CRYSTAL MCRAE

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EDUCATION

2014-2021 **PhD**
Biological Sciences | Natural Resources and Environmental Studies
Simon Fraser University; Burnaby, Canada.
National Dong Hwa University; Hualien, Taiwan

2006-2009 **MSc**
Natural Resources and Environmental Studies (Biology)
University of Northern British Columbia; Prince George, Canada.

2000-2004 **BSc**
Environmental and Resource Studies & Geography
Trent University; Peterborough, Canada.

2004 **International English Teaching Certificate**
Global TESOL College; Ottawa, Canada.

RESEARCH EXPERIENCE

2022-Present **Postdoctoral Fellow**
National Museum of Marine Biology & Aquarium; Checheng, Taiwan

- Leading experiments to identify upper coral thermal tolerance thresholds and plasticity of coral resistance and resilience to climate change induced warming.
- Creating innovative outreach activities to promote marine ecology education both in Taiwan and internationally.

2014-2021 **Cotutelle PhD Candidate**
Simon Fraser University; Burnaby, Canada.
National Dong Hwa University; Hualien, Taiwan

- Undertook experiments (lab and field-based) to assess naturally occurring thermal tolerance and the capacity for active enhancement of thermal tolerance in corals.
- Designed and maintained a flow-through aquaculture tank system to test coral response to chronic and acute thermal stress.

2010-2013 **Fish and Forest Ecology Research Assistant**
National Dong Hwa University; Hualien/Kenting, Taiwan

- Compiled data for a meta-analysis to examine potential age truncation in Alaskan fisheries to better inform management practices.
- Monitored the phenology of *Ficus benjamina* to quantify seed production and evaluate population level dynamics.

2006-2009 **MSc Student**
University of Northern British Columbia; Prince George, Canada.

- Investigated spawning site selection and embryonic development in an endangered sub-species of coho salmon.
- Conducted a radio telemetry tracking study, physical and chemical habitat assessments, and artificial spawning experiments.

2006-2009 **Fish Ecology Research Assistant**
University of Northern British Columbia; Prince George, Canada.

2004 **Fisheries Lab and Field Technician**
Ontario Ministry of Natural Resources; Algonquin Park, Canada.

2001 **GIS Lab Assistant**
Ontario Ministry of Agriculture and Rural Affairs; Ottawa, Canada.

TEACHING EXPERIENCE

2019-2021 **Teaching assistant**
Simon Fraser University; Burnaby, Canada.

- In-person and remote teaching (due to COVID) for 5 undergraduate level courses; emphasis on ecological theory and data analysis/coding.
- Courses: Introduction to Environmental Science, Environmental Science in Practice, General Biology (x2), Marine Biology & Oceanography.

2010-2014 **Lecturer**
National Dong Hwa University; Hualien; Taiwan.

- Designed and instructed multiple English, Ecology and Tourism courses at the undergraduate and graduate level.
- Founded, developed, and taught the university's first English Ecology course; emphasis on both foundational theory and practical field skills.

2010-2012 **Educator & Mentor**
Alliance for International Women's Rights; Taiwan/Afghanistan.

- Developed specific curricula based on individual learning objectives within a culturally sensitive learning environment.
- Prepared Afghan women with the tools needed to attain employment requiring high-level English skills.

2009-2010 **English Teacher**
AMC Language School; Yuli, Taiwan.

2004-2005 **English Teacher & Tutor**
CEDEI Preschool and Language School; Cuenca, Ecuador.

VOLUNTEER EXPERIENCE

2014-2021 **Co-Founder & President**
NRES Graduate Student Society; Hualien, Taiwan.

- Created the first Natural Resources and Environmental Studies (NRES) Graduate Student Society at National Dong Hwa University.
- Responsible for organizing activities to create student cohesion and provide opportunities for student/community educational outreach events.

2014-2019 **Instructor & Mentor**
Coral Reef Ambassador Program; Checheng, Taiwan.

