



## Beck Frydenborg

Sr. Scientist / Ecologist / Analyst

Beck is an interdisciplinary ecologist with extensive expertise in study design, aquatic assessments, microbiology, statistical analyses, data visualization, and GIS. Beck's has a diverse background in biological research, including developmental and cell biology, plant genetics, microbial ecology, molecular biology, epidemiology, coral ecology, environmental health, and bioinformatics.

At Frydenborg Ecologic, Beck collects biological and water quality data using FDEP SOPs, performs statistical analyses and data visualizations using R and QGIS, writes reports interpreting data in the context of Florida environmental statutes, and coordinates with regulatory agencies on clients' behalf.

Beck has been a key member of projects concerning Numeric Nutrient Criteria, Environmental Resource Permitting, Waste Water Treatment Facility permits, NPDES compliance, Microbial Source Tracking, policy reviews and meta-analyses, and ecological restoration.

## EDUCATION

<b>M.S.</b> , Environmental Health Science	<b>University of Georgia</b>	<b>2013</b>
<i>Thesis:</i> Preliminary analysis of the viral influence on the holobiont of Elkhorn coral, <i>Acropora palmata</i> , in the context of temperature associated white pox disease		
<b>B.S.</b> , Microbiology and Cell Science	<b>University of Florida</b>	<b>2010</b>

## SKILLS AND CERTIFICATIONS

*Certifications* – FDEP Stream Condition Index (SCI), FDEP Habitat Assessment, Scientific SCUBA

*Software* – QGIS, GRASS, R, Python, MS Office Suite, Geneious, MEGA 5, IMG, SEED, MG-RAST, CAMERA

*Field* - FDEP SCI, FDEP lake vegetation index survey, aquatic invertebrate taxonomy, FDEP stream and lake habitat assessment, FDEP water sampling, FDEP Biorecon, coral sampling and mapping

*Laboratory* - next generation sequencing (NGS), metabolite studies, qPCR, DNA/RNA isolation, TRFLP, gel electrophoresis, PCR, fluorescence microscopy, cloning, plasmid design, bacteriophage and bacterial isolation and characterization, fecal indicator bacteria enumeration, DNA microinjection, spectroscopy, antibody staining, cell culture, model organism propagation and use (*A. thaliana*, *C. elegans*, *A. pallida*)

## ENVIRONMENTAL POLICY PUBLICATIONS

1. Frydenborg, R.B and **B.R. Frydenborg**. 2016. Assessment of Selected Seminole County Water Conveyances to Determine Compliance with NNC, Including a Stressor Identification Evaluation of Salt Creek (Seminole County). Frydenborg Ecologic, LLC. For Seminole County.
2. **Frydenborg, B. R.** and R. B. Frydenborg. 2016. A Meta-Analytical Approach for Determining the Effectiveness of Agricultural Best Management Practices for Reducing Nutrient Pollution in Florida, Phase 2: Meta-Analysis of Cow/Calf Operations, Vegetable Crops, and Agronomic Crops
3. **Frydenborg, B. R.** and R. B. Frydenborg. 2015. Evaluation of the Effect of Relocation of the Georgia-Pacific Discharge in Relation to Biological Water Quality Criteria (Putnam County).

4. Frydenborg, R.B and **B.R. Frydenborg**. 2015. Level II Water Quality Based Effluent Limitations for Gainesville Regional Utilities' Main Street Water Reclamation Facility. Frydenborg Ecologic, LLC and Dynamic Solutions, LLC. For Gainesville Regional Utilities.
5. Frydenborg, R.B and **B.R. Frydenborg**. 2014. Physical, Chemical, and Biological Characterization of the City of Tallahassee's Urban Water Conveyances. Frydenborg Ecologic, LLC. For City of Tallahassee, WRE – Stormwater Management.
6. Frydenborg, R.B and **B.R. Frydenborg**. 2014. Stream Restoration and Mitigation Activities Associated with Attapulgitte Mining (BASF Complex A), Gadsden County, Florida. Frydenborg Ecologic, LLC. For BASF.
7. **Frydenborg, B.R** and R.B. Frydenborg. 2014. Preliminary Analysis of the Feasibility of Reclassifying St. Joe Canal (currently Class III) to Class I. Frydenborg Ecologic, LLC. For: Hopping, Green, and Sam.
8. Frydenborg, R.B. and **B.R. Frydenborg**. 2014. Physical, Chemical, and Biological Information Required by the Town of Callahan's Wastewater Treatment Facility Permit. Frydenborg Ecologic, LLC. For: Town of Callahan.
9. **Frydenborg, B.R** and R.B. Frydenborg. 2014. Fecal Coliform Exceedances in Reedy Creek (WBID 3170F7) are Caused by natural (wildlife) sources. Frydenborg Ecologic, LLC. For: Reedy Creek Improvement District.
10. Frydenborg, R.B. and **B.R. Frydenborg**. 2014. Biological Assessment of Fletcher Creek, Escambia County, FL, Associated with an Accidental Phosphoric Acid Spill. Frydenborg Ecologic, LLC. For: CSX.
11. Frydenborg, R.B. and **B.R. Frydenborg**. 2014. Assessment of Mill and Daisy Creeks for Compliance with Numeric Nutrient Criteria. Frydenborg Ecologic, LLC. For SJRWMD.

