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EDUCATION

PhD (Biology) Candidate, University of New Brunswick, *Saint John, NB* In-Progress

- Project is part of the NSERC Funded Canadian Fisheries Research Network
- Supervised by Dr. Rémy Rochette (PI of the Lobster Node of the CFRN)
- Begun May 2010

Morse, B. In Progress. Movement and Activity of the American Lobster (*Homarus americanus*) and Implications for Population Ecology, Structure and Dynamics. PhD Thesis, University of New Brunswick, Saint John, NB.

MSc (Biology), University of New Brunswick, *Saint John, NB* May 2009
- Supervised by Dr. Heather Hunt

Morse, B. 2009. The Effect of Settlement and Post-Settlement Dispersal on the Recruitment Patterns of Juvenile Bivalves at Mill Cove, NB, Canada. MSc Thesis, University of New Brunswick, Saint John, NB.

BSc (Honours Marine Biology), University of New Brunswick, *Saint John, NB* May 2007
- Supervised by Dr. Heather Hunt

Morse, B. 2007. Effect of Water Currents on Movement of the Green Sea Urchin *Strongylocentrotus droebachiensis*. BSc Honours Thesis, University of New Brunswick, Saint John, NB.

RESEARCH

RESEARCH PROJECTS

Below is a short description of my research projects so far.

My BSc honours project looked at how unidirectional water currents affect the movement of the Green Sea Urchin (*Strongylocentrotus droebachiensis*). This study was done in a laboratory flume tank and we found that urchin movement, both movement speed and direction, was affected by the current velocity.

My MSc work moved to the field to document the settlement locations of the soft shell clam (*Mya arenaria*) on an intertidal shore, and then quantify how passive clam dispersal from currents and waves changes the abundance and distribution of these very small (0.3 – 1 mm) animals over the following year.

My PhD project is part of the Canadian Fisheries Research Network (<http://cfrn-rcrp.ca>), a tripartite research network composed of Academia (Scientists and Students), Government Scientists, and Industry Collaborators (Fisheries Harvesters and their Associations). One of the goals of the Network was to investigate large scale questions that the fishing industry has had an interest in. My project's focus is on the movement of juvenile and adult American lobsters (*Homarus americanus*), and is part of the larger project 'Metapopulation dynamics, management areas and biological units of lobster in eastern Canada'. The first chapter evaluates whether the current life history scheme for juvenile benthic phase American lobsters accurately describes lobster movement in the field using an ultrasonic telemetry tracking system. The second chapter expands the size range of lobsters to include adults as well as expanding the scale of ultrasonic tracking, both in area and temporal duration. Again the current life history scheme will be evaluated, and this larger study will investigate seasonal changes in movements, and questions about habitat use. The third chapter utilizes a unique data set that includes multiyear recaptures of ovigerous females, which will be used to assess how behaviour limits habitat use across years, and if there is a relationship between lobster recaptures and lifetime spawning area.

An upcoming research project, not part of my PhD thesis work, will involve tracking of large ovigerous (egg bearing) lobsters within the Bay of Fundy to determine if their seasonal migrations to > 200 m depth are driven by the need to stay in the warmest water available to promote embryo development. As the lobsters will be tagged using Pop-up satellite archival tags to measure depth and water temperature, the migration route and homing ability of the lobsters will also be able to be determined. The question of homing or connectivity to different areas will build upon my PhD research.

RESEARCH GRANTS AWARDED

Project Title:

Seasonal migrations and thermal histories of large ovigerous lobsters (*Homarus americanus*): Do movements increase degree days for egg development?

Funding Body:

Atlantic Lobster Sustainability Foundation (<http://www.lobstersustainability.ca/>)

Project Funding:

\$23 202 from Atlantic Lobster Sustainability Foundation

\$10 983 from Dr. Rémy Rochette's Lab

\$20 500 in In-Kind Support from Grand Manan Lobster Harvesters

Timeline for Research:

Project Funding was awarded in March 2013. Further funding will be applied for by May 1st from the New Brunswick Wildlife Trust Fund to expand the project. Materials (Pop-up Satellite Archival Tags) will be purchased Summer 2013, tagging will occur Fall 2013, data will arrive from the lobsters June 2014, analysis & writing will be done in summer 2014. I can forward a copy of the ALSF Application which further describes the upcoming project if you are interested.

