

Havalend E. Steinmuller

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Senior Marine Scientist
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Education

- 2019 Ph.D. in Conservation Biology, University of Central Florida, Orlando, FL.
Dissertation Title: *Biogeochemical Response to Sea Level Rise-Induced Transitions in Coastal Wetlands* (advisor: Dr. Lisa G. Chambers)
- 2015 M.S. in Oceanography and Coastal Sciences, Louisiana State University, Baton Rouge, LA. Thesis Title: *Anthropogenic Impacts on Microbial Processes in Coastal Wetlands: Nutrient Loading and Rising CO₂ Levels* (advisor: Dr. John R. White)
- 2013 B.S. in Coastal Environmental Science, Louisiana State University, Baton Rouge, LA. Focus: Environmental Science and Research. Thesis Title: *Effects of Fertility Gradients on the Net Primary Productivity of Typha sp in Newly Forming Wetlands*

Professional Experience

- Jan. 2023 – Present Senior Marine Scientist, Dauphin Island Sea Lab; Assistant Professor, University of South Alabama
- Aug. 2021 – Dec. 2022 Postdoctoral Scholar, Coastal and Marine Laboratory, Florida State University
- Nov. 2020 – June 2021 Postdoctoral Scholar, Aquatic Ecology and Global Change Laboratory, Department of Watershed Sciences, Utah State University
- Dec. 2019 – Oct. 2020 Postdoctoral Scholar, Freshwater Biogeochemistry Laboratory, Florida International University, Miami, FL
- May 2019 – Dec. 2019 Research Scientist, Aquatic Biogeochemistry Laboratory, Department of Biology, University of Central Florida, Orlando, FL
- Aug. 2015 – May 2019 Graduate Teaching Assistant (General Biology I), Instructor of Record (Wetland Ecology and Biogeochemistry), and Graduate Research Assistant, Department of Biology, University of Central Florida, Orlando, FL
- Aug. 2013 – July 2015 Graduate Research Assistant (Wetland and Aquatic Biogeochemistry Laboratory), Department of Oceanography and Coastal Sciences, Louisiana State University, Baton Rouge, LA
- Jan. 2015 – May 2015 Non-Primary Instructor (Wetlands and Water Quality), Department of Oceanography and Coastal Sciences, Louisiana State University, Baton Rouge, LA

Refereed Journal Articles and Book Chapters

* denotes co-first authors

17. **Steinmuller, H.E.**, J. Garwood, E. Bourque, S.B. Lucas, K.M. Engelbert, J. L. Breithaupt. "Comparing vertical change in riverine, bayside, and barrier island wetland soils in response to acute and chronic disturbance in Apalachicola Bay, FL". Accepted in a special issue (Wetland Elevation Dynamics) of *Estuaries and Coasts*.
16. Breithaupt, J.L., and **HE. Steinmuller**. "Refining the global estimate of mangrove carbon burial rates using sedimentary and geomorphic settings." *Geophysical Research Letters* (2022): e2022GL100177.
15. **Steinmuller, H. E.**, J.L. Breithaupt, K. Engelbert, P. Assavapanuvat, T. S. Bianchi. "Coastal wetland soil organic carbon storage at mangrove range limits in Apalachicola Bay, FL: Observations and expectations". Accepted in a special issue (Mangroves in the Anthropocene) of *Frontiers in Forests and Global Change*.
14. Hurst, N.R., B. Locher, **H.E. Steinmuller**, L. J. Walters, and L.G, Chambers. "Carbon Dynamics and Microbial Community Response to Oyster Reef Restoration: Implications for Carbon Storage". *Limnology and Oceanography* (2022).
13. **Steinmuller, H.E.**, S. L. Stoffella, R. Vidales, M.S. Ross, S. Dattamudi, and L.J. Scinto. "Characterizing hydrologic effects on soil physicochemical variations within coastal tree islands and marshes in the Florida Everglades". *Soil Science Society of America Journal* (2021).
12. **Steinmuller, H.E.**, T.E. Foster, C.R. Hinkle, L.G. Chambers. "Herbaceous encroachment increases soil nutrient content and supports higher rates of biogeochemical processing in a coastal marsh". *Science of the Total Environment* (2020).
11. **Steinmuller, H.E.**, M.P. Hayes, N.R. Hurst, Y. Sapkota, R.L. Cook, J.R. White, X. Zuo, L.G. Chambers. "Does edge erosion alter coastal wetland soil properties? A multi-method biogeochemical study". *Catena* 187 (2020).
10. **Steinmuller, H.E.**, T. E Foster, P. Boudreau, C.R. Hinkle, L.G. Chambers. "Tipping points in the mangrove march: Characterization of biogeochemical cycling along the mangrove – salt marsh ecotone". *Ecosystems* (2020).
9. Breithaupt, J.L., N.R. Hurst, **H.E. Steinmuller**, E. Duga, J.M. Smoak, J. Kominoski, L.G. Chambers. "Comparing the biogeochemistry of storm surge sediments and pre-storm soils in coastal wetlands: Hurricane Irma and the Florida Everglades". Accepted within a special issue (Impact of 2017 Hurricanes on Estuaries and Coasts in the Caribbean and the Gulf Coast States) of *Estuaries and Coasts* (2019).
8. **Steinmuller, H. E.**, and Lisa G. Chambers. "Characterization of coastal wetland soil organic matter: Implications for wetland submergence." *Science of the Total Environment* 677 (2019): 648-659.
7. Chambers, L.G., **H.E. Steinmuller**, J. Breithaupt. "Toward a mechanistic understanding of peat collapse and its contribution to coastal wetland loss". *Ecology* (2019) 100 (7):e02720.
6. **Steinmuller, H.E.**, K. Dittmer, J.R. White, L.G. Chambers. "Understanding the fate of soil organic matter in submerging coastal wetland soils: a microcosm approach." *Geoderma* 337 (2019): 1267-1277.
5. **Steinmuller, H. E.**, and Lisa G. Chambers. "Can saltwater intrusion accelerate nutrient export from freshwater wetland soils? An experimental approach." *Soil Science Society of America Journal* 82.1 (2018): 283-292.
4. White, J.R., **H.E. Steinmuller**. "El ciclo del Nitrogeno en los humedales". *Humedales de tratamiento: alternativa de tratamiento de aguas residuales aplicable en America Latina* (2018).

