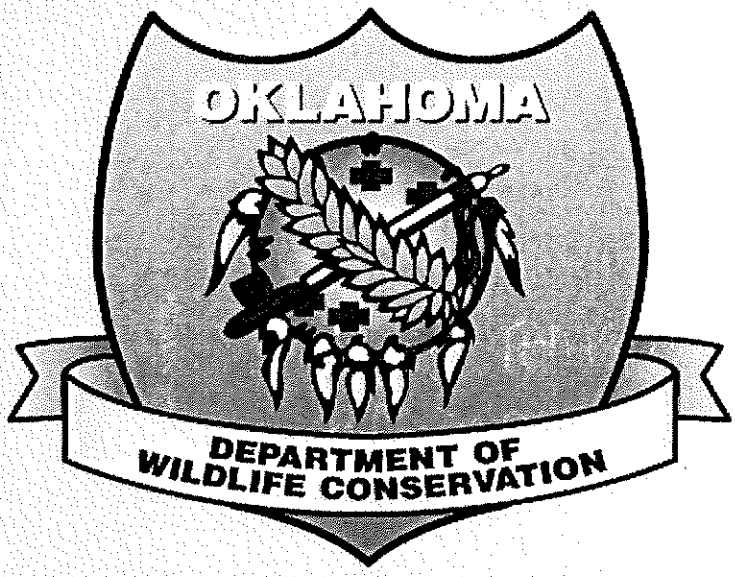
FINAL PERFORMANCE REPORT



FEDERAL AID GRANT NO. T-50-1

OKLAHOMA PADDLEFISH RESEARCH FOR CONSERVATION MANAGEMENT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

October 01, 2007 through December 31, 2009

Final Performance Report

State: Oklahoma **Grant Number:** T-50-1

Grant Program: State Wildlife Grant

Grant Title: Oklahoma Paddlefish Information for Conservation Management

Grant Period: October 1, 2007-December 31, 2009

Principal Investigator: Brent Gordon

Project Objective

To identify paddlefish staging areas and spawning locations and to collect preliminary data for determining spawning success under various flows and velocities on Grand Lake.

II. Summary of Progress

A. Introduction

Due to the threat of over-harvest, paddlefish *Polyodon spathula* were listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1998 as one of the species threatened by extinction. Notwithstanding the CITES listing, paddlefish populations nationwide have continued to decline and the population structure is increasingly skewed towards sub-adult fish with a critical lack of spawning-age adult female fish. Paddlefish conservation is a priority among resource agencies in the Midwest. In 1995, 22 states organized the Mississippi Interstate Cooperative Resource Association (MICRA) to better manage inter-jurisdictional fisheries resources within the Mississippi River Basin. MICRA has a subcommittee devoted to paddlefish management issues. Although paddlefish have adapted and even thrived in impoundments, little is known about how these fish use reservoir environments (Russell 1986). The paddlefish population in the Grand River system is an economic boom to the region around Grand Lake and its tributaries. Rapid changes in land use practices in these areas put the paddlefish population at risk of losing their spawning habitat. Paddlefish have diminished in numbers during the last century because of destruction of spawning grounds, exploitation, dam construction, river channelization, dewatering of rivers, and pollution (Carlson and Bonislawsky 1981). Depletion of vital spawning habitat would have disastrous effects to the self-sustaining paddlefish population in Grand Lake. To date, little has been done to determine these locations and the movement of the paddlefish within the system. Data is needed to allow the Oklahoma Department of Wildlife Conservation (ODCW) to make important decisions regarding the management of this population. The ODWC also opened its Paddlefish Research and Processing Center (RPC) at Twin Bridges State Park in the spring of 2008, found at the confluence of the Neosho and Spring Rivers, which will also help get much needed data on this population.

B. Methods

Preparation for the project took place prior to the fish being netted and implanted with tags. Supplies (concrete, cable and pipe) were purchased, the concrete anchors were poured and pipes were cut to desired length. Submersible Ultrasonic Receivers (SURs; Sonotronics ® Tucson, AZ) were attached by cables, as well as "Fish Research" decals placed on all buoys to discourage the public from tampering with them (Figure 1). The Grand River Dam Authority (GRDA), managing agency, was notified that the project was under way. SURs were deployed below the dam at Grand Lake, in the main body of the lake, and above the lake in the Neosho and Spring Rivers (Figures 2-4). The SURs were strategically placed to determine the locations most used by the paddlefish during certain times of the year. The range of the transmitters was tested using a test tag.

