

MALCOLM ALEXANDER BARNARD

CURRICULUM VITAE

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EDUCATION

- PhD** University of North Carolina – Chapel Hill, Marine Sciences (2023)
Committee: Dr. Hans Paerl (Major Advisor), Dr. Jaye Cable and Dr. Marc Alperin
Research Focus: Understanding the effects of fertilizer runoff and other environmental influences on cyanoHAB toxicities
- BSc** University of Georgia, Ecology August 2017
Certificate, Environmental Ethics
Certificate, Water Resources
Cum Laude with Honors
Bernard Ramsey Honors Scholar, University of Georgia Honors Program
CURO Undergraduate Research Scholar, Center for Undergraduate Research Opportunities
Advisors: Dr. James W. Porter, Dr. Susan Wilde, & Dr. Alan P. Covich
Honors Thesis: Utilizing *Spirogyra grevilleana* as a Phytoremediatory Agent for Reduction of Limnetic Nutrients and *Escherichia coli* Concentrations.

PUBLICATIONS

Peer-Reviewed Articles

Barnard, M.A., Porter, J.W., and Wilde, S.B. 2017. "Utilizing *Spirogyra grevilleana* as a Phytoremediatory Agent for Reduction of Limnetic Nutrients and *Escherichia coli* Concentrations," *American Journal of Plant Sciences*, 8: 1148-1158. <https://doi.org/10.4236/ajps.2017.85075>.

Repository Papers

Barnard, M.A. and Peissig, J.M. 2016. "Effects of Light Pollution on Loggerhead Sea Turtle (*Caretta caretta*) Nesting Behavior in Georgia and South Carolina," University of Georgia Athenaeum Repository. Paper ID: 10724/35551. SeaTurtle.org Paper ID: 9775.

Barnard, M.A. 2015. "A Survey of the Tidal Cycle Influence on the Differential Phytoplankton Diversity of the Duplin River at Marsh Landing on Sapelo Island, Georgia," University of Georgia Athenaeum Repository. Paper ID: 10724/35550.

Barnard, M.A., Brock, H.K., Campbell, P., and Peissig, J.M. 2015. "Soil Manipulation by Leaf Cutter Ants at La Selva Biological Station, Puerto Viejo, Costa Rica," University of Georgia Athenaeum Repository. Paper ID: 10724/35605.

Posters

Barnard, M.A., Porter, J.W., and Wilde, S.B. "Utilizing *Spirogyra grevilleana* as a Phytoremediatory Agent for Reduction of Limnetic Nutrients and *Escherichia coli* Concentrations." Poster presented at European Geosciences Union General Assembly 2018, April 12, 2018, on <http://essoar.org> (2018). DOI: <https://doi.org/10.1002/essoar.884a8536f683a34d.b4c20790a6644e17.2>.

PATENTS

Barnard, M.A., 2018. Algal System for Improving Water Quality. United States Patent 10,065,876. Issued September 4, 2018.

Barnard, M.A., 2014. Algal System for Improving Water Quality. Canadian Patent Application CA/2951817. Filed 12 June 2014 as International Patent Application WO/2014/201298. Patent Pending.

GRANTS AND AWARDS

Kenan Graduate Student Award, “Using stable isotopes to identify fertilizer-derived nitrogen (N) assimilation in microcystins” (\$2500) 2019

Sigma Xi Grants-in-Aid of Research, “Understanding the effects of grazing on cyanoHAB toxicity” (\$750) 2019

Odum School of Ecology Josh Laerm Memorial Outstanding Ecology Undergraduate Award (\$500) 2017

CONFERENCE PRESENTATIONS

“Use of ¹⁵N compound specific analysis to trace N assimilation into microcystins in toxic cyanobacterial harmful algal blooms (cyanoHABs),” American Chemical Society 2019 Eastern North Carolina Poster Session, Greenville, NC, USA, November 2019.

“Utilizing the Alga *Spirogyra* to Improve Limnetic Water Quality: A Phytoremediatory Approach to Nutrient and Bacterial Pollution,” Association for the Sciences of Limnology and Oceanography 2018 Summer Meeting, Victoria, BC, Canada, June 2018.

