

RACHEL E. PRESLEY

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CURRENT POSITION

University of Maine Darling Marine Center
PhD Candidate and Graduate Research Assistant

Walpole, ME
2018-Present

EDUCATION

University of Maine
PhD, Oceanography
Dissertation: Factors controlling nitrogen removal and retention in marine sediments
Advisor: Dr. Jeremy Rich

Orono, ME
Walpole, ME
2017-Present

University of West Florida
MS, Biology
Thesis: Temporal differences in nitrogen-fixation rates and abundances of nitrogen-fixing bacteria within the rhizospheres and sediment of subtropical seagrass species, *Thalassia testudinum* and *Halodule wrightii*
Advisor: Dr. Jane M. Caffrey

Pensacola, FL
2015-2017

University of Texas at Austin
BS, Biology
Option III: Freshwater and Marine Biology

Austin, TX
2014

RESEARCH EXPERIENCE

University of West Florida
Contract Scientist

Pensacola, FL
2022-2023

- Worked with Dr. Jane M. Caffrey to analyze the dynamics between benthic fluxes and porewater nutrients in healthy seagrass beds of *Thalassia testudinum* (turtle grass) and *Halodule wrightii* (shoal grass) in Santa Rosa Sound, FL
- Conducted field sampling using light and dark domes to collect information about benthic fluxes and collected overlying water and seagrass blades for measures of environmental parameters, water chemistry, and productivity
- Carried out lab experiments to determine plant productivity and analyzed water samples for biogeochemical parameters

University of Maine Darling Marine Center
PhD Candidate and Graduate Research Assistant

Walpole, ME
2018-Present

- Developed a novel, experimental method for using sediment “thin discs” in which conditions are tightly controlled and experiments can be conducted in an anaerobic glove bag
- Conducted “thin disc” experiments to determine the effect of certain biogeochemical conditions (nitrate loading rates and carbon additions) on sediment microbial communities (16S and 18S amplicon sequencing) and biogeochemical cycling using stable isotopes (^{15}N and ^{13}C)
- Examined sediment microbial community composition along an estuarine gradient for the Damariscotta River Estuary throughout multiple seasons

Association for the Sciences of Limnology and Oceanography (ASLO) Limnology and Oceanography Research Exchange (LOREX) Program

Remote
2021-2022

Graduate Student Intern

- Inverse modeling internship
- Developed an R script to automate the analysis of chemical concentration data for a flow-through reactor system that would select an optimal number of zones and rates for a time course

National Science Foundation (NSF) Established Program to Stimulate Competitive Research (EPSCoR) Maine eDNA Project
Theme 3 Graduate Student and Researcher

Orono, ME
Walpole, ME
2020-2022

- Index Site Project Leader
 - Conducted field sampling every month at multiple locations: collected water samples using niskin bottles for molecular analysis and biogeochemical parameters, collected sediment samples using grab sampler for molecular analysis, created water column profiles using YSI sondes, recorded field notes on paper and through ArcGIS Survey123, and took photographs
 - Conducted lab work following sampling events: filtered water samples for DNA, extracted DNA from sediment samples, analyzed biogeochemical samples for nitrate+nitrite, nitrite, ammonium, total sulfide, and phosphate, recorded lab notes on paper and through ArcGIS Survey123, and took photographs
 - Responsible for the management of multiple undergraduate and graduate students and interns
 - Coordinated all sampling events and lab work

National Science Foundation (NSF) Established Program to Stimulate Competitive Research (EPSCoR) Sustainable Ecological Aquaculture Network (SEANET) Project

Orono, ME
2018-2019

Theme 2 Graduate Student and Researcher

University of Maine

PhD Student and Graduate Teaching Assistant

Orono, ME

2017-2018

University of West Florida

Master's Thesis Candidate

Pensacola, FL

2015-2017

- Recorded water quality data in the Pensacola Bay System
- Characterized estuarine sediments
- Analyzed porewater hydrogen sulfide concentrations in seagrass bed sediments
- Quantified nutrient regimes in seagrass bed sediments and overlying water column
- Measured nitrogen fixation rates using the acetylene reduction assay (ARA) in estuarine sediments
- Extracted DNA and used to qPCR on the *nifH* gene to determine the presence and abundance of nitrogen fixing prokaryotes