Twenty-two paddlefish were collected (18 sexually mature females and 4 sexually mature males) from Grand Lake using gill nets. Of the 18 females, 11 were gravid at the time the tagging took place. Lengths (mm; eye-to-fork length), weights (kg), gender were recorded and individually identifiable ultrasonic transmitters (Sonotronics ® Tucson, AZ; model CTT-83-2-I, 14 month battery life) were surgically implanted using standard methods. All transmitter-equipped fish were named (Table 1), tagged with purple jaw tags for externally identification and released. A manual digital receiver and directional hydrophone were used to ensure that the internal transmitters were working properly. The SURs provided downloaded data using SURsoft®[1]. SUR battery life was advertised as 8 months and changed as needed. Tagged fish locations were also obtained by boat using a portable receiver and hydrophone.

Signs were placed at lake access points to encourage anglers to notify ODWC in the event that one of the tagged fish was caught. This allowed the ODWC to inform the angler of the importance to the project and request that the fish be returned to the location in the lake where it was captured.

C. Results and Discussion

Ninety-five percent (21 of 22) of the tagged fish were detected by at least one of the SURs. Leigha (Table 1) was the only fish not detected on a SUR after release, implying emigration or transmitter malfunction.

Three of the gravid females (Carla, Betty, and Bertha) were detected on SURs up the Neosho River as far as Site 9 (Stepford Bridge), presumably at spawning sites, with Carla making it all the way to Site 10 (Stateline; Figure 4). These females presumably spawned within one month of each other. Carla turned downstream after "spawning" on 29 March 2008, the same day as the first spawned out female was brought in for processing at the Research and Processing Center (RPC) (Scarnecchia et al. 2008). The month in which all three of these females spawned coincides with the time period that the majority of the spawned out females were brought into the RPC.

Eight additional tagged fish migrated upriver as far as Site 8 (Twin Bridges) (Figure 3) in 2008. Six of these fish were gravid females and two were males. These fish could have gone up the Spring River to spawn, but as a result of higher than average flows the SURs were flushed out and lost. Rocky was one of two males that were detected as far upriver as Twin Bridges (site 8), and was caught and released in that area on 23 March 2008. After being caught he was detected on SURs all throughout Grand

Lake (Sites 1-7) and was at Site 1 (Dam) on 20 April 2008 before migrating up lake and being detected at Site 8 (Twin Bridges) again on 28 April 2008.

The 10 remaining tagged fish (two males, seven non-gravid females, one gravid female) were detected no higher than Site 7 (Grays Ranch), with the majority staying in the mid-lake Site 4 (Monkey Island) areas during the historical spawning period. Katy (non-gravid female) was detected in the Grays Ranch area (Site 7) in February, but then moved down to the Monkey Island (Site 4) and Horse Creek area (Site 3) during March and April. Katy spent the entire year in the mid to upper lake area, implying that she might have been schooling with fish that were staging to make their annual spawning run when she was detected at Site 7 (Grays Ranch) before moving down lake.

Site 6 (Elk River; Figure 3) only detected five fish (four females, two of which were gravid, one male) in 2008. All of the detections were from June through October. This indicates that Elk River serves as neither a staging area nor a spawning area for paddlefish in Grand Lake.

Spring 2008 was a high flow period (Figure 6). Several SURs were lost due to the high flows (Spring River (2), Miami Park, and Stateline on the Neosho River; Figure 4). The SUR located below the Dam was also lost (Figure 3). The project was extended for an additional year to monitor locations under more normal flow conditions. The SUR at Site 1 (Dam) was relocated to Site 11b (Highway 10 Bridge on the Spring River).

Flows in 2009 were closer to "normal" than those in 2008 (Figures 7 and 8). However, SUR's at Site 9 (Stepford Bridge), Site 8 (Twin Bridges), and Site 3 (Horse Creek) were lost in 2009. Data from the remaining six SURS were downloaded but no SUR's were recovered from the "spawning areas" in 2009. The SUR's detected 10 tagged fish in 2009. These fish were detected from Site 2 (Drowning Creek) up lake to Site 7 (Grays Ranch). Only one fish was detected at Site 6 (Elk River) and, as in 2008, it was in June. Site 11b (Spring River at the Highway 10 Bridge) did not detect any tagged fish in 2009.