“Utilizing *Spirogyra grevilleana* as a Phytoremediatory Agent for Reduction of Limnetic Nutrients and *Escherichia coli* Concentrations,” 2018 European Geosciences Union General Assembly, Vienna, Austria, May 2018.

“Providing Potable Water from Lake Water: The Frontiers of Sustainability in Your Own Backyard,” Ecological Society of America’s Centennial Conference, Baltimore, Maryland, USA, August 2015.

“Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels,” Center for Undergraduate Research Opportunities Symposium, Athens, GA, USA, March 2015.

“Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels,” Georgia Association of Water Professionals Industrial Conference, Athens, GA, USA, March 2015.

“Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels,” International Erosion Control Association Environmental Connection Conference, Portland, OR, USA, February 2015.

“Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels,” UGA Sustainability Science Symposium, Athens, GA, USA, January 2015.

“Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels,” Odum School of Ecology Graduate Symposium, Athens, GA, USA, January 2015.

“Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels,” Georgia Association of Water Professionals Annual Conference, Savannah, GA, USA, July 2014.

“Utilization of *S. grevilleana* as a Novel Method of Bioremediation in Freshwater Lakes,” Georgia Association of Water Professionals Annual Conference, Savannah, GA, USA, July 2013.

INVITED TALKS

Brown Bag Seminar, “Understanding Western Lake Erie CyanoHAB Bloom Dynamics,” Institute of Marine Sciences, University of North Carolina at Chapel Hill, Morehead City, NC, USA, January 2020.

National Wildlife Federation EcoLeader Panel, Georgia Campus Sustainability Network Annual Conference, Atlanta, GA, USA, September 2016.

TEDx Talk, “Solving the Global Water Crisis,” TEDxUGA Student Idea Competition, one of nine students campus-wide selected to present, Athens, GA, USA, January 2015.

National Wildlife Federation Speech, “The Importance of Volunteering in Your Community,” Disney Kids and Nature Celebration, Orlando, FL, USA, February 2012.

TEDx Talk, “Follow Your Dreams,” TEDxYouth@PiedmontPark, Atlanta, GA, USA, November 2011.

SELECTED HONORS AND AWARDS

Kenan Graduate Student Award	2019
Election to Full Membership, Sigma Xi	2018
Josh Laerm Memorial Outstanding Ecology Undergraduate Award	2017
Awarded to a graduating senior Ecology major based on a combination of research, classroom, and service performance (<i>i.e.</i> , all-around qualities as a professional ecologist)	
President’s Volunteer Service Gold Award	2016
1st place in UGA Sustainability Science Symposium poster session	2015
2nd place in Odum School of Ecology Graduate Symposium poster session	2015
University of Georgia Bernard Ramsey Honors Scholarship (4-yr academic scholarship)	2014
IBM Watson Scholarship (4-yr academic scholarship)	2014
AXA Achievement Scholarship (Undergraduate scholarship for community service)	2014
I-SWEEEP (International Sustainable World Energy, Engineering, Environment Project)	2014
Olympiad, International science fair, Silver medal for algal research	
U.S. National Stockholm Junior Water Prize , State of Georgia winner for algal research	2013, 2014
Georgia’s 20 Under 20 , 21 st Century Leaders	2012
Cox Conserves Heroes Finalist , Cox Enterprises and The Trust for Public Land	2011
Awarded for contribution to community conservation	

