

Final Report for Crayfish Surveys of Big Thicket National Preserve

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Abstract

The Big Thicket Association, a conservation non-profit organization, awards research grants for Wetland Species and Ecosystem Analysis in the Big Thicket region of Southeast Texas through the Thicket of Diversity. The acquisition of baseline data from comprehensive biological inventories in wetlands provides a qualitative tool to assess current and future status of living species, water quality and the integrity of its floodplains. Data collected is shared with the National Park Service and aids resource managers in decision making to protect critical resources. This Crayfish Survey (2014-2018) conducted by Dr. Zachary Loughman of West Liberty University is an example of a Thicket of Diversity project.

Introduction

Texas's crayfish fauna represents a great void in North America's astacological knowledge (Hobbs 1990; Taylor et al. 2007). First treated by Hobbs and Penn (1958), Texas was again treated by Johnson and Johnson in 2008, who listed 43 species for the occurring in the state. Horton Hobbs Jr., the father of American astacology, recognized the diversity and importance of Texas's crayfish fauna and the role it played in North American astacology. In an effort to garner attention by North American crayfish workers, Hobbs (1987) published a paper specifically focused on the crayfishes of the Neches River system.

Inspired by Hobbs, West Liberty University's Dr. Zachary Loughman chose the Southeast Texas region currently occupied by Big Thicket National Preserve (BTNP) for the scope of his project with the purpose of highlighting the diversity of crayfishes.

Big Thicket National Preserve to date did not have a dedicated crayfish survey, though the region harboring the preserve supports a rich crayfish fauna. The potential for undescribed species was high, as well as species worthy of conservation attention. This proposal completed the first dedicated crayfish survey of BTNP. The project provided opportunities for citizen science and general public education in active science on preserve lands. Results from the survey can serve as a foundation for conservation planners.

Methods

Field Methods and Time Line

Determining BTNP's burrowing crayfish fauna was a primary objective of this project, given the high diversity of taxa observed in the region. Burrowing crayfishes were collected through uses of burrowing crayfish nets (Welsh and Eversole 2006), baited lines (Loughman et al. 2013), and when permission granted excavation. Epigeal crayfishes primary collection method was seining and trapping with crayfish traps; however hand collection, dip netting, snorkel surveys, and nocturnal searches were employed if needed. All crayfishes collected were vouchered and deposited in West Liberty University's Astacology Collection.

The field work for this project was performed over the course of multiple field seasons. Sampling commenced in the summer of 2014 with a single collecting trip. A total of 18 days in the field were logged between 2014 and 2016. Final analysis of collected data and description of any undescribed species was completed in 2016. Site selection was non-random and targeted. Many sites suggested by Mona Halvorsen, Director of the Thicket of Diversity, received highest priority and were very valuable and time saving. Bridge crossings, road pull offs, public fishing access points, roadside ditches, sloughs, wetlands, and stream reaches adjacent to roads and trails made up the majority of sample sites. Sites were distributed between the preserve's nine units and six river corridors, with special attention given to Beaumont, Lance Rosier, Jack Gore Baygall, Menard Creek and Big Sandy unit. Research was also conducted in the Big Thicket National Preserve's newly acquired Houseman tract.

Results

Complete data has been submitted to the Big Thicket National Preserve according to the requested guidelines. A summary of 2016 data listing the species found and the preserve units where the inventory was designed.

Educational Outreach was varied and significant. In 2014 Dr. Loughman made a presentation to Kountze High School 160 biology students. He was also nominated as Liberty West University Professor of the Year.

On January 29th through February 1, 2015 Loughman presented in Savannah, Georgia "Astacology and crayfish conservation in the southeastern United States: Past, present and future" at the Spring meeting of the Southern Division of the American Fisheries Society. This symposium was attended by over 50 students, agency biologists and astacologists from across the central and southeastern United States.

Loughman published a list of all crayfishes (family *Cambaridae*) in the southern United States, which includes common names, global conservation status, an alternative review of the conservation status based on the IUCN red list criteria, and state distribution. This list includes 357 native crayfishes, of which 12 (3.4%) are critically endangered, 37 (10.4%) are endangered,

126 (35.3%) are vulnerable, 181 (50.7%) are lower risk, and 1 (0.3%) is not evaluated. The leading factors causing imperilment are restricted ranges caused by anthropogenic impacts from changes in land use, contaminants, invasion by non-indigenous species, and habitat fragmentation. In order to conserve and manage diversity of native crayfish, consistency is needed in determining conservation status and more complete distribution and life history information are needed for about 60% of species. (Loughman, 2015)

In March 2016 Dr. Loughman hosted a science café at the Logon Café in Beaumont, Texas for the public.

Loughman conducted further research in the lab on potential impacts of invasive crayfish on native crayfish. (Hale, et. al, 2016)

On April 9, 2016 Loughman's research was presented and published in the proceedings of the West Virginia Academy of Science 91st Annual Meeting at Marshall University. The topic was the result of research from Angelina County. (Myers et. al, 2016)

A 2016 study by Dr. Zachary Loughman documenting 13 crayfish species in the Big Thicket National Preserve was used by Texas Parks and Wildlife Department, Inland Fisheries Division for a Middle and Lower Neches River Basin Bioassessment (Robertson, et. al 2018). It tapped data submitted to the Big Thicket Association from this project.

Students of Dr. Loughman created a poster documenting Big Thicket Crawfish research further disseminating the project.

Discussion

As the preserve harbors a unique and high diversity of crayfish, it is highly likely that additional research will reveal a unique and high diversity of crayfish symbionts and/or parasites. This group is primarily unsampled. The only detailed survey of *entocytherids* in Texas was conducted by Peters and Pugh in 1999 in the Brazos River Basin. No survey has focused on *branchiobdellidans*, a type of worm found on crayfish. Further research of symbionts, an

understudied taxa, could provide valuable ecological data with new findings on species in wetland environments.

Conclusion

Funding for Loughman's research on Crayfish was performed with penalty monies from a Texas Commission on Environmental Quality enforcement action. Special thanks to Mona Halvorsen and the Big Thicket Association's Thicket of Diversity for facilitating this research.

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Crayfish Survey
Dr. Zachary Loughman
2016



Species	Total Collected	Beaumont	Beaumont-Houseman Tract	Beech Creek	Big Sandy	Canyonlands	Hickory Creek	Lance Rosier	Little Pine Island	Lobolly	Neches Bottom & Jack Gore Baygall	Turkey Creek	Upper Neches River Corridor	Village Creek
<i>Cambarellus puer</i>	167	2	4	16	10	12	16	43	1	43	10	6	5	
<i>Cambarellus shufeldtii</i>	45	1			15	6	4	2	1	1	3	10		2
<i>Cambarus ludovicianus</i>	55									55				
<i>Fallicambarus fodiens</i>	129	10		40	1	5	8	7		10	20	28		
<i>Fallicambarus kountzeae</i>	23			17	1	2	1	1			1			
<i>Orconectes lancifer</i>	14							1			11	2		
<i>Orconectes texanus</i>	16				7		3				6			
<i>Procambarus acutus</i>	111	1	1					46		40	23			
<i>Procambarus clarkii</i>	15	1	2							2	10			
<i>Procambarus depratzii</i>	35	7	11		1			1		3	10			2
<i>Procambarus henei</i>	1									1				
<i>Procambarus kensleyi</i>	40	11	8							18	1	2		
<i>Procambarus zongangulus</i>	13	1	1							11				
13	664	34	27	73	35	25	32	101	1	184	95	48	5	4