3. Dittmer, K. M., **Steinmuller, H.E.**, Chambers, L.G. "Temperature effects on greenhouse gas production from treatment wetland soils along a nutrient gradient." *UCF Undergraduate Research Journal* 9 (2017).
2. Chambers, L.G., Gaspar, S.A., Pilato, C.J., **Steinmuller, H.E.**, McCarthy, K.J., Sacks, P.E., Walters, L.J. "How well do restored intertidal oyster reefs support key biogeochemical properties in a coastal lagoon?" *Estuaries and Coasts* (2017).
1. **Steinmuller, H.E.**, M.B. McKee, J.R. White, S. A. Graham, I.A. Mendelssohn. "A Decadal Scale Nutrient Loading Study in a Coastal Wetland: Impacts on Soil Microbial Processes". *Ecological Engineering* (2016). 97:58-63.

Manuscripts in review:

1. Breithaupt, J.L., **H.E. Steinmuller**, A. S. Rovai, K. Engelbert, J.M. Smoak, L.G. Chambers, S. Harttung, K. Radabaugh, R. P. Moyer, A. Chappel, K. Comparetto, D. Vaughn, T.S. Bianchi, R. R. Twilley, M. Cifuentes, P. Pagliosa. "An improved framework for estimating organic carbon content of mangrove soils using loss-on-ignition and coastal environmental setting". Submitted to *Scientific Reports*.

Presentations

* denotes presenting author

29. **Steinmuller, H. E.***, J.L. Breithaupt, K.M. Engelbert, P. Assavapanuvat, T. S. Bianchi. "Comparing observations and expectations of encroachment impacts on soil organic carbon storage at mangrove range limits". Joint Aquatic Sciences Meeting, May 2022.
28. **Steinmuller, H.E.***, E. Bourque, S.B. Lucas, K.M. Engelbert, J. Garwood, J.L. Breithaupt. "Evaluating coastal wetland vulnerability to sea-level rise through surface elevation dynamics within Apalachicola Bay, FL". Apalachicola National Estuarine Research Reserve Symposium, February 2022.
27. **Steinmuller, H. E.**, J.L. Breithaupt*, K.M. Engelbert, P. Assavapanuvat, T. S. Bianchi. "Comparing mangrove and tidal marsh soil carbon density in Apalachicola Bay". Apalachicola National Estuarine Research Reserve Symposium, February 2022.
26. K.M. Engelbert*, **H.E. Steinmuller**, J.L. Breithaupt. "60 years of changing benthic sediment organic content within Apalachicola Bay". Apalachicola National Estuarine Research Reserve Symposium, February 2022.
25. **Steinmuller, H. E.*** "Coastal wetlands and the rising tide: Evaluating how sea-level rise induced transitions alter biogeochemical cycling". Invited seminar at Florida Agricultural and Mechanical University, October 2021.
24. Breithaupt, J.L.* , J.M. Smoak, A.R. Chappel, L.G. Chambers, **H.E. Steinmuller**, S. Harttung, K.R. Radabaugh, R.P. Moyer, T.S. Bianchi, and D. Vaughn. "Guidelines and insights for using loss-on-ignition to estimate organic carbon content in mangrove soils and sediments." 13th International Symposium on Biogeochemistry of Wetlands, March 2021.
23. Chambers, L.G.* , **H.E. Steinmuller**, M.P. Hayes, N.R. Hurst, Y. Sapkota, R.L. Cook, J.R. White, and Z. Xue. "Soil carbon loss through submergence: understanding the biogeochemistry of edge erosion in coastal wetlands." 13th International Symposium on Biogeochemistry of Wetlands, March 2021.

