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Mussel Survey of the Caddo River
below the DeGray Reservoir Reregulating Dam
near Caddo Valley, Clark County, Arkansas

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Introduction

JDJ Energy Company of Malvern, Arkansas has proposed to construct a hydro-power facility adjacent to the Reregulating Dam for DeGray Reservoir, approximately 2.8 kilometers west southwest of Caddo Valley, Clark County, Arkansas (NW 1/4 Section 36; R20W; T6S). The project area is illustrated in Figure 1. The power facility project will consist of construction of intake facility with generator, steel penstock, a single, double regulated turbine, generator, controls, powerhouse, tailrace, switchyard, transmission line, and recreation mitigation measures.

Two species of freshwater mussels (Mollusca: Unionidae) with Federal protected status are known to occur within the Ouachita River drainage (Gordon, et al, 1980; Harris and Gordon, 1987, 1988). The pink mucket [Lampsilis abrupta Say, 1831 = pink mucket pearly mussel, Lampsilis orbiculata (Hildreth, 1828)] is listed as a Federal Endangered species (U.S. Fish and Wildlife Service, 1987). The Arkansas fatmucket [Lampsilis powelli (Lea, 1852)] has been proposed for Federal Threatened listing (U.S. Fish and Wildlife Service, 1989).

Due to the potential for adverse impacts to these protected mussels, the U.S. Department of the Interior Office of Environmental Project Review requested that a survey be conducted within the

