

## Catheline Y.M. Froehlich

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### EDUCATION

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- PhD Postgraduate Fellow: University of Wollongong, Australia* 2018-present  
School of Earth, Atmospheric, and Life Sciences  
Thesis: Causes and consequences of sociality in coral-dwelling gobies (genus *Gobiodon*)
- M.S. University of Texas at Brownsville (now University of Texas Rio Grande Valley), USA* 2012-2014  
Department of Biological Sciences, Biology program, GPA: 4.0  
Major Advisor: Richard J. Kline  
Thesis: A comparison of fish communities over different reef configurations in the northwestern Gulf of Mexico
- B.S. University of Massachusetts at Amherst, USA* 2008-2012  
College of Natural Sciences, Pre-veterinary degree, French minor, GPA: 3.7
- Study Abroad at University of Queensland, Australia* Feb-Jun 2011

### RESEARCH EXPERIENCE

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- Zoltan Florian Marine Biology Fellow: Australian Museum* 2019-present  
Lizard Island Doctoral Fellowship Program
- Councillor: Australian Coral Reef Society* 2019-present
- Conference Organizer: Kioloa SEALS Postgraduate Conference* 2019  
University of Wollongong
- Postgraduate Research Assistant: University of Wollongong* 2018-2019  
School of Earth, Atmospheric, and Life Sciences
- Research Associate II: University of Texas Rio Grande Valley* 2016-2018  
School of Earth, Environmental, and Marine Sciences
- Bat Telemetry and Trapping Assistant, Angelo State University* 2015  
TX, USA
- Graduate Research Assistant & Fellow: University of Texas at Brownsville* 2012-2014  
Department of Biological Sciences (2012-2014)  
Department of Graduate Studies (2013-2014)
- Support Scientific SCUBA Researcher: University of Texas at Brownsville* 2012  
Department of Biological Sciences

### TEACHING EXPERIENCE

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- Demonstrator/Teaching Assistant: University of Wollongong* 2019  
Class: Biol 240: Biodiversity of Marine and Freshwater Organisms
- Software Teaching: University of Texas Rio Grande Valley* 2014-2018  
Software taught: Zotero, SPSS, PRIMER-E, R programming

*Lecturer: University of Texas at Brownsville* 2015  
 Classes: General Biology II Lectures  
 Other tasks: mentored Greater Texas Foundation scholars from minority groups

*Invited Lecturer: University of Texas at Brownsville* 2014  
 Lecture: Oceanography: Tsunamis and Coastal Processes

*Graduate Teaching Assistant: University of Texas at Brownsville* 2012-2014  
 Classes: General Biology I Laboratory, General Biology II Laboratory

*SCUBA Teaching Assistant: University of Massachusetts at Amherst* 2012  
 Classes: Open Water SCUBA Diving

### **DIVERSITY/EQUITY/INCLUSION EXPERIENCE**

*Equity, Diversity, and Inclusion Committee: Postgraduate Working Group Representative* 2020-present  
 Faculty of Science, Medicine, and Health, University of Wollongong

*GAPS panelist: Closing the G.A.P.S. (Girls Aren't Pursuing Science)* 2016-2017  
 A Summer Institute to Foster Women Scientists and Engineers, Texas Southmost College

### **MAJOR INTERNATIONAL GRANT**

*Zoltan Florian Marine Biology Fellowship - AUD\$33,250* 2019-2022  
 Lizard Island Doctoral Fellowship Program, Australian Museum  
 Project: Advantages of sociality in challenging environments using coral-dwelling gobies

### **VOLUNTARY COMMITMENTS TO RESEARCH**

*Grant reviewer: U.S. National Marine Fisheries Service's Marine Fisheries Institute* 2021

*Conference moderator: ACRS conference, Animal Behavior Society, and UOW SEALS HDR conference* 2018-present

*Journal reviewer: Marine Ecology Progress Series, Biology Letters* 2017-present

*Community Liaison for Third Coast Science For You, a community-based journal* 2017-2018

### **OUTREACH EXPERIENCE**

*News Interview: ABC Far North Queensland* 2021

*Prepared educational material: Mahonia Na Dari's Marine Environment Education Program* 2021