22. Scinto, L. J.*, **H.E. Steinmuller**, M.S. Ross, S. Stofella, R. Vidales, S. Dattamudi. "Variation in soils and soil biogeochemistry along a coastal ecogeomorphic setting." 13th International Symposium on Biogeochemistry of Wetlands, March 2021.
21. **Steinmuller, H.E.*** "Coastal wetlands and the rising tide: evaluating biogeochemical response to sea-level rise induced transitions." Invited seminar, University of South Alabama, February 2021.
20. **Steinmuller, H.E.*** "Evaluating the biogeochemical response to sea-level rise induced transitions within coastal wetlands". Invited seminar, Florida International University Graduate Seminar Series, Miami, FL. October 2020.
19. **Steinmuller, H.E.*** and L.G. Chambers. "Characterizing coastal wetland soil organic matter: implications for wetland submergence." 13th International Symposium on Biogeochemistry of Wetlands, Baton Rouge, LA. April 2020. (Cancelled).
18. Breithaupt, J.L.* , N.R. Hurst, **H.E. Steinmuller**, E. Duga, J.M. Smoak, J.S. Kominoski, L.G. Chambers. "Biogeochemical impacts of storm surge sediments in mangroves of the coastal Everglades." Oral presentation. Coastal and Estuarine Research Federation, Mobile, AL. November 2019.
17. **Steinmuller, H.E.***, L.G. Chambers. "Impacts of vegetation transitions on biogeochemical cycling within coastal wetlands". Oral presentation. Society of Wetland Scientists Annual Meeting, Denver, CO. June 2018.
16. Chambers, L.G.* , **H.E. Steinmuller**, C. Wang, C. Tong, T. Z. Osborne, K. Ramesh Reddy. "Short-term response of freshwater wetland soils to saltwater intrusion." Invited oral presentation, 12th International Symposium on Biogeochemistry of Wetlands, Coral Springs, FL. April 2018.
15. Hurst, N.R.* , J.L. Breithaupt, **H.E. Steinmuller**, L.G. Chambers. "Biogeochemical responses to hurricane Irma in a mangrove-encroached Florida salt marsh". Poster Presentation, 12th International Symposium on Biogeochemistry of Wetlands, Coral Springs, FL. April 2018.
14. **Steinmuller, H.E.***, L.G. Chambers, K. Dittmer, J.R. White. "Fate of soil carbon following sea level rise-induced coastal wetland submergence: a microcosm experiment". Oral presentation. 12th International Symposium on Biogeochemistry of Wetlands, Coral Springs, FL. April 2018.
13. White, J. R.* , **Steinmuller, H.E.**, Chambers, L. G., Fontenot, A. "The Fate and Stability of Eroding Wetland Soil Carbon in a Subsiding Deltaic Coastal Plain." 2017 AGU Fall Meeting. 2017.
12. **Steinmuller, H.E.**, L.G. Chambers *, K. Dittmer, J.R. White. "Fate of soil carbon following sea level rise-induced coastal wetland submergence". Invited oral presentation. Soil Science Society of America Annual Meeting, Tampa, FL. October 2017.
11. **Steinmuller, H.E.***, L.G. Chambers. "Can saltwater intrusion accelerate nutrient export from freshwater wetland soils? An experimental approach" Invited oral presentation. Soil Science Society of America Annual Meeting, Tampa, FL. October 2017.
10. **Steinmuller, H.E.***, L.G. Chambers. "Effects of mangrove expansion on biogeochemical cycling". Invited oral presentation within symposium "Storms, sea level, climate, and humans: spatial and temporal impacts of disturbance to mangrove forests" at the Society of Wetland Scientists annual meeting, San Juan, Puerto Rico. June 2017.
9. **Steinmuller, H.E.*** "Wetland Biogeochemistry". Invited oral presentation, Central Florida Association of Environmental Professionals, Orlando, FL. April 2017.
8. **Steinmuller, H.E.***, L.G. Chambers. "Can saltwater intrusion accelerate nutrient export from freshwater wetland soils?" Poster presentation, University of Central Florida Graduate Research Forum, Orlando, FL. April 2017.

