

Education

First Class Master of Science, Marine Biology

University College Cork, Cork, Ireland

Graduated: January 18th 2023

Bachelor of Science, First Class Concentrated Honours in Marine Biology

Dalhousie University, Halifax, Nova Scotia, Canada

Graduated: May 13th, 2020

Cumulative GPA: 3.64

Cumulative GPA within major: 3.94

Honours Thesis Grade: A+ (92/100)

Peer reviewed – in preparation

Beck, C.T., Moran, P.A., Coughlan, J., Cauwelier, E., & Reed, T.E. Validation of anadromy associated single nucleotide polymorphisms in geographically distant and genetically distinct populations of European brown trout (*Salmo trutta*)

- Manuscript in progress

Beck, C.T., Kozela, C., & Johnston, M.O. Genetic differentiation in Cardinal flower (*Lobelia cardinalis*), a widespread specialist pollinated angiosperm

- Manuscript in progress

Kozela, C., Beck, C.T., & Johnston, M.O. Characterization of Microsatellite Loci in Cardinal Flower (*L. cardinalis*) and closely related *Lobelia* spp.

- Manuscript in progress

Presentations

Beck, C.T., Moran, P.A., Coughlan, J., Mirimin, L., Cariolate, E., Cauwelier, E., Gilby, J., McGinnity P., Lemopoulos, A., & Reed, T.E. The potential of single nucleotide polymorphisms (SNPs) for managing diversity of complex life-history traits in brown trout (*Salmo trutta*)

- Invited talk at the 2022 workshop on “The Evolutionary Consequences of Unintended Artificial Selection on Population Fitness”, Fafleralp, Switzerland.

Beck CT, & Johnston MO. Genetic differentiation in cardinal flower (*Lobelia cardinalis*), a widespread specialist pollinated angiosperm. Science Atlantic: Biology, Aquaculture, & Fisheries. Mar 13th-15th 2020.

- I was invited talk at a yearly conference which highlights research done by students in Atlantic Canada. Unfortunately, the conference was cancelled last minute due to COVID-19.

Citizen Science and Cardinal Flower (*Lobelia cardinalis*) August 2018

- In the summer of 2018, I was asked by the argyle horticulture society to make a presentation on cardinal flower. During my talk I addressed topics such as cardinal flower distribution, habitat preferences, and husbandry.

Thesis Work

Validation of single nucleotide polymorphisms (SNPs) associated with migratory versus non-migratory life-histories in brown trout (*Salmo trutta*) submitted August 2022

- Supervised by Dr. Tom Reed & Dr. Jamie Coughlan
- Was marked by 2 members of the department of Biological, Environmental, and Earth Sciences at University College Cork and received a 1.1 (first class honours)

Genetic differentiation in Cardinal flower (*Lobelia cardinalis*) submitted April 2020

- Supervised by Dr. Mark Johnston
- My final thesis was marked by 3 faculty members in the Biology Department at Dalhousie University and received a final mark of A+ (92/100).

Lab experience

GWAS of cardiac complications during non-cardiac surgery April-August 2021

- This past summer I worked as a research assistant at the population health research institute helping to spearhead a genome wide association study on potential genetic influence on cardiac complications experienced by patients during non-cardiac surgery. During this project I developed my proficiency in R, learned to write grant proposals, and became acquainted with the tools used in cutting edge genomic research. The two grant proposals I co-authored during this project were successful and resulted in a total of \$80,000 CAD in funding.

DNA extraction, amplification, and indexing May 2018-Aug 2021

- For my honours project I investigated genetic differentiation in geographically distant cardinal flower populations using microsatellite loci. My project involved disruption of leaf tissue using a high rpm shaker, DNA extraction using phenol chloroform, DNA binding with silica, amplification using PCR and indexing of over 1200 samples.

Seed size measurements using image analysis April-August 2018

- In the summer of 2018, I worked on an independent project measuring the variation in cardinal flower seed sizes between geographically distant populations. During this project I developed my own protocol to scan and measure 4,976 seeds from a total of 311 individuals using the image analysis software ImageJ. The results from this project demonstrated that there is a significant difference in seed size between geographically distant cardinal flower populations.

Plant husbandry September 2017-August 2020

- For 3 years I was the main caretakers of the cardinal flowers grown in the Dalhousie greenhouse. This job involved overseeing the growth of approx. 1,600 cardinal flowers each year, from germination, through transplanting, flowering, and overwintering. As a caretaker it was my job to keep a strict watering and fertilizing schedule, monitor the greenhouse temperature, oversee the movement of plants between different rooms of the greenhouse and outdoor growth facilities, treat the plants for parasites, and coordinate tasks done by volunteers.

Field experience

Measuring the Long-term impacts of Tributyltin (TBT) exposure on two species of gastropod mollusk, Firth of Clyde, Scotland, February 2022

- Tributyltin (TBT) is an antifouling agent that was commonly used in the paint of marine equipment until the mid 1990s. TBT is now known to have numerous negative impacts on marine environments and organisms including the development of male sex organs on female gastropod mollusks. In the Firth of Clyde population declines and local extinction events of the gastropods *L. littorea* and *N. lapillus* were well documented. This research project produced baseline data on the population dynamics of both species two decades after the initial reports of population declines due to TBT. During this project I worked with a group of fellow graduate students and took on a variety of roles from experiential design, sample collection in the field, data entry, statistical analysis, and written communication of results in a journal style report. I developed a number of skills including intertidal survey techniques as well as gastropod identification and aging while working along difficult shorelines in challenging weather conditions.

