis pink papershell	1,3	3*	1,1	1	0	0
Potamilus purpuratus bleufer	0	1	2,2	1,1	5	0
Quadrula nodulata wartyback	1	1	0	0	1	0
Quadrula pustulosa pimpleback	0	0	3	1	2	0
Quadrula quadrula mapleleaf	0	0	0	0	0	0
Tritogonia verrucosa pistolgrip	0	0	0	0	0	0
Truncilla truncata deertoe	0	0	0	0	0	0
TOTAL	2,3	9,8	14,3	9,6	22,1	0

Table 1 (Cont). Species and specimens recovered from search cells. Numbers with asterisks and following commas refer to dead shells.

SPECIES Common Name	SEARCH CELL - MIDDLE 1	 2	 3
Amblema plicata threeridge	1	0	0
Anodonta imbecillis paper pondshell	0	0	0
Fusconia ebena ebonyshell	1	0	0
Fusconia flava Wabash pigtoe	0	0	0
Lampsilis cardium plain pocketbook	0	1	0
Lampsilis hydiana Louisiana fatmucket	0	0	0
Lampsilis teres yellow sandshell	0	0	0
Leptodea fragilis fragile papershell	0	0	0
Megalonaias nervosa washboard	0	0	0
Obliquaria reflexa threehorn wartyback	0	0	0
Plectomerus dombeyanus bankclimber	0	0	0
Potamilus capax fat pocketbook	1	0	0
Potamilus ohiensis pink papershell	0	0	0
Potamilus purpuratus bleufer	0	0	0
Quadrula nodulata wartyback	4	0	0
Quadrula pustulosa pimpleback	2	0	0
Quadrula quadrula mapleleaf	0	0	0
Tritogonia verrucosa pistolgrip	0	0	0
Truncilla truncata deertoe	0	0	0
TOTAL	9	1	0

Table 1 (Cont). Species and specimens recovered from search cells. Numbers with asterisks and following commas refer to dead shells.

SPECIES Common Name	SQUARE METER SAMPLE 1	2	3	4	5	AVG
Amblema plicata threeridge	9	10	11	10	11	10.2
Fusconian ebena ebonyshell	2	0	0	0	0	0.4
Lampsilis teres yellow sandshell	0	0	1	0	0	0.2
Leptodea fragilis fragile papershell	0	0	1	0	0	0.2
Megalonaias nervosa washboard	1	0	0	0	0	0.2
Potamilus capax fat pocketbook	2	2	0	1	0	1.0
Potamilus ohiensis pink papershell	0	1	0	0	0	0.2
TOTAL	14	13	12	11	11	12.2

Table 2. Species and specimens recovered from square meter samples along LHB.

A.

B.

Figure 4A. Potamilus capax taken from LHB. 4B. Other species taken from LHB.

quantitative samples yielded and average of one fat pocketbook per square meter.

Discussion

In the proposed project area, mussels are distributed in narrow bands approximately one to three meters wide running parallel to river banks. These bands or mussel "beds" occur at the junction of the vertical bank and the horizontal stream bottom where there is stable clay, clay-sand, or sand-silt-organic substrate and sufficient current to keep the substate free of fine silt and sand. Along the left hand descending bank (LHB), the bed runs throughout the area surveyed (30 m upstream of centerline to 300 m downstream). The bed along the right hand descending bank is more limited. It begins approximately 15 - 20 meters downstream of centerline, and extends approximately 250 meters downstream.

It appears that these beds have been commercially exploited. Substrate searches revealed many pockets or holes in the substrate that suggest live shells have been recently removed. Shells encountered were often much more numerous in difficult to access areas around fallen trees and other debris. Easily accessible, clean substrate areas along the beds appeared to have been picked clean of commercial shells.

Densities of the fat pocketbook within the search area appear comparable to those reported in previous studies. Ranges of 0.004 to 0.16 specimens/square meter have been reported (Ecosearch, Inc.,1985; Harris, 1986; Jenkinson and Ahlstedt,

1987). Jenkinson (1989) reported 2,321 specimens of the fat pocketbook were relocated from a four mile (6.4 km) stretch of Clark Corner Cutoff immediately upstream of the project area for the Oklahoma - Arkansas Pipeline Project. Harris (1986) relocated 82 individuals from the St. Francis River at Madison. Within the preferred habitat (beds)of this search area, 32 specimens were recovered from an estimated 1800 square meters (300 meter long transects X 3 meter bed width X 2) to yield a density of approximately 0.02 specimens/square meter. The density is undoubtedly somewhat higher because the area was not exhaustively searched and all specimens were not recovered.

Literature Cited

Ahlstedt, S. A. and J. J. Jenkinson. 1987. Distribution and abundance of Potamilus capax and other freshwater mussels in the St. Francis River System, Arkansas and Missouri. U.S. Army Corps of Engineers, Memphis. Project PD-86-6052. 67 p.

Bates, J. M. and S. D. Dennis. 1983. Mussel (naiad) survey - St.Francis, White, and Cache rivers, Arkansas and Missouri. U.S. Army Corps of Engineers, Memphis. Project #DACW66-78-C-0147. 88 p. + appendices A-E.

Dennis, S. D. 1984. A recovery plan for the fat pocketbook pearly mussel Potamilus (= Proptera) capax (Green, 1832). U.S. Fish and Wildlife Service, Jackson, MS. 43 p.

Ecosearch, Inc. 1985. Mussel (naiad) study: St. Francis and White rivers Arkansas. U.S. Army Corps of Engineers, Memphis. Project # DAC-84-M-1666-R. 29 p.

Harris, J. L. 1986. Relocation of the fat pocketbook pearly mussel, Proptera capax (Green), in the St. Francis River at Madison, St. Francis County, Arkansas. Arkansas Highway and Transportation Department and Arkansas Game and Fish Commission, Little Rock. 14 p.

Harris, J. L. and M. E. Gordon. 1987. Distribution and status of rare and endangered mussels (Mollusca: Margaritiferidae, Unionidae) in Arkansas. Proceedings Arkansas Academy of Science 41(1987):49-56.

Harris, J. L. and M. E. Gordon. 1990. Arkansas mussels. Arkansas Game and Fish Commission, Little Rock. 32 p.

Jenkinson, J. J. 1989. Relocation of Potamilus capax from a 4-mile reach of the St. Francis Floodway in Arkansas. U.S. Army Corps of Engineers, Memphis District. Contract No. PD-88-CO44. 16 p. + App. A-B.

Jenkinson, J. J. and S. A. Ahlstedt. 1987. A search for a additional populations of Potamilus capax in the St. Francis and Cache River watersheds, Arkansas and Missouri. U.S. Army Corps of Engineers, Memphis. Contract No. PD-87-CO43. 133 p. + field notes.

Jenkinson, J. J. 1989. Relocation of Potamilus capax from a 4-mile reach of the St. Francis Floodway in Arkansas. U.S. Army Corps of Engineers, Memphis. Contract No. PD-88-CO44. 53 p.