A comparison of floodplain restoration sites on the Mississippi River with a focus on gars (Lepisosteidae)

Derek C. Sallmann[1], Solomon R. David[1], Bryan P. Piazza[2]
[1]Nicholls State University, [2]The Nature Conservancy

Introduction

Connectivity of large rivers with their floodplains can benefit riverine fishes by providing access to food, spawning, and nursery habitat.[1,2,3,4,5]

Anthropogenic modifications such as dams and levees often disconnect rivers from their floodplains, potentially limiting ecosystem function.

To address this problem in the Lower Mississippi River basin, The Nature Conservancy (TNC) and Louisiana Department of Wildlife and Fisheries (LDWF) have initiated projects to improve floodplain connectivity (Figure 1).

Due to their reliance on floodplains and role as top predators, the presence and abundance of gars (Lepisosteidae) can be used as an indicator of restoration success.

Restoration Sites

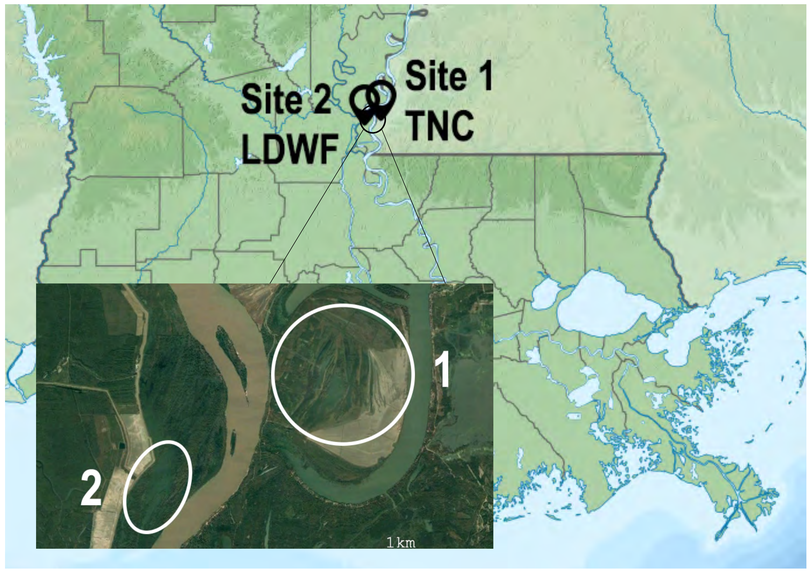


Figure 1. TNC Site: Wilkinson, Mississippi (Site 1). LDWF Site: Vidalia, Louisiana (Site 2). Maps: SANtosito - Wikimedia CC BY-SA 4.0: Google Earth Pro.

Methods

Gar diversity and abundance at Sites 1 and 2 will be monitored and compared before and after restoration activities.

Fishes will be collected using gill nets, cast nets, and jug lines.

Presence/absence and abundance of the four LA/MS gar species (Figure 2) at multiple life stages will be used as indicators of restoration success.

Purpose

Compare gar diversity and abundance at two sites in the Lower Mississippi River basin before and after restoration efforts are completed.

Results

Pre-restoration, all four gar species were present at Site 1, and three gar species were present at Site 2 (Figure 2).

207 gars were collected from Site 1 and 46 gars were collected from Site 2, which provides length distributions for species at both sites (Figure 3).

Young-of-the-year (YOY) of three gar species were found at Site 1, including two Alligator Gars (Figure 4).

22 fish species were present at Site 1 and 16 species were present at Site 2.

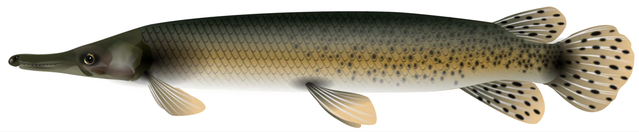
Site 1	Site 2
Alligator Gar (*Atractosteus spatula*)	
	
2 (6)	0 (2)
Longnose Gar (*Lepisosteus osseus*)	
	
56 (6)	7 (2)
Spotted Gar (*Lepisosteus oculatus*)	
	
95 (6)	16 (2)
Shortnose Gar (*Lepisosteus platostomus*)	
	
54 (6)	23 (2)

Figure 2. Number of gars at Sites 1 and 2. Number of sampling trips in parentheses. Fish illustrations: Madhusudhan Gundappa @fish_lines.

Results (continued)

Figure 3. Box plot length distribution of gars at Sites 1 and 2. Alligator Gar was not included because only two individuals were collected.

Figure 4. Young-of-the-year Alligator Gar from Site 1. Credit: KristieRae Ellis.

Discussion

Pre-restoration sampling serves as a baseline to compare fish community composition in the floodplains before and after restoration is completed.

Additional sampling at Site 2 will be needed to make more accurate comparisons between sites.

Presence of young-of-the-year (YOY) gars at Site 1 indicates the floodplain is being used for spawning.

We expect fish diversity and abundance (including more YOY gars) to increase after restoration efforts are completed at both sites.

Literature Cited

1. Bayley, P. B. 1995. Understanding large river-floodplain ecosystems. BioScience 45:153–158.
2. Fry, B. 2002. Stable isotopic indicators of habitat use by Mississippi River fish. Journal of the North American Benthological Society 21:676–685.
3. Junk, J. J., P. B. Bayley, and R.E. Sparks. 1989. The flood pulse concept in river-floodplain systems. Canadian special publication of fisheries and aquatic sciences 106:110–127.
4. Kluender, E. R., R. Adams, and L. Lewis. 2016. Seasonal habitat use of alligator gar in a river–floodplain ecosystem at multiple spatial scales. Ecology of Freshwater Fish 26:233–246.
5. Ropke, C. P., S. A. Amadio, K. O. Winemiller, and J. Zuanon. 2015. Seasonal dynamics of the fish assemblage in a floodplain lake at the confluence of the Negro and Amazon Rivers. Species Issue: Fish and habitat conservation in South America 89:194-212.

Acknowledgments

We thank Louisiana Department of Wildlife and Fisheries, Scott Lemmons, Raynie Harlan, KristieRae Ellis and Audrey Baetz.

GarLab.org
For more information contact Derek Sallmann at dsallmann@nicholls.edu