

Matthew A. Birk, Ph.D.

Assistant Professor of Biology
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Education

- 2018 **Ph.D. Marine Science.** *University of South Florida.* College of Marine Science.
- 2013 **B.Sc. Marine Biology (with University Honors).** summa cum laude. *University of North Carolina Wilmington.* Department of Biology and Marine Biology.

Professional Experience

- 2021-Present **Assistant Professor of Biology.** *Saint Francis University.* Department of Biology.
- 2019-2021 **NSF Postdoctoral Research Fellow.** *Marine Biological Laboratory.* Eugene Bell Center for Regenerative Biology and Tissue Engineering. Advised by Joshua J.C. Rosenthal.
- 2018-2019 **Postdoctoral Scientist.** *Marine Biological Laboratory.* Eugene Bell Center for Regenerative Biology and Tissue Engineering. Advised by Joshua J.C. Rosenthal.
- 2016-2018 **NSF Graduate Research Fellow.** *University of South Florida.* College of Marine Science. Advised by Brad A. Seibel.
- 2015-2016 **NSF Graduate Research Fellow.** *University of Rhode Island.* Department of Biological Sciences. Advised by Brad A. Seibel.
- 2013-2015 **Graduate Research Assistant.** *University of Rhode Island.* Department of Biological Sciences. Advised by Brad A. Seibel.
- 2011-2013 **Undergraduate Research Assistant.** *University of North Carolina Wilmington.* Department of Biology and Marine Biology. Advised by J. Wilson White.
- 2012 **NOAA Hollings Scholar.** *NOAA Southwest Fisheries Science Center.* Fisheries Ecology Division. Advised by John C. Field.
- 2011 **NSF REU Student.** *Marine Biological Laboratory.* NSF Research Experience for Undergraduates Program. Advised by Roger T. Hanlon.
- 2010-2011 **Undergraduate Research Assistant.** *University of North Carolina Wilmington.* Department of Biology and Marine Biology. Advised by Sean C. Lema.

Funding

Funding to date: \$508,628.

External funding

- 2023-2027 **Kavli Exploration Award in Neurobiology and Changing Ecosystems.** *The Kavli Foundation.* Effects of temperature and hypoxia on RNA editing in squid. \$1.7M total budget. \$133,320 SFU subaward budget.
- 2019-2022 **Postdoctoral Research Fellowship in Biology.** *National Science Foundation.* \$207,000.
- 2015-2018 **Graduate Research Fellowship.** *National Science Foundation.* \$138,000.
- 2017 **Travel Grant.** *Society for Experimental Biology.* \$185.
- 2014 **Grant-in-Aid of Research.** *Sigma Xi.* \$700.
- 2011-2013 **Ernest F. Hollings Undergraduate Scholarship.** *National Oceanic and Atmospheric Administration.* \$22,500

Institutional funding

- 2022 **Faculty Grant.** *SFU School of STEAM.* \$900.
- 2015 **Enhancement of Graduate Research Award.** *URI Graduate School.* \$1000.
- 2015 **Student Travel Fund.** *URI College of the Environment and Life Sciences.* \$150.
- 2015 **Student Travel Fund.** *URI Department of Biological Sciences.* \$150.
- 2014 **Student Travel Fund.** *URI College of the Environment and Life Sciences.* \$200.
- 2014 **Student Travel Fund.** *URI Department of Biological Sciences.* \$200.
- 2013 **Enhancement of Graduate Research Award.** *URI Graduate School.* \$1000.
- 2013 **Undergraduate Travel Award.** *UNCW Center for the Support of Undergraduate Research and Fellowships.* \$1000.
- 2011 **Undergraduate Travel Award.** *UNCW Center for the Support of Undergraduate Research and Fellowships.* \$1000.
- 2011 **Research Supplies Grant.** *UNCW Center for the Support of Undergraduate Research and Fellowships.* \$323.
- 2010 **Undergraduate Travel Award.** *UNCW Center for the Support of Undergraduate Research and Fellowships.* \$1000.