*Co-director and Host: The Graduates Sci-Com podcast* 2019-present

*Skype-A-Scientist Outreach Scientist* 2016-present

*Advisor for the Graduate Student Alliance at the University of Texas Rio Grande Valley* 2016-2017

*Co-founder of the Brownsville branch of Nerd Nite events* 2015-2018

*Volunteer: Sea Turtle Inc. rehabilitation center* 2013-2018

Public Outreach Educator: South Texas

2012-2018

Oceanarium at Gladys Porter Zoo, Texas Sea Grant Floating Classroom Program, Rio Grande Science and Arts Festival, Alternative Spring Break for the Center for Civic Engagement, Fishing's Future, Judging at the Rio Grande Valley Regional Science and Engineering Fair

#### **CURRENT PUBLICATION WORK**

4. **Froehlich, C.Y.M.**, Heatwole, S.J., Klanten, O.S., and Wong, M.Y.L. *In prep.* Movement decisions of a coral-dwelling goby are not affected by environmental variation.
3. **Froehlich, C.Y.M.**, Kirby, R., Heatwole, S.J., Klanten, O.S., Hing, M.L. and Wong, M.Y.L. *In prep.* Linking population genomics and sociality in coral-dwelling gobies in the Indo-Pacific region.
2. **Froehlich, C.Y.M.**, Heatwole, S.J., Klanten, O.S., Hing, M.L. and Wong, M.Y.L. *In prep.* Maintenance of social structures of coral-reef fishes on a geographic scale.
1. **Froehlich, C.Y.M.**, Klanten, O.S., Hing, M.L., Dowton, M., and Wong, M.Y.L. *To be submitted.* Climate induced impacts cause shifts in host specialisation and differential recovery in host-symbiont assemblages.

#### **INTERNATIONAL ACADEMIC PUBLICATIONS**

10. **Froehlich, C.Y.M.**, Heatwole, S.J., Klanten, O.S., and Wong, M.Y.L. *Accepted.* Habitat size, health and saturation do not alter movement decisions or the preference for familiarity in a social coral-reef fish. *Animal Behaviour* (impact factor:2.844, quartile 1 for ecology, evolution, behavior and systematics).
9. **Froehlich, C.Y.M.** *Accepted.* What happens during a cyclone? The perspective of a reef fish. *In: Coral reefs of Australia: perspectives from the water's edge, Chapter 4: Understanding the Fundamentals of Coral Reefs.* CSIRO publishing, Australia.
8. **Froehlich, C.Y.M.**, Klanten, O.S., Hing, M.L., Dowton, M., and Wong, M.Y.L. 2021. Uneven declines between corals and cryptobenthic fish symbionts from multiple disturbances. *Scientific Reports* (impact factor 4.379, quartile 1). doi: 10.1038/s41598-021-95778-x.
7. **Froehlich, C.Y.M.**, Lee, A., Oquita, R., Cintra-Buenrostro, C.E., and Shively, J.D. 2021. Reproductive characteristics of red snapper *Lutjanus campechanus* on artificial reefs in different jurisdictions. *Regional Studies in Marine Science* (impact factor 1.63) 47:101936. doi: 10.1016/j.rsma.2021.101936.
6. **Froehlich, C.Y.M.**, Garcia, A., Cintra-Buenrostro, C.E., Hicks, D.W., and Kline, R.J. 2021. Structural differences alter residency and depth patterns of red snapper (*Lutjanus campechanus*) at two artificial reefs. *Fisheries Research* (impact factor 1.874, quartile 1 for aquatic science) 242:106043. doi: 10.1016/j.fishres.2021.106043.
5. Rueger T., Branconi, R., **Froehlich, C.Y.M.**, Heatwole, S.J., Wong, M.Y.L., and Buston, P.M. 2021. The next frontier in understanding the evolution of coral reef fish societies. *Frontiers in Marine Science* (impact factor 3.07, quartile 1 for aquatic science). 8:665780. doi: 10.3389/fmars.2021.665780.
4. **Froehlich, C.Y.M.**, Garcia, A., and Kline, R.J. 2019. Daily movement patterns of red snapper (*Lutjanus campechanus*) on a large artificial reef. *Fisheries Research* (impact factor 1.874, quartile 1 for aquatic science) 209:49-57. doi: 10.1016/j.fishres.2018.09.006.
3. **Froehlich, C.Y.M.**, Lee, A., Oquita, R., Cintra-Buenrostro, C.E., Shively, J.D., and Shipley, J.B. 2018. A comparison of population dynamics from red snapper associated with inshore and offshore artificial reefs in the northwestern Gulf of Mexico. *In: Bortone SA, editor. Marine artificial reef research and development: integrating fisheries management objectives. USA: Transactions of the American Fisheries Society* (impact factor: 1.406, quartile 1 for aquatic science), 68.
2. Arney, R.N., **Froehlich, C.Y.M.**, and Kline, R.J. 2017. Recruitment patterns of juvenile fish at an artificial reef in the Gulf of Mexico. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* (impact factor 1.177, quartile 1 for aquatic science). 9:79-92. doi: 10.1080/19425120.2016.1265031.

