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Searching for the False Map Turtle

By: Shay Austin

As part of my Sustainable RIVER experience with the Kerby Lab, I helped survey along the 800 miles of shoreline of Lake Oahe, a large reservoir on the Missouri River, to search for false map turtles (*Graptemys pseudogeographica*). Before coming to Vermillion, South Dakota, I had never heard of the false map turtle! I soon realized the importance of this research because no one knew if this state-threatened species still existed in Lake Oahe. I figured I would learn a lot about these charming creatures during the three weeks I spent scanning Lake Oahe with binoculars and setting turtle traps in every nook and cranny of the reservoir. Although I learned a lot, I did not see a SINGLE false map turtle in Lake Oahe. We slept in tents along the Oahe shoreline and weathered five-foot swells in a little johnboat, but by the end of the trip we couldn't report a single false map turtle sighting from Pierre to North Dakota.

The lack of false map turtles was particularly shocking because a study from the early 60s revealed that the area used to contain the highest abundance of false map turtles in the state¹. The natural question is, what happened?

Before dams were constructed on the Missouri River, the river was large, allowed to naturally meander, and was uncontrolled. Now, each of the six main stem dams controls the flow of the river, creating large flooded areas upstream from the dams called reservoir lakes. Lake Oahe is the largest of these areas on the Missouri. In fact, it is so large, that it can be seen from space!

Dams and reservoirs are known to drastically change the ecology, geology, and hydrology of the river. It seems that the false map turtle can't thrive in this reservoir habitat. This isn't a surprise; false map turtles are reported at higher densities in moving waters¹.

We can't say for certain that there are absolutely no false map turtles in Lake Oahe, but it seems unlikely – especially considering how easy they are to spot in the flowing Missouri river by Vermillion. We could find dozens of false map turtles in a just a couple of hours in the flowing water habitat. They clearly prefer the natural current that exists there. A major aspect of the habitat is the snags, or sunken logs that protrude from the water, which are abundant in the shallow, moving stream. The turtles need places to bask to maintain an optimal body temperature, and snags are perfect beach chairs.

So, it's more than likely that the Oahe reservoir destroyed the false map turtle habitat. The next question I investigated was if there were any threats to the turtle in the free-flowing stretch of the river. The turtles appear to be very abundant in this area, but is there anything creeping in the water that could endanger the health of the population?

One thing that is impossible to miss while driving in eastern South Dakota is the seemingly never-ending agricultural fields of corn and soybeans, nearly all of which use herbicides and pesticides to maintain their yields. Unfortunately, these chemicals can pollute nearby streams and tributaries and eventually find their way to the Missouri.

The most commonly used herbicide worldwide is Roundup®. The active agent, glyphosate, is present in nearly all Midwestern streams, and it is known to kill bacteria². I wanted to find out if glyphosate had any major impact on the microbiome of false map turtles, seeing as changes to the microbiome is known to affect disease susceptibility and individual fitness³. I collected ten turtles from the main stem of the Missouri River and brought them back to the lab to run an experiment. I kept the turtles in individual tubs and randomly dosed five of them with Roundup®. Cloacal swabs taken before and after the treatment will soon be analyzed for bacteria species and diversity to see if glyphosate had an impact on the bacterial composition of the dosed turtles.

Additionally, when turtles were captured, we took a blood sample to later test for ranavirus; detection of ranavirus in turtles would be the first for the state. There may also be a correlation between presence of ranavirus and the types of bacteria found in the turtles.

The work on Lake Oahe will continue for at least another year, and the lab is continuing to venture into the little explored ecological communities of microbiomes. The Kerby Lab is a prolific hub made up of hardworking people that I was happy to be a part of. I'm certain that there are more exciting studies and discoveries to come.

Check out the following links to learn more about the Kerby Lab and the amphibian and reptile research that is ongoing!

<http://sdherps.org/>

<http://dakotaherps.org/>



Young false map turtle.



Boat used to survey Lake Oahe



Example of how turtle traps were set in Lake Oahe



Experimental tank where false map turtles were exposed to roundup and their microbiome was sampled.

Shay is a senior pursuing her Program in the Environment major at the University of Michigan. She participated in the 11-week Sustainable RIVER REU in 2017, and researched the effects of contaminants on the false map turtle microbiome with her research mentor Dr. Kerby. Shay hoped to pursue a career in sustainability or in a wildlife program.

Literature Cited

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2. Scribner et al. (2002). Reconnaissance Data for Glyphosate, Other Selected Herbicides, Their Degradation Products, and Antibiotics in 51 Streams in Nine Midwestern States, 2002. USGS Open-File Report 03-217, 101 pp.
3. Knutie et al. (2017). Early-life disruption of amphibian microbiota decreases later-life resistance to parasites Nature Communications. 8: 86.