Publications

12. Artigas P., Meyer D.J., Young V.C., Spontarelli K., Eastman J., Strandquist E., Rui H., Roux B., Birk M.A., Nakanishi H., Abe K., Gatto C. (2023). *A Na pump with reduced stoichiometry is up-regulated by brine shrimp in extreme salinities*. **Proceedings of the National Academy of Sciences**, 120(52): e2313999120.
11. Birk M.A., Liscovitch-Brauer N., Dominguez M.J., McNeme S., Yue Y., Hoff J.D., Twersky I., Verhey K.J., Sutton R.B., Eisenberg E., Rosenthal J.J.C. (2023). *Temperature-dependent RNA editing in octopus extensively recodes the neural proteome*. **Cell**, 186(12): 2544-2555.
10. Seibel B.A., Birk M.A. (2022). *Unique thermal sensitivity imposes a cold-water energetic barrier for vertical migrators*. **Nature Climate Change**, 12: 1052-1058.
9. Seibel B.A., Andres A., Birk M.A., Burns A.L., Shaw C.T., Timpe A.W., Welsh C.J. (2021). *Oxygen supply capacity breathes new life into critical oxygen partial pressure (P_{crit})*. **Journal of Experimental Biology**, 224(8): jeb242210.
8. Geffeney S.L., Williams B.L., Rosenthal J.J.C., Birk M.A., Felkins J., Wisell C.M., Curry E.R., Hanifin C.T. (2019). *Convergent evolution in a voltage-gated sodium channel underlies TTX-resistance in the greater blue-ringed octopus: *Hapalochlaena lunulata**. **Toxicon**, 170: 77-84.
7. Birk M.A., Mislan K.A.S., Wishner K.F., Seibel B.A. (2019). *Metabolic adaptations of the pelagic octopod, *Japetella diaphana*, to oxygen minimum zones*. **Deep-Sea Research Part I: Oceanographic Research Papers**, 148: 123-131.
6. Wishner K.F., Seibel B.A., Roman C., Deutsch C., Outram D., Shaw C.T., Birk M.A., Mislan K.A.S., Adams T.J., Moore D., Riley S. (2018). *Ocean deoxygenation and zooplankton: Very small oxygen differences matter*. **Science Advances**, 4: eaau5180.
5. Birk M.A., McLean E.L., Seibel B.A. (2018). *Ocean acidification does not limit squid metabolism via blood oxygen supply*. **Journal of Experimental Biology**, 221(19): jeb187443.
4. Birk M.A., Dymowska A.K., Seibel B.A. (2018). *Do squid breathe through their skin?* **Journal of Experimental Biology**, 221(19): jeb185553.
3. Chubb C., Chiao C.-C., Ulmer K., Buresch K., Birk M.A., Hanlon R.T. (2018). *Dark scene elements strongly influence cuttlefish camouflage responses in visually cluttered environments*. **Vision Research**, 149: 86-101.
2. Birk M.A., Paight C., Seibel B.A. (2017). *Observations of multiple pelagic egg masses from small-sized jumbo squid (*Dosidicus gigas*) in the Gulf of California*. **Journal of Natural History**, 51(43-44): 2569-2584.
1. Birk M.A., White J.W. (2014). *Experimental determination of a prey patch from the predator's perspective*. **Oecologia**, 174(3): 723-729.

Presentations

Invited presentations

- 2018 **University of Rhode Island. Graduate School of Oceanography.** Bio at Noon Seminar Series.