7. **Steinmuller, H.E.***, L.G. Chambers. “Impacts of Increased Salinity on Nutrient Dynamics in Freshwater Wetland Soils.” Oral presentation. Society of Wetland Scientists – Gulf Estuarine Research Society Joint Meeting, Pensacola, FL. October 2016.
6. Barker, V., K. Foss, **H.E. Steinmuller***. “Coastal Connections in Chile: School of the Coast and Environment Global Expansion”. Invited oral presentation, LSU School of the Coast and Environment Seminar Series. September 2015.
5. Barker, V., K. Foss, **H.E. Steinmuller ***. “Researching Louisiana’s Disappearing Coastline”. Invited oral presentation, Center for the Study of Multiple Drivers on Marine Socio-Ecological Systems (MUSELS), Concepción, Chile. May 2015.
4. **Steinmuller, H.E. ***, C.L. Stagg, J.R. White. “Impacts of elevated CO₂ levels on soil microbial activity in vegetated and non-vegetated wetland soils”. Graduate Student Research Forum, Baton Rouge, LA. April 2015.
3. **Steinmuller, H.E. ***, M. B. McKee, J.R. White, S.A. Graham, I.A. Mendelssohn. “A decadal scale nutrient loading study in a coastal wetland: impacts on soil microbial processes”. Oral presentation. Graduate Student Symposium, Dauphin Island, AL. April 2015.
2. **Steinmuller, H.E. ***, M. B. McKee, J.R. White, S.A. Graham, I.A. Mendelssohn. “A decadal scale nutrient loading study in a coastal wetland: impacts on soil microbial processes”. Oral presentation. Soil Science Society of America, Long Beach, CA. March 2015.
1. **Steinmuller, H.E. ***, M.B. McKee, J.R. White, S. A. Graham, I.A. Mendelssohn. “A Decadal Scale Nutrient Loading Study in a Coastal Wetland: Impacts on Soil Microbial Processes”. Oral presentation. Louisiana Association of Public Biologists, Baton Rouge, LA. August 2014.

Datasets

Breithaupt, J. L, and **H.E. Steinmuller** (2022). Refining the global estimate of mangrove carbon burial rates using a sedimentary and geomorphic settings framework: 2022 Global Dataset of Mangrove Soil Organic Carbon Burial Rates. https://doi.org/10.33009/FSU_1655915511

Steinmuller, H. E., White, J. R., Cook, R. L., Xue, Z., Chambers, L. G. (2021) Soil physicochemical properties of coastal wetland soil cores collected in June 2018 from Barataria Bay, Louisiana. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-02-10 [if applicable, indicate subset used]. doi:10.26008/1912/bco-dmo.840246.1

Steinmuller, H. E., White, J. R., Cook, R. L., Xue, Z., Chambers, L. G. (2021) Nutrient properties of coastal wetland soil cores collected in June 2018 from Barataria Bay, Louisiana. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-02-10. doi:10.26008/1912/bco-dmo.840293.1

Steinmuller, H. E., White, J. R., Cook, R. L., Xue, Z., Chambers, L. G. (2021) Microbial gene abundance of coastal wetland soil cores collected in June 2018 from Barataria Bay, Louisiana. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-02-10 [if applicable, indicate subset used]. doi:10.26008/1912/bco-dmo.840278.1

Chambers, L. G., **Steinmuller, H. E.**, Dittmer, K., White, J. R., Cook, R. L., Xue, Z. (2019) Barataria Bay carbon mineralization and biogeochemical properties from nine soil cores. Biological and Chemical

