

Buehler Committee Meeting

2022

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Personal Update

- Journal Editing
 - I took on a Journal Editor role for *Reptiles & Amphibians*
- Grants
 - Finalized submission of Section 6 Grant in Dec. 2021
- Classes
 - Evolutionary Biology
- GTA Support
 - Instructor of Record for Herpetology
- Lab Work
 - Created RAD libraries for *Drymarchon*, *Laticauda*, and *Pachydactylus*
 - Started a *Laticauda laticaudata* morphometrics project with an undergraduate I have been mentoring

- Attended the *Joint Meeting of Ichthyologists and Herpetologists*
 - Presented a poster on *Pachydactylus*
 - Had an undergraduate present a poster on *Laticauda laticaudata* morphometrics
- Started a new project with another undergraduate researcher looking at morphometrics of Cottonmouth Snakes in the Apalachicola Hybrid Zone

- GTA Support
 - Teaching A&P I and II
- Classes
 - Pedigree Reconstruction
- Lab Work
 - Processing RAD data
- Grants
 - Submitted a proposal for Year 2 Funding of Section 6 Grant

Dissertation Status

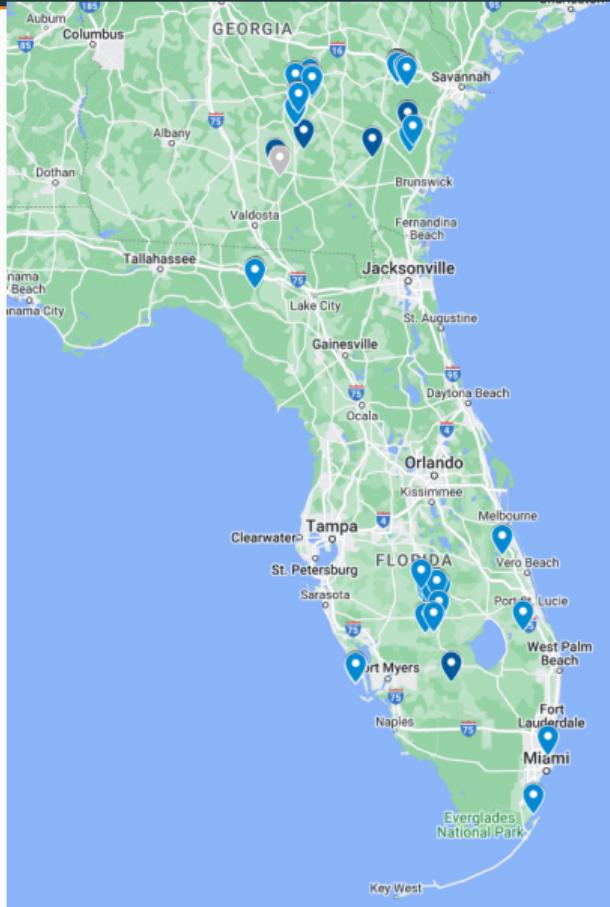
Indigo Snake Sequencing Efforts

164 individuals sequenced, 37 broodstock, 47 OG Broodstock, 80 wild individuals

- ~ 40,000 loci

Whole Genome Sequence using PacBio Sequel II Platform

- Working with DLS, have a couple candidate samples



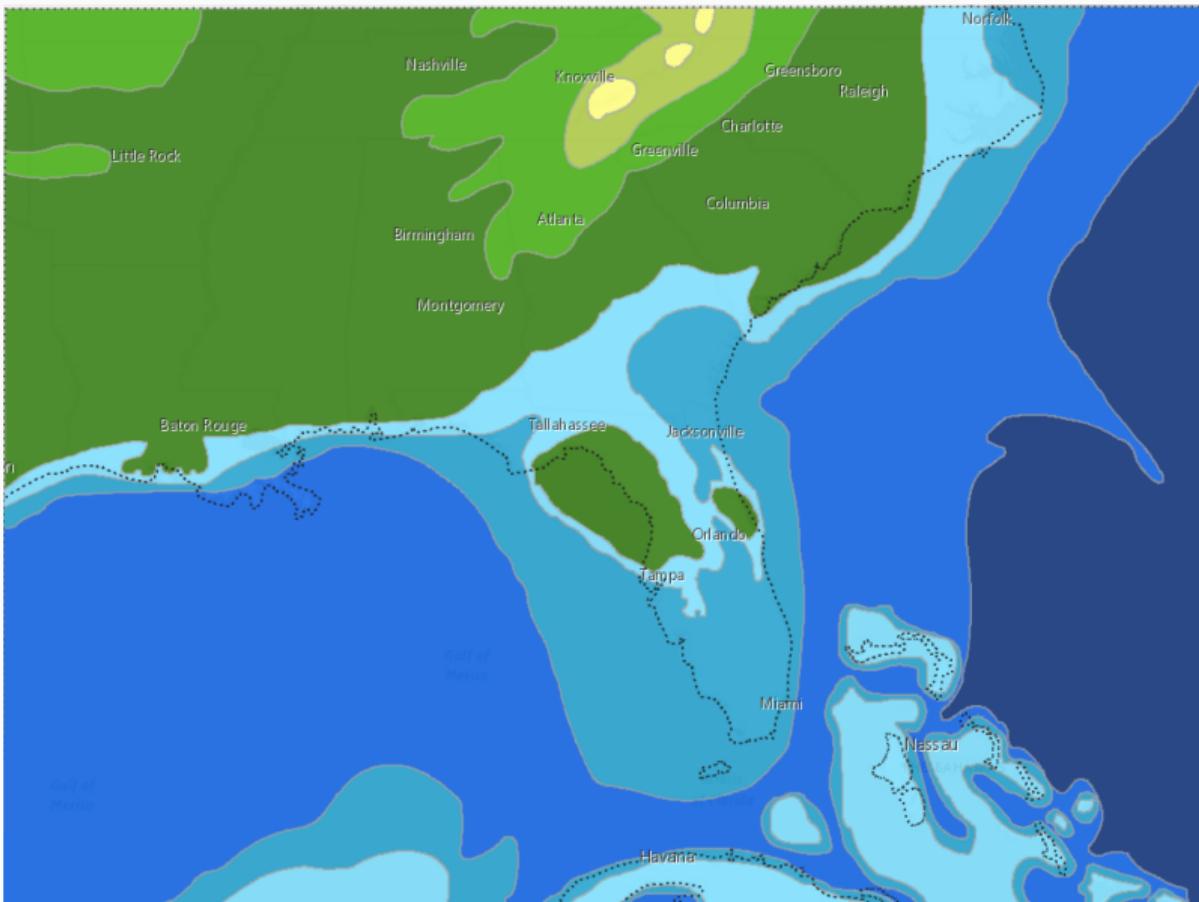
Chapter 1: RADcap Panel Creation

- Technical Chapter
- **Purpose:** Develop a panel of SNP loci from the 3RAD data that can be used to amplify informative loci for pedigree reconstruction and phylogenetic estimation. I will then develop a protocol that can be generalized and implemented for conservation of other squamate species.
- **Goals:**
 - Create a pipeline for mining informative SNP loci from 3RAD data
 - Create a protocol for designing and testing MyBaits probes sets
 - Create a protocol for preparing RADcap libraries and sequencing
 - Create a pipeline for assembling the data, assessing data quality, and running preliminary analyses
 - Create a script for reconstructing a pedigree for the OCIC breeding colony

