Sierra E. Cagle

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Research Interests

I am broadly interested in the ecology of aquatic habitats, and how these ecosystem's processes are effected by climate change and other anthropogenic disturbances. More specifically my research interests focus on lower aquatic food web interactions and how these interactions may be influenced by historical environmental conditions and disturbance events.

Education

2019-P **Post-Doctoral Research Associate**, Marine Biology Department, Texas A&M University at Galveston, Galveston, TX

2014-19 **PhD, Wildlife and Fisheries Sciences**, Texas A&M University, College Station, TX.
Advisor: Dr. Daniel Roelke, Graduation Date: December 2019
Dissertation: *"An Investigation into how mixotrophy and deleterious chemical production give harmful algae a competitive advantage in systems influenced by anthropogenic disturbance"*

2007-11 **B.S., Bioenvironmental Science**, Texas A&M University, College Station, TX.

Research Experience

2020-P **Post-Doctoral Research Associate**, Marine Biology Department, Texas A&M University at Galveston
The research is contracted by Texas Commission for Environmental Quality with lead-PI, Dr. Daniel Roelke. The work includes refining biological components of a biophysical numerical model (MUMPS) and subsequent spatiotemporal analysis of relationships between inflows, nutrient loading, phytoplankton, dissolved oxygen, and light extinction in the San Antonio Bay System (SABS) and the Copano/Aransas Bay System (CABS). The models will be integrated into a Graphic User Interface (GUI) that can be used to enter and retrieve information to apply the models under user-defined conditions.

2019-P **Co-Lead PI with Sebastian Diehl, Numerical Modeling,** Integrated Science Laboratory, Umea University
The overarching objective of this research is to investigate how increasing cDOM and various mixotrophic life history strategies influence planktonic community structure in lake systems characterized by boreal abiotic conditions. For this purpose, a numerical model with a chemostat design was built using MATLAB software.

2018-19 **Dissertation Research: Numerical Modeling,** Aquatic Ecology Laboratory, Texas A&M University
The study is focused on mechanisms driving phytoplankton succession in lentic systems and how climate influenced differences in these drivers may effect their sensitivity to disturbance events related to climate change. For this purpose, a self-organizing numerical model with a chemostat design was built using MATLAB software. Currently working on manuscript.

2018-19 **Project Assistant,** Yucatan Initiative, Consejo Nacional de Ciencia y Tecnología (abbreviated CONACYT) and Texas A&M University AgriLife Research
The study objective is to examine linkages between land use, ground water pollution, and cyanotoxins with a comparison between sink-hole lakes (cenotes) of the Yucatan, Mexico and stream-like systems of central Texas, U.S. and between urban and rural landscapes. Responsibilities include project planning and international laboratory coordination, and field sampling and laboratory analyses for project sites in the U.S. Currently working on statistical analysis

2017-19 **Dissertation Research: Laboratory Experiments,** Aquatic Ecology Laboratory, Texas A&M University
This study is focused on how the deleterious effects of a harmful algae bloom forming species, *Prymnesium parvum*, vary depending on the stoichiometric nutrient conditions under which the culture is grown. Effects toward organisms of multiple trophic levels will be examined through allelopathy and toxicity bioassays. Currently working on manuscript.

2018-19 **Field Assistant,** Aquatic Ecology Laboratory, Texas A&M University
Helped with field sampling of water quality parameters and water collection from lake systems throughout Texas for experimental use. Also assisted with statistical analysis of experiment data.

2015 **Dissertation Research: Field Experiments,** Aquatic Ecology Laboratory, Texas A&M University
Conducted multi-week field studies involving *in-situ* plankton mesocosm experiments in Lakes Whitney and Possum Kingdom, TX. The objective of this work was to evaluate the relationship between historical occurrence of disturbance in selected aquatic ecosystems and plankton community stability when subjected to compounded disturbances. For that purpose, I focused on multiple lakes with varying degrees of historical natural salinity fluctuation, where the compounding disturbances involve increased salinity and *P. parvum* invasion, a harmful algal bloom-forming species responsible for $10s millions of economic damage in Texas alone.

2014-19 **Field Assistant,** Aquatic Ecology Laboratory, Texas A&M University
Helped conduct multi-week field studies involving *in-situ* plankton mesocosm experiments in Galveston and Matagorda Bays focused on pH effects on *Prymnesium parvum* invasion. Also assisted with statistical analysis of experiment data.

2011-13 **Laboratory Technician**, Southwest Research Institute
Preformed sample clean up and extraction of Polycyclic Aromatic Hydrocarbons (PAHs) from oil, asphalt, and engine emission samples. Prepared samples to be analyzed using gas chromatography–mass spectrometry and processed data looking for the concentrations of up to 20 different PAH target compound.

Awards

2019 Aggies Commit Fellowship, Graduate and Professional Student Council of Texas A&M University, $1200.

2018 Limnology and Oceanography Research Exchange (LOREX), National Science Foundation funded initiative through the Association of Limnology and Oceanography.

2018 Department of Wildlife and Fisheries Sciences Scholarship, $390.

2017-18 Mills Scholarship, Texas Water Resource Institute, Texas A&M University, $5,000.

2015-17 William Roach Scholarship Award, Department of Wildlife and Fisheries Science, Texas A&M University, $1,000 annually.

2015-16 J.H. Benedict, Sr. Memorial Graduate Student Scholarship, Departments of Wildlife and Fisheries Science and Entomology, Texas A&M University, $2,500.

Publications

Roelke, D.L., **Cagle, S.E.,** Muhl, R.M.W., Sakavara, A., Tsirtsis, G. *Emergent properties of phytoplankton assemblages in a less hydraulically dynamic Anthropocene with implications for harmful algal bloom management.* Marine and Freshwater Research. 71: 56-67.

Cagle, S. E., Roelke, D. L., & Muhl, R. M. 2018. *Compounding effects of co-occurring disturbances on populations of a harmful bloom-forming mixotrophic protist.* Hydrobiologia. 831: 23–31.

Presentations/Talks

Cagle, S.E., Roelke, Daniel L., Bhattacharyya, J. 2020. Invited Speaker, Oral Presentation: *MUMPs – A modeling tool for the prediction of algal biomass and dissolved oxygen in Texas bays.* Nutrient Criteria Development Advisory Work Group (NCDAWG), Hosted by the Texas Commission for Environmental Quality.

Cagle, S.E., Roelke, Daniel L., Bhattacharyya, J. 2020. Oral Presentation: *MUMPs – A modeling tool for the prediction of algal biomass and dissolved oxygen in Texas bays.* Project initiation meeting with Texas Commission for Environmental Quality.

Cagle, S.E., Roelke, Daniel L., Bhattacharyya, J. 2020. Invited Speaker, Oral Presentation: *MUMPs – A modeling tool for the prediction of algal biomass and dissolved oxygen in Texas bays.* Texas Water Development Board, Coastal Science Team within the Surface Water Division.

Cagle, S.E. 2019. Dissertation Defense: *Interactive effects of mixotrophy and eutrophication on system stability and implications for harmful bloom forming species*. Texas A&M University.

Cagle, S.E. 2019. Oral Presentation: *Lakes, Plankton, and Climate Change: A modeling story. 20th* Ecological Integration Symposium, Texas A&M University.

Cagle, S.E. Opening address for the 19th annual Ecological Integration Symposium, 2018, Texas A&M University.

Cagle, S.E., Roelke, Daniel L., Haile, Margaret. 2018. Oral Presentation: *Effect of nutrient stoichiometry on mode of allelopathy and toxicity in Prymnesium parvum.* ASLO Summer Meeting, Victoria, B.C., Canada.

Cagle, S.E., Roelke, Daniel L., Muhl, Rika M.W. 2017. Oral Presentation: *Effect of compound disturbance, salinification and invasion of a toxic and mixotrophic alga, on lake plankton communities.* 18th Workshop of the International Association of Phytoplankton Taxonomy and Ecology (IAP), Natal Rio Grande do Norte, Brazil.

Cagle, S.E., Roelke, Daniel L., Muhl, Rika M.W. 2017. Oral Presentation: *Effect of compound disturbance, salinification and invasion of a toxic and mixotrophic alga, on lake plankton communities.* WFSC Lunchtime Seminar Series, Texas A&M University.

Roelke, Daniel L. and **Cagle, S.E.** 2016. Oral Presentation: *Towards an understanding of linkages between Lake Conroe water quality and water treatment plant operation*, San Jacinto River Authority, Lake Conroe, Texas.

Cagle, S.E. 2016. Oral Presentation: *Effect of Compounded Disturbance on Texas Freshwater Plankton Communities. 17th* Ecological Integration Symposium, Texas A&M University.

