

# Katherine Silliman, PhD

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## EDUCATION

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### University of Chicago

*PhD, Evolutionary Biology*

June 2019

Chicago, IL

- Dissertation: Population structure and local adaptation in the Olympia oyster (*Ostrea lurida*)
- Advisor: Catherine Pfister

### University of Miami

*BS, Marine Science/Biology and BA, Music (Tuba)*

May 2013

Coral Gables, FL

- Thesis: Rate of DNA mutations across the genome of *Alpheus* snapping shrimp
- Advisor: Carla Hurt

## PROFESSIONAL EXPERIENCE

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### Research Biologist | NOAA Atlantic Oceanographic & Meteorological Lab

May 2024 – Present

*Miami, FL*

- AOML 'Omics Program lead.

### Research Scientist II | NOAA Atlantic Oceanographic & Meteorological Lab

Feb. 2023 – May 2024

*Miami, FL*

- Bioinformatics, data analysis, and best practices development for a broad range of research projects in the Gulf of Mexico and South Atlantic, with a particular focus on environmental DNA applications.

### Assistant Marine Scientist | South Carolina Dept. of Natural Resources

Dec. 2021 – Jan. 2023

*Charleston, SC*

- Co-lead of the Population Genetics group in the Marine Resources Division. Projects involve the development and use of molecular tools for resource management (e.g., eDNA detection of rare or invasive species (qPCR probe-based and metabarcoding), defining fishery stock structure, parentage analysis for stock enhancement, detecting hybridization, oyster disease screening, metabarcoding for diet analyses).
- **Adjunct Faculty, College of Charleston:** Serving on one Masters thesis committees.

### Postdoctoral Fellow | Auburn University

July 2019 – Nov. 2021

*Supervisor: Eric Peatman*

*Auburn, AL*

- Estimated hybridization and population structure in black basses (*Micropterus* spp.) of the southeastern US using genotype-by-sequencing (GBS) data. Developed a rapid assay panel of 73 SNPs for the Agena MassArray system to detect hybridization and ancestry in largemouth bass for use in resource management.
- Integrated genomic and methylation data for the Olympia oyster (*Ostrea lurida*) in a novel multi-omics framework to characterize the relationship between genotype and epigenotype.

### Postdoctoral Fellow | Georgia Institute of Technology

April – June 2019

*Supervisor: Annalise Paaby*

*Atlanta, GA*

- Short-term contract to help develop a bioinformatics pipeline for predicting RNA secondary structure in the nematode *Caenorhabditis elegans*, in collaboration with Dr. Christine Heitsch in Mathematics.

### PhD Student | University of Chicago

Sept. 2013 – Mar. 2019

*Advisor: Cathy Pfister*

*Chicago, IL*

- Used reduced-representation genomic sequencing, transcriptomics, and mesocosm experiments to characterize the population structure of the Olympia oyster (*Ostrea lurida*) and assess its adaptive potential in response to ocean acidification.

### Undergraduate Research Assistant | University of Miami

Sept. 2009 – June 2013

*Advisor: Carla Hurt*

*Coral Gables, FL*

- Estimated the rate of genomic DNA substitutions for three sister-species pairs of snapping shrimp (*Alpheus* spp.) that span the Isthmus of Panama, using GBS data and demographic coalescent modeling. Provided novel evidence for dating the final closure of the Isthmus.
- Collaborated on research project that reconstructed the geographic and host-specific context of speciation in four Caribbean taxa of *Alpheus* snapping shrimp using 10 nuclear genes and mitochondrial CO1.

- Assisted in time course experiments, RNA extractions, and bioinformatics to characterize the molecular mechanisms underlying circatidal (12.4 hr cycle) biological rhythms in marine invertebrates, using RNASeq data and a classical harmonic analysis implemented through MATLAB.