Oral presentations

13. Birk M.A., Liscovitch-Brauer N., Eisenberg E., Sutton R.B., Yue Y., Verhey K.J., Rosenthal J.J.C. (2022). **Temperature-sensitive RNA editing causes extensive protein recoding to compensate protein function.** *Cephalopod International Advisory Council Conference*. Sesimbra, Portugal.
12. Birk M.A., Liscovitch-Brauer N., Eisenberg E., Rosenthal J.J.C. (2020). **Temperature-sensitive RNA editing causes extensive protein recoding to compensate protein function.** *Molluscan Forum*.
11. Birk M.A., Dymowska A.K., Seibel B.A. (2018). **Do squids breathe through their skin?** *Cephalopod International Advisory Council Conference*. Saint Petersburg, Florida, USA.
10. Birk M.A. (2018). **Ecophysiology of Oxygen Supply in Cephalopods.** *Dissertation Defense*. University of South Florida.
9. Birk M.A., McLean E.L., Seibel B.A. (2018). **Oxygen supply unaffected by ocean acidification in active squids (and probably most other marine animals too).** *Society for Integrative and Comparative Biology Annual Meeting*. San Francisco, California, USA.
8. Birk M.A., Seibel B.A. (2018). **Squids do not breathe through their skin.** *Society for Integrative and Comparative Biology Annual Meeting*. San Francisco, California, USA.
7. Birk M.A., Seibel B.A. (2015). **Observations of multiple pelagic egg masses from small-sized jumbo squid (*Dosidicus gigas*) in the Gulf of California.** *Cephalopod International Advisory Council Conference*. Hakodate, Japan.
6. Birk M.A. (2013). **How to choose your next meal: experimentally defining the spatial scale of a prey patch from the predator's perspective.** *Undergraduate Honors Thesis Defense*. University of North Carolina Wilmington.
5. Birk M.A., White J.W. (2013). **How to choose your next meal: determining the spatial scale of predatory foraging behavior in fishes.** *Colonial Academic Alliance Undergraduate Research Conference*. University of Delaware.
4. Birk M.A., Field J.C. (2012). **Population dynamics of the market squid, *Doryteuthis opalescens*, in the California Current System.** *State of North Carolina Undergraduate Research and Creativity Symposium*. Duke University.
3. Birk M.A., Field J.C. (2012). **Population dynamics of the market squid, *Doryteuthis opalescens*, in the California Current System.** *Science and Education Symposium*. NOAA Office of Education.
2. Birk M.A., Ulmer K.M., Chiao C.C., Chubb C., Siemann L., Hanlon R.T. (2011). **Cuttlefish camouflage: using visual psychophysics approach with grayscale disk patterns to examine disruptive body patterning.** *State of North Carolina Undergraduate Research and Creativity Symposium*. East Carolina University.
1. Birk M.A., Ulmer K.M., Chiao C.C., Chubb C., Siemann L., Hanlon R.T. (2011). **Changeable camouflage: How cuttlefish choose the right pattern.** *Undergraduate Research Symposium*. Marine Biological Laboratory.

Poster presentations

13. McNeme S., Bui A.A., Harsini F.M., Birk M.A., Rosenthal J.J.C., Sutton R.B. (2019). **ADAR-mediated mRNA recoding in C2 domains of synaptotagmin 1 in *O. bimaculoides*.** *Texas Protein Folders & Function Meeting*. Cleveland, Texas, USA.
12. Birk M.A., Mislan K.A.S., Wishner K.F., Seibel B.A. (2018). **How do mesopelagic octopods breathe in the OMZ?** *Cephalopod International Advisory Council Conference*. Saint Petersburg, Florida, USA.