RESEARCH EXPERIENCE

Field Work , Understanding the Western Lake Erie cyanoHAB proliferation and toxicity	2019-current
PI: Dr. George Bullerjahn, Co-PIs: Dr. Justin Chaffin, Dr. Hans Paerl, Dr. Thomas Bridgman, Dr. Timothy Davis, Dr. Steven Wilhelm, and Dr. Gregory Boyer	
<ul style="list-style-type: none"> Investigating influences of nutrient limitation on cyanoHAB dynamics in Maumee Bay and Sandusky Bay, Lake Erie running bioassays at the Stone Lab on South Bass Island, Ohio, USA. Investigating the 40% nutrient load reduction recommendation for Western Lake Erie. Investigating nutrient effects on toxin production. Identifying differences between the June and August cyanoHABs. 	
Field Work , Tracing nitrogen assimilation into toxins during cyanoHABs using ¹⁵ N	2019-current
PI: Malcolm Barnard, assistance from Dr. Hans Paerl, Dr. Gregory Boyer, and Dr. Steven Wilhelm	
<ul style="list-style-type: none"> Investigating nitrogen assimilation into microcystins and other cyanotoxins in the Maumee Bay and Sandusky Bay, Lake Erie near Ohio, USA by using ¹⁵N-labeled nitrogen additions as tracers. Utilizing a novel HPLC-LC-MS(-MS) technique of measuring ¹⁵N in cyanotoxins developed by Dr. Gregory Boyer and Dr. Steven Wilhelm Funded in part by the 2019 Kenan Graduate Student Award. 	
Field Work , Investigating grazing effects on cyanoHAB toxicity	2019-current
PI: Malcolm Barnard, assistance from Dr. Hans Paerl, Dr. Gregory Boyer, Dr. Timothy Davis, and Dr. Nathan Hall	
<ul style="list-style-type: none"> Investigating effects of grazing on toxin production in cyanoHABs in Maumee Bay, Lake Erie near Ohio, USA and Arrowhead Beach, Chowan River, North Carolina, USA Funded in part by Sigma Xi Grant-in-Aid of Research G201903158412545. 	
Field Work , Comparing dilution methods for determining grazing rates	2019-current
Project devised and led by Malcolm Barnard with assistance by Dr. Hans Paerl	
<ul style="list-style-type: none"> Investigating the effects of using 0.2 um filtered water versus 0.7 um filtered water versus major ion solution for Laundry and Hassett based dilution grazing experiments in the Chowan River and Neuse River Estuary in Eastern North Carolina, USA, Lake Jordan in Central North Carolina, USA, and the Atlantic Ocean Shelf off the Outer Banks of North Carolina, USA 	
Undergraduate Research , University of Georgia, Athens, GA, USA	2016-2017

- Undergraduate Researcher, Advisors: Dr. James Porter and Dr. James Richardson
- Investigated sea turtle nesting behavior in Georgia
 - Analyzed anthropogenic impacts (population, light pollution, and dredging) on nesting behavior
- Undergraduate Research**, University of Georgia, Athens, GA, USA 2014-2017
- Undergraduate Researcher, Advisors: Dr. Susan Wilde and Dr. Todd Rasmussen
- Investigated changes in cyanobacteria and algae in local lakes and effects on CyanoHABs in southern limnetic systems
 - Monitored water quality in UGA Golf Course lakes
 - Created media for algal culture
 - Surveyed algal assemblages utilizing Sedgwick-grafter counting plates for freshwater lake samples
 - Monitored *E. coli* and coliform levels in regional lakes and streams using Colilert 18 and 3M plating
- Field Study**, University of Georgia – Sustainability Wintermester, Australia December 2016-January 2017
- Advisor: Dr. Michael Tarrant
- Studied effects of human foot traffic on reef communities in the Great Barrier Reef, Lady Elliot Island, Queensland, Australia
 - Created long term management study using Eye on the Reef study methods
- Undergraduate Research**, University of Georgia, Athens, GA, USA 2015-2016
- Research Assistant, Advisor: Dr. Andrew Davis
- Utilized dissecting microscope to dissect horned passalus beetles to determine unknown parasite
 - Studied changes in parasite concentrations over time
- Field Study**, University of Georgia – Coastal Summer Semester, Sapelo and Skidaway Islands, GA June 2015
- Advisors: Dr. Mary Ann Moran, Dr. Jim Nelson, and Dr. Ann Savage
- Studied change of phytoplankton diversity as a response to the tidal cycle at Marsh Landing on Sapelo Island, GA, USA
 - Operated flow cytometer on oceanic research cruise on R/V Savannah of Skidaway Institute of Oceanography on Skidaway Island, GA
 - Wrote ship tracking MatLab program to convert GPS coordinates to absolute and relative distance travelled aboard research vessel with ability to import ship track onto map
- Field Study**, University of Georgia – Tropical Ecology Maymester, Costa Rica May 2015
- Advisor: Dr. Scott Connelly
- Studied factors affecting leaf cutter ant mound size in the tropical rain forest of La Selva Biological Station in Puerto Viejo, Costa Rica
 - Investigated effects of herbivory on pollination of several plant families in cloud forests of Monteverde, Costa Rica
- Precollege Research**, Johns Creek High School, Johns Creek, GA, USA 2009 to 2014
- Lead Researcher
- Studied effects of algae on lake water quality from diurnal studies to controlled microcosm experiments
 - Invented Algal Filtration Device to utilize algae to filter polluted lake water and remove excess nutrients and *E. coli*

WORK EXPERIENCE

- Research Assistant**, Warnell School of Forestry and Natural Resources, UGA 2015–2017
- Research and Teaching Responsibilities under Dr. Susan Wilde
- Conducted algal screening
 - Taught water quality testing techniques
 - Performed UV fluorescent microscopy to count cyanobacteria
 - Prepared and sustained cultures
 - Screened for Avian Vacuolar Myelinopathy (AVM) causing cyanobacteria
 - Trained others in lab in algal identification and aquatic macroinvertebrates
- Summer Intern**, Husbandry Department and Tybee Island Sea Turtle Project May-July 2016
- Tybee Island Marine Science Center, Tybee Island, GA, USA
- Responsibilities: Animal Caretaker, Animal Rescue, and Sea Turtle Conservation

- Monitored and provided aquarium maintenance and water quality monitoring
- Collected animals for food and display, including fish trawling
- Prepared and distributed animal food
- Medicated fish and reptiles
- Transported injured shorebirds and reptiles to veterinary doctor
- Performed diamondback terrapin rescue and egg salvation
- Participated in diamondback terrapin and loggerhead sea turtle head start programs
- Responded to sea turtle and marine mammal stranding events
- Trained with DNR in sea turtle tagging and nest identification, monitoring and excavation
- Searched for, identified, and relocated loggerhead sea turtle nests
- Monitored sea turtle nests and hatchings, including conducting excavations and data collection
- Assisted with writing operating and training procedures for new volunteer positions

TEACHING EXPERIENCE

Graduate Research Consultant , University of North Carolina at Chapel Hill (MASC 220/ENEC 220) “North Carolina Estuaries: Environmental Processes & Problems” May 2019 Assisting Dr. Marc Alperin	May 2019-Present
Teaching Assistant , University of North Carolina at Chapel Hill (MASC 401/BIOL 350/ENVR 417/GEOL 403) “Oceanography” Assisting Dr. Andreas Teske (ENEC 433/MASC 433) “Wetland Hydrology and Hydrodynamics” Assisting Dr. Jaye Cable	August 2018- May 2019 Spring 2019 Fall 2018
Teaching Assistant , University of Georgia (FYOS 1001) “First Year Odyssey Seminar – Aquatic Life in UGA Watersheds.” Assisted Dr. Susan Wilde	August 2016-December 2016 Fall 2016

PROFESSIONAL TRAINING / CERTIFICATION

CPR/First Aid/AED Training and Certification, American Heart Association (2019)

Scientific Diving Certification – American Academy of Underwater Science, University of North Carolina (2019-Present), University System of Georgia (2016-2017)

2019 ComSciCon-Triangle Science Communication Training Workshop, Raleigh/Research Triangle Park, North Carolina, USA (2019)

Entering Mentoring Training Workshop, University of North Carolina – Chapel Hill Graduate School, North Carolina, USA (2019)

University of North Carolina – Chapel Hill Safe Zone Training, University of North Carolina – Chapel Hill LGBTQ Center, North Carolina, USA (2018)

Helping Advocates for Violence Ending Now (HAVEN) Training, University of North Carolina – Chapel Hill Equal Opportunity & Compliance Office, North Carolina, USA (2018)

Methods in Environmental Acquisition / Remote Data Acquisition (RDA) Sensor Training Workshop, University of New Mexico, Sevilleta Field Station, New Mexico, USA (2018)

Introduction to Remote Sensing and GIS for Ecological Applications, PR Informatics, Glasgow, Scotland, UK (2018)

Stable Isotope Ecology Course, Sicily Center for International Education, Siracusa, Sicily, Italy (2018)

DAN Emergency O₂ Provider Certification, Divers Alert Network (2018)

Master SCUBA Diver, Scuba Schools International Certification, Stress and Rescue (2017), Navigation, Deep, Wreck, Night/Reduced Visibility, and Nitrox (2016)