PUBLICATIONS

Published Papers

Morse, B., Hunt, H. (2013). Effect of Unidirectional Water Currents on Displacement Behaviour of the Green Sea Urchin *Strongylocentrotus droebachiensis*. *Journal of the Marine Biological Association of the United Kingdom*. (<http://dx.doi.org/10.1017/S002531541300060X>)

Morse, B., Hunt, H. (2013). Impact of Dispersal on the Spatial Distribution of Juvenile *Mya arenaria* on an Intertidal Shore. *Journal of Experimental Marine Biology and Ecology* 448: 57-65. (<http://dx.doi.org/10.1016/j.jembe.2013.06.016>)

Papers in Review

Sigurdsson, G. M., Morse, B., Rochette R. In Review. Light Traps as a Tool to Sample Planktonic Larval Stage American Lobsters (*Homarus americanus*). Submitted to The Journal of Crustacean Biology July 2, 2013.

Papers In Prep

Morse, B., Rochette, R. In Prep. Using Ultrasonic Telemetry to Test Ecological Hypotheses about Juvenile American Lobster (*Homarus americanus*) Under Natural Conditions. To be submitted to *Marine Ecology Progress Series* November 2013.

SCIENTIFIC PRESENTATIONS

Morse, B., Rochette, R. Seasonal migrations and thermal histories of large ovigerous lobsters (*Homarus americanus*): Do movements increase degree days for egg development? Atlantic Lobster Sustainability Foundation Annual Conference, July 2013. Oral presentation.

Morse, B., Rochette, R. Population Connectivity in the American Lobster: Are movements of Juveniles and Adults Important? Canadian Fisheries Research Network – Lobster Node Annual General Meeting, March 2013. Halifax, NS. Oral and Poster presentation.

Morse, B., Rochette, R. Population Connectivity in the American Lobster: Are movements of Juveniles and Adults Important? Canadian Fisheries Research Network Annual General Meeting, February 2013. Toronto, ON. Oral and Poster presentation.

Morse, B., Rochette, R. On the Activity Levels and Movements of Juvenile American lobsters (*Homarus americanus*) in a Nursery Area: an Ultrasonic Telemetry Study. US-Canada Science Symposium on *The American Lobster in a Changing Ecosystem*. Portland, Maine. 2012. Oral Presentation – Best Student Presentation Award

Rochette, R., Bernatchez, L., Chassé, J., Comeau, M., Greenwood, S., Lawton, P., Ouellet, P., Sainte-Marie, B., Tremblay, J., Haarr, M.L., Quinn, B.K., Sigurdsson, G.M., Dinning, K., Morse, B., and Benestan, L. Connectivity and stock structure of American lobster (*Homarus americanus*) in Atlantic Canada. Canadian Fisheries Research Network Annual General Meeting, December, 2011. St. John's, Newfoundland. Poster presentation.

Morse, B., Rochette, R. Movement of Juvenile and Adult Lobsters (*Homarus americanus*); a research proposal. Canadian Fisheries Research Network Lobster Node Annual General Meeting, November, 2011. Truro, Nova Scotia. Oral presentation.

Morse, B., Hunt, H. The effect of tidal height on the settlement and post-settlement transport of clams and mussels. Benthic Ecology Meeting: Providence, Rhode Island. 2008. Poster Presentation.

Morse, B., Hunt, H. The effect of current on the movement of the green sea urchin. Atlantic University Undergraduate Conference. Saint John, New Brunswick. 2007. Poster Presentation.

SCHOLARSHIPS AND AWARDS

Marguerite and Murray Vaughan Graduate Fellowship. University of New Brunswick Saint John, October 2013.

Best Student Oral Presentation. US-Canada Science Symposium on *The American Lobster in a Changing Ecosystem*. Portland, Maine. 2012.

Marguerite and Murray Vaughan Graduate Fellowship. University of New Brunswick Saint John, September 2012.

The President's Doctoral Tuition Award. University of New Brunswick, May 2010-2013.

Marguerite and Murray Vaughan Graduate Fellowship. University of New Brunswick Saint John, September 2008 – 2010.

J. Fraser Gregory Scholarship. University of New Brunswick Saint John, September 2006.

Ward Chipman Founder's Scholarship. University Entrance Scholarship, University of New Brunswick Saint John, September 2003.