***L. cardinalis* sampling, Northern Ontario, Canada July 2017-August 2021**

- Throughout my undergraduate degree I had the opportunity to independently find and sample natural populations of cardinal flower in Northern Ontario. This field work began in 2017 when I reached out to various horticulture and naturalist groups in the Nipissing area in the hopes of finding cardinal flower populations further north than Algonquin Provincial Park which was the most northern cardinal flower population sampled by the Johnston lab at the time. This outreach led to me investigating and subsequently finding and sampling 3 cardinal flowers close to the northern limit of the species.

Shark tagging, Halifax, Nova Scotia, Canada July 2019

- I was one of the fortunate students who was accepted to take the highly competitive field course on the conservation and biology of cartilaginous fish offered by the Dalhousie Seaside summer field course program. The field portion of this course involved spending two 13-hour days on a 38ft long fishing boat ~30km off the coast of Nova Scotia in order to catch, tag and release sharks. During my time at sea, I gained experience in boat safety and shark handling as well as getting to bring in my own 5-foot blue shark.

Reef health assessments, Billy Hawke Caye, Stann creek district, Belize May 2018

- During the early summer of 2018 I took a tropical marine ecology class which involved 10 days of field work on the Belizean barrier reef system. During this time, I gained experience in common reef health assessments including the use of image analysis to estimate percent coral cover, swimming line transects to estimate fish abundance/biomass, and the preparation and deployment of squid pop assays to measure predation intensity. During this project, we were trained how to catch and prepare our own food and lived in tents on a >1 acre² caye in the absence of electricity, internet, cellphone reception, or refrigeration.

Coastal ecosystem impact assessments, Nova Scotia, Canada July-August 2018

- In the summer of 2018, I took a coastal ecology field course in which we investigated and compared the diversity and abundance of organisms between lightly and heavily impacted coastal ecosystems including mudflats, rocky intertidal, and sandy intertidal habitats. During this course, I gained experience in measuring physical and chemical water parameters, sampling water and sediment, as well as identifying and calculating abundance of flora and fauna with the use of transects and microscopic counts.

Teaching

Supervised students

- Clément Mottier (MSc BEC, 2022-2023): The influence of proximity on salmonid kinship recognition

Teaching assistant in evolutionary biology September 2018-April 2021

- For 3 years I had the opportunity to work as a teaching assistant for the second-year evolution class in the biology department at Dalhousie University. My role as a teaching assistant was to lecture on the concepts and statistics used in modern evolution research, invigilate examinations, answer students' questions, as well as mark and give feedback on the assignments of approx. 30 students each semester. This past year I worked closely with the instructor who runs the course in order to assist in redeveloping the lab to work in an online synchronous environment. This reworking of the lab has involved making more extensive quizzes, coding, and rewriting existing labs. During late 2020 and 2021 I taught the labs in a synchronous online environment using Microsoft teams. Over six semesters' students anonymously scored my overall teaching ability as 4.84 out of 5.

Other articles and scientific outreach

Bell-shaped blooms of bright red

- In 2018 I was asked by the Nipissing naturalists to write an article about my field work with cardinal flower the previous summer. This article would go on to be published in the March of 2018 edition of the Nipissing Naturalists monthly newsletter "The Woodland Observer".

The benefit and importance of kleptoplasty to sacoglossan sea slugs

- After my first-year writing course "Conversations with Ocean Scientists" my review paper was chosen to be published in the 2017 issue of the Dalhousie undergraduate ocean sciences journal "Oceans First".

Awards and scholarships

Senior teaching assistant award

- In October 2020 I was nominated for and received the 2019-2020 senior teaching assistant award from the biology department at Dalhousie University. In order to receive this award you must be nominated by a member of the department and have letters of support from students. The selection committee chose me as the recipient of the award due my approachability, my enthusiasm for the course content, and my ability to adjust my teaching style to better fit the needs of individual students as well as the classroom as a whole.

Sarah Lawson research scholarship

- A \$6,800 stipend paid over four months in support of honours students working on botanical research.

Gary Hicks memorial award

- This \$1,070 award was put in place in memoriam of Dr. Gary Hicks who was a faculty member in the biology department at Dalhousie for 27 years. The purpose of this award is to financially support the studies of an honours student within the department whose major area of study is plant science.

David Dougall memorial bursary

- This \$1,236 bursary was established in memory of David Dougall who was a second-year biology student at the time of his death. The intent of this award was that it be given to a responsible and capable individual to whom the award will financially assist their need.

Dalhousie Club of NY scholarship

- This \$3,000 award is given to incoming students who demonstrate outstanding academic and extracurricular achievements prior to attending Dalhousie.

Dalhousie Renewable bursary

- This \$5,600 bursary is given out as one payment per year for four years to full time students who demonstrate financial need and maintain a minimum GPA of 2.0.

Certifications

Certification for the care and use of fish, Dalhousie University, Canada, 2019

- This certification included theoretical and practical elements on the use of fish and other organisms in scientific research and included topics such as humane care, and euthanization. It fulfills the Canadian Council on Animal Care (CCAC) requirement for the National Institutional Animal User Training Program (NIAUT)

Certificate in Sea Survival (Personal Survival Techniques), National Maritime College of Ireland, Ireland, 2022

- This certification included both theoretical and practical elements including deployment of a life raft, first aid, and the use of safety equipment while at sea. It fulfills the mandatory training required of all seafaring personnel by the Irish government.

National Powerboat Certification, Kinsale Outdoor Education Centre, Ireland, 2022

- This certification was awarded by the Irish government under the national powerboat training scheme overseen by Irish sailing. It required the demonstration of various powerboating skills including safe rescue of an overboard person, refueling, docking, handling and maneuvering, planeing, and coming along-side.