US Army Corps
of Engineers
Waterways Experiment
Station

Zebra Mussel Research
Technical Notes

Section 1 — Environmental Testing Technical Note ZMR-1-31

October 1995

Status of Zebra Mussel Infestation in Oklahoma

Background The U.S. Army Engineer District, Tulsa, maintains and operates three locks and two hydropower dams on the Arkansas River and two locks on the Verdigris River. Zebra mussels were first noticed in the Arkansas River at Locks 14 (W. D. Mayo), 15 (R. S. Kerr), and 16 (Webbers Falls) in late January 1993. Zebra mussels were found in the Verdigris River at Lock 17 (Chouteau) in mid-June 1993 and Lock 18 (Newt Graham) in mid-January 1994. Initially, zebra mussels at each lock were few and widely scattered.

Purpose The purpose of this technical note is to describe the current status of zebra mussels at Locks 15, 16, and 17. In addition, water quality in each of the three locks is discussed.

Additional information This technical note was prepared by Mr. Everett Laney, U.S. Army Engineer District, Tulsa, and Dr. Jim Schooley, Northeastern Oklahoma State University. For additional information, contact Mr. Laney, (918) 669-7411, or Dr. Schooley, (918) 456-5511. Dr. Ed Theriot, U.S. Army Engineer Waterways Experiment Station, (601) 634-2678, is Manager of the Zebra Mussel Research Program.

Methods All monitoring is being conducted by Dr. Jim Schooley, Northeastern State University, and will continue at least through 1995. Sampling in Locks 15, 16, and 17 has been done according to the following procedures. The lock chamber was filled; then, selected mooring bits were chained to the overhead beam that caps each channel in the lock wall. A small boat was launched in the lock chamber. The chamber was slowly drained to a depth that would allow easy boat access to the suspended pontoon of the mooring bit. Four of the bits at each site were sampled. Four additional bits at each site will be used to monitor the overwintering success of the adult mussels. The surface of each bit was divided into quadrats 0.5 m deep and as wide as the inside edges of the anodes. This varied between 0.5 and 0.7 m. Counts did not include the anodes or mussels adjacent to them because of the wide variation in the condition of the anodes at the three locks.

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It was apparent from variations in periphyton growth that location in the chamber influenced mussel settlement and growth. Therefore, density estimates were taken from two bits from each side of the lock and from at least one bit from the upstream, middle, and downstream sections of the lock.

Water samples were collected at a depth of 3 m at each lock. Samples were retained and processed in the laboratory.

Results and discussion

Zebra mussel densities (individuals per square meter) at the three locks were as follows: 21.2 ± 19.9 (± standard deviation) at R. S. Kerr, 2.1 ± 2.5 at Webbers Falls, and 0.7 ± 1.2 at Chouteau. Many quadrat counts of zero were recorded. The highest density was at R. S. Kerr, where a single sample at 2.5 to 3.0 m was 80/m^2. Maximum abundance occurred at depths greater than 1.5 m at all three sites. When comparing shell length and the mean volume per individual, the larger individuals are at Chouteau, followed by Webbers Falls and R. S. Kerr (Table 1).

Water at all the sites was well mixed and showed little vertical variation in any parameter. Water quality results for the 3-m depths are reported in Table 2. Dissolved calcium, estimated from total hardness, was approximately 40, 41, and 36 mg/L at R. S. Kerr, Webbers, and Chouteau, respectively.

Table 1. Mussel Shell Length and Mean Volume/Individual

Corps Lock Where Collections Were Made	Shell Length, mm			Mean Volume/ Individual, ml
	Median	Maximum	Minimum	
R. S. Kerr	10-15	31.2	8.4	0.248
Webbers Falls	5-10	31	4.7	0.516
Chouteau	25-30	29.6	18	1.35

Table 2. 1994 Water Quality at 3-m Depth

Date	Lock	Temperature, °C	pH	Dissolved Oxygen, ppm	Conductance, mho	Oxygen Reduction Potential, mV	Secchi Disk, cm	Turbidity, NTU	Total Dissolved Solids, mg/L	Hardness, mg/L
Sep 27	15	21.1	7.5	7.5	740	252	—	—	—	—
Sep 29	16	21.4	7.2	5.6	784	258	—	—	—	—
Sep 29	17	22.4	7.1	6.9	318	263	—	—	—	—
Oct 4	15	22.7	7.7	7.6	678	234	45	19	270	143
Nov 8	16	14.5	6.7	7.8	309	267	15	116	130	145
Oct 13	17	20.5	7	7.5	390	249	35	31	180	127