1. **Froehlich, C.Y.M.**, and Kline, R.J. 2015. Using fish population metrics to compare the effects of artificial reef density. *PLoS One (impact factor 2.806, quartile 1 for aquatic science)*. 10(9):e0139444. doi: 10.1371/journal.pone.0139444.

#### **CITED REVIEWER**

1. Reviewer for book: 'Coral reefs of Australia: perspectives from the water's edge', 2022. *Australian Coral Reef Society*. CSIRO Publishing, Australia.

#### **SCIENCE MEDIA ARTICLES**

1. **Froehlich, C.**, Wong, M., Klanten, O.S. September 2021. Photos from the field: why losing these tiny, loyal fish to climate change spells disaster for coral. *The Conversation*. <https://theconversation.com/photos-from-the-field-why-losing-these-tiny-loyal-fish-to-climate-change-spells-disaster-for-coral-167119>

#### **GOVERNMENT WHITE PAPERS**

7. **Froehlich, C.**, Goyen, S., Hoey, A. August 2020. The ACRS comments on revisions of AS/NZS scientific diving standards. *Australian Coral Reef Society submission to the Standards Australia Diving Committee*.
6. Wolfe, K., & **Froehlich, C.** August 2020. The ACRS calls for a reassessment of the East Coast Sea Cucumber fishery. *Australian Coral Reef Society submission to Department of Agriculture, Water and the Environment regarding Sea Cucumber Fishery (East Coast) – Status report for reassessment*.
5. Suggett, D., **Froehlich, C.**, Scott, A., Sims, C., Ricardo, G., Torda, G., Cumming, G., & Lewis, B. July 2020. The ACRS comments on the Draft Policy on Great Barrier Reef Interventions. *Australian Coral Reef Society submission to the Great Barrier Reef Marine Park Authority*.
4. Steinberg, R., **Froehlich, C.**, & Turnbull, J. April 2020. Listing the cauliflower soft coral (*Dendronephthya australis*) as an endangered species. *Australian Coral Reef Society submission to the NSW Fisheries Scientific Committee*.
3. Hamylton, S., & **Froehlich, C.** December 2019. Great Barrier Reef outlook report highlights the urgent need to curb carbon emissions and improve water quality. *Australian Coral Reef Society Reef Matters: ACRS commentary on the 2019 Great Barrier Reef Outlook Report*.
2. **Froehlich, C.** & Brodie, J. November 2019. The Great Barrier Reef needs evidence-based regulation of farm practices that impact water quality. *Australian Coral Reef Society submission to the Senate Rural and Regional Affairs and transport References Committee*.
1. Fordyce, G., Goyen, S., & **Froehlich, C.** September 2019. Submission to the Australian Maritime Safety Authority on the proposed new Marine Order 505. *Australian Coral Reef Society submission to the Australian Maritime Safety Authority*.

