



East Carolina University

HONORS COLLEGE

Senior Honors Project Contract

THESIS

PART 1: Student Information

Name: Taylor Locklear

Banner ID: B00689720 Contact Phone: 919-995-3546

Intended Date for Graduation: Spring 2016

Major(s): Biology Minor(s): n/a

Overall GPA at ECU: 3.64 Total Honors Hours Completed: 11 s.h.

PART 2: Senior Honors Project Proposal Information and Narrative

Senior Honors Project Title: Sequencing and Comparative analysis of the mitochondrial cytochrome b gene in the Marion Uplands Florida Sand Skink

NOTE: The title of your senior honors project must fit tightly with the disciplines that you are studying.

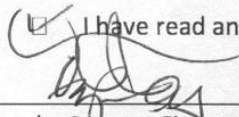
Thesis Description:

In a cohesive and well-written document, please describe your planned research project. To achieve consistency across a wide range of disciplines, please use the headings below as your first-level headings. You may choose to add a second level of headings to focus your narrative. This proposal should be written with care and in consultation with your faculty mentor. While the length of the proposal narrative may vary considerably from one student to the next, a proposal less than three pages is likely to lack detail and rigor.

Paste these questions in a separate document and respond to each one. Use Calibri/Arial/Times New Roman font size 12 and double-space your work.

- **Introduction:** This section addresses the "why" of your research. This section should indicate why this study is valuable in the context of your field. In other words, what problem exists that you are investigating?
- **Background:** This section addresses the background for the reader. What is important to know about the study? Use literature to situate your study.
- **Purpose of the study:** This section addresses the "what" of your research. Summarize what your research will achieve.
- **Research question(s) or hypotheses:** Many empirical studies use research questions or hypotheses as a guide. *If this is appropriate for your research*, please clearly state these after sharing your purpose. If this is not appropriate, then please state your guiding questions. What questions are guiding your research?
- **Methodology:** This section will address the "how" of your research. What type of data will you use to achieve your study purpose? How will you access these data? What procedures will you follow?
- **Closure:** This section concludes your proposal by stating how this research will add value to your field and your career path. As you may recall, an oral presentation is a required component of your Senior Honors Project. Mention your initial thoughts regarding where you might present your research next year.
- **Timeline:** Please include your first and second semester timelines at the end of your proposal.

☒ I have read and agree with the student's responses to these aforementioned requests.


Faculty Mentor Signature and Date

02 Dec '14

PART 3: Timeline Template for Semester One and Semester Two

Note: This is a template for a research-based SHP using primary data collection. Please adapt this template for your project.

Semester One	Goal(s) for the week	Broad goal
<i>Sample Week 1</i> Dates: 8/26-31	<i>Read 5 articles, write abstracts for each</i>	<i>Working toward a review of literature</i>
Week 1 Dates: 1/12-1/18	Apply for grants	Research possible grants to utilize for travel
Week 2 Dates: 1/19-1/25	Apply for grants (continued)	Apply for available grants
Week 3 Dates: 1/26-2/1	Apply for grants (continued)	Apply and wait upon response for grants
Week 4 Dates: 2/2-2/8	Travel to Florida (tentative)	At some point, we will collect samples (date yet to be determined)
Week 5 Dates: 2/9-2/15	Travel to Florida (tentative)	Date yet to be determined to collect samples
Week 6 Dates: 2/16-2/22	Travel to Florida (tentative)	
Week 7 Dates: 2/23-3/1	Train for executing PCR	
Week 8 Dates: 3/2-3/8	Isolate genomic DNA from tail tip samples	Use tail tips to isolate mitochondrial DNA
Week 9 Dates: 3/9-3/15	Amplify mitochondrial DNA	Use PCR to amplify mitochondrial DNA
Week 10 Dates: 3/16-3/22	Sequence cytochrome b gene	Sequence gene of interest for comparison
Week 11 Dates: 3/23-3/29	Sequence cytochrome b gene	Sequence gene of interest for comparison
Week 12 Dates: 3/30-4/5	Gather relevant genetic information from Genbank	Research relevant information for comparison
Week 13-16 Dates: 4/6-semester end	Compare and analyze sequences	Compare Marion sequences to preexisting data

Semester Two	Goal(s) for the week	Broad Goal
Dates: 8/21-mid semester	Synthesizing information	Collect comparisons and write paper
Dates: Mid-semester-semester end	Plan for presentation	Gather resources necessary to give thesis presentation
Semester end	Present research thesis	
Weeks 13-16	Written document finalized and uploaded to <i>The Scholarship</i> and submitted to the Honors College for approval for to graduate with the Honors College designation.	

PART 4: Course Registration

1. First, check to see if your major or minor discipline (the area that coordinates with your project's topic) has an honors thesis class already established. For example, Neuroscience has NEUR 4950 (3 credit hours) and NEUR 4951 (3 credit hours). If the area has an honors thesis class already established, then register yourself for those courses during the appropriate honors registration window. Remember your senior honors project experience must equal a 6 credit hour experience over two semesters.
2. If you do not have a major or minor discipline thesis class established in the area that you are proposing for your Senior Honors Project, then we will create a section of HNRS 4500 (first course) and HNRS 4550 (second course) for you after you receive approval for your Senior Honors Project.
3. Now, please list the courses you plan to take and when you plan to take them:

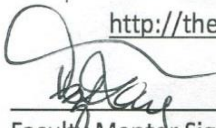
First Course: BIOL 4504 Semester hours: 2 Semester: Spring Year: 2015

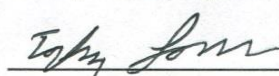
Second Course: BIOL 4514, 4995 Semester hours: 4 Semester: Fall Year: 2016

PART 5: Contractual Statements with Faculty Mentor Verification

Please read each statement, check each box and sign below.

- ☒ I understand that my Senior Honors Project must be an original project completed during my senior year.
- ☒ I understand that I must use MLA or APA format for my paper, and I need to discuss paper lengths, paper format, etc. with my faculty mentor.
- ☒ I understand that I need to discuss any IRB needs relative to my project with my faculty mentor. We will comply with all IRB requirements, if necessary.
- ☒ I understand that during the second course, I am required to present my project orally (i.e., State of North Carolina Undergraduate Research and Creativity Symposium-SNCURCS, a national conference, a state conference, Research and Creative Achievement Week-held each spring on campus, etc.).
- ☒ I understand that I must submit **two** items electronically five days prior to graduation: 1.) The Honors College's Online Repository Template, and 2.) My final paper and the first page must follow the Honors College Senior Honors Project Title Page template.
- ☒ I understand that my final paper will be uploaded into ECU's online repository, *The Scholarship*, database.
- ☒ I have read, understand and agree with The Scholarship Non-Exclusive Distribution License found at: <http://thescholarship.ecu.edu/license>

 2 Dec '14
Faculty Mentor Signature and Date (implying consent for the project and willingness to advise for both courses)

 2/12/14
Student's Signature and Date

HNRS 4000 Instructor Faculty Endorsement Signature and Date

PART 6: Faculty Mentor Information for the Credentialing Process

Required Section:

Faculty Mentor's Full Name: Trip Lamb

Department: Biology

Phone: 328 - 6494

Email address: lamba@ecu

Faculty Mentor's Department Chair: Jeff McKinnon

College: Arts & Sciences

Does the faculty mentor hold a terminal degree in a discipline directly related to the content being explored in this project? (Faculty mentor, please circle one) YES NO*

*If no, please attach a brief description to satisfy standard alternate credentialing.

Note: The faculty mentor is required to hold a terminal degree in a discipline directly related to the content being explored in this senior honors project. If this is not the case the faculty mentor may provide as an attachment a brief description of alternate qualifications that would permit standard alternate credentialing for this project.

Optional Section: Complete only if you have a co-mentor.

Co-mentor's Full Name: _____

Department: _____

Phone: _____

Email address: _____

Faculty Mentor's Department Chair: _____

College: _____

Signature of Dean Marianna Walker

Date

Credential Approval: Signature of Dean Marianna Walker required after completion of HNRS 4000.

Your HNRS 4000 instructors will submit this section to Dean Marianna Walker.

Introduction

The Florida sand skink (*Plestiodon reynoldsi*), a small lizard endemic to the scrublands of central Florida, is one of many species affected by habitat loss in the Florida highlands. In this project, we will examine mitochondrial DNA variation in a skink population not previously studied. The population inhabits the Marion Uplands, which is geographically isolated from the skink populations nearby on the Mt. Dora and Lake Wales ridges. Our objective will be to determine which populations are most closely related to the Marion Upland skinks and add these new genetic findings to the existing genetic database for sand skinks.

Background

The Florida sand skink is a small burrowing lizard restricted to a highly specific ecosystem—known as Florida scrub—in portions of peninsular Florida's central uplands. Endemic to the Mt. Dora, Lake Wales, and Marion Uplands sand ridges, the skink's habitat and its habitat are "rapidly disappearing under human development" (Branch et al., 2003). Genetic research on the populations from these regions reveals that the skinks exhibit "high levels of genetic divergence associated with habitat fragments" (Branch et al., 2003). Due to their limited region, the skinks are highly vulnerable to disturbances in their habitat (Richmond et al., 2009). Habitat "fragments have become gradually more isolated in the latter half of the 20th century, due to rapid urban and agricultural development, fire suppression, and vegetative overgrowth," which "reduce suitable microhabitat area for sand skinks and may also limit their dispersal ability" (Richmond et al., 2009). Overall, the skink is at a risk of extinction as a result the loss of suitable habitat.

Purpose of the Study

This research will add to the preexisting genetic database on Florida sand skinks. By determining genetic relationships among populations, the lizard's range-wide genetic profile can be used to implement "strategies for translocation, reservation design, and management of landscape connectivity" to aid in the conservation of sand skinks (Branch et al., 2003). This information can be used in the development of a comprehensive plan to conserve the increasingly fragmented populations of sand skinks. Should the Marion Uplands population exhibit a high level of genetic divergence, protecting its habitat will become ever more significant.

Hypothesis

We hypothesize that the Marion Uplands population will be most genetically most similar to populations on the Mt. Dora Ridge, which are closest geographically. However, these two uplands are separated by the Ocklawaha River; thus the Marion Uplands population may be more genetically similar to populations to the south on the Lake Wales Ridge. The Marion Upland skinks may exhibit significant genetic divergence from both the Lake Wales and Mt. Dora populations, following trends demonstrated by previous research.

Methodology

This project will begin with initial sample collection. We will visit the Marion Uplands and collect approximately 25 sand skinks. As these skinks are federally protected, we will clip tail tips from the skinks for DNA analysis, allowing the skinks to be released at their capture sites. We will isolate genomic DNA from tail tip samples, and amplify and sequences the mitochondrial DNA gene cytochrome b, an informative genetic marker used in previous population genetic surveys of this species. We will then compare our cytochrome b data with

that published for the skinks from Mt. Dora and Lake Wales ridges to determine patterns of genetic relatedness among the Mt. Dora, Lake Wales, and Marion Upland populations (Branch et al., 2003, Richmond et al., 2009).

Closure

This research has direct correlations to my career path in exotic veterinary medicine. I will be able to utilize both field and lab research. Ideally, I will travel to the Marion Uplands and assist in collecting skink tail samples. In addition, I will learn how to execute a polymerase chain reaction to amplify and sequence DNA as well as how to process and analyze the resulting genetic data. Lab time and experience are crucial components of veterinary school, as well as the hands-on approach found in field work. More significantly, this research has direct implications for conservation. I will be making a small contribution to a larger body of work that is essential for developing effective plans for protecting skink populations and the quality of their habitat.

- Branch, L.C., Clark, A. M., Moler, P.E., Bowen, B.W. (2003). Fragmented landscapes, habitat specificity, and conservation genetics of three lizards in Florida scrub. *Conservation Genetics*, 4, 199-212.
- Richmond, J.Q., Reid, D.T., Ashton, K.G., Zamudio, K.R. (2009). Delayed genetic effects of habitat fragmentation on the ecologically specialized Florida sand skink (*Plestiodon reynoldsi*). *Conservation Genetics*, 10, 1281-1297.