PUBLICATIONS ([GOOGLE SCHOLAR](#))*Peer-reviewed Articles*

- Emily E Curd, Luna Gal, Ramon Gallego, **Katherine Silliman**, Shaun Nielsen, and Zachary Gold. rCRUX: A rapid and versatile tool for generating metabarcoding reference libraries in R. *Environ DNA*, 6(1), January 2024. ISSN 2637-4943. doi: 10.1002/edn3.489.
- Samuel N Bogan, Jason Johns, J Griffiths, Danielle Davenport, Sara J Smith, Sara M Schaal, Alan M Downey-Wall, R Lou, K Lotterhos, Megan E Guidry, H Rivera, J A McGirr, Jonathan B Puritz, Steven B Roberts, and **Katherine Silliman**. A dynamic web resource for robust and reproducible genomics in nonmodel species: marineomics.io. *Methods Ecol. Evol.*, 14:2709–2716, October 2023. ISSN 2041-210X. doi: 10.1111/2041-210X.14219.
- Katherine Silliman\***, Laura Spencer\*, Samuel J. White, and Steven B. Roberts. Epigenetic and genetic population structure is coupled in a marine invertebrate. *Genome Biology and Evolution*, 15:evad013, 2023. doi: 10.1093/gbe/evad013.
- Sejal Patel, Jinesh Patel, **Katherine Silliman**, Nathan Hall, Kira Bowen, and Jenny Koebornick. Comparative transcriptome profiling unfolds a complex defense and secondary metabolite networks imparting *Corynespora cassiicola* resistance in soybean (*Glycine max* (L.) merrill). *Int. J. Mol. Sci.*, 24:10563, 2023. doi: 10.3390/ijms241310563.
- Katherine Silliman**, Honggang Zhao, Megan Justice<sup>‡</sup>, Wilawan Thongda, Bryant Bowen, and Eric Peatman. Complex introgression among three diverged largemouth bass lineages. *Evolutionary Applications*, 14:2815–2830, 2021. doi: 10.1111/eva.13314. [GitHub Repo](#).
- Matthew Lewis, **Katherine Silliman**, Steven Sammons, and Eric J. Peatman. Failure of phenotypic markers to accurately identify black bass species and associated hybrids in Mobile River Basin, Alabama. *North American Journal of Fisheries Management*, 41:1591–1601, 2021. doi: 10.1002/nafm.10673.
- Katherine Silliman**, Jane L. Indorf, Nancy Knowlton, William E. Browne, and Carla Hurt. Base-substitution mutation rate across the nuclear genome of *Alpheus* snapping shrimp and the timing of isolation by the Isthmus of Panama. *BMC Ecology and Evolution*, 21(104), 2021. doi: 10.1186/s12862-021-01836-3.
- Mark C. Bitter, Lydia Kapsenberg, **Katherine Silliman**, Jean-Pierre Gattuso, and Cathy A. Pfister. Magnitude and predictability of pH fluctuations shape plastic responses to ocean acidification. *American Naturalist*, 197(4):486–501, 2021. [GitHub Repo](#).
- Honggang Zhao, **Katherine Silliman**, Matthew Lewis, Sarah Johnson, Garret Kratina, Steven J. Rider, Carol A. Stepien, Eric M. Hallerman, Benjamin Beck, Adam Fuller, and Eric Peatman. SNP analyses highlight a unique, imperiled southern walleye (*Sander vitreus*) in the Mobile River Basin. *Canadian Journal of Fisheries and Aquatic Sciences*, 77:1366–1378, 2020. doi: 10.1139/cjfas-2019-0351.
- Katherine Silliman**. Population structure, genetic connectivity, and adaptation in the Olympia oyster (*Ostrea lurida*) along the west coast of North America. *Evolutionary Applications*, 11:697, 2019. doi: 10.1111/eva.12766. [GitHub Repo](#).
- Katherine Silliman**, Tynan K. Bowyer<sup>‡</sup>, and Steven B. Roberts. Consistent differences in fitness traits across multiple generations of Olympia oysters. *Scientific Reports*, 8(1):6080, 2018. doi: 10.1038/s41598-018-24455-3. [GitHub Repo](#).
- Carla Hurt, **Katherine Silliman**, Arthur Anker, and Nancy Knowlton. Ecological speciation in anemone-associated snapping shrimps (*Alpheus armatus* species complex). *Molecular Ecology*, 22(17):4532–4548, 2013. doi: 10.1111/mec.12398.

*Peer-reviewed Data Descriptor*

- Samuel J. White, Brent Vadopalas, **Katherine Silliman**, and Steven B. Roberts.

Genotype-by-sequencing of three geographically distinct populations of Olympia oysters, *Ostrea lurida*. *Scientific Data*, 4:170130, 2017. doi: 10.1038/sdata.2017.130.

\* denotes co-first authorship, † denotes undergraduate author

## SELECTED RESEARCH PRESENTATIONS

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MarineOmics: A new web resource for robust and reproducible genomic research in marine and aquatic science. *RCN for Evolution in Changing Seas Integration and Training Workshop*. Virtual. 2022. [20 min.]

Complex introgression among three diverged largemouth bass lineages. *American Fisheries Society Annual Meeting*. Baltimore, MD. 2021. [15 min.]

Diagnostic SNPs for determining genetic integrity and hybridization among Delta, Largemouth Bass, and Florida Bass. *Southern Division American Fisheries Society Annual Meeting*. Virtual. 2021. [20 min.]

Population structure and local adaptation in the Olympia oyster (*Ostrea lurida*) *Auburn University, Biological Sciences invited seminar*. 2020. [25 min.]

Comparative transcriptomics of Olympia oysters (*Ostrea lurida*) and rock scallops (*Crassadoma gigantea*) in response to ocean acidification. *National Shellfisheries Association meeting*. New Orleans, LA. 2019. [15 min.]

Variation in response to ocean acidification among Olympia oysters (*Ostrea lurida*) from California, Oregon, and British Columbia. *Gordon Research Conference on Ocean Global Change Biology*. New Hampshire. 2018. [Poster]

Genetic and Phenotypic Differentiation in the Olympia Oyster (*Ostrea lurida*). *Midwest Population Genetics Conference*. East Lansing, MI. 2018. [Winner of best poster presentation]

Phylogeography and population genomics of the Olympia oyster. *Evolution meeting*. Portland, OR. 2017. [15 min.]