11. [Birk M.A.](#), McLean E.L., Seibel B.A. (2018). **Squid oxygen supply is resilient to ocean acidification.** *Cephalopod International Advisory Council Conference*. Saint Petersburg, Florida, USA.
10. [Birk M.A.](#), Mislan K.A.S., Seibel B.A. (2018). **How do mesopelagic octopods breathe in the OMZ?** *Ocean Sciences Meeting*. Portland, Oregon, USA.
9. [Birk M.A.](#), McLean E.L., Seibel B.A. (2017). **Combined effects of CO₂, temperature, and O₂ on squid metabolism.** *Society for Experimental Biology Annual Meeting*. Gothenburg, Sweden.
8. [Birk M.A.](#), McLean E.L., Seibel B.A. (2015). **Effects of increased CO₂ on squid metabolism and hypoxia tolerance.** *Cephalopod International Advisory Council Symposium*. Hakodate, Japan.
7. [Birk M.A.](#), White J.W. (2013). **How to choose your next meal: determining the spatial scale of predatory foraging behavior in fishes.** *Undergraduate Research and Creativity Showcase*. University of North Carolina Wilmington.
6. [Birk M.A.](#), White J.W. (2013). **How to choose your next meal: determining the spatial scale of predatory foraging behavior in fishes.** *Benthic Ecology Meeting*. Savannah, Georgia, USA.
5. [Birk M.A.](#), Ulmer K.M., Chiao C.C., Chubb C., Siemann L., Hanlon R.T. (2012). **Cuttlefish camouflage: using a psychophysics experiment with visual patterns to examine disruptive body patterning.** *Undergraduate Research and Creativity Showcase*. University of North Carolina Wilmington.
4. [Birk M.A.](#), Ulmer K.M., Chiao C.C., Chubb C., Siemann L., Hanlon R.T. (2012). **Cuttlefish camouflage: using a psychophysics experiment with visual patterns to examine disruptive body patterning.** *Colonial Academic Alliance Undergraduate Research Conference*. Old Dominion University.
3. [Birk M.A.](#), Ulmer K.M., Chiao C.C., Chubb C., Siemann L., Hanlon R.T. (2012). **Cuttlefish camouflage: using visual psychophysics approach with grayscale disk patterns to examine disruptive body patterning.** *Society for Integrative and Comparative Biology Annual Meeting*. Charleston, South Carolina, USA.
2. [Birk M.A.](#), Ulmer K.M., Chiao C.C., Chubb C., Siemann L., Hanlon R.T. (2011). **Effect on camouflage behavior of grayscale disk patterns in the visual environment of cuttlefish.** *Undergraduate Research Symposium*. Marine Biological Laboratory.
1. Hardy K.M., Follett C.R., [Birk M.A.](#), Burnett L.E., Lema S.C. (2011). **HIF-1 α and HIF-1 β gene transcription exhibits tissue-dependent responses to hypoxia and hypercapnic hypoxia in the Atlantic blue crab, *Callinectes sapidus*.** *Society for Integrative and Comparative Biology Annual Meeting*. Salt Lake City, Utah, USA.

Teaching

- **Instructor of Record.** *Environmental Animal Physiology (BIOL 345)*. Saint Francis University. 1 semester. Spring 2024.
- **Instructor of Record.** *Marine Biology (BIOL 218)*. Saint Francis University. 3 semesters. Fall 2021-2023.
- **Instructor of Record.** *Oceanography (MS 223)*. Saint Francis University. 1 semester. Spring 2022.
- **Instructor of Record.** *Research Diver Methods (MS 471)*. Saint Francis University. 2 semesters. Spring 2022-2024.

- **Instructor of Record.** *Introduction to Biology: Molecules, Cells, and Animal Physiology Lab (BIOL 111L)*. Saint Francis University. 6 semesters. Fall 2021 - Spring 2024.
- **Guest Lecturer.** *First-year Seminar (CORE 113)*. Saint Francis University. Fall 2021.
- **Teaching Assistant.** *Marine Aquaculture (OCE 4930)*. University of South Florida. 3 semesters. Spring 2017 - Spring 2018.
- **Teaching Assistant.** *General Animal Physiology Lab (BIO 201)*. University of Rhode Island. 2 semesters. Fall 2013-2014.
- **Lab Coordinator.** *General Animal Physiology Lab (BIO 201)*. University of Rhode Island. Fall 2014.
- **Guest Lecturer.** *Introduction to Marine Pollution (OCG 480)*. University of Rhode Island. Spring 2016.
- **Guest Lecturer.** *Marine Environmental Physiology (BIO 345)*. University of Rhode Island. Spring 2014.
- **Guest Lecturer.** *General Animal Physiology (BIO 201)*. University of Rhode Island. Fall 2013.