TEACHING

TEACHING EXPERIENCE

Tutorial Instructor – Biology Department, University of New Brunswick (Saint John)

At UNBSJ the first year biology course takes place in two parts over two semesters. During the fall semester 65% of the course mark comes from written midterms and exams from lecture material, and 35% comes from a tutorial course. For three consecutive years (fall 2010 - 2012) I have been an instructor for the first year biology tutorials, which run for 90 minutes once a week for 12 weeks. Being the tutorial instructor involved facilitating small group activities to emphasize important lecture material, facilitating group literature assignments and providing instruction during midterm and exam review sessions. The lecture activities and literature exercises were evaluated by the tutorial instructor and constructive feedback was given to each of the individuals after each exercise so they could improve as the course progressed. Each tutorial class had 15 – 25 students, and I was the instructor for two tutorial classes per semester.

Course Lectures – Filling in for Course Professor

Both designed and presented lecture

Fall 2012 – One Evolution Lecture for First Year Biology (250 students)

Fall 2011 – Two Geologic Time Lectures for First Year Geology (70 students)

Winter 2009 – One Ecology Lecture for Intro to Marine Science (40 Students)

Teaching Assistant - Biology Department, University of New Brunswick (Saint John)

The role of a TA in biology courses at UNBSJ changes based on the professor, the TA's interest and skill level, and the type of labs in the course. I have been a lab demonstrator, a field assistant demonstrating data collection methods, and a marker for different courses. During the courses where I was a TA multiple times for the same professor, more opportunities were given for teaching during the labs.

Courses I was TA for during my MSc & PhD - September 2007 – May 2009 & Sept 2010 – Present

Field Labs – Ecology (x2)

Laboratory Labs – First year Biology (x2), Microbiology, Intro to Marine Science, First year Geology (Part 1 and 2)(x3), Genetics, Zoology (x2), Botany, Animal Physiology, Chemistry

Marking for Courses – Ecology, Pathophysiology (Nursing), First year Geology Lab (Part 1 and 2)

Member of the Hunt and Rochette Labs at UNBSJ

During my time as a graduate student there were many opportunities to provide other students (both Graduate and Undergraduate) in the lab with feedback during practice presentations for coursework, and before conference presentations.

Working with Dr. Rochette a small number of PhD students were involved in the peer review of a scientific paper submitted to a scientific journal for which Dr. Rochette is a reviewer. This was a terrific exercise in critical thinking and giving clear and constructive feedback in written form.

Scuba Diving Instruction – The Dive Shack in Saint John, NB

Certified Scuba Diving International (SDI) Divemaster

During Pool Instruction – Teach and Demonstrate Skills, Evaluate Skills and Give Feedback

During Openwater Checkouts – Evaluate Skills and Give Feedback

Other Activities

Judge at the Regional Science Fair in Saint John, NB - Spring 2011 & 2013.

ADMINISTRATION

Graduate Student

As a graduate student, both during my MSc and PhD, I was in charge of many administrative tasks in order to conduct my research. This included writing experimental protocols for the Animal Care Committee and acquiring Department of Fisheries and Oceans animal collection permits. I filled out paperwork for Purchase Orders, purchased supplies and filled out the necessary paperwork to be reimbursed. I was also in charge of renting cars and scheduling boat time for fieldwork days.

Scientific Diving

During 2012 & 2013 I have assisted the UNB Diving Safety Officer (who is based at the Fredericton Campus of UNB) by administering the yearly SCUBA skills evaluation, the yearly written dive theory test and ensuring everyone's qualifications were kept up to date.

Tutorial instructor/ Teaching Assistant

As the tutorial instructor, part of my duties involved marking assignments and quizzes and keeping a spreadsheet of marks for each class. On a few occasions I had to resolve minor group disputes. I have also posted files on WebCT/Blackboard/Desire2Learn for professors while I was a TA.

The Graduate Student Association

During my MSc I served as the Vice-President of Communications of the Graduate Student Association at UNB Saint John. This involved being a liaison between the grad student executive and the grad student members, as well one of my roles as VP Communications was to build and maintain a GSASJ website.

The Dive Shack

I have designed, built and maintained the website for The Dive Shack, a SCUBA diving business in Saint John, NB (www.thediveshack.com). I am also in charge of their social media presence, including Twitter and Facebook.

ACCREDITATIONS

Transport Canada Marine Emergency Duties Course (MED A1)
CCG Pleasure Craft Operator Card
Scuba Diving International (SDI) certified Divemaster SCUBA diver
Canadian Association of Underwