

Two-Year Telemetry Study on Paddlefish in Tippo Bayou, MS

Prepared for the Inventory and Monitoring Program

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Objectives

The first objective of this study was to determine if the paddlefish *Polyodon spathula* found in Tippo Bayou (located in Tallahatchie County, Mississippi, USA) were capable of using a side channel that bypasses a water control structure built by the Corps of Engineers. The second objective was to describe the seasonal movements of these paddlefish throughout Tippo Bayou. With the primary question being, where are these fish going during their spawning period, which ranges from March to June?

Methods

Collection and tagging of paddlefish took place from February 28, 2013 until March 21, 2013 with the assistance of refuge personnel. There were 19 individual paddlefish collected throughout a 17 river mile section of Tippo Bayou using mono-filament gill nets (4, 5 and 6 in. bar mesh). The descriptions of the fishing gear, gear locations, and times set are shown in Appendix A (table 1). Acoustic transmitters (V16-69kHz; Vemco; Bedford, Nova Scotia, Canada) were surgically implanted into individual paddlefish abdominal cavities. Their movements throughout Tippo Bayou were monitored using six stationary acoustic monitoring receivers (VR2W-69kHz; Vemco; Bedford, Nova Scotia, Canada). The locations of these receivers are shown as red dots in Figure 1. These locations were given station names associated with the description of their surroundings (beginning with the farthest upstream: “Above the control structure,” “Below the control structure,” “Lawrence Lake,” “Larry,” “South entrance,” and lastly “Six mile lake”). Six of the paddlefish were captured in Six Mile Lake and the other thirteen were collected between “Larry” and “Lawrence Lake.”



Figure 1 Map of receiver locations and Tallahatchie Refuge boundary.

The physical data of these fish are shown in Appendix A (table 2). Something interesting to note about the length range on these fish is that there is only one fish that was over 37 inches (eye to fork length). The Tallahatchie and Coldwater Rivers above Route 32 have been open to commercial paddlefish roe harvest with a minimum length limit of 37 inches since 2011. The Yazoo River below Wasp Lake (near Belzoni) has also been opened to harvest since 2012. Tippo Bayou is centrally located between these two commercial fishing zones. Only four of the 19 fish that were used in this study were determined to be sexually mature females based on the presence of eggs in the gonads. The other 15 fish were males one of which was releasing sperm at the time of capture. After completion of transmitter implantation these fish were then monitored by the VR2W receivers that were already strategically placed in Tippo bayou. The data from these receivers were offloaded once a month using Bluetooth communication between the receivers and a laptop computer, with the assistance of refuge personnel. The software used for this study was VUE version 2.0.

Results

2013 Data

After initial analysis of the movements it appeared that in order for these fish to have the capability to utilize the side channel around the water control structure there must first be an influx of water. From Figure 2 it appears that after a rain event, during their spawning period, multiple fish would swim upstream above the water control structure. The precipitation data was obtained through the National Climatic Data Center under the National Oceanic and Atmospheric Administration. Between March and June 8 of the 19 fish were detected above the water control structure. These movements are assumed to be their spawning migration. The

females would have been searching for gravel substrate and the males would have been traveling with the females. Paddlefish are induced to spawn in the wild based on water temperature, photoperiod and current on gravel substrate.

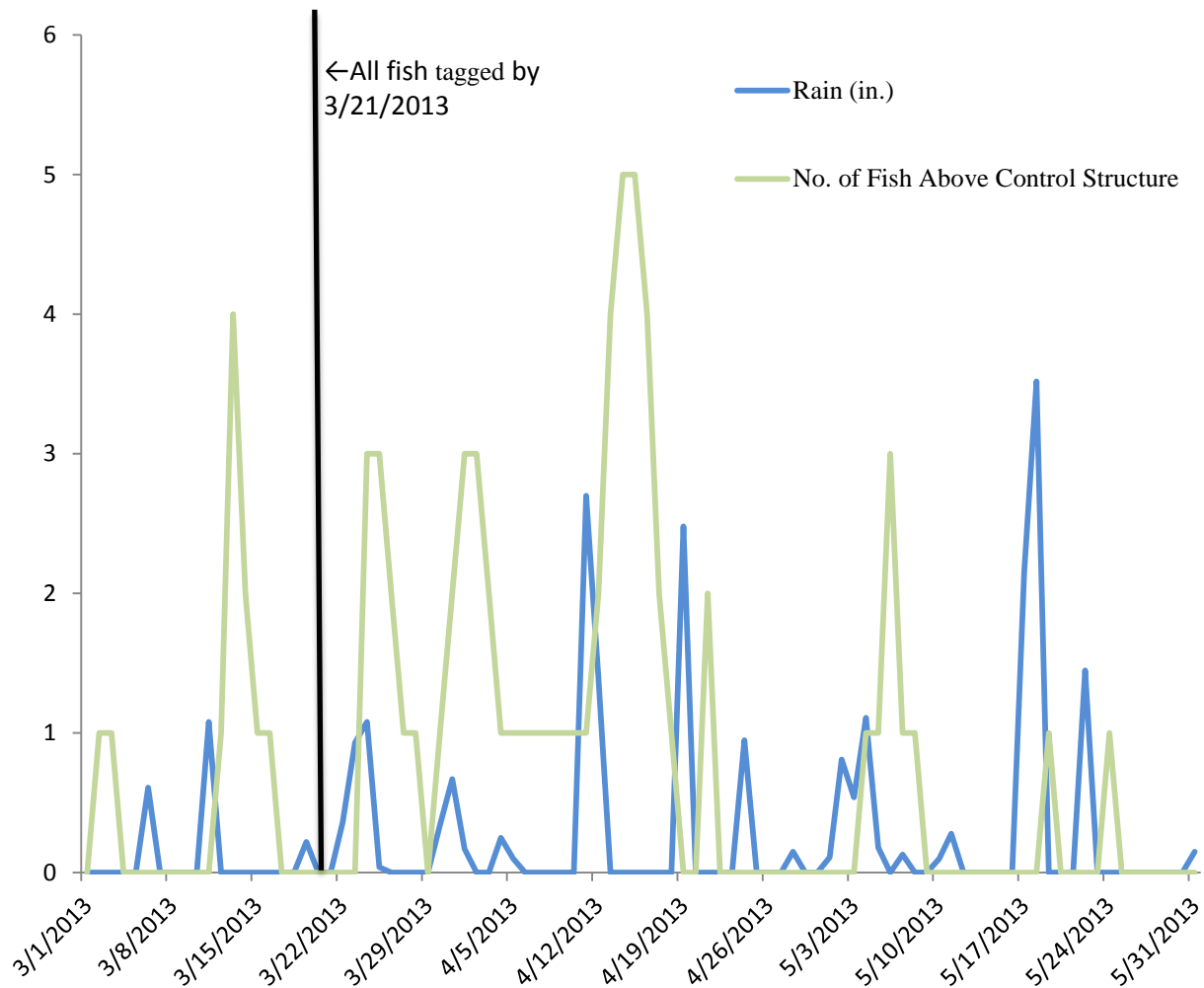


Figure 2 This figure shows the temporal relationship between a rain event, which took place in Grenada, MS and the subsequent number of fish that then were received above the water control structure.

The detected fish moved upstream and downstream multiple times and some traveled from “Six Mile Lake” to “Above the control structure” within one day, a distance of 17 river miles. The six fish that were tagged in Six Mile Lake were only ever detected by the “Six Mile Lake” station. After May 24, 2013 none of the paddlefish had been detected by the “Above the

control structure” station and after May 31, 2013 all paddlefish except two males had traveled downstream to the “Six Mile Lake” station, some are believed to have traveled even further downstream as early as April, 2013. This idea is based on the fact that four male paddlefish were never detected the following year. Also anecdotally, a commercial fisherman on the Mississippi River near Port Gibson caught two paddlefish with FWS floy tags. He did not record the tag numbers unfortunately.

The two male paddlefish that were not detected by station “Six Mile Lake” were “Brent” and “Ike.” “Brent” has only been detected by the station “Larry,” which is located in a relatively deeper section of Tippo Bayou. “Ike” traveled above the water control structure on May 19, 2013 and has never been detected since this time. One possible reason is that this fish found a refuge area above the control structure that provided adequate habitat. Another possible reason is that this fish was stranded above the water control structure after a sudden drop in water level. Some evidence that supports this possibility is the fact that the water level drop so much that the receiver above the water control structure became dry docked by July 30, 2013.

2014 Data

During the 2014 spawning season only two male paddlefish “Brent” and “Frank” and none of the female paddlefish were detected above the control structure (Fig. 3). The number and magnitude of rain events did not differ between the two years. The precipitation data was collected from the National Climatic Data Center under the National Oceanic and Atmospheric Administration. During the middle of April (8th-16th) two male fish “Dan” and “Harry” were detected at Larry and one female fish “Kadie” was detected below the control structure. “Harry” was later detected at Larry on June 15th. These five fish were the only individuals to exhibit any spawning movements within Tippo Bayou. The remaining paddlefish were only detected at Six

Mile. Thirteen were detected in Six Mile until the receivers were pulled in August, 2014, four were last detected in Six Mile in April, 2013, “Brent” was last detected above the control structure in June, 2014 and “Ike” was last detected above the control structure in May, 2013.

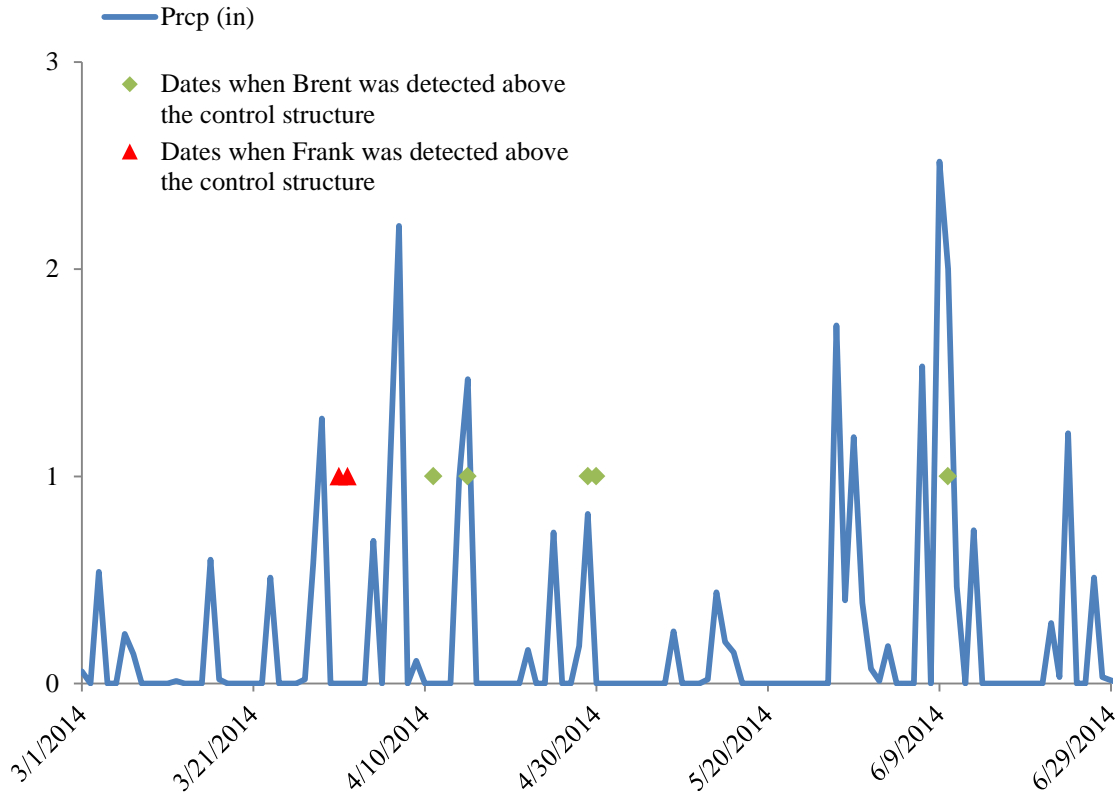


Figure 3 This figure shows the temporal relationship between a rain event, which took place in Grenada, MS and the dates when two male paddlefish (Brent and Frank) were detected above the control structure.

Conclusion

Thus far, we have learned that the paddlefish in Tippo Bayou are able to travel around the water control structure after a rain event, which would raise the water level in Tippo Bayou. These fish then leave after their spawning period and travel to Six Mile Lake and possibly even further downstream to enter the Yalobusha River and perhaps the Mississippi

River. This supports the idea, from refuge personnel, that the upper reaches of Tippo Bayou may support paddlefish spawning migration and possible spawning habitat during the spring but as summer approaches the lack of water influx reduces the stream flow and volume. However, because only two paddlefish travelled above the control structure in 2014 this area may not be critical spawning habitat. Paddlefish have been shown to exhibit site fidelity to the spawning areas where they have previously spawned. However a similar study has shown that not all paddlefish return to the same location every year to spawn even when water levels allow (Stancill et al., 2002). Because some fish travelled downstream of Six Mile Lake and may have left the system there may be suitable spawning habitat elsewhere.

Of the paddlefish that were captured 94.7% of them were less than the commercial fishing length limit. These fish showed the ability to travel relatively great distances within a connected system. They may become exposed to commercial fishing pressure if they leave Tippo Bayou and travel to surrounding rivers. This may also explain why less fish were detected above the control structure if they moved to other areas that provided suitable spawning habitat.

Hopefully the next step will be to identify actual spawning sites and determine if successful spawning occurs by collecting larval or juvenile paddlefish in Tippo Bayou. The first step would be to use side-scan sonar to develop a bathymetry model of Tippo Bayou and characterize river substrate when the water level allows. Paired with a GPS unit this would provide exact locations of possible spawning habitat for paddlefish. After these locations are determined a more coordinated effort to collect larval paddlefish during March to May could be attempted by possibly using light traps once a week. Another option would use Spawntex spawning mats to collect eggs once a week and hatch these eggs at the hatchery to determine if they are paddlefish eggs.

Another aspect of this study, optimistically, would be to place some water data loggers in Tippo Bayou and monitor the water temperature and correlate temperature with movements. This will help narrow the area of Tippo Bayou where these paddlefish are able to spawn. A receiver could also be moved further downstream, possibly at the convergence of Tippo Bayou and the Yalobusha River, to provide more evidence that some of these fish travel between different systems and may only use Tippo Bayou as a spawning site.

Reference:

Stancill, W., Jordan, G. R., Paukert, C. P., 2002. Seasonal Migration Patterns and Site Fidelity of Adult Paddlefish in Lake Francis Case, Missouri River. *North American Journal of Fisheries Management*. Vol. 22, Iss. 3.

APPENDIX A

Table 1: Description of fishing gear, location of gear and time set.

Net No.	Mesh Size (in.)	Length (ft)	Set Time	Set Date	Water Temp (°F)	Water Depth (ft)	Latitude Longitude	Soak Time (hrs)
1	5	150	11:00 AM	2/28/2013	47	7	N33°44.950' W090°08.839'	5
2	5	150	11:30 AM	2/28/2013	47	8.4	N33°44.901' W090°09.758'	5
3	4	150	11:40 AM	2/28/2013	47	9.4	N33°44.708' W090°09.538'	5
4	6	150	11:49 AM	2/28/2013	47	8.5	N33°44.590' W090°09.648'	5
5	4	150	11:58 AM	2/28/2013	47	9	N33°44.454' W090°09.713'	5
6	4	150	12:15 AM	3/1/2013	45.4	9	N33°45.895' W090°08.528'	4
7	5	150	12:25 AM	3/1/2013	45.4	7.5	N33°45.951' W090°08.141'	4.5
8	5	150	12:35 AM	3/1/2013	45.4	7	N33°45.969' W090°07.978'	4.5
9	5	150	10:30 AM	3/6/2013	46	6.5	N33°45.970' W090°08.043'	6
10	5	150	10:50 AM	3/6/2013	46	6	N33°45.952' W090°07.958'	6
11	4	150	11:15 AM	3/6/2013	46	7	N33°45.917' W090°07.734'	5.5
12	4	100	11:20 AM	3/21/2013	54	15	N33°41.233' W090°12.810'	2.5
13-1	5	150	11:30 AM	3/21/2013	54	15	N33°41.123' W090°12.701'	1.5
13-2	5	150	1:00 PM	3/21/2013	54	15	N33°41.123' W090°12.701'	3
14-1	5	150	12:10 PM	3/21/2013	54	11	N33°41.324' W090°12.477'	1
14-2	5	150	1:30 PM	3/21/2013	54	11	N33°41.324' W090°12.477'	1
15-1	6	150	2:45 PM	3/21/2013	54	11	N33°41.224' W090°12.778'	2
15-2	6	150	4:30	3/21/2013	54	11	N33°41.224' W090°12.778'	1

Table 2: Physical data of the Paddlefish used in this study.

Transmitter No.	Name	Floy Tag No.	Net No.	Length (Eye to Fork in.)	Weight (lbs)	Sex	Date Tagged	Notes
28535	Adam	1602	1	30	13	M	2/28/2013	
28537	Brent	1605	1	30.5	14	M	2/28/2013	
28534	Cory	1606	3	36	21.5	M	2/28/2013	
28539	Dan	1607	3	30.75	13.5	M	2/28/2013	
28536	Ervin	1608	3	35.5	18.5	M	2/28/2013	
28538	Frank	1609	5	30.25	14	M	2/28/2013	Flowing
28521	Garry	1610	5	29.5	19	M	2/28/2013	
28520	Harry	1611	5	28.5	15	M	2/28/2013	
28519	Ike	1612	6	34	28	M	3/1/2013	
28518	Joan	1613	8	34.5	26	F	3/1/2013	W/ eggs
28517	Kadie	1614	8	33.5	26	F	3/1/2013	W/ eggs
28515	Lucas	1615	9	30	15	M	3/6/2013	
28513	Monty	1616	11	26.75	12.5	M	3/6/2013	
28511	Nancy	1617	13-1	38	30	F	3/21/2013	W/ eggs
28512	O'Brian	1618	13-1	31.5	15	M	3/21/2013	
28516	Percy	1619	14-1	30.5	11	M	3/21/2013	
28514	Quan	1620	14-1	29	10	M	3/21/2013	
28510	Ricky	1621	14-2	32	12	M	3/21/2013	
28522	Sam	1622	15-1	36.5	24	F	3/21/2013	W/ eggs