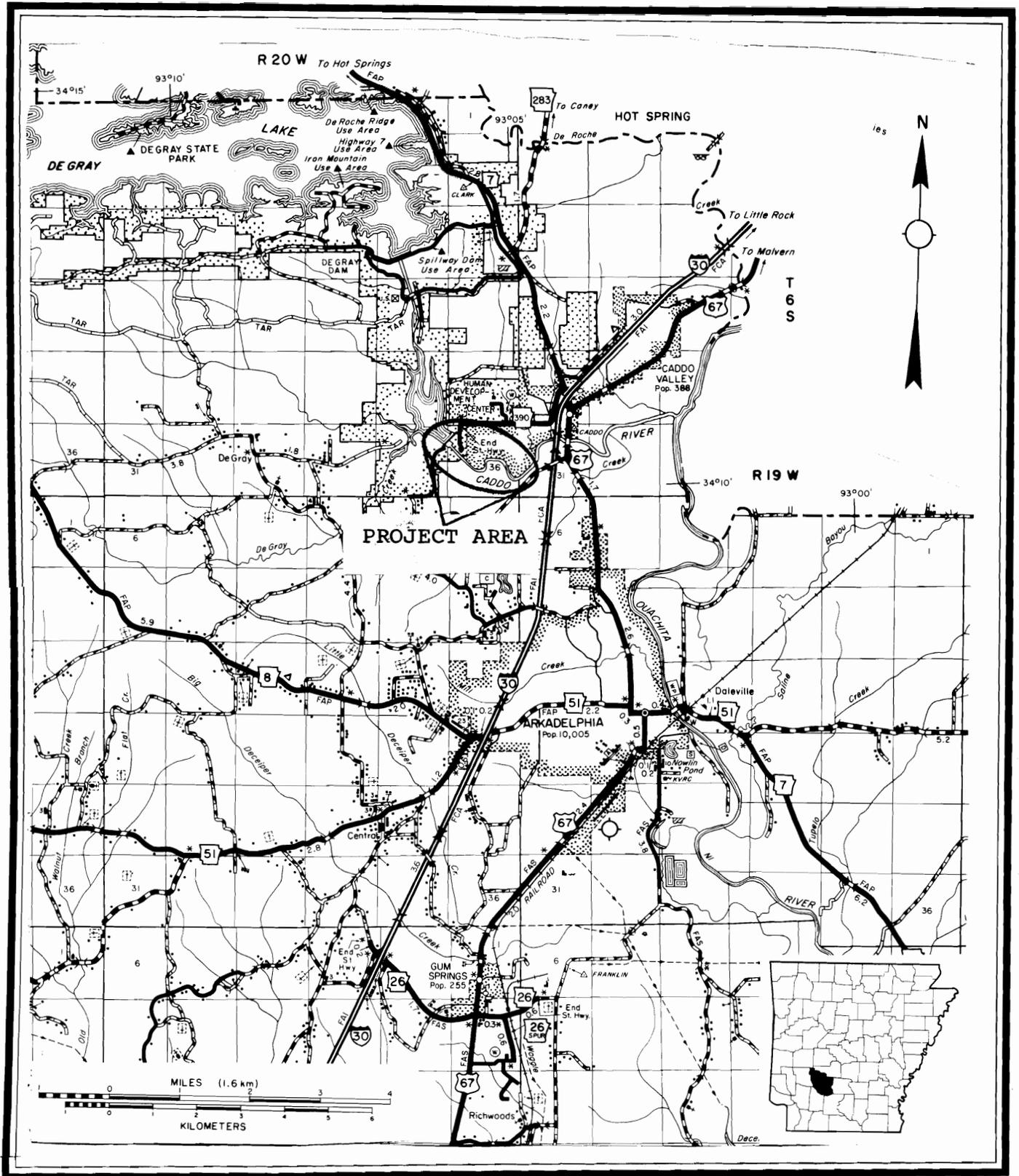


Figure 1. Location of the survey area.

project area to determine the presence or absence of these species (R. P. Churan, letter dated 4 October 1989). The requested survey area included the "area to be inundated by the regulation reservoir, the dam site, and the area within one mile (= 1.6 kilometers) downstream of the damsite".

Survey Area

The Caddo River, a tributary to the Ouachita River, is located in the Ouachita Mountain Ecoregion (Arkansas Department of Pollution Control and Ecology, 1988) and drains approximately 1243 square kilometers (= 480 square miles) upstream of the Reregulating Dam (Arkansas Soil and Water Conservation Commission, 1987).

Construction of the DeGray Reservoir project was begun in 1963 and completed in 1972. From 1969 to March 15, 1983, water released from DeGray Dam was hypolimnetic (cold water release). Physical and chemical water quality below the Reregulating Dam has generally been good since March, 1983 (Arkansas Soil and Water Conservation Commission, 1987; JDJ Energy Company, 1988).

Water depths in the survey area reach a maximum of five meters and substrates are predominately rock and coarse gravel. Water clarity was excellent during the survey with maximum underwater visibility of approximately two meters.

Survey Methods

The Caddo River, from the DeGray Reservoir Reregulating Dam downstream for a distance of 1.6 kilometers, was surveyed for mussels on 10-11 November 1989. Underwater search was performed by diver using a boat mounted generator/compressor which supplied air

via 10 meter long reinforced hose and Hookah regulator. The entire length of the 1.6 kilometer survey area was searched by diver. Particular emphasis was placed on searching microhabitats previously identified for the pink mucket (Ahlstedt, 1985; Arkansas Highway and Transportation Department, 1984) and the Arkansas fatmucket (Harris and Gordon, 1988). Also, depositional areas such as gravel bars and overflow banks were searched for shells and all specimens collected.

Live and dead mussels encountered were collected, bagged, and brought to the surface for identification and enumeration. Shells of protected species were sexed and measured to the nearest 0.5 millimeter with Helios dial calipers.

Survey Results

Table 1 summarizes the mussels collected within the survey area and Figure 2 illustrates the location of mussels collected. Nomenclature follows Turgeon, et al (1988). Table 2 gives pertinent data for specimens of Lampsilis powelli that were collected. Figure 3 pictures male and female Lampsilis powelli and other mussel species taken during the survey.

Five live individuals of the Arkansas fatmucket were among the 13 species and 58 live mussels collected during the survey. Two of the thirteen species were found only as dead shells.