Georgia Soil and Water Conservation Commission Level 1-A Certified Personnel/Blue Card Holder
Georgia NPDES Training Institute (2016)

Georgia Adopt-A-Stream QA/QC Certification, State of Georgia’s Environmental Protection Division
Chemical (2009, 2010, 2016); Biological (2010, 2016); and Bacterial (2012) water quality testing

SELECTED UNIVERSITY INVOLVEMENT

University of North Carolina – Chapel Hill – Marine Sciences Graduate Student Symposium 2019-2020

Co-Chair	
University of Georgia Student Government Association – Odum School of Ecology Senator	2015-2017
Chair of Auxiliary Services Committee	
University Council – Odum School of Ecology Student Representative	2016-2017
Library Committee Member	
American Water Resources Association, UGA Chapter – Treasurer	2015-2017
National Wildlife Federation – Campus EcoLeader	2014-2017

SELECTED COMMUNITY OUTREACH

Science Fair Mentor, mentoring eight grade students at Beaufort Middle School, Beaufort, North Carolina, USA. November 2019-current.

SciREN Coast, 2019-2020 Admin Team member and Educator Team member.

Future City Competition Mentor, mentoring one team of seventh graders and two teams of eighth graders at Epiphany School of Global Studies in New Bern, North Carolina, USA for the 2020 Future City Competition, October 2019-current.

Raleigh Model Water Competition, volunteer with the 2019 Model Water Competition hosted by the North Carolina Water Environment Association at Abbotts Bridge Elementary School, Raleigh, North Carolina, USA, October 2019.

Girls Exploring Science and Technology, volunteer with the 2019 Girls Exploring Science and Technology at the University of North Carolina – Chapel Hill Institute of Marine Sciences, Morehead City, North Carolina, USA, October 2019.

United States National Stockholm Junior Water Prize Coach, acting as coach at the 2019 United States National Stockholm Water Prize completion at The Ohio State University, Columbus, Ohio, USA, June 2019.

North Carolina Stockholm Junior Water Prize Judge, acting as member of the North Carolina Water Environment Association Public Education Committee, April 2019. Helped to select the North Carolina 2019 state winner.

North Carolina Regional Science and Engineering Fair – Region V, Junior Division Science Fair Judge, Greensboro, NC, February 2019.

SciREN Coast, Lesson Plan Workshop at Duke University Marine Lab, January 2019.

Georgia DNR Tybee Island Sea Turtle Project, Sea Turtle Patrol, 2014-2018. Conducting morning beach surveys, nocturnal nest sitting, nest transfers, and egg genetic sample field preparation.

Tybee Island Marine Science Center, Volunteer, 2011-2018. Educating visitors through gallery interpretation and assistance with beach walks, husbandry, and research.

National Park Service, Park Volunteer, 2010-2018. Assisting with educational programs, event preparation, and park cleanup at the Chattahoochee River National Recreation Area.

Upper Oconee Watershed Network, Volunteer, 2015-2017. Quarterly water quality monitoring of Athens-Clarke County, GA streams.

Georgia State Science and Engineering Fair, Junior Division Science Fair Judge, Athens, GA, April 2016.

Rivers Alive, River Clean Up, Athens, GA, 2015.

National Wildlife Federation, Project leader and volunteer, 2010-present, Youth Ambassador, 2010-2014. Created and led Johns Creek Certified Community Wildlife Habitat Project.

Chattahoochee Nature Center, Docent, 2009-2014. Completed docent training program; educated visitors through artifact biobuggies and exhibit gallery interpretation.

STATISTICAL SOFTWARE PROFICIENCIES

Matlab, mathematical modeling

R/R Studio, statistical analysis utilizing **LaTeX** for formatting

Grass GIS, Open Source Global Information Systems Software

P.A.S.T., population analysis

JMP, population modeling

SELECTED PROFESSIONAL AFFILIATIONS

Ecological Society of America, Student Section, Aquatic Section

Sigma Xi, Full Member

**North Carolina American Water Works Association/Water Environment Association, Public Education
Committee**

North Carolina Water Resources Association

Association for the Sciences of Limnology and Oceanography

European Geosciences Union

American Academy of Underwater Science

Phycological Society of America

American Association for the Advancement of Science

American Chemical Society

Water Environment Federation

American Water Works Association

International Erosion Control Association