Brady Nichols

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EDUCATION

Bowdoin College
Brunswick, Maine

B.A.; Major in Physics & Math, Minor in Biology; **GPA: 3.85/4.00**   *Sep 2020 – May 2024 (Expected)*

Senior Honors Thesis: Characterizing the oscillatory gait of *Asterias forbesi*

Activities: Ultimate Frisbee, Concert Band (Clarinet)

Marine Academy of Technology and Environmental Science
Manahawkin, New Jersey

High School Diploma   *Sep 2016 – Jun 2020*

Activities: Birding Club, Envirothon, Shore Bowl, Project Terrapin

RESEARCH & WORK EXPERIENCE

Bowdoin College – Johnson Lab
Brunswick and Harpswell, Maine

Summer Research Fellowship + Honors Project   *Summer 2023 - Present*

- Team summer research project, "Bouncing, flouncing, jouncing sea stars: characterizing the oscillatory gait of *Asterias forbesi*." Continuing independently for senior honors project, "Fall forward, spring back: Mechanical drivers of the sea star bouncing gait." Presented at Bowdoin's summer research symposium and the Schiller Coastal Studies Center fall open house, will also present a poster at the SICB 2024 meeting.
- Collected sea stars and took films of them moving, obtained kinematic data using DeepLabCut, then used Julia and some Fourier analysis techniques to try and pinpoint a gait transition within the data.
- Also derived and implemented a model in Julia, first for only a single foot but then incorporating multiple podia synchronizing through the gait transition and the resultant collective behavior.

Bowdoin College – Rogalski Lab
Brunswick, Maine

Research Assistant   *Sep 2021 – Present*

- Ecotoxicology research investigating the response of water fleas (*Daphnia ambigua*) from different ponds in Maine to various levels of salinity to understand how populations are adapting to pollution.
- Consistent tasks include filtering lake water, changing the animals' water and feeding, monitoring for births and deaths, and occasionally collecting plankton or water samples via canoe.
- Using R to calculate the intrinsic rate of growth for trial populations based on birth and death data for an upcoming manuscript: Rogalski, M., Chambers, O., Burchell, S., **Nichols, B.**, Kulzy, K. "Rapid evolutionary response to salinity fluctuations in a coastal Daphnia population"

Middle Tennessee State University Computational Sciences
Murfreesboro, Tennessee

NSF REU Participant   *Summer 2022*

- NSF-REU in mathematical biology modeling the transmission of West Nile Virus (WNV) between birds and mosquitoes. Team project title: "An early-season model of West Nile Virus in birds of Rutherford County, TN."
- Created an SIR model of differential equations that represented early-season transmission of WNV through a population of birds and mosquitos, expanding upon the previous years' model by adding direct transmission between birds and multiple compartments of birds based on their susceptibility to WNV. Parameterized the model and analyzed long-term behavior with MATLAB. Also developed a workflow for using eBird data to make the model location-specific.

Project Terrapin
Manahawkin, New Jersey

Research Assistant   *Summers 2018-2021*

- Assisted in multi-year mark-recapture study of Northern Diamondback Terrapins (*Malaclemys terrapin terrapin*) in Barnegat Bay with the purpose of monitoring the population over time. Field work consisted of collecting terrapins from the road, taking morphometrics, marking their shells, and releasing.
- Conducted independent research for high school senior project: "Mathematical modeling of road-to-plastron heat transfer and its effect on internal temperatures of *Malaclemys terrapin terrapin*". Attented regional Diamondback Terrapin Working Group conference in 2019 (Tuckerton, NJ) and 2021 (Virtual). Presented in 2021.
- Further involved with the same organization in environmental education outreach to local schools and conservation events and care of educational terrapins housed at MATES high school.

Save Barnegat Bay   Island Beach, New Jersey

Student Grant Participant   *Summer 2020*

- Team biodiversity study of the Sedge Island Marine Conservation Zone adding to a multi-year dataset of fish, shrimp, and crab populations.
- Primarily field work, collecting organisms by boat and identifying them. Analyzed biodiversity and trends in organism size between different habitats and trends in organism populations across years. Used Simpson's, Shannon-Wiener, and Jaccard indices for biodiversity.

Presentations

Nichols, B., Lucas, G., Marriott, H., Ellers, O., Zeeman, M. L., Syphers, D., Johnson, A. "Fall forward, spring back: Mechanical drivers of the sea star bouncing gait" (January 2-6, 2024). Society for Integrative and Comparative Biology 2024 Meeting. Accepted abstract.

Johnson, A., Ellers, O., Lucas, G., Marriott, H., **Nichols, B.** "Froude number of the crawl-bounce gait transition in sea stars" (January 2-6, 2024). Society for Integrative and Comparative Biology 2024 Meeting. Accepted abstract.

Nichols, B., Marriott, H., Lucas, G., Johnson, A., Ellers, O. "Bouncing, flouncing, jouncing sea stars: characterizing the oscillatory gait of *Asterias forbesi*" (July 21, 2023). Bowdoin College Summer Research Final Symposium.

Nichols, B., Vogel, S., Leander, R., Ding, W. "An Early-Season Model of West Nile Virus in Birds of Rutherford County, TN" (July 29, 2022). MTSU-COMS REU Final Symposium.

Nichols, B., Wnek, J. "Mathematical modeling of road-to-plastron heat transfer and its effect on internal temperatures of *Malaclemys terrapin terrapin*" (August 20, 2021). 2021 Mid-Atlantic Diamondback Terrapin Working Group Meeting

Killian, K. **Nichols, B.** Quigley, S. Advisor: Jason Kelsey. "Sedge Island Marine Conservation Zone Biological Survey" (14 August, 2020). Save Barnegat Bay Student Grant Final Presentation (General Audience)

Grants & Awards

Henry L. and Grace Doherty Charitable Foundation Coastal Studies Research Fellowship, Summer 2023;

MTSU-COMS NSF REU, Summer 2022;

Save Barnegat Bay Student Grant, Summer 2020;

MATES – Bob Raimann Scholarship, Spring 2020;

MATES – Pete McClain Natural Science Award, Spring 2020;

Skills

Technologies: LaTeX, Python, Julia, R, MATLAB, Mathematica

Quantitative Skills: Differential equations and dynamical systems, statistics with R (population genomics data, citizen science data, and more), numerical simulations

Field and Lab Skills: Animal population surveys, water collecting and filtering, plankton collection, macroinvertebrate collection and water quality, soil sampling and analysis, gas chromatography, DNA extraction, PCR, gel electrophoresis, filming and kinetic data extraction

Other: Bird Photography, Adobe Lightroom