#### **PEER REVIEWED PUBLICATIONS**

1. **Frydenborg, B.R.**, Krediet, C.J., Teplitski M, Ritchie, K. 2013. Temperature-dependent inhibition of opportunistic *Vibrio* pathogens by native coral commensal bacteria. *Microbial Ecology*.
2. **Frydenborg, B.R.**, D. Kemp, and E.K. Lipp. 2015. Abundance of virus like particles and bacteria of *Acropora palmata*: relationship to temperature change and coral health state. In prep.
3. **Frydenborg, B.R.** and E.K. Lipp. 2015. Two novel bacteriophages of *Serratia marcescens* PDR60 and implications for the Elkhorn coral. In prep.

#### **NON REFERRED PUBLICATIONS**

1. **Frydenborg, B.R.** 2013. Preliminary analysis of the viral influence on the holobiont of Elkhorn coral, *Acropora palmate*, in the context of temperature associated white pox disease University of Georgia M. Sc. Thesis.

#### **ENVIRONMENTAL POLICY PRESENTATIONS**

2. "Practical Implementation of NNC: Simplifying the Labyrinth Maze", Florida Stormwater Association, Sanibel Harbour, FL. June 2014.
3. "Impacts of the Apalachicola River Water Wars, an NNC perspective", Georgia Environmental Conference, Jekyll Island, GA. August 2014.
4. "City of Tallahassee Environmental Policy Management Workshop", Tallahassee, FL. September 2014.
5. "Microbial source tracking: proper study design", FDEP Biocriteria Meeting, Lake Mary, FL. October 2014.
6. "Seminole County Numeric Nutrient Criteria, Impairment Listings, and Class III Limited", Lake Mary, FL. November 2014.
7. "Official Measures of Lake Health: Water Quality Standards ", Archbold Biological Station, AWRA Technical Meeting. March 2015.

8. "New Regulatory Requirements for Stressor Identification Studies", Florida Stormwater Association, Sanibel Harbour, FL, June 2015.
9. "Ducks, Dogs, and detritus: Fecal Indicators and Source Tracking Limitations ", Florida Stormwater Association, Sanibel Harbour, FL. June 2016.

#### FIRST AUTHOR RESEARCH PRESENTATIONS

1. "Investigating programmed cell death of maize pollen cells resulting in cytoplasmically inherited male sterility using *Arabidopsis thaliana*", UF Undergraduate Research Symposium, Gainesville, FL, 2007
2. "Inducible over-proliferation of differentiated cells in *C. elegans*", Howard Hughes Medical Institute scholars meeting, Paris, France, 2008.
3. "Heat shock inducible proliferation of neurons in *C. elegans*", University Scholars Research Symposium, Gainesville, FL, 2009
4. "*Acropora palmata* beneficial bacteria and opportunistic *Vibrio* pathogens", More Marine REU scholars symposium, Sarasota, FL, 2009.
5. "Temperature dependent growth of isolated *A. palmata* commensals and opportunistic pathogens", 3<sup>rd</sup> Annual University of Florida Marine Biology Symposium, The Whitney Laboratory, St. Augustine, FL, 2011.
6. "The temperature dependent interactions between *A. palmata* isolates and model *Vibrio* pathogens: implications for coral health", General Meeting for the American Society for Microbiology, New Orleans, LA, 2011.
7. "A healthy coral holobiont, nonantibiotic mechanisms explain microbial community dynamics", 97<sup>th</sup> Annual Southeastern Branch American Society for Microbiology Meeting, University of Florida, Gainesville, FL, 2011.
8. "Monitoring levels of fecal indicator bacteria and salmonella upstream and downstream of a constructed wetland", 73<sup>rd</sup> Association of Southeastern Biologists meeting, Athens, GA, 2012.
9. "Bacteriophage influence on *Serratia marcescens*; A coral reef perspective", 98<sup>th</sup> Annual Southeastern Branch Society for Microbiology Meeting, University of Georgia, Athens, GA, 2012.
10. "An examination of temperature dependent ecology of phages infecting the coral-pathogenic *Serratia marcescens*", NSF Ecology and Infectious Disease PI meeting, Athens, GA, 2013.
11. Characterization of phages against coral-pathogenic *Serratia marcescens*", General Meeting of the American Society for Microbiology, Denver, CO, 2013.
12. "A meta-analytical approach to determining the effectiveness of best management practices for Florida Agriculture", Society for Freshwater Science, Raleigh, NC, 2017.

