SOAR Project Proposal
Summer 2017

Painted Turtle Nest Predation in Ponds at the Lehigh Gap Nature Center

Faculty Adviser: Frank T. Kuserk, Louise E. Juley Professor of Biological Sciences and Director, Environmental Studies & Sciences Program

Student: Maria Manz
Junior
Environmental Science
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Project Title: *Painted Turtle Nest Predation in Ponds at the Lehigh Gap Nature Center*

Project Start & End Dates: Tuesday, May 30, 2017 to Friday, August 4, 2017 (10 weeks)

Project Description: Half of the world's populations of turtles and tortoises have been faced with the threat of extinction (IUCN Red List, n.d.). The survival of adult turtles has been demonstrated as a major influence in keeping a population at a sustainable level (Brooks et al., 1991; Congdon *et al*., 1993), but the survival of turtle nests may also have a major influence since these eggs will grow to be the next generation of reproducing turtles. The mortality rates of nests have been found to be largely influenced by predation (Congdon *et al*. 1983). One of the predators associated with turtle nest predation is raccoons, which have been found to benefit from supplemental foods that can be found in agricultural, suburban, urban, and many other areas with which humans are associated (Oehler and Litvaitus, 1996; Pedlar *et al.,* 1997; Dijak and Thompson, 2000). In other words, anthropogenic change on the landscape level has direct influence on freshwater turtle populations (Rizkalla and Swihart, 2006; Sterrett *et. al.,* 2011). Furthermore, studies have shown that habitat fragmentation can alter the abundance of turtle populations (Rizkalla and Swihart, 2006).

Since 2012 students taking BIOL 360 (Ecology), BIOL 292 (Aquatic Biology), and BIOL 250/PSYC 250 (Animal Behavior), along with 2016 SOAR students Shelby Does and Robert McKinley, have been monitoring turtle populations in Mallard, Kingfisher and Wood Duck Ponds at the Lehigh Gap Nature Center (LGNC), as part of a nationwide study on the effects of urbanization on these reptiles. Organized under the auspices of the Ecological Society of America, the TurtlePop Project involves faculty and students at 27 predominantly undergraduate colleges across the United States. For her Honors Project Shelby radiotracked painted turtles in the area of the pond to measure interpond migrations and piloted a study that examined nest predation. Because the study was conducted in Fall 2016-Winter 2017 nest predation was minimal. We propose to conduct this study in late spring-early summer when mating and egg laying by female turtles are at their height.

In this study we hypothesize predation rates of artificial freshwater turtle nests will vary by land use and distance from the pond.

Proposed 2017 activities:

For each habitat type, artificial turtle nests should be placed at three linear distances: 50 m, 100m, and 150m from the water's edge. A laser range finder will be used to find the linear distance from the water's edge. If the habitat is at least 50 m wide, we will place up to 5 simulated nests at each distance separated by at least 10 m.

While digging and placing the nest, gloves will be used to minimize human scent left on the artificial nests. Nests will be created by digging a 10 cm deep hole that is roughly 5 cm wide. Each nest will contain 2 bobwhite unfertilized quail eggs from Wadley Quail Farm (http://www.wadleyquailfarm.com/quail_eggs_for_human_consumption.html). Before eggs are placed in the nest, the nest will be sprayed with turtle water. Turtle water is simply water taken from a tank of turtles to mimic the odor of a nesting female. The eggs are then placed in the nest and sprayed again with turtle water before being lightly covered in a fine layer of dirt. HOBO Pendant 8K Temperature data loggers will be placed in the nests next to the eggs before being covered with dirt.

A secondary question of this project is who is predating turtle nests? This question will be investigated by placing wildlife trail cameras facing each of the turtle nests. Our 12 cameras are motion-triggered and operate during both the day and night using infrared light.

Nests will be set all in the same day during the turtle-nesting season (May – early July). Nests will be checked weekly for signs of predation. Any sign of disturbance counts as predation. This is because nests that are disturbed will usually become predated soon after. New nests will be created as needed during the entire study period.

In order to document turtle migration patterns, and hence the location of real painted turtle nests, we will use radiotransmitters to track the movements of female turtles captured from the LGNC ponds. We currently have a receiver and antenna and have previously attached radiotransmitters to five female turtles captured in Mallard Pond. We propose to track an additional five turtles in this study.

Qualifications and Certifications: For the past five years I have had experience trapping turtles at the LGNC as a participant in the nationwide TurtlePop Project. We presented the results of our first-year findings at a recent meeting of the Ecological Society of America and are currently preparing a manuscript of our results to be submitted to the journal *Conservation Biology*. In February 2016 I presented my findings on Mallard Pond populations to members and guests of the LGNC. I currently hold a Scientific Collector's Permit (#349) from the Pennsylvania Fish and Boat Commission to conduct turtle surveys.

Roles and Responsibilities of Faculty and Students:

Faculty Role: I have been conducting studies on turtle populations at the LGNC as a participant in the TurtlePop Project since 2012. As a result, I have engaged many Moravian College students in this activity because of this collaboration. For this project I will assist my research student, Maria Manz, to develop a background literature search, provide expertise in how to conduct the required assessments, assist in collection and analyses, and guide her in the preparation of results for presentation and publication. Maria has completed BIOL 292 (Aquatic Biology) and is familiar with the techniques that we will use in this project.