Rate of DNA mutations across the genome of *Alpheus* snapping shrimp. *Society for Integrative and Comparative Biology meeting*. New Orleans, LA. 2017. [Poster]

New Markers for Population Genomics and Phylogeography of the Olympia Oyster. *National Shellfisheries Association meeting*. Monterey Bay, CA. 2015. [15 min.]

A transcriptomic approach to circatidal rhythms. *American Society for Limnology and Oceanography meeting*. New Orleans, LA. 2013. [Poster]

## GRANTS AND AWARDS

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Multiple contracts with state agencies for fish genetics projects [\$24,000-\$39,000]	2022
RCN-ECS Working Group, Funding for Research Internships and Publications [\$15,000]	2021-2022
NSF Doctoral Dissertation Improvement Grant [\$12,697]	2016–2018
National Geographic Young Explorers Grant [\$4,500]	2016–2018
Field Museum Pritzker Award [\$5,000]	2017,2015,2014
NSF Graduate Research Fellowship	2015–2018
American Fisheries Society Berkeley Marine Conservation Award, Runner-Up [\$1,000]	2015
National Shellfisheries Association Student Carriker Grant [\$1,250]	2015
University of Chicago Hinds Fund Research Award [\$3,125]	2015,2014
Dept. of Biology Senior of the Year, University of Miami	2013
Isaac Singer Merit Scholarship, University of Miami [full tuition]	2009–2013

## TEACHING AND MENTORING EXPERIENCE

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### University of Chicago

Quarter system

*Co-instructor* | Teacher Assistant Training for Biological Sciences

Fall 2017 & 2018

- Prepared and co-taught a 10 week pedagogy course for graduate students in biological sciences.

*Teaching Assistant* | Desert Ecology field trip

Summer 2018

- Three week field trip for undergraduates through the U.S. southwest. Advised student projects, taught plant/wildlife identification, logistical support.

*Teaching Assistant* | Desert Ecology for Bio Majors

Spring 2018

- Taught and facilitated discussion of primary literature, 50 min (18 sessions).

*Teaching Assistant* | Biodiversity

Spring 2017

- Developed lab lectures, grading, writing exam questions. Laboratory section 170 min (9 sessions).

*Teaching Assistant* | Marine Ecology

Winter 2016

- 80 min lecture, wrote exam questions, led review sessions, grading.

### University of Miami

Semester system

*Teaching Assistant* | Chemical Oceanography

Spring 2013

- Taught laboratory section, 150 min (10 sessions).

### Invited lecture

*Concordia University Chicago* | Intro to Biotechnology

Fall 2017

### Pedagogical Training

*Chicago Center for Teaching* | Course Design and College Teaching course

Fall 2017

*University of Chicago* | Teaching Assistant Training course

Fall 2014

### Mentoring

- **Undergraduates:** Trained and mentored two research interns from Washington State through the Puget Sound Restoration Fund's internship program (Summer 2015, Summer 2016). Trained and collaborated with a UChicago undergraduate research assistant, resulting in his first published manuscript (Spring 2016). Mentored an undergraduate through the UChicago Multicultural Graduate Community (2015).
- **Graduates:** Committee member for two Masters students at College of Charleston; Mentored and trained two graduate students on molecular lab work, bioinformatics, and manuscript preparation as a postdoc at Auburn University.

## OUTREACH AND RELATED ACTIVITIES

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Guest Scientist for Project Exploration's Sisters4Science | *Chicago, IL*

2014–2017

- Demonstrated the effects of ocean acidification and molecular biology concepts through hands-on lab activities to girls at predominantly Black and Latinx middle schools.

Seminar speaker for Life Long Learners series | *Chicago, IL*

2017–2018

- Presented hour and a half seminars at senior centers titled "Beyond Global Warming: Human Impacts on the World's Oceans".

PopUp Science Event at Homewood Science Center | *Homewood, IL*

2016

- Hosted a station for the public demonstrating the effect of water temperature on dissolved oxygen while linking to climate change and local aquatic habitats.

Native Shellfish Hatchery Open House | *NOAA Manchester Research Station, WA*

2016

- Discussed shellfish restoration practices and ongoing research (including my own!) investigating how native shellfish may respond to global change.

Ocean Kids event workshop leader | *University of Miami, FL*

2010–2012

- Designed and led activities demonstrating coral diversity for 200 3rd graders from underserved elementary schools.

## PROFESSIONAL SERVICE

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**MarineOmics website:** Leading a working group of 15 faculty, early career researchers, and undergraduates funded by the [NSF RCN for Evolution in Changing Seas](#) to develop a dynamic website resource with guidelines and training materials for marine genomics research. <https://marineomics.github.io/>

**Reviewer:** Molecular Ecology, Ecology and Evolution, PeerJ, Genomics, Conservation Biology, Frontiers in Marine Science, ICES Journal of Marine Science, Journal of Fish Biology, National Geographic, PLOS One, and Sea Grant

**Professional affiliations:** American Fisheries Society, Research Coordinated Network for Evolution in Changing Seas, Society for the Study of Evolution, National Shellfisheries Association, Society for Comparative and Integrative Biology

**Computer and Equipment Manager:** 2015–2018, Committee on Evolutionary Biology, University of Chicago