#### SELECTED AWARDS AND RECOGNITION

- UGA Graduate Travel Award to present at international American Society for Microbiology annual meeting (2013)
- Graduate School Research Assistantship winner (2011)
- American Society for Microbiology Undergraduate Research Fellowship (2010)
- National Science Foundation Research Experience for Undergraduates (2009)
- Howard Hughes Medical Institute Provost Scholar (2008)
- International Baccalaureate Program, summa cum laude (2006)
- Eagle Scout (2004)

#### CONTINUING EDUCATION

1. Submerged Lands and Environmental Resources Coordination (SLERC) Conference, Orlando, FL June 2014.
2. The 41<sup>st</sup> Annual Meeting of the Southeastern Water Pollution Biologists Association. Savannah, GA, November 2014.
3. Florida Environmental Regulation Commission meeting, Tallahassee, FL, December 2014.
4. Florida Earth Foundation Ag Module: Innovation in the Water Space. Tallahassee, FL, February 2015.
5. AWRA technical meeting: Lakes. Archbold Biological Station, FL. March, 2015.
6. Apalachicola River and Bay System Symposium. Tallahassee, FL. May 2015.
7. AWRA Technical Meeting: Management and Restoration of Northwest Florida's Water Resources. Apalachicola, FL, September 2015.
8. Florida Earth Foundation Big Data and Decision Making: The Future of the Water Space. Gainesville, FL, December 2015
9. Annual symposium and membership meeting of the Society for Ecological Restoration – Southeast. Quincy, FL. October 2016.

## RESEARCH EXPERIENCE

- *Graduate School Research Assistant*, University of Georgia, August 2011 – December 2013. Characterized and identified novel phage-bacterial interactions and their abiotic and biotic controls in a complex coral reef ecosystem using bioinformatics, next generation sequencing, and traditional microbiology approaches
- *Lab Technician*, University of Florida, Jan 2011 – July 2011. Identified environmental influences on bacterial microcosms, and determined explanatory mechanisms using qPCR, azocasein protease assays, and enzymatic activity.
- *American Society of Microbiology Undergraduate Research Fellow*, University of Florida, August 2009 – Dec 2010. Designed novel multi-factorial bacterial microcosm studies to examine biotic and abiotic influences on survival and population density of previously characterize isolates.
- *National Science Foundation Research Experience for Undergraduates (NSF-REU)*, Mote Marine Laboratory, May 2009 – August 2009. Characterized differences due to environmental influences (e.g. temperature) in commensal and pathogenic bacterial isolates from coral reefs using TRFLP, growth curves, and cell counts
- *Howard Hughes Medical Institute Provost Scholar*, Utrecht University, May 2008 – Dec 2008. Manipulated quiescent neuron and muscle cells of *C. elegans* by over-expression of cell cycle control enzymes in order to better understand control and regulation of the cell cycle.
- *Howard Hughes Medical Institute Scholar*, University of Florida, Jan 2007 – April 2008. Created *Arabidopsis thaliana* plants containing a gene inducing programmed cell death, leading to increased understanding of a mechanism to control out-crossing of genetically modified crops.
- *Caribbean Coral Reef health monitoring and characterization (2011-2013)*. Quarterly collection of the surface mucus layer of *Acropora palmata*, *Acropora cervicornis*, *Montastraea faveolata*, *Montastraea annularis*, *Porites porites*, and *Porites asteroides*. Sites sampled were Looe Key, Western Sambo, Molasses, Sombrero Key, Rock Key, Grecian Rocks, and Carysfort Reefs. Samples were collected using SCUBA and analyzed for presence of *S. marcescens*.