Matthew T. Duggan

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Education

University of South Carolina — **Columbia,SC**

Honors College — *Prospective Graduation:* May 2022
Bachelor of Science in Computer Sciences — Leadership Distinction in Research
Bachelor of Science in Biological Sciences — **GPA:** 4.0

Awards & Honors

Barry M. Goldwater Scholar* — **2021**
The most prestigious undergraduate award given in the sciences for STEM researchers.

T.L. McMeekin Scholar — **2020**
University of South Carolina Biological Science Program merit scholarship.

General Computer Science Scholar — **2020**
University of South Carolina Computer Science Program first year merit scholarship.

Academic Excellence Scholar — **2018-2021**
University of South Carolina Honors College Program merit scholarship.

President's List — **All Semesters**
Fall '18, Spring '19, Fall '19, Spring '20, Fall '20, Spring '21, Fall '21

Publications

Duggan, M., Groleau, M., Shealy, E., Self, L., Utter, T., Waller, M., ... Mousseau, T. (2021). An approach to rapid processing of camera trap images with minimal human input. *Ecology and Evolution*. (link, pdf)

Research Grants

Magellan Scholar Grant — **2021**
Concluding Successful Nesting of Limosa limosa with Geolocation Data

SC Space Grant Consortium Mini-REAP — **2020**
Effects of Ionizing Radiation on Plant Germination

Science Undergraduate Research Fellowship — **2019**
Automation of Camera Trap Image Processing with Machine Learning

Relevant Experience

Senner Lab, University of South Carolina — Columbia,SC
Undergraduate Researcher — Oct 2020 - Present

- Constructed and optimized Markov models and random forests on movement data from Black-tailed godwits to predict their nesting success, behavioral plasticity, and predictability.
- Measured the generalization of machine learning on precise data (GPS: less than 30-meter error) to highly irregular data (Argos: greater than 100-meter error).

Advisor: Dr. Nathan Senner

Ward Lab, Pacific Northwest National Laboratory — Sequim,WA
Student Undergraduate Leadership Intern — May 2021 - Aug 2021

- Constructed random forests to study the influences of biogeochemical signals within the National Estuarine Research Reserve System (NERR).
- Predicted ammonia, phosphate, nitrate, and chlorophyll A, with above satisfactory predictions (53-83% Nash-Sutcliffe efficiency) during severe weather events.
  Advisor: Dr. Nicholas Ward

Mousseau Lab, University of South Carolina — Columbia,SC
Undergraduate Researcher — Nov 2020 - May 2021

- Observed differences in germination success for the chronically irradiated seeds of Chernobyl, Ukraine comparing various levels of exposure from different areas in the Chernobyl exclusion zone.
- Assisted in experimental design, fabrication of incubation vessels, daily monitoring of germination progress, and final visualizations.
  Advisor: Dr. Timothy Mousseau

Mousseau Lab, University of South Carolina — Columbia,SC
Undergraduate Researcher — Nov 2018 - Mar 2021

- Classified big ecological data by analyzing four million+ images from Fukushima, Japan; Chernobyl, Russia; Fort McCrady, SC; and Clarks Hill, SC.
- Developed a Convolutional Neural Network (CNN) with an average F1 score of 86% in McCrady and Clarks Hill, South Carolina camera trap projects for 21 indicator species.
  Advisor: Dr. Timothy Mousseau

Presentations

Duggan, M., Wilde, L., Verhoeven, M., Piersma, T., & Senner, N. (2022, January). *Animal movement: A window into behavior.* USC Undergraduate research Symposium. (Talk)

Duggan, M., Wilde, L., Verhoeven, M., Piersma, T., & Senner, N. (2021b, October). *Inferring successful breeding of a precocial bird with tracking data.* 7th International Biologging Society. (Virtual talk)

Duggan, M., Wilde, L., Verhoeven, M., Piersma, T., & Senner, N. (2021c, August). *Predicting shorebird nesting behaviors with movement data.* American Ornithological Society. (Virtual talk)

Duggan, M., Regier, P., Myers-Pigg, A., & Ward, N. (2021, July). *Utilization of random forests to predict nutrient concentration with water quality predictors.* Pacific Northwest National Laboratory Student Leadership Symposium. (Virtual talk)

Duggan, M., Wilde, L., Verhoeven, M., Piersma, T., & Senner, N. (2021a, April). *Hidden markov models and random forests with movement data.* Discover USC. (Virtual iPoster)

Duggan, M., Groleau, M., & Mousseau, T. (2019, September). *Detecting deer (odocoileus virginianus) in fort mccrady and clarks hill, sc.* Sustainable Showcase. (Poster)

Relevant Coursework

BIOL 301: Honors Ecology and Evolution
BIOL 541: Biochemistry
BIOL 588: Genomic Data Science
BIOL 630: Biology of Birds
CSCE 350: Data Structure & Algorithms
CSCE 567: Data Visualization Tools
CSCE 580: Artificial Intelligence
CSCE 587: Big Data Analytics
ENGL 462: Technical Writing
GEOG 285: Drones for Airborne Spatial Data
MATH 344: Applied Linear Algebra
STAT 509: Statistics for Engineers

Technical Strengths

Computer Language	R, Java, Python, HTML/CSS, C++
Data Management	SQL, Hadoop, Linux, Git
Data Collection	Unmanned Aircraft, Plant Germination, Wildlife Camera Traps
Technical Skills	Open Water Scuba, Small Vessel Operation, Manual Transmission