D. Conclusions/Recommendations

- Although the flows were well above average in 2008, a more complete set of data were obtained. High flows caused several SUR's to be lost, resulting in a data set lacking fish at potential spawning sites. Data from 2008 did locate potential spawning sites in the Neosho River, upstream from Miami Park. Loss of SUR's in the Spring River precluded locating potential spawning locations. Loss of SUR's in the Neosho River in 2009 prevented verification of spawning locations identified in 2008.
- Locations of the three gravid females (Carla, Betty, and Bertha) in the Neosho River coincided with RPC data showing that most of the spawned out females were brought into the center during the same time frame (29 March -21 April 2008). These three females all started making their "run" after the second significant flow event (15,000 cubic feet per second or greater) of the season. Although no telemetry data from the Neosho or Spring Rivers are available for 2009, RPC data show that spawned-out females started being brought to the center after the second significant flow event. In 2009 the first spawned out female was brought to the RPC on 11 April; nine days after the second flow of 15,000 cubic feet per second (Figures 7 and 8).

- The data obtained from the Elk River location indicate that none of the tagged fish were utilizing the Elk River as a potential spawning site. Bertha was one of the gravid females detected in the area in September and October, but was found in the Neosho River during the spawning period.
- The reason there were only ten fish detected in 2009 could have many possibilities. Past tagging studies have shown that paddlefish do emigrate from reservoirs. Also, angler harvest and non-reporting of tagged fish may have resulted in tag loss. Natural mortality may have resulted in tag loss and since SUR's are static the potential for location is not as great as if locations would have been attempted using a mobile system. The three females that made the run up the Neosho River to Site 9 (Stepford Bridge) were among those not detected in 2009.
- Paddlefish in Grand Lake can be found throughout the lake during any time of the year. Individual fish may prefer the lower or upper ends. Site preference could be related to water quality (thermocline depth) and/or food availability. Competition from invasive species (bighead carp, zebra mussels) could lead to localized differences in plankton abundance which may influence paddlefish distribution.
- None of the non-gravid females were detected above the Grays Ranch location. This data could aid in future studies on paddlefish targeting the individuals that are in fact making the annual spawning run up the rivers.

E. Significant Deviations: None

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Date: June 1, 2010

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F. Literature Cited

Carlson, D. M., and P. S. Bonislawsky. 1981. The Paddlefish (*Polyodon spathula*) fisheries of the Midwestern United States. Fisheries 6(2):17-27.

Russell, T. R. 1986. Biology and life history of the paddlefish—a review Pages 2–20. The Paddlefish, Status, Management and Propagation Jefferson City (MO) American Fisheries Society, North Central Division. Special Publication no. 7.

Scarnecchia, D. L., B. Gordon, K. Green. 2009. Assessment of the Paddlefish Stock in Neosho River, Spring River and Grand Lake, Oklahoma. Oklahoma Department of Wildlife Conservation, Federal Aid in Sport Fish Restoration Project F-50-R.

Table 1. Names given to specific fish, along with the Frequency and Interval specific to the internal transmitter placed in each fish. (+) denotes a gravid female at time of tagging, (-) denotes a non-gravid female, ($^{\#}$) denotes males, and (*) denotes a mortality or transmitter error.

Name	Frequency	Interval
Betty +	71	1050
Sue -	72	1060
Leigha +*	73	1070
Kelly -	74	1080
Scar$^{\#}$	76	1100
Kyle$^{\#}$	77	1110
Steve$^{\#}$	78	1120
Rosita +	79	1130
Lucy +	80	1140
Jenny -	83	1170
Katy -	69	1210
Daisy -	70	1200
Helga -	71	1230
Jane +	73	1250
Jon +	74	1240
Bertha +	75	870
Lola +	76	860
Rocky$^{\#}$	77	890
Pamela +	78	880
Wanda -	79	910
Anna +	80	900
Carla +	72	1220

Figure 1. Deployment design of the Submersible Ultrasonic Receivers (SURs).

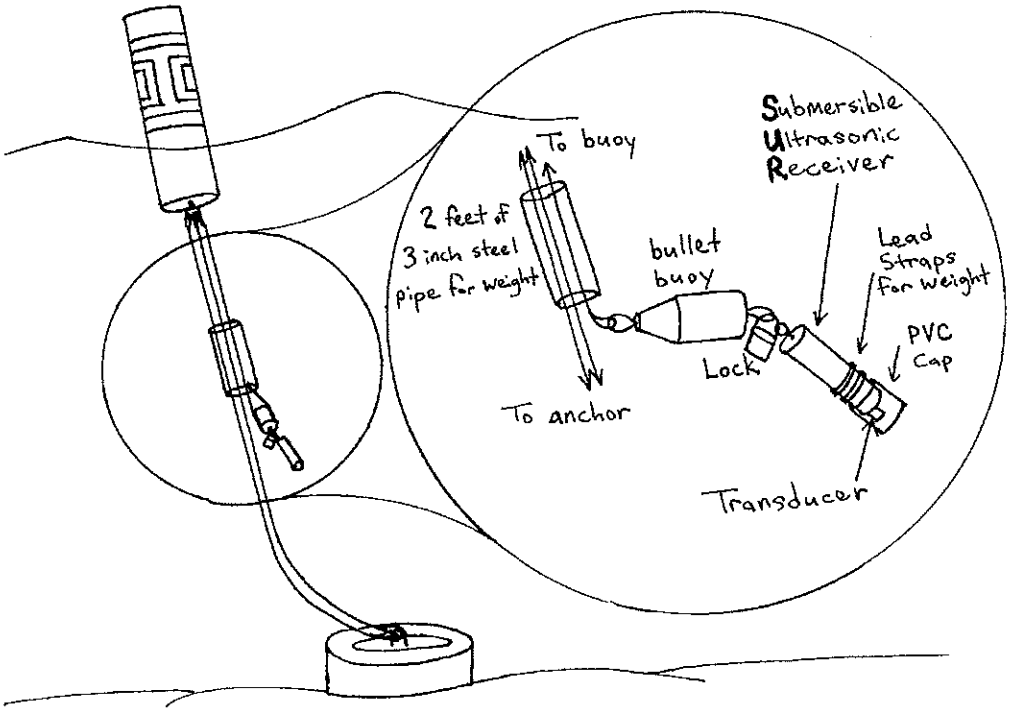

Figure 2. Map of the lower end of Grand Lake, with the 4 SUR locations marked with the red dot.

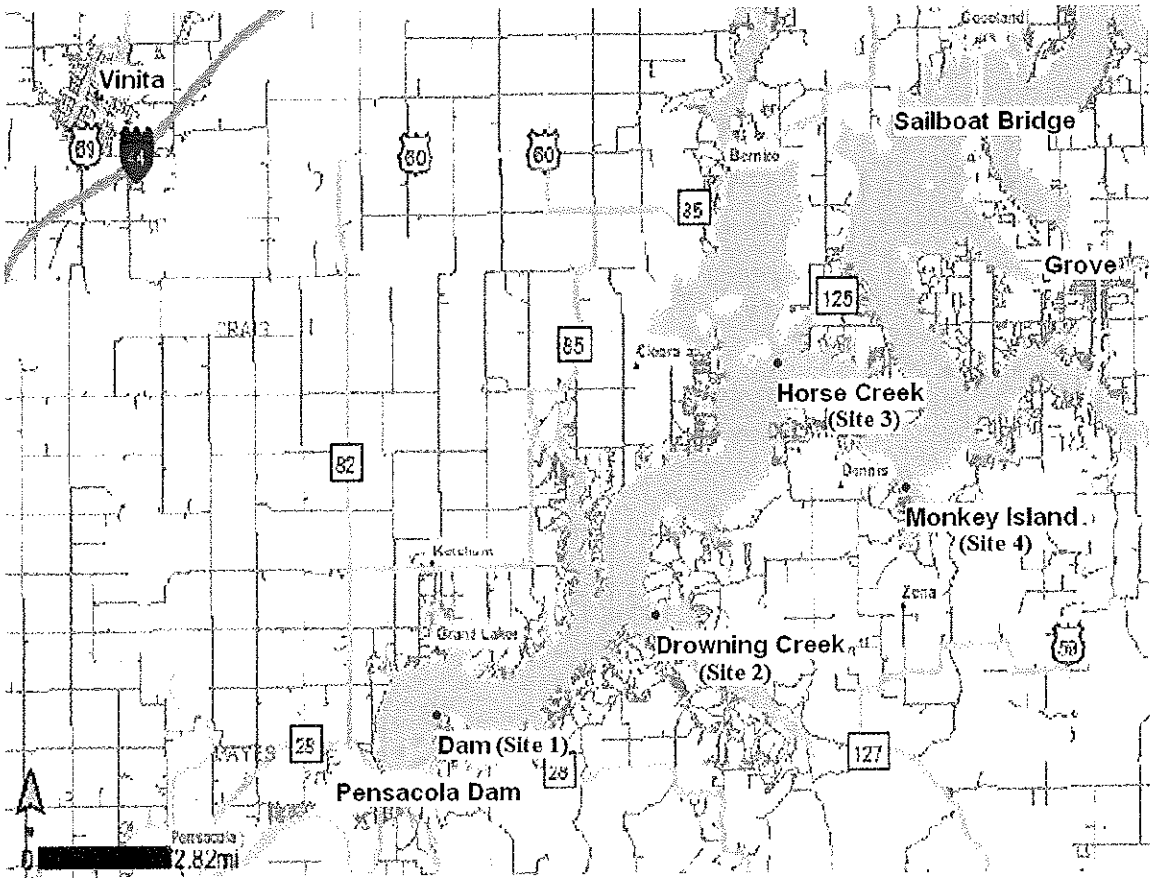

Figure 3. Map of the upper end of Grand Lake, with the 4 SUR locations marked with the red dot.

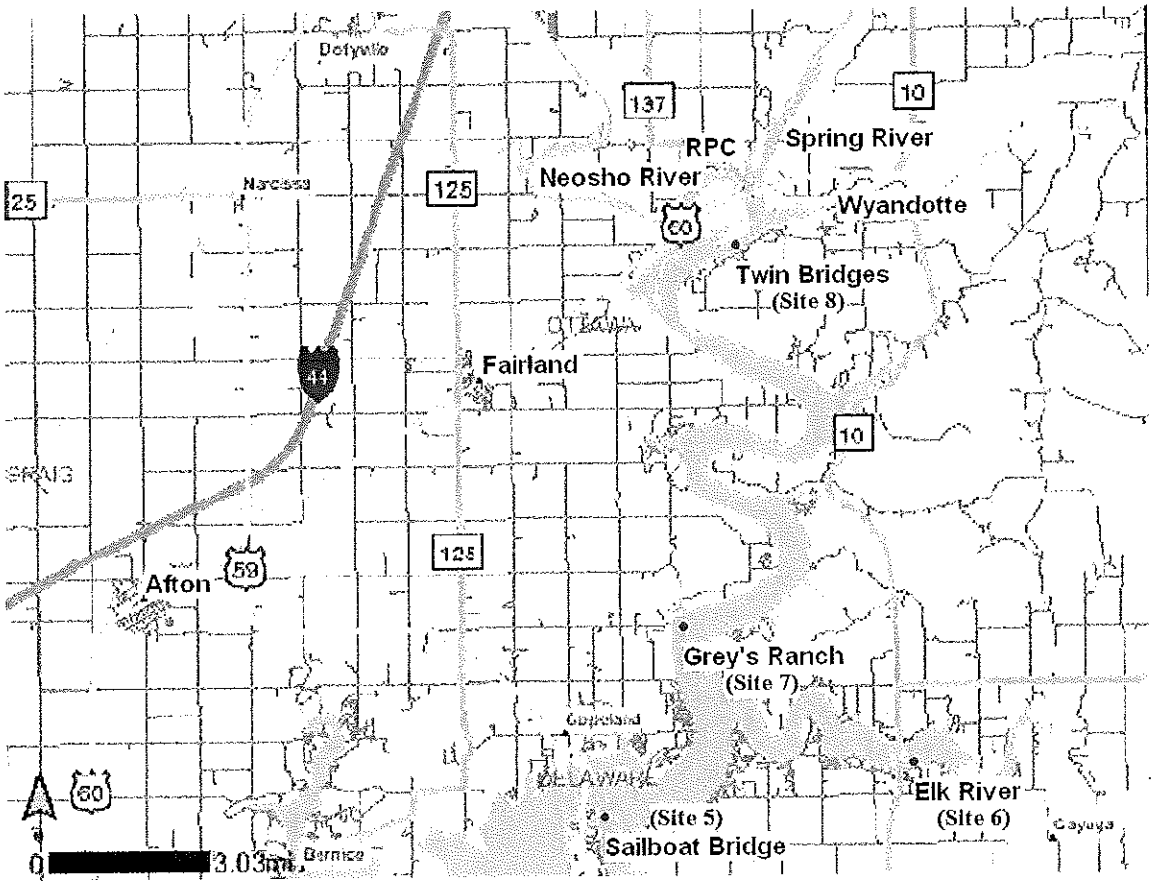

Figure 4. Map of the Neosho and Spring Rivers, with the SUR locations marked with the red dot.