Cagle, S.E. 2015. Invited Speaker, *NSF grant writing: an example proposal for a study looking at the effects of compound disturbance on Texas plankton communities.*

Media and Popular Science Writing

Graduate Student Spotlight, Wildlife and Fisheries Science Webpage, 2019

Teaching

2016,18 **Graduate Teaching Assistant**, Animal Ecology Laboratory (WFSC 403), Department of Wildlife and Fisheries Science, Texas A&M University (spring and summer semesters under Dr. Masami Fujiwara, fall semester under Dr. Bill Grant)

2017 **Assistant**, field portion of Professional Aspects of Aquatic Ecology (WFSC 489), Department of Wildlife and Fisheries Science, Texas A&M University

2016 **Graduate Teaching Assistant**, Fundamentals of Ecology Laboratory (RENR 215), Department of Wildlife and Fisheries Science, Texas A&M University

2013 **Graduate Teaching Assistant**, Introduction to Environmental Science, Department of Environmental Science, University of Texas at San Antonio.

Mentoring/Training Experience

2018-19 Mentor, Graduate Student researcher: Roni Houck, in the Aquatic Ecology Laboratory, supervised by Dr. Daniel Roelke, Texas A&M University at Galveston.

2018-19 Mentor, Undergraduate Student researcher: Margaret Haile, in the Aquatic Ecology Laboratory, supervised by Dr. Daniel Roelke, Texas A&M University.

2018 Trained personnel at Centro de Investigación Científica de Yucatán (CICY) on ELISA test kit protocol and procedures for microcystin analysis.

2015 Mentor, Undergraduate Big Bend Field Experience, Ecology and Evolutionary Biology Program, Texas A&M University.

2013 Kay See, Laboratory Technician Trainee, Southwest Research Institute, San Antonio, Texas

2012 Roger Olvera, Laboratory Technician Trainee, Southwest Research Institute, San Antonio, Texas

Professional Service Activities

2018-19 President, Graduates of Wildlife and Fisheries Sciences Student Organization, Texas A&M University.

2018 ASLO student worker, ASLO 2018 Summer Meeting, Victoria, B.C., Canada.

2017-18 Organizing Committee Member, 19th annual Ecological Integration Symposium, Texas A&M University.

2016-17 Representative of the Graduate Students of Wildlife and Fisheries Science to the Graduate and Professional Student Council, Texas A&M University.

2016-17 Internal Committee Member for awards and grants, Graduate and Professional Student Council, Texas A&M University.

2015-17 Volunteer, Ecological Integration Symposium, Texas A&M University.

Memberships/Societies

2015-P American Society of Naturalists

2015-P Association for the Sciences of Limnology and Oceanography

2014-P Graduate Students of Wildlife and Fisheries Science, Texas A&M University

Field/Laboratory Skills

- Mesocosm and microcosm experimental design
- Boat and trailer operation
- Water sample collection and processing for basic water quality parameters, nutrients, microcystins, chl *a*, phytoplankton, zooplankton.
- *In-situ* primary production determinations using light/dark bottle methodology
- ELISA test kit protocols for microcystins
- Phytoplankton and zooplankton identification via light microscopy
- Phytoplankton (*R. Salina*, *P. parvum*, *S. Capriconatum*) and zooplankton (*D. magna*) culturing
- Bio-assay methodology for acute toxicity using *Daphnia Magna* and *Rhodomonas salina*
- Basic techniques for molecular ID of phytoplankton
- Proficient with the following equipment: Eureka multiprobe for water quality measurements (including calibration), phytoplankton and zooplankton nets, niskin bottle, flourometer, spectrophotometer, inverted light microscope, tower/well slide settling chambers, heamocytometer, sedwick rafter counting cell

Computer Programs

MATLAB programming platform, R statistical software, Microsoft Excel, Word, and PowerPoint

Related Courses

Community Ecology, Aquatic Microbial Ecology, Population Dynamics, Professional Aspects of Aquatic Ecology, Community Analysis, Directed Studies: Numerical Modeling and Ecological Theory

Outreach

2019	Volunteer Host, STEMing 4 Greatness, Hands-on workshop showcasing Wildlife and Fisheries Science Dept. learning/research opportunities for high school students, Texas A&M University, TX.
2017	Volunteer booth host (plankton specimens and activities), Bioblitz ecological survey and community outreach, Lick Creek Park, College Station, TX.
2016-18	Science mentor, Letters to a Pre-Scientist, Pen-pal program with students from low income schools throughout the US.
2015	Volunteer, Bioblitz ecological survey and community outreach, Lick Creek Park, College Station, TX.
2013-14	Volunteer Education Docent, Michelle Lake Audubon Center, San Antonio, TX.
2013	Volunteer, Bioblitz ecological survey, Cibolo Creek Nature Center, San Antonio, TX.