

Evaluating Turtle Habitats in a Spring-fed Pond, a Natural Creek, a Manmade Pond, a Manmade Canal: What Role Does Disturbance Play in Population Structure and Parasite Load?

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Abstract

In Indianapolis, IN six different turtle species were studied; *Chelydra serpentina* (Common snapping turtle), *Sternotherus odoratus* (musk turtle), *Apolone spinidera* (spiny softshell turtle), *Trachemys scripta* (red eared slider turtle), *Chrysemys picta* (painted turtle), *Graptemys pseudogeographica* (map turtle). There were 4 locations used to collect turtles; Marian University's "Ecolab", Broad Ripple Central Canal, Crooked Creek, and Indianapolis Museum of Art's "100 Acres" park. These locations were chosen because of their varying levels of human disturbance and differences in water sources. It has been shown that turtle populations can be greatly impacted by human activity from fragmentation (Ryan, 2005), though habitat type also impacts turtle populations. This study seeks to explore the role of human disturbance versus water source in turtle population demographics and eco-physiology. Both of these constructs may impact turtle population structure and health. Through monitoring of ecto- and endoparasite load as well as population demographics, we begin to identify the interaction of ecological dynamics and turtle fitness.

Methodology

- Dates: June-September 2010 and June-July 2011
- 2 traps set up in the "Ecolab"
- 2 traps in Crooked Creek
- 4 traps at the Indianapolis Museum of Art's pond
- Turtles were caught using aquatic column traps baited with sardines
- Traps were re-baited and turtles were collected every other day for 7 weeks
- Recorded traits upon capture: sex, species, weight (g), carapace length and width (mm), parasite load, any noticeable damage, date, and location of capture
- External parasites counted and blood collected
- Turtles were marked with a non-invasive identifier on their scout and released back into the place of capture
- Blood smears will stained using the Wright-Giemsa staining protocol
- Plasma samples will be used for future hormone analysis

Conclusions

- Over all we have found that the species *Chrysemys picta* had the most parasites out of all the species collected.
- Figure 1 and 2 represents the diversity of species in the "Ecolab", IMA, and Broad Ripple Canal showing that these places are adequate for many types of turtles.
- In figure 3 the data from the "Ecolab" and Indianapolis Museum of Art all correlated with previous studies concluding that carapace length may be related to the amount of parasites on a turtle, which is dependent on the species, the size, and age of the turtle.
- In figure 4 there was a large difference in sex ratios in the "Ecolab" and Indianapolis Museum of Art. Could the sex depend on the number of parasites present on a turtle or does the location matter more?
- Figure 5 shows that *Chrysemys picta* in the IMA and "Ecolab" had more parasites out of all the species, which means they may be more receptive to external parasites.
- This summer adding two new locations added more data to look more closely at the relationship of disturbance, location, and water source to parasite load.
- Since no turtles were caught in Crooked Creek, we conclude that turtles may not prefer this type of water habitat and instead may prefer a pond or canal off the White River.

Results

Background

Importance:

- Turtle populations have been strongly impacted by human activity, expansion, and urbanization (Ryan, 2005).
- Turtles are important to ecosystems because they are markers of environmental biodiversity (Iverson, 1982; Congdon et al, 1986).
- Leeches are one of the most commonly found parasite on turtles (Readel, Phillips, and Wetzel, 2008).
- Turtles play host to many leeches, *Placobdella parasitica*, and *Placobdella ornata* which may cause blood parasites (McAuliffe, 1977; Siddall and Desser, 2001).
- Leeches are also vectors for hemoparasites which can be transmitted between turtles, both intra- and interspecifically (Telford, 1984; Barnard and Upton, 1994; Siddall and Desser, 2001).

Species:

Omnivorous bottom dwellers:

- Chelydra serpentina* (Common snapping turtle)
- Sternotherus odoratus* (musk turtle)

Omnivorous aerial-baskers:

- Apolone spinidera* (spiny softshell turtle)
- Trachemys scripta* (red eared slider turtle)
- Chrysemys picta* (painted turtle)
- Graptemys pseudogeographica* (map turtle)

Sites:

- Marian University's "Ecolab":** spring-fed pond, 30 acres of marsh and wet lands.
- Broad Ripple Central Canal:** 170 years old, manmade canal, dredged annually, runs along residential areas and intersects many roads.
- Indianapolis Museums of Art's "100 Acres" park:** manmade pond, 100 acres of wetland and forest.
- Crooked Creek:** A tributary to the white river in Indianapolis, IN.