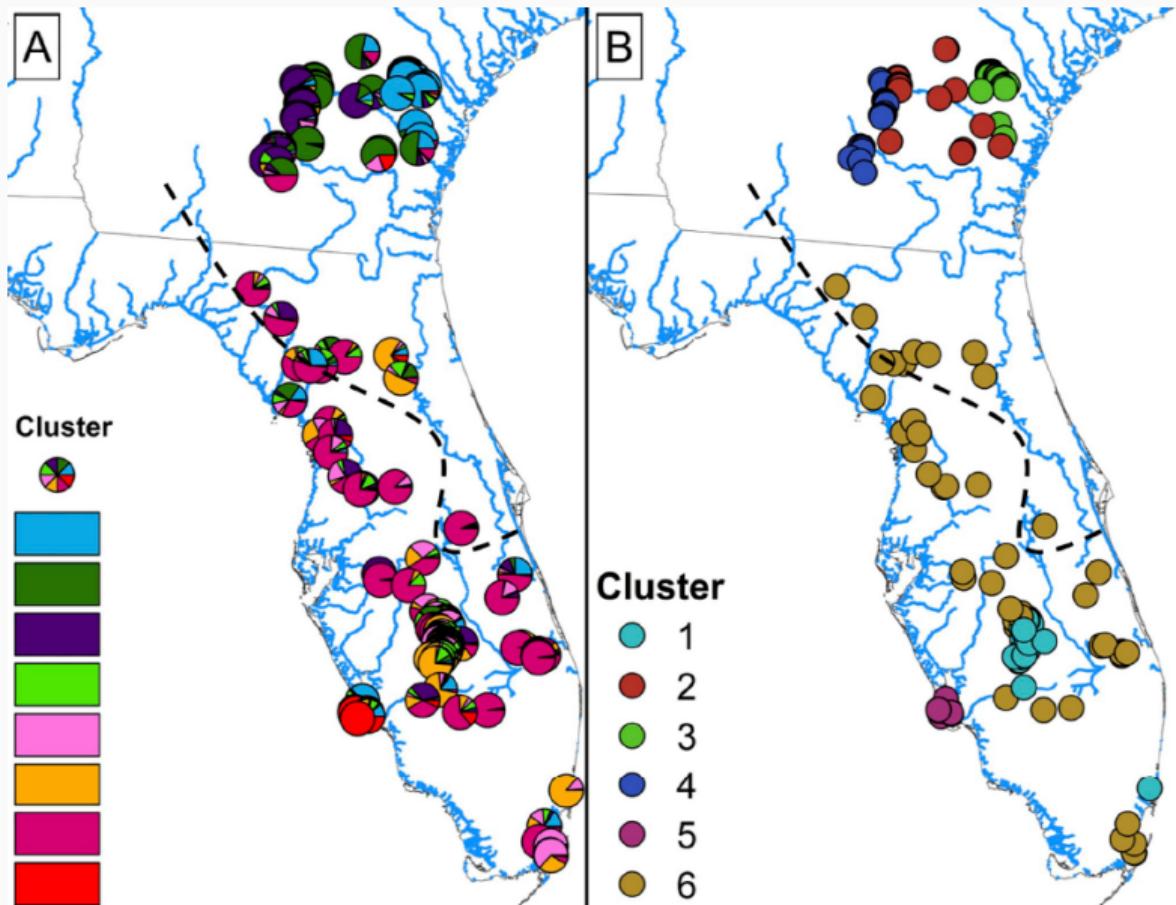
Chapter 2: Indigo Snake Phylogeography

- **Biological Question** What abiotic factors contributed to the patterns of diversity seen in the EIS across Florida and southern Georgia?
 - **Hypothesis 1** The Suwanee Strait and Appalachian uplift led to genetic differentiation between northern and southern populations of *Drymarchon couperi* in the Miocene
 - **Hypothesis 2** Founder events after glacial retreat lead to the establishment of genetically unique populations in southern Georgia.
 - **Hypothesis 3** The central ridge of Florida does act a barrier to gene flow between Atlantic and Gulf populations. Perhaps because the snakes typically forage and mate in the low lands they aren't crossing the ridge during meaningful times during the year
 - **Hypothesis 4** The species originates in the north and founder events are actually down into Florida. Localized adaptation to warmer climates has lead to genetic differentiation between populations.

Miocene Florida; 23–5.3 MYA



Indigo Snake Genetic Diversity



Chapter 3: Indigo Snake Population Genetics

- **Biological Question:** How connected are populations of *D. couperi*?
 - **Hypothesis 1:** Populations of southern Florida are actively sharing genes
 - **Hypothesis 2:** Populations are restricted due to fragmented habitat and urbanization of the landscape. There is little to no gene flow between populations

Chapter 4: SLiM Model for Population Viability

- **Biological Question:** How does the demographic and genetic make up of the OCIC breeding colony impact the chances of long term success of reintroduced populations?
 - **Hypothesis 1:** Low genetic diversity in the OCIC breeding colony will lead to an increased frequency of the re-introduced population going extinct
 - **Hypothesis 2:** Small effective population sizes will lead to rapid extinction of re-introduced indigo snake populations
 - **Hypothesis 3:** Non-adaptive variation will result in strong directional selection in the re-introduced population leading to a drop in effective population size.
- **Methods:**
 - SLiM model developed in class last fall
 - Based on the Folt et al. 2019 conservation model
 - This model included many life history traits, but did not explicitly model how genetic diversity may shape outcomes

Year Goals

Spring and Summer 2023

- GTA support
- Personal Goals
 - Complete proposal over winter break
 - Do written exam by the end of the Spring Break
 - Proposal seminar by the end of the semester
- Classes
 - No

Questions?