Student Role: Maria will participate in pre-project planning with me, collect, and analyze specimens using established protocols. She will assist in the analysis of the data that we collect and in writing the final report that will be given to the LGNC and used in the TurtlePop Project. Finally, she will prepare and deliver presentations at scientific meetings including the Landmark Conference Summer Undergraduate Research Conference and the National Conference on Undergraduate Research and will participate in next year's Moravian College Annual Student Scholarship and Creative Arts Day. Over the past seven years I have had 24 of my SOAR and Honors research students present their findings at the annual National Conference on Undergraduate Research.

Timetable: Fieldwork will consume the entire 10-week summer period. A report to the LGNC that provides an analysis of the data will be completed by October 1, 2017.

Benefits to the Student, Faculty Member and Moravian College:

Student Benefits: Maria will benefit by being part of a long-term ecological study that has great environmental importance. She will become part of a team of researchers and conservation scientists dedicated to studying an important group of threatened species. In this way she will experience how modern ecological research is a collaborative effort involving many people, each contributing in a specific way, according to their expertise. She will need to operate both as a team player and as an individual charged with the responsibility of learning accepted sampling protocols, identifying turtle species, and performing statistical analyses on the results. Additionally, she will gain experience in the writing of scientific reports and papers. Depending on the outcome of the project she will also prepare their work for publication as a technical report to be published by the LGNC. She will additionally present her work at Moravian College's Annual Student Scholarship and Creative Arts Day and at a scientific meeting such as the National Conference on Undergraduate Research next spring.

Faculty & College Benefits: I am eager to continue a research program that actively involves undergraduates and collaborates with professional colleagues. Continued cooperation with the LGNC will assist us in providing our students with field experiences such as this. This organization has provided meaningful opportunities for students engaging in scientific research, environmental policy, environmental management, and environmental education. Our Biology and Environmental Studies & Sciences Programs rely on our ability to develop strong relationships with environmental organizations.

Literature Cited

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Student Statement of Purpose

Project Title: *Painted Turtle Nest Predation in Ponds at the Lehigh Gap Nature Center*

Student Name: Maria Manz
Major: Environmental Science
Date of Graduation: May 2018
Faculty Mentor: Dr. Frank T. Kuserk
Campus Housing: Yes

Participation Rationale and Expected Outcomes:

The Student Opportunities for Academic Research (SOAR) summer program will provide me a valuable opportunity to serve on Dr. Kuserk's research team, which is focused on freshwater turtles in the Lehigh Valley. As a rising senior, this opportunity will allow me to develop research competencies, formulate my career goals, and prepare me for graduate study in in aquatic biology. I believe that in participating in this SOAR project, I will refine my research and professional interests in environmental science, specifically ecology.

I expect that this SOAR project will be an extremely beneficial opportunity for my future career as I hope to attend a graduate program that will allow me to continue studying environmental science. I understand how essential it is to have a specific area of research as I move onto graduate school. However, at present I am unsure of what area I will direct my research interests. By working closely with Dr. Kuserk's research team, I hope to explore my passion for studying freshwater turtles and possibly advance my summer research into a future Honors project during my senior year. At the same time, I understand that SOAR is intended to expose me to new ideas, as well as extend my interests into other, related directions. The unique SOAR experience offers experiences and mentoring that will allow me to discern my personal interests in environmental science.

While discussing this opportunity with Dr. Kuserk he has made me realize that if I wish to continue onto a graduate program for environmental science I will need to have a strong skill set in field research. With Dr. Kuserk's mentoring, I will be able to adopt valuable practices for future field research opportunities. I hope to learn how to productively and safely work with an ecosystem, and develop skills that cannot be taught solely in a classroom. Additionally, by working with a well-known faculty member, I hope to acquire professional habits when working with others, and continue to build upon my ability to work within a team. By collaborating with a research team we will be able to conceptualize research ideas and learn to problem solve, as the research is being conducted and analyzed.

I am excited to begin this research in hopes that I will conclude this summer with a better understanding of what it means to be apart of a well-developed environmental science program, which will well prepare me for future research opportunities in graduate school. Moreover, I hope to gain knowledge in preparing and presenting my research to others, and possibly continue researching freshwater turtles or inspire fellow students to continue our research and make a difference within the Lehigh Valley.

Expense Proposal

Project Title: *Painted Turtle Nest Predation in Ponds at the Lehigh Gap Nature Center*

Faculty Mentor: Frank T. Kuserk
Louise E. Juley Professor of Biological Sciences
Director, Environmental Studies & Sciences Program

Student: Maria Manz

Budget: $500

Expenses as described below:

$100	Since this project involves extensive travel to conduct sampling at field sites we request funds for gasoline. We will use the Environmental Studies & Sciences van for travel.
$ 50	Licenses. Maria requires a valid 2017 Pennsylvania Fishing License.
$ 50	2017 Pennsylvania Scientific Collector's Permit. This is required by the Pennsylvania Fish & Boat Commission in order to conduct turtle surveys.
$300	5 Lotek Systems radio transmitters. It is anticipated that the total cost of radio transmitter equipment and supplies for this project will exceed $500. Additional supplies and expenses will be covered by the Environmental Studies & Sciences budget.
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$500	Total