Undergraduate Mentoring

- **Holly Jones.** 2023-Present.
- **Brandon Dick.** 2023-Present.
- **Bailey McDougall.** *Jellyfish bell shape influence on movement efficiency.* 2022.

Honors & Awards

2022	Francis the Builder Award. <i>SFU Dean's Council.</i> (for contributions to the Scuba Diving Program).
2020	Sackett Prize for Innovative Research. <i>USF College of Marine Science.</i>
2019	"Paper of the Year" Award. <i>Deep-Sea Biology Society.</i>
2018	Runner-up Best Student Oral Presentation. <i>SICB Division of Invertebrate Zoology.</i>
2015	Runner-up Best Student Talk. <i>Cephalopod International Advisory Council 2015 Symposium.</i>
2013	Marine Biology Achievement Award. <i>UNCW Department of Biology and Marine Biology.</i> (graduating Marine Biology student with best overall academic record).
2013	Honors Project Research Poster Competition Award. <i>UNCW Department of Biology and Marine Biology.</i>
2012	Distinguished Undergraduate Research Scholar. <i>University of North Carolina Wilmington.</i>
2012	Leadership Excellence Award. <i>University of North Carolina Wilmington.</i>
2010	Herbert and Shirley Mintzes Memorial Award. <i>UNCW Department of Biology and Marine Biology.</i> (highest standing in departmental freshman course requirements).

Media Coverage

- 2023 *Octopuses tweak the RNA in their brains to adjust to warmer and cooler waters.* **National Public Radio (NPR)**'s "All Things Considered". <https://www.npr.org/2023/06/08/1181009210/octop-tweak-the-rna-in-their-brains-to-adjust-to-warmer-and-cooler-waters>
- 2023 *Octopuses edit their genetic code on the fly to adapt to changing temperatures* **Canadian Broadcasting Corporation (CBC)**'s "Quirks and Quarks". <https://www.cbc.ca/radio/quirks/quirks-quarks-jun-10-2023-1.6870231>
- 2022 *Warming oceans likely to shrink the viable habitat of many marine animals – but not all.* **ScienceDaily**. <https://www.sciencedaily.com/releases/2022/10/221018220428.htm>
- 2021 *Seeking an Octopus in the Wild.* **Alert Diver** Magazine (Q3/Q4 2021). <https://dan.org/alert-diver/article/seeking-an-octopus-in-the-wild>

Research Cruises

- 2017 **Eastern Tropical North Pacific.** *R/V Sikuliaq.* 28 days at sea.
- 2015 **Gulf of California.** *R/V Oceanus.* 32 days at sea.
- 2014 **Northwest Atlantic.** *R/V Endeavor.* 6 days at sea.
- 2012 **California Current System.** *R/V Bell M. Shimada.* 36 days at sea.

Software

R Packages

- **measurements.** *Tools for Units of Measurement.* <http://cran.r-project.org/package=measurements>. 91st percentile on CRAN. 3,038 downloads/month. 229,205 downloads to date.
- **respirometry.** *Tools for Conducting and Analyzing Respirometry Experiments.* <http://cran.r-project.org/package=respirometry>. 70th percentile on CRAN. 433 downloads/month. 39,171 downloads to date.
- **birk.** *MA Birk's Functions.* <http://cran.r-project.org/package=birk>. 34th percentile on CRAN. 430 downloads/month. 62,290 downloads to date.

Service

Professional

- 2016-Present **Journal Reviewer.** *Aquaculture, Deep-Sea Research Part II, Frontiers in Physiology, Invertebrate Biology, Marine Biology Research, Physiological and Biochemical Zoology, PLOS ONE (2), The R Journal.*
- 2022 **Student Presentation Judge.** *CIAC 2022 Conference.*

- 2019 **Student Abstract Reviewer.** *SACNAS 2019 Annual Meeting.*
- 2016 **Judge.** *CIAC 2015 Best Paper Award.*
- 2016 **Instructor.** *RhodyRStats ggplot2 Workshop.*