University of West Florida and Florida Fish and Wildlife Research Institute

Pensacola, FL

2015-2017

Local Project Leader in the Pensacola Bay System

Gulf Estuarine Benefit Fund (GEBF) Roadblocks to Seagrass Recovery

- Surveyed for submerged aquatic vegetation species composition and cover
- Sampled for optical water quality parameters
- Characterized sediments and surveyed for animal disturbance
- Quantified productivity and growth rates of *Thalassia testudinum* (turtle grass)
- Conducted field experiment to examine the effects of sulfate-reducing bacteria stimulation and inhibition on *T. testudinum* and *Halodule wrightii* (shoal grass)

University of West Florida and University of South Alabama

Pensacola, FL

Lab and Field Assistant

2015-2017

Productivity changes before and after artificial reef installation

- Assessed benthic productivity and nutrient fluxes using plexiglass domes with varying light levels
- Measured pelagic and benthic phytoplankton chlorophyll *a*
- Quantified bioavailable nutrient availability in the water column

University of West Florida and U.S. Fish and Wildlife Service

Pensacola, FL

Field Research Assistant

2015-2016

Breeding and migratory habits of wintering waterfowl in Northwest Florida

- Conducted monthly point count surveys in Santa Rosa Sound and Big Lagoon

**University of West Florida, United States Park Service, and
Inventory and Monitoring Program Gulf Coast Network**

Pensacola, FL
2015

Field Research Assistant

Herpetological community survey for the Gulf Islands National
Seashore

- Captured, identified, and obtained morphometric measurements of reptiles and amphibians at sites within the Naval Live Oaks units of the Gulf Islands National Seashore

University of West Florida

Pensacola, FL
2015

Lab and Field Research Assistant

Gary C. Baine II's master's thesis: Effects of nutrient input and microzooplankton grazing on phytoplankton productivity in the Grand Bay Estuary, Mississippi

- Analyzed water samples for nutrient content and chlorophyll *a* concentration
- Collected water for experiments that assess changes in biomass and efficiency of carbon uptake in response the nutrient additions

Grand Bay National Estuarine Research Reserve (GBNERR)

Moss Point, MS
2015

Lab and Field Assistant

Proximity of Mississippi Phosphates fertilizer plant and its ecology effects on a pristine wetland and estuarine habitats

- Sampled water column for nutrient availability
- Assessed phytoplankton productivity in the water column and benthos
- Aided in simulated industrial spill via fluorescein dye study

University of West Florida

Everglades
National Park, FL
2015

Field Research Assistant

Philip M. Coppola's master's thesis: Quantifying Habitat and Apple Snail Density Effects on Prey Availability to Snail Kites

- Surveyed for apple snail (*Pomacea* spp.) density using an established throw trap method
- Collected apple snail shells from underneath endangered Everglades snail kite (*Rostrhamus sociabilis plumbeus*) perches to determine prey size preference
- Quantified emergent and submerged vegetation species composition and cover to examine the effect it had on apple snail density

University of Texas at Austin Marine Science Institute (UTMSI)

Port Aransas, TX
2013

Undergraduate Research Assistant

Texas Statewide Seagrass Monitoring Program

- Collected data on water column conditions including depth, temperature, dissolved oxygen, and light penetration
- Obtained seagrass leaf tissue for isotope analysis

- Analyzed water column samples for total suspended solids (TSS), nutrient concentration, and chlorophyll *a* concentration
- Assessed seagrass and macroalgal species composition and cover
- Obtained sediment cores for grain-size analysis, algal epiphyte biomass, canopy height, shoot density, seagrass biomass, root:shoot ratios, and C:N:P

University of Texas at Austin Marine Science Institute (UTMSI)

Port Aransas, TX

Undergraduate Research Assistant

2013

Kelly M. Darnell's doctoral dissertation: Understanding factors that control seagrass reproductive success in sub-tropical ecosystems

- Obtained and sorted sediment cores for seagrass seed density, identification of seagrass reproductive structures, and seagrass biomass

University of Texas at Austin Marine Science Institute (UTMSI)

Port Aransas, TX

Participant, Biological Signals in Estuarine Sediments course

2013

Professors: Dr. Zhanfei Lui and Dr. Amber K. Hardison

- Collected sediment cores within the Mission-Aransas National Estuarine Research Reserve (MANERR)
- Assessed benthic and pelagic phytoplankton composition using pigment analysis
- Characterized sediment using grain-size analysis, CHN analysis, and HPLC methods

Texas Alcoholic Beverage Commission (TABC)