#### **CONFERENCE PRESENTATIONS – INTERNAT'L AND NAT'L (\*presenter(s))**

23. Wong, M.Y.L.\* & **Froehlich, C.Y.M.\*** (April 2022). Transitions in the Study of Social Evolution in Reef Fish Societies. *Animal Behaviour Live Seminar Series*. Online Seminar Series.
22. **Froehlich, C.Y.M.\***, Heatwole, S.J., Klanten, O.S., Hing M.L., & Wong, M.Y.L. (August 2021). Do social structures of coral-dwelling gobies change along a spatial gradient? Oral Presentation. *The 58<sup>th</sup> Annual Conference of the Animal Behavior Society*. Virtual conference.
21. **Froehlich, C.Y.M.\***, Klanten, O.S., Hing M.L., Dowton, M., & Wong, M.Y.L. (July 2021). Host coral plasticity in coral-dwelling gobies (genus *Gobiodon*) following multiple extreme climatic events. Oral Presentation. *The 14<sup>th</sup> International Coral Reef Society Conference*. Virtual Conference.
20. Heatwole, S.J., \* **Froehlich, C.Y.M.**, Rueger, T., Klanten, O.S., & Wong, M.Y.L. (July 2021). Multi-scale comparisons of anemonefish social behaviour across ecological contexts for predicting resilience. Poster Presentation. *The 14<sup>th</sup> International Coral Reef Society Conference*. Virtual Conference.

19. **Froehlich, C.Y.M.\***, Heatwole, S.J., Klanten, O.S., & Wong, M.Y.L. (December 2020). Who will recover: extreme climatic events affect habitat use and persistence of coral-dwelling fishes. Oral Presentation. *The 60th National Conference of the Ecological Society of Australia*. Virtual Conference.
18. Heatwole, S.J., \* **Froehlich, C.Y.M.**, Rueger, T., Klanten, O.S., & Wong, M.Y.L. (December 2020). Large spatial scale comparisons of social behaviour across ecological contexts for predicting resilience. Oral Presentation. *The 60th National Conference of the Ecological Society of Australia*. Virtual Conference.
17. **Froehlich, C.Y.M.\***, Heatwole, S.J., Klanten, O.S., & Wong, M.Y.L. (November 2020). Getting along: investigating spatial gradients of social hierarchies in groups of coral-dwelling gobies. Oral Presentation. *Annual HDR Conference, TEFKAK Conference, School of Earth, Atmospheric, and Life Sciences, University of Wollongong, NSW, Australia*.
16. Heatwole, S.J. \*, **Froehlich, C.Y.M.**, Klanten, O.S., Rueger, T., & Wong, M.Y.L. (November 2020). Comparisons of anemonefish social behaviour across ecological contexts. Oral Presentation. *Annual HDR Conference, TEFKAK Conference, School of Earth, Atmospheric, and Life Sciences, University of Wollongong, NSW, Australia*.
15. Heatwole, S.J.\*, Wong, M.Y.L., Rueger, T., **Froehlich, C.Y.M.**, & Klanten, O.S. (July 2020). Conflict vs cooperation: multi-species comparisons and how ecological factors shape social variation. Oral Presentation. *The 57th Annual Conference of the Animal Behavior Society*. Virtual conference.
14. **Froehlich, C.Y.M.\***, Heatwole, S.J., Klanten, O.S., & Wong, M.Y.L. (July 2020). To swim or not to swim: decisions of translocated coral gobies in relation to habitat quality and social life. Oral Presentation. *The 57th Annual Conference of the Animal Behavior Society*. Virtual conference.
13. **Froehlich, C.Y.M.\***, Hing, M.L., Klanten, O.S., Downton, M. & Wong, M.Y.L. (October 2019). Coral bleaching affects assemblages and host coral occupancy of gobies more than cyclones. Oral Presentation. *Annual HDR Conference, Kioloa Postgraduate Conference, School of Earth, Atmospheric, and Life Sciences, University of Wollongong, NSW, Australia*.
12. **Froehlich, C.Y.M.\***, Hing, M.L., Klanten, O.S., & Wong, M.Y.L. (May 2019). Consequential detriment to mutual coral and coral gobies following cyclones and bleaching events. Oral Presentation. *Australian Coral Reef Society*. Moreton Island, QLD, Australia.
11. **Froehlich, C.Y.M.\*** (November 2018). What is the hype of group living? Investigating sociality in coral-dwelling gobies genus *Gobiodon*. Oral Presentation. *Kioloa Conference and the Center of Sustainable Environmental Solutions, University of Wollongong, NSW, Australia*.
10. Oquita, R.\*, **Froehlich, C.Y.M.**, Lee, A., Shively, J.D., Shipley, J.B., & Cintra-Buenrostro, C.A. (April 2018). Age and growth of red snapper (*Lutjanus campechanus*) in four artificial reefs in South Texas. Poster presentation. *University of Texas Rio Grande Valley Engaged Scholar Symposium*. Brownsville, MA, USA.
9. Kline, R.J.\*, **Froehlich, C.Y.M.**, & Garcia, A. (January 2018). Home range of red snapper *Lutjanus campechanus* over a large artificial reef. Oral presentation. *42nd Annual Meeting of the Texas Chapter of the American Fisheries Society*. College Station, TX, USA.
8. **Froehlich, C.Y.M.\***, Lee, A., Oquita, R., Cintra-Buenrostro, C.A., Shively, J.D., & Shipley, J.B. (August 2017). Inshore and offshore artificial reef comparison of population dynamics of the heavily-fished *Lutjanus campechanus*, Poey, 1860, in the northwestern Gulf of Mexico. Oral presentation. *147th Annual Meeting of the American Fisheries Society*. Tampa, FL, USA.
7. **Froehlich, C.Y.M.\***, & Kline, R.J. (February 2015). Using fish population metrics to predict the ideal density of future concrete reefs. Oral presentation. *2nd Annual Texas Artificial Reef Consortium*. Texas Parks and Wildlife Department, Corpus Christi, TX, USA.
6. **Froehlich, C.Y.M.\***, & Kline, R.J. (April 2014). Current composition of sportfish populations at an artificial reef off the coast of Texas. Oral presentation. *Texas Bays and Estuaries*. Port Aransas, TX.