- Trained high school and university students about foundational knowledge of coral ecosystems and their associated threats in preparation for international exchange to educate other youth about Taiwan's coral reefs.
- Led aquarium tours, gave marine ecology-based lectures, and provided English training to enable clear communication aboard.

2017 **Intern Supervisor**
Taiwan Tech Trek Program; Checheng, Taiwan.

- Mentored undergraduate students about coral ecology research during an intensive research-based internship.
- Developed a unique curriculum involving training in coral identification, field and lab skills, experimental design, and the development and honing of effective oral presentation abilities.

2012-2014 **Supervisor & Faculty Representative**
NDHU Toastmasters Public Speaking Club; Hualien, Taiwan.

- Oversaw and provided presentation feedback at weekly meetings of the National Dong Hwa University (NDHU) Toastmasters Club.
- Mentored undergraduate and graduate students on how to build confidence in public speaking, and demonstrated the methods needed to organize and execute a clear and captivating presentation.

2011-2014 **Founder & Instructor**
Lunchtime Chats English Club; Hualien, Taiwan.

- Started an English-speaking club to meet the needs of Taiwanese students seeking to gain practical oral English experience.
- Established and led a team of lecturers in creating entertaining and relevant topic discussions to forge a relaxed and authentic learning environment for students preparing to study and work abroad.

PUBLICATIONS

Connelly MT, **McRae CJ**, Liu PJ, Martin CE and Traylor-Knowles N (2021) Antibiotics treatments alter *Pocillopora* coral-Symbiodiniaceae-bacteria interactions and cause microbial dysbiosis during heat stress. Frontiers in Marine Science (*in press*; accepted December 2021).

McRae CJ, Mayfield AB, Huang WB, Côté IM, **Fan TY** (2021) Contrasting proteomic responses of adult and larval coral to high temperatures. Frontiers in Marine Science 1171. [https://doi.org/10.3389/fmars.2021.716124]

McRae CJ, Fan TY, Lin C, Cirino L, Ye ZM, Kuo FW (2021) First report of successful recruitment by conjoined larvae in the brooding scleractinian coral *Pocillopora acuta*, southern Taiwan. Bulletin of Marine Science 97(3). [https://doi.org/10.5343/bms.2021.0004]

McRae CJ, Huang WB, Fan TY, Côté IM (2021) Effects of thermal conditioning on the performance of *Pocillopora acuta* adult coral colonies and their offspring. Coral Reefs 40: 1491-1503. [https://doi.org/10.1007/s00338-021-02123-9]

Connelly M, **McRae CJ**, Liu PJ, Traylor-Knowles N (2020) Lipopolysaccharide treatment stimulates Pocillopora coral genotype-specific immune responses but does not alter coral-associated bacteria communities. Developmental and Comparative Immunology 103717. [https://doi.org/10.1016/j.dci.2020.103717]

Fan TY, Hsieh YC, Lin KH, Kuo FW, Soong K, **McRae CJ**, Edmunds PJ, Fang LS (2017). Plasticity in lunar timing of larval release of two brooding pocilloporid corals in an internal tide-induced upwelling reef. Marine Ecology Progress Series 569: 117-27. [https://doi.org/10.3354/meps12071]

Shrimpton JM, Warren KD, Todd NL, **McRae CJ**, Glova GJ, Telmer KH, Clark AD (2014) Freshwater movement patterns by juvenile Pacific salmon *Oncorhynchus spp*. before they migrate to the ocean: Oh the places you'll go! Journal of fish biology 85(4): 987-1004. [https://doi.org/10.1111/jfb.12468]

McRae CJ, Warren KD, Shrimpton JM (2012). Spawning site selection in interior Fraser River coho salmon *Oncorhynchus kisutch*: an imperiled population of anadromous salmon from a snow-dominated watershed. Endangered Species Research 16(3): 249-260. [https://doi.org/10.3354/esr00401]

McRae CJ (2009). Spawning site selection and the influence of incubation environment on larval success in interior Fraser Coho. Masters dissertation, The University of Northern British Columbia.