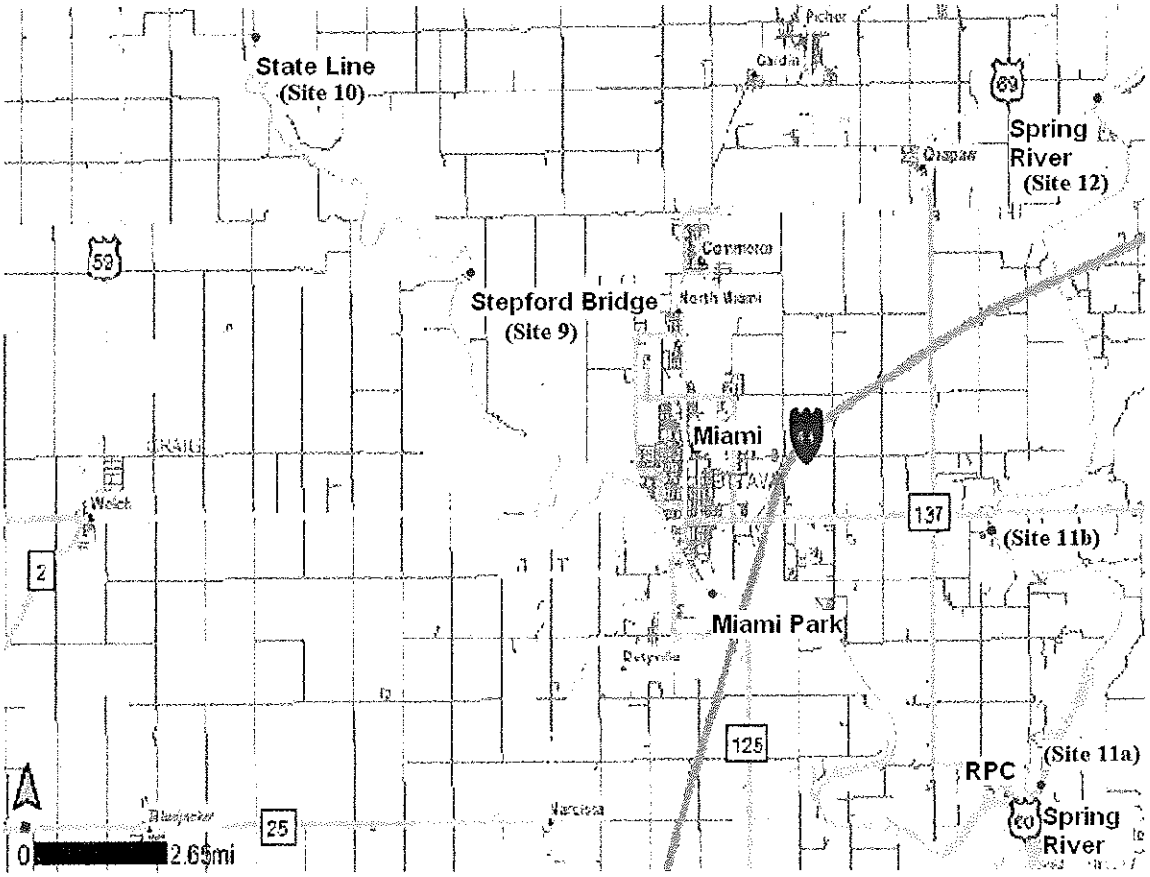

Figure 5. Seasonal upriver movement of three gravid female paddlefish detected at potential spawning sites in the Neosho River. Refer to Figures 2-4 for SUR locations.