5. **Froehlich, C.Y.M.\*** (April 2014). Artificial reef density effects on fish communities and red snapper sizes in the Western Gulf of Mexico. Oral presentation. 3<sup>rd</sup> place award. *16<sup>th</sup> Annual University of Texas at Brownsville Research Symposium*. Brownsville, TX, USA.
4. **Froehlich, C.Y.M.\***, & Kline, R.J. (March 2014). Culvert reef structure densities may affect fish community diversity in Western Gulf of Mexico. Oral presentation. *117<sup>th</sup> Annual Meeting of the Texas Academy of Science*. Galveston, TX, USA.
3. Kline, R.J. \*, **Froehlich, C.Y.M.**, Arney, R.N., & Bollinger, M.A. (January 2014). Characterization of reef fish use by patch configuration on a shallow, turbid culvert reef system. Oral presentation. *1<sup>st</sup> Annual Texas Artificial Reef Consortium*. Texas Parks and Wildlife Department, Corpus Christ, USA.
2. **Froehlich, C.Y.M.\***, & Kline, R.J. (November 2013). Fish diversity differs among varying densities of culvert reefs in the Gulf of Mexico. Poster presentation. *Gulf and Caribbean Fisheries Institute*. Corpus Christi, TX, USA.
1. **Froehlich, C.Y.M.\***, & Kline, R.J. (October 2013). Culvert reef density affects fish communities at an artificial reef in the Gulf of Mexico. Poster presentation. *American Shore and Beach Preservation Association*. South Padre Island, TX, USA.

### SEMINAR PRESENTATIONS

7. “Human impacts on coral reefs and fish behavior.” **Froehlich, C.Y.M.** (May 2021). Bionet: The UOW Biology Network. Wollongong, NSW, Australia.
6. “Time to get social: what factors of ecology promote group living?” **Froehlich, C.Y.M.** (February 2021). *Lizard Island Research Station Seminar Series*. Lizard Island, QLD, Australia.
5. “Advantages of sociality in coral-dwelling fishes.” **Froehlich, C.Y.M.** (February 2020). *Lizard Island Research Station Seminar Series*. Lizard Island, QLD, Australia.
4. “What is the hype of group living? A goby snapshot from the Indo-Pacific.” **Froehlich, C.Y.M.** (September 2018). *Walindi Invited Seminars*. Kimbe Bay, PNG.
3. “Diving under the horizon will uplift your spirits as you discover a world full of life: a look into South Texas artificial reefs.” **Froehlich, C.Y.M.** (November 2016). *South Texas Border Chapter Texas Master Naturalist Invited Seminars*. Mission, TX, USA.
2. “Reaction to underwater predators: does size even matter?” **Froehlich, C.Y.M.** (July 2014). *Monday Night Science Cafe hosted by University of Texas Brownsville Physics Department*. Brownsville, TX.
1. “Artificial reef communities: culvert patch density on species diversity.” **Froehlich, C.Y.M.** (March 2013). *Coastal and Terrestrial Ecology Research Symposium hosted by University of Texas Brownsville*. Brownsville, TX, USA.

### GRANTS

<i>Vice-Chancellors – Equality, Diversity, and Inclusion Transformation – AUD\$4462.301</i>	2022
University of Wollongong, Australia	
Collaborators: Noor Jarbou, Asha Kumar, Martina Sanderson-Smith	
Project: Survey HDR students to identify baseline EDI concerns	
<i>University Postgraduate Award – Top-Up Stipend Scholarship - AUD\$14,427</i>	2022
University of Wollongong, Australia	
<i>Center for Sustainable Ecosystem Solutions Additional Funding Initiative – AUD\$1312</i>	2020
School of Earth, Atmospheric, and Life Sciences, University of Wollongong, Australia	
Collaborator: Siobhan J. Heatwole	
Project: Population genetics of habitat-specialist fishes	
<i>Center for Sustainable Ecosystem Solutions Funding Initiative – AUD\$1463</i>	2020
School of Earth, Atmospheric, and Life Sciences, University of Wollongong, Australia	
Project: Consequences of consecutive climatic disturbances on genetic diversity in coral gobies	

<i>ACRS Student Research Award – AUD\$2,500</i>	2020
Australian Coral Reef Society, Australia	
Project: Investigating a link between devastating climatic events and changes in genetic diversity in coral-obligate fishes	
<i>Student Writing Retreat Scholarship – AUD\$364</i>	2020
Australian Coral Reef Society, Australia	
Project: Declines among corals and cryptobenthic fish symbionts from multiple disturbances	
<i>Center for Sustainable Ecosystem Solutions Funding Initiative – AUD\$2882</i>	2019
School of Earth, Atmospheric, and Life Sciences, University of Wollongong, Australia	
Project: Population connectivity of coral-dwelling gobies across geographically-discrete reef systems	
<i>SMAH HDR Student Travel Grant – AUD\$857</i>	2019
Faculty of Science, Medicine and Health, University of Wollongong, Australia	
<i>Student Travel Award – AUD\$390</i>	2019
Australian Coral Reef Society, Australia	
<i>Sea Turtle Inc Academic Scholarship - US\$500</i>	2019
Sea Turtle Inc.	
<i>Zoltan Florian Marine Biology Fellowship - AUD\$33,250</i>	2019-2022
Lizard Island Doctoral Fellowship Program, Australian Museum	
Project: Advantages of sociality in challenging environments using coral-dwelling gobies	
<i>University Postgraduate Award – Stipend Scholarship - AUD\$82,788</i>	2019-2021
University of Wollongong, Australia	
<i>International Postgraduate Tuition Scholarship - AUD\$131,520</i>	2018-2022
University of Wollongong, Australia	
<i>Center for Sustainable Ecosystem Solutions Funding Initiative - AUD\$500</i>	2018
Department of Biological Sciences, University of Wollongong, Australia	
Project: Investigating the advantages of sociality in degraded habitats using coral-dwelling gobies	
<i>Study Abroad Scholarship for Coral Reef Ecology in Belize - US\$1,500</i>	2014
The University of Texas at Brownsville, USA	
<i>College of Science, Math, and Technology Talent Scholarship - US\$3,400</i>	2013-2014
The University of Texas at Brownsville, USA	
<i>Graduate Research Fellowship - US\$15,000</i>	2013-2014
Department of Graduate Studies at The University of Texas at Brownsville, USA	
Project: A comparison of fish communities over different reef configurations in the northwestern Gulf of Mexico	
<i>Talent Housing Scholarship - US\$1,500</i>	2013-2014
Department of Residential Life at The University of Texas at Brownsville, USA	

## **AWARDS**

- ISBE 2020: Conference Best Abstracts Award* 2020  
International Society for Behavioral Ecology  
Abstract title: To swim or not to swim: decision making of translocated coral gobies in relation to habitat quality and social life
- ACRS Best Student Presentations – Honorary Mention* 2019  
Australian Coral Reef Society, Australia  
Project: Consequential detriment to mutual coral and dwelling gobies following cyclones and bleaching events
- 3<sup>rd</sup> Place Award for Best Presentation* 2014  
16<sup>th</sup> Annual University of Texas at Brownsville Research Symposium, USA