Awards and Grants

2021	Breithaupt, J.L., Steinmuller, H.S. , Grove, A., Garwood, J., Morey, S., Chen, Xu, Alizad, K., and Passeri, D. Evaluating shoreline vulnerability to expansion by red and black mangroves in the northeastern Gulf of Mexico. Pre-Proposal submitted to National Estuarine Research Reserve System Science Collaborative on 7 December 2021. FSU requested funding: \$280,000 (total request \$400,000).
2020	University of Central Florida Outstanding Dissertation Award, Honorable Mention
2018	Florida Sea Grant Elise B. Newell Scholarship Program Recipient
2018	University of Central Florida Department of Biology Research Award
2018	University of Central Florida Graduate Presentation Scholarship
2018	Society of Wetland Scientists, South Atlantic Chapter Student Travel Award
2016	Society of Wetland Scientists, South Atlantic Chapter/Gulf Estuarine Research Society Student Travel Award
2015	Louisiana State University, College of the Coast and Environment Outstanding Thesis Award
2015	3 rd Place Graduate Student Oral Presentation, Graduate Student Symposium, Dauphin Island Sea Lab, AL.
2014	1 st Place Graduate Student Oral Presentation, Joint Meeting of the CSA, ASA, SSSA. Wetland Soils Division, Long Beach, CA.

Student Mentorship

2022	Erin Tilly, trained in laboratory techniques and assisted with directed independent research through Florida State University Undergraduate Research Opportunity Program
2022	Sean McCollum; trained in laboratory techniques
2017 – 2019	Chelsea Nitsch; trained in laboratory and field techniques, assisted with directed independent research: <i>Impacts of saltwater intrusion on denitrification rates and nitrogen availability in two intertidal wetland soils</i>
2017 – 2019	Jennifer Bennett; trained in laboratory and field techniques, assisted with directed independent research: <i>Identifying relationships between soil carbon storage and vegetation community in an urbanized landscape</i>
2017 – 2018	Hayden Denton; trained in laboratory techniques
2016 – 2019	Kevin McCarthy; trained in laboratory and field techniques, assisted with directed independent research: <i>Can nutrient additions 'prime' soil microbial activity at depth within freshwater wetland soils?</i>
2017 – 2019	Paul Boudreau; trained in laboratory and field techniques
2015 – 2016	Stephanie Gaspar; trained in laboratory and field techniques
2015 – 2017	Kyle Dittmer; trained in laboratory and field techniques, assisted with completion of directed undergraduate research: <i>Temperature Effects on Greenhouse Gas Production along a Nutrient Gradient in Treatment Wetland Soils</i>
2015 – 2016	John Heiland; trained in laboratory techniques, as well as completion of UCF EXCEL/COMPASS program

STEM Outreach

2022	Florida State University, Coastal and Marine Lab Open House (Attendance > 1000)
2022	Presentation, Women in Math, Science, and Engineering, Florida State University Coastal and Marine Lab
2021	Skype-A-Scientist Presentation, Gateway Charter School (FL) and Dewey Elementary (CA)
2020	Skype-A-Scientist Presentation, Holy Rosary High School and Battlefield High School (cancelled due to COVID-19 pandemic)
2018	UCF STEM DAY - Educational session, Orlando, FL
2018	Science Education, "Digging up the Dirt on Soil" at Carillon Elementary School
2017	UCF STEM DAY - Educational session, Orlando, FL
2016	UCF Faculty and Family Fun Day- interactive display booth, Orlando, FL

Media Coverage

"Saltwater Intrusion of Coastal Soils" — Crops, Soils, Agronomy (CSA) News Magazine, Feature 7/5/18 (<https://dl.sciencesocieties.org/publications/csa/articles/63/7/8>)

"How Wetlands Help Protect Against Climate Change" — UCF Today 6/7/18 (<https://today.ucf.edu/how-wetlands-help-protect-against-climate-change/>)

Leadership Activities

2022-2023	Chair, Biogeochemistry Section of the Society of Wetland Scientists
2020-2022	Chair-Elect, Biogeochemistry Section of the Society of Wetland Scientists (Extended due to COVID-19 pandemic)
2016-2017	Secretary, Biology Graduate Student Association, University of Central Florida
2014-2015	Sustainability Chair, Coastal and Environmental Graduate Organization, Louisiana State University
2014-2015	Seminar Committee, School of the Coast and Environment, Louisiana State University
2014-2015	Mentor, Louisiana State University Environmentors

Professional Organizations

Society of Wetland Scientists (2013-Present)

Soil Science Society of America (2013-Present)

American Association for the Advancement of Science (2018-Present)

American Association for Women in Science (2020 – Present)

Special Skills

Certified Small Craft Operator, United States Power Squadron (active in all states)

CPR/First Aid Certified

Wilderness First Aid Certified

Wilderness First Responder (WFR, January 2021)

Open Water Diver (PADI)