Austin, TX

Laboratory Assistant

2012

Testing and Label Approval Department

- Tested and categorized alcoholic beverages according to TABC standards and regulations

University of Texas at Austin

Austin, TX

Undergraduate Research Assistant

2010-2011

“Functional Genomics” research stream of the Freshman Research Initiative (FRI) program

- Made microbiological media for yeast species (*Saccharomyces* spp.)
- Grew yeast cultures for subsequent DNA extraction
- Used 16S PCR amplification products and high-throughput next-generation sequencing technologies to examine the phylogenetic relationships within the *Saccharomyces* genus

PUBLICATIONS

Yarbro, LA, Carlson PR, Heck KL, Byron D, Brooke S, Fitzhugh L, Scolaro S, Albrecht B, Presley R, Caffrey JM (2023) Biomass and productivity of *Thalassia testudinum* in

estuaries of the Florida Panhandle. *Gulf and Caribbean Research*: (34) 69-78.
<https://doi.org/10.18785/gcr.3401.11>

Presley R, Caffrey JM (2021) Nitrogen Fixation in Subtropical Seagrass Sediments: Seasonal Patterns in Activity in Santa Rosa Sound, Florida, USA. *Journal of Marine Science and Engineering*: (9) 766. <https://doi.org/10.3390/jmse9070766>

Capps RE (2017) Temporal differences in nitrogen fixation rates within sediments colonized by subtropical seagrass species, *Thalassia testudinum* and *Halodule wrightii*. Master's thesis. University of West Florida. Department of Biology.
<https://uwf.digital.flvc.org/islandora/object/uwf:61205>

REPORTS

Caffrey JM, Albrecht B, **Capps RE** (2017) Seagrass abundance and productivity in Pensacola Bay and Santa Rosa Sound. Final Technical Report. Florida Fish and Wildlife Commission Fish and Wildlife Research Institute. January 31, 2017. <https://ir-uwf.edu.ezproxy.lib.uwf.edu/islandora/object/uwf%3A23476>

TEACHING EXPERIENCE

University of Maine Darling Marine Center	Walpole, ME
Guest Lecturer, Estuarine Oceanography	Fall 2019
Guest Lecturer, Westfield State University Introduction to Marine Biology	Spring 2019
Guest Lecturer, Estuarine Oceanography	Fall 2018
University of Maine	Orono, ME
Guest Lecturer, Microbes in the Environment	Spring 2019
Guest Lecturer, Microbes in the Environment	Spring 2018
Graduate Teaching Assistant, Microbes in the Environment	Spring 2018
University of West Florida	Pensacola, FL
Instructor of Record, Aquatic Botany Lab	Spring 2017
Guest Lecturer, Florida Institute of Oceanography (FIO) Field Studies in Marine Biology	Summer 2016
Graduate Teaching Assistant, Anatomy and Physiology II Lab	Fall 2015
Guest Lecturer, Florida Institute of Oceanography (FIO) Field Studies in Marine Biology	Summer 2015
Graduate Teaching Assistant, Comparative Animal Physiology I Lab	Summer 2015
Graduate Teaching Assistant, Anatomy and Physiology I Lab	Spring 2015
Graduate Teaching Assistant, Anatomy and Physiology I Lab	Spring 2015
Graduate Teaching Assistant, Aquatic Botany Lab	Spring 2015
Mentor for Pensacola High School International Baccalaureate Student Maya Humeda's Extended Essay: Does the Carbon: Nitrogen: Phosphorus Content in Seagrasses <i>Thalassia testudinum</i> and <i>Halodule wrightii</i> Indicate Signs of Eutrophication at Big Sabine Point in Santa Rosa Sound, Florida?	2015-2016

Academic Center for Excellence and 21st Century Scholars
Biology Tutor

Pensacola, FL
2015

PROFESSIONAL SERVICE

Gulf Estuarine Research Society (GERS) and Society of Wetland Scientists (SWS) Meeting
Session Chair

Pensacola Beach, FL
2016

- Moderated “Influence of Freshwater Flow on Coastal Processes” session

Gulf Estuarine Research Society (GERS) and Society of Wetland Scientists (SWS) Meeting
Fundraising Committee Member

Pensacola Beach, FL
2016

- Helped solicit donations from local vendors and business
- Aided in raffle organization, set up, and ticket sales

PUBLIC OUTREACH AND EDUCATION

University of Maine Darling Marine Center
Summer Science Seminar Speaker

Walpole, ME
2019

- "Nitrogen biogeochemistry: why and how we study nitrogen cycling in marine sediments."