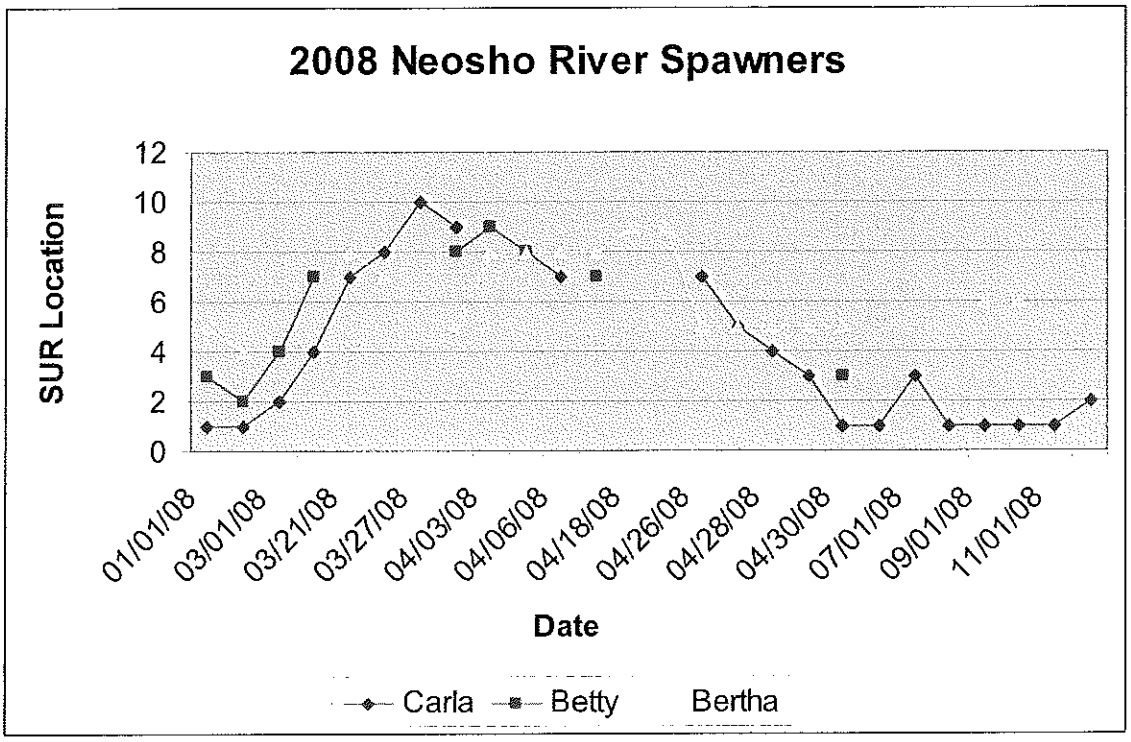

Figure 6. USGS daily discharge for 2008 on the Neosho River near Commerce, Oklahoma.