Discussion

Live mussels were found at only two locations within the 1.6 kilometer length of the study area. The single squawfoot collected at Site 1 was found in a depositional area on the downstream side of an island in water approximately three meters deep. The shell was

Species Name Common Name -----	Site -----	Live -----	Dead -----
<u>Strophitus undulatus</u> squawfoot	1	1	0
<u>Anodonta grandis</u> giant floater	2	0	7
<u>Actinonaias ligamentina</u> mucket	2	1	0
<u>Amblema plicata</u> threeridge	2	38	10
<u>Fusconaia flava</u> Wabash pigtoe	2	0	2
<u>Lampsilis hydiana</u> ✓ Louisiana fatmucket	2	1	0
<u>Lampsilis powelli</u> ✓ Arkansas fatmucket	2	5	3
<u>Lampsilis satura</u> ✓ sandbank pocketbook	2	3	0
<u>Lampsilis teres</u> yellow sandshell	2	2	6
<u>Potamilus purpuratus</u> bleufer	2	0	1
<u>Tritogonia verrucosa</u> pistolgrip	2	5	3
<u>Uniomerus tetralasmus</u> pondhorn	2	1	0
<u>Villosa lienosa</u> little spectaclecase	2	1	0

Table 1. Results of mussel survey.

Species	Sex	Length	Width	Depth
<u>Lampsilis powelli</u>	F	117.0	67.0	51.5
<u>Lampsilis powelli</u>	M	103.0	59.0	47.5
<u>Lampsilis powelli</u>	F	91.0	55.0	44.0
<u>Lampsilis powelli</u>	M	92.5	51.0	38.0
<u>Lampsilis powelli</u>	F	103.0	58.0	46.0

Table 2. Sex, length, width, and depth for Lampsilis powelli collected. F = female, M = male. Measurements are in millimeters.

badly worn and not buried in the substrate. The substrate at Site 1 was composed of gravel with limited quantities of sand and prodigious numbers of both dead and live Corbicula fluminea, the introduced Asian clam. The Asian clam population was very dense throughout the upper 0.2 kilometer of the study area.

Site 2 (Figure 4) contained a low to moderate density mussel population. Most specimens came from a five meter deep pool with fine gravel and sand substrate and just enough flow to prevent silt deposition. This habitat was limited to an estimated area of approximately 200 square meters. Site 2 is located approximately 0.8 kilometer downstream of the proposed construction site.

Mussels at Site 2 appeared in good condition with thick shells and little evidence of shell erosion. All specimens were mature individuals and no evidence of recruitment was found.

Potential Adverse Impacts

Potential adverse impacts to the Arkansas fatmucket could occur due to changes in water quality or quantity.

A.

B.

Figure 3. A. Female (above center) and male (below center)
Lampsilis powelli. B. Mussels collected at Site 2.

A.

B.

Figure 4. A. Downstream view of Site 2. B. Upstream view from Site 2 towards Reregulating Dam.

Water quality. Plans for the proposed power project include construction of the power plant and tailrace immediately adjacent to the Caddo River. The construction of the proposed project will result in temporary, short-lived increases in turbidity levels downstream of the project (page 18, JDJ Energy Company, 1988). However, the majority of physical alteration will occur outside the Caddo River streambed and, therefore, prospects of adverse impacts to the Arkansas fatmucket 0.8 kilometer downstream due to siltation and/or sedimentation appear minimal. Measures to control erosion and minimize siltation and sedimentation should be prepared and promptly implemented during construction to assure no adverse impacts occur to the Arkansas fatmucket.

Following construction, operation of the power plant will not change existing water quality conditions (page 16, JDJ Energy Company, 1988). Therefore, no adverse water quality impacts are expected to affect the Arkansas fatmucket following construction.

Water quantity. Decrease in minimum flows or drastic increase in maximum flows have potential to impact the Arkansas fatmucket. The proposed project will not decrease existing minimum flows (page 14, JDJ Energy Company, 1988). The proposed project will be operated to minimize downstream flow fluctuations by more effective "ramping and dampening" of flow releases downstream of DeGray Reregulating Reservoir. Therefore, peak discharges following construction of the power project will be somewhat less than equivalent preconstruction peak discharges. Potentially, this will improve the downstream warmwater fishery and provide more individual fish hosts that are required for mussel reproduction.

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