Department, College, & Institution

- 2022-Present **Member, At-large.** *SFU Committee on Faculty Development.*
- 2021-Present **Faculty Advisor.** *SFU Scuba Club.*
- 2023 **Member.** *Search Committee for Exercise Physiology Faculty Hire.*
- 2020-2021 **Co-founder.** *MBL Postdoctoral Association.*
- 2018-2021 **Postdoc Representative.** *MBL Diversity Advisory Committee.*
- 2018-2019 **Tutor.** *MBL English as a Second Language Conversational Tutoring Program.*
- 2016 **Panelist.** *URI Graduate Professionalization Committee.* Panel discussing how to apply for interdisciplinary graduate grants.
- 2015 **Panelist.** *MBL Research Experience for Undergraduates Seminar.* Panel discussing how to maximize summer research experience.
- 2014 **Panelist.** *URI College of the Environment and Life Sciences.* Panel discussing how to apply to graduate school.
- 2009-2012 **Volunteer.** *UNCW Marine Mammal Stranding Program.*
- 2012 **Panelist.** *UNCW Honors College.* Panel discussing NOAA Hollings Scholarship Program.
- 2011 **Invited Speaker.** *UNCW Board of Trustees.* Invited to speak about undergraduate research at UNCW.
- 2011 **Honors College Representative.** *UNCW Visitation Day.*

Community & Outreach

- 2017-Present **Scientist.** *Skype a Scientist.* 13 classroom meetings to date.
- 2022 **Expert Panelist.** *Science Friday's Cephalopod Movie Night - Pittsburgh.*
- 2022 **Panelist.** *Virtual Natural Science Panel - University of Pittsburgh at Greensburg.*
- 2021 **Science Judge.** *Mashpee Middle-High School Science Fair.*
- 2017 **Science Mentor.** *USF Oceanography Camp for Girls.*
- 2015-2016 **Graduate Science Communications Intern.** *Metcalf Institute for Marine and Environmental Reporting.*
- 2014-2016 **Outreach Scientist.** *Narragansett Bay Classroom.*
- 2014 **Invited Speaker.** *The Goddard School.*
- 2014 **Science Judge.** *National Ocean Sciences Bowl.*
- 2013 **Dive Programs Instructor.** *UNCW MarineQuest.*
- 2013 **Invited Speaker.** *Myrtle Grove Christian School.*

Certifications

- AAUS Scientific Diver (100 foot depth certification).
- NAUI Intro to Technical Diving (Instructors: Dave Caldwell & Heather Knowles).
- PADI Open Water Scuba Instructor.
- Relevant specialty scuba certifications:
 - PADI Search and recovery instructor.
 - PADI Deep instructor.
 - PADI Enriched air nitrox instructor (Max 40% O₂).
 - PADI Drysuit diver.
- DAN Instructor for:
 - Basic Life Support: CPR and First Aid (BLS).
 - Emergency Oxygen for Scuba Diving Injuries (EO₂).
 - Diving First Aid for Professional Divers (DFA Pro).
- PSI-PCI Visual Cylinder Inspector.

Professional Society Memberships

- Cephalopod International Advisory Council (CIAC).
- Society for Experimental Biology (SEB).
- Society for Integrative and Comparative Biology (SICB).
- The Oceanography Society (TOS).
- Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS).

References

- **Postdoctoral Advisor and Collaborator.** *Dr. Joshua J. C. Rosenthal.* Senior Scientist, Eugene Bell Center, Marine Biological Laboratory. jrosenthal@mbl.edu.
- **Ph.D. Advisor and Collaborator.** *Dr. Brad A. Seibel.* Professor, College of Marine Science, University of South Florida. seibel@usf.edu.
- **Undergraduate Research Advisor.** *Dr. J. Wilson (Will) White.* Assistant Professor, Department of Fisheries and Wildlife, Oregon State University. will.white@oregonstate.edu.
- **Undergraduate Research Advisor.** *Dr. Sean C. Lema.* Associate Professor, Biological Sciences Department, California Polytechnic State University. slema@calpoly.edu