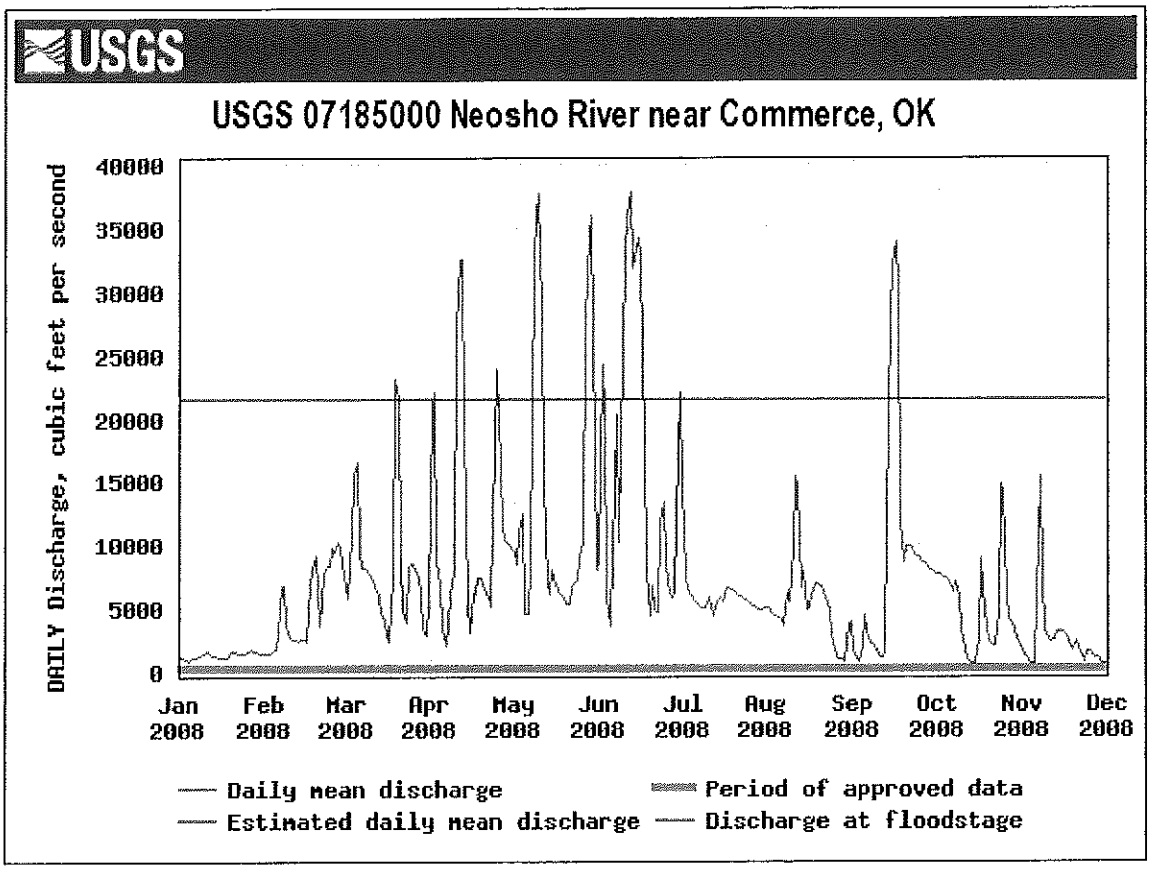

Figure 7. River discharge in March 2008 and 2009 on the Neosho River, Oklahoma.

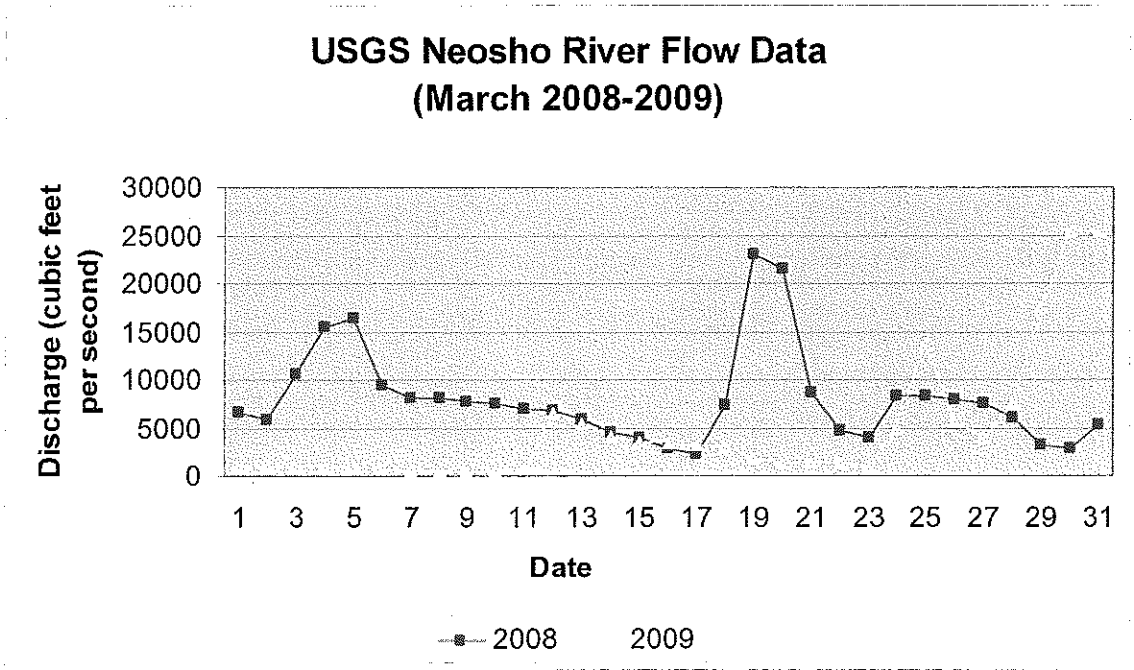

Figure 8. River discharge in April 2008 and 2009 on the Neosho River, Oklahoma.