Demographics: Species Numbers by Locations

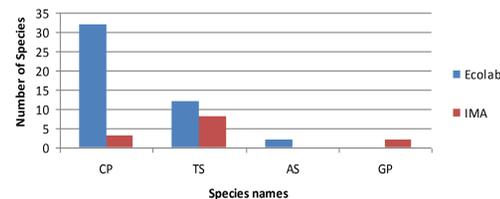


Figure 1: histogram shows the species collected, the capture location, and number collected. Locations: Ecolab, Indianapolis Museum of Art (IMA), and the Broad Ripple Canal (BRC). Species collected: AS=A. spinidera (spiny softshell turtle), TS=T. scripta (red eared slider turtle), CP=C. picta (painted turtle), GP=G. pseudogeographica (map turtle), GG=G. geographica (subspecies of map turtle). Note no turtles were collected at Crooked Creek (CC).

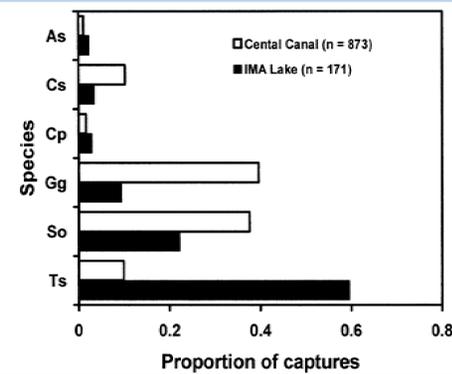


Figure 2: A graph of the amount of turtles caught in the IMA and BRC from the paper (Connor et al, 2005). This graph is in comparison to Figure 1.

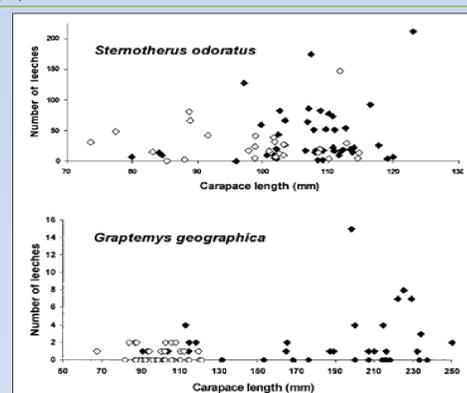
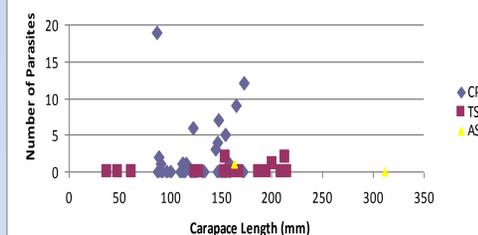


Figure 3: (A) compares leech count with carapace length (mm) in the species *S. odoratus* from the Central Canal (BRC) (Ryan and Lambert 2005). The open circle represents males and the closed circle represents females. (B) compares leech count with carapace length (mm) with the turtles caught at the "Ecolab" and the IMA.

Leech Infestation Compared to Carapace Length



Graph B

Future Studies

- Future studies will continue working with Butler University to collect and analyze more turtle parasite data.
- As well as looking at hormone levels to look at correlations between infected and non-infected turtle species as well as hormone level variation among habitat type.
- A later study of soil and water samples near where the traps were, this will explore temperature and chemical levels. This would show us if there is any difference in water and soil among the different locations.
- Explore stress hormone implants to observe stress responses to demonstrates whether stress influences parasite load or whether parasite load influences stress
- Additional lab studies to introduce parasites into different turtle micro habitats in the lab to see altered hormone levels.

Picture of *Chrysemys picta* (painted turtle) with leeches on its shell



| Location | Male | Female |
|----------|------|--------|
| Ecolab | 25 | 21 |
| IMA | 11 | 2 |
| BRC | 363 | 413 |

Figure 4: This chart shows the sex ratio in all three locations where turtles were collected. In both the IMA and "Ecolab" there were more males than females. However, the BRC was different and had more females than males showing a different sex demographic.

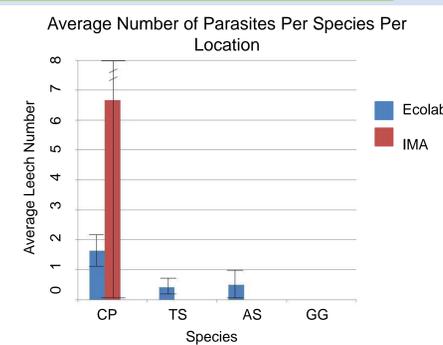


Figure 5: This graph shows the relationship between the different species studied, where they were found, and how many parasites they have on them. From this we can see that *C. picta* (painted turtle) had an average of the most parasites at the IMA. The "Ecolab" on average had less parasites than the IMA had.

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