Falmouth High School Nor'Easter Bowl Team Visit and Lab Tour at the University of Maine Darling Marine Center
Speaker and Presenter

Walpole, ME
2019

Essex High School Environmental Technology Program Students Visit and Lab Tour at the University of Maine Darling Marine Center
Speaker and Presenter

Walpole, ME
2019

University of West Florida Graduate School Science and Environmental Studies Graduate School Virtual Fair 2017
Speaker

Pensacola, FL
2017

**“What about grad school?”
Event by University of West Florida Graduate Women in Science (GWIS)**
Speaker and Panelist

Pensacola, FL
2016

Gulf Islands 2016 National Parks BioBlitz
Volunteer

Gulf Breeze, FL
2016

University of West Florida Graduate School Science and Environmental Studies Graduate School Virtual Fair 2016
Speaker

Pensacola, FL
2016

Escambia County Marine Science Symposium

Pensacola, FL

- Speaker 2016
- Discussed with high school students what it is like to do research
 - Explained my research questions, methods, and conclusions
 - Answered any questions that students had about college and getting involved as an undergraduate
- Tour of University of West Florida College of Science and Engineering for Washington High School Students** Pensacola, FL 2016
- Speaker
- Discussed projects that the lab of Dr. Jane M. Caffrey works on
 - Talked about opportunities for undergraduates to get class credit or compensation for research experience
 - Recruited students to work in our lab as high school students or undergraduates
- 15th Annual Seagrass Awareness Celebration** Gulf Breeze, FL 2015
- IFAS Extension of University of Florida and Sea Grant Florida**
- Volunteer
- Organized and set up booth for adults and children of all ages to visit
 - Conveyed the importance of seagrass beds as vital ecosystems
 - Taught individuals how to use equipment commonly used in water quality and seagrass monitoring, such as a YSI multiparameter probe, light meter, and microscope
- 60th West Panhandle Regional Science and Engineering Fair** Pensacola, FL 2015
- Science Fair Judge
- Helped judge and interview over 200 middle and high school projects from Escambia and Santa Rosa Counties
- Keep Austin Beautiful** Austin, TX 2014
- Volunteer
- Picked up trash, repainted benches and picnic tables, and planted trees and bushes at local parks and recreational areas
- Explore UT** Austin, TX 2014
- Volunteer
- Helped set up and run booth
 - Taught children about basic oceanographic principles with demonstrations
 - Monitored touch tank that held various marine organisms
- Blue Crab Life Cycle – Citizen Science Program** Port Aransas, TX 2013
- Volunteer
- Collected blue crab larvae from the local fishing pier on a weekly basis

University of Texas Marine Science Institute Summer Science Program

Port Aransas, TX
2013

Student Assistant

- Helped children (grades 3rd through 4th) learn about local coastal ecosystems and practice scientific field collection methods

CONFERENCES AND MEETINGS ATTENDED

Coastal and Estuarine Research Federation (CERF) 2021 26th Biennial Conference

Virtual
2021

Oral Presentation

- “Factors controlling nitrogen removal and retention in marine sediments”

Association for the Sciences of Limnology and Oceanography (ASLO) 2020 Aquatic Sciences Meeting

San Diego, CA
2020

Oral Presentation

- “Factors controlling nitrogen removal and retention in marine sediments”

Coastal and Estuarine Research Federation (CERF) 2019 25th Biennial Conference

Mobile, AL
2019

Oral Presentation

- “Factors controlling nitrogen removal and retention in marine sediments”

Sustainable Ecological Aquaculture Network (SEANET) All Hands Meeting

Orono, ME
2019

Poster Presentation

Maine Established Program to Stimulate Competitive Research (EPSCoR) State Meeting

Orono, ME
2019

School of Marine Sciences (SMS) 2019 Graduate Research Symposium

Walpole, ME
2019

Oral Presentation

- “Factors controlling nitrogen removal and retention in marine sediments”

University of Maine Student Symposium 2019

Orono, ME
2019

Poster Presentation

- “Factors controlling nitrogen removal and retention in marine sediments”

Association for the Sciences of Limnology and Oceanography (ASLO) 2019 Aquatic Sciences Meeting

San Juan, PR
2019

Poster Presentation

- “Factors controlling nitrogen removal and retention in marine sediments”
- Sustainable Ecological Aquaculture Network (SEANET) All Hands Meeting** Orono, ME
2018
- Poster Presentation
 - “Enormous Nitrate Concentrations Inside Microbial Cells in Marine Sediments Exposed to Light”
- Maine Established Program to Stimulate Competitive Research (EPSCoR) State Meeting** Orono, ME
2018
 - Cloud Institute Workshop
- School of Marine Sciences (SMS) 2018 Graduate Research Symposium** Walpole, ME
2018
- Poster Presentation
 - “Factors controlling nitrogen removal and retention in marine sediments”
- Coastal and Estuarine Research Federation (CERF) 2017 24th Biennial Conference** Providence, RI
2017
- Oral Presentation
 - “Nitrogen Availability in Seagrass Beds Dominated by *Thalassia testudinum* and *Halodule wrightii*”
 - Session “Microbial Communities and Geochemical Processing in Redox Gradients”
- University of West Florida Student Scholars Symposium and Faculty Research Showcase** Pensacola, FL
2017
- Poster Presentation
 - “Nitrogen Fixation in Seagrass Beds Dominated by *Thalassia testudinum* and *Halodule wrightii*”
- Association for the Sciences of Limnology and Oceanography (ASLO) 2017 Aquatic Sciences Meeting** Honolulu, HI
2017
- Poster Presentation
 - “Nitrogen Cycling in Seagrass Beds”
- Gulf Estuarine Research Society (GERS) and Society of Wetland Scientists (SWS) Meeting** Pensacola Beach, FL
2016
- Oral Presentation
 - “Nitrogen Availability in Seagrass Beds Dominated by *Thalassia testudinum* and *Halodule wrightii* and Its Effect on the Seagrass Health and Proliferation”
- Chromatography Seminar** Spanish Fort, AL
2016
 - Presented by Thermo Scientific
- 10th National Monitoring Conference** Tampa, FL
2016
- Oral Presentation

- “Nitrogen Availability in Seagrass Beds Dominated by *Thalassia testudinum* and *Halodule wrightii* and Its Effect on the Seagrass Health and Proliferation”

University of West Florida Student Scholars Symposium and Faculty Research Showcase

Pensacola, FL
2016

Poster Presentation

- “Nitrogen Fixation in Seagrass Beds Dominated by *Thalassia testudinum* and *Halodule wrightii*”

Association of Limnologists and Oceanographers (ASLO) Ocean Sciences Meeting

New Orleans, LA
2016

Poster Presentation

- “Nitrogen Cycling in Seagrass Beds Dominated by *Thalassia testudinum* and *Halodule wrightii*: the Role of Nitrogen Fixation and Ammonium Oxidation in Regulating Ammonium Availability”

FUNDING AND ACADEMIC AWARDS

National Science Foundation (NSF) Established Program to Stimulate Competitive Research (EPSCoR) Maine eDNA Project	2020-2022
National Science Foundation (NSF) Established Program to Stimulate Competitive Research (EPSCoR) Sustainable Ecological Aquaculture Network (SEANET) Project	2018-2019
University of Maine Graduate Student Government (GSG) Travel-to-Present Grant	2019
University of Maine Graduate Student Government (GSG) Degree-Related Grant	2018
National Science Foundation (NSF)	2017-Present
University of West Florida Graduate Student Teaching Award	2017
Florida Fish and Wildlife Commission	2015-2017
Who’s Who Among Students in American Universities and Colleges	2015
John C. Pace Jr. Graduate Scholarship	2015
University of West Florida Graduate Student Association (GRSA) Research Award	2015
University of West Florida Scholarly and Creative Activities Committee (SCAC) Grant	2015

MEMBERSHIPS AND AFFILIATIONS

American Geophysical Union (AGU) Student Member	2019-Present
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Coastal and Estuarine Research Federation (CERF) Student Member	2019-Present
New England Estuarine Research Society (NEERS) Student Member	2019-2021
Association for the Sciences of Limnology and Oceanography (ASLO) Student Member	2018-Present
University of Maine Scuba Club	2018-2021
Gulf Estuarine Research Society (GERS)	2016-2017
University of West Florida Botanical Society	2015-2017
University of West Florida Scuba Club	2015-2017
Texas Exes Alumni Association	2014-Present

CERTIFICATIONS

AAUS Scientific Diver	2018-2021
SDI Rescue Diver	2018
SDI Nitrox SCUBA Certified	2015
SDI Open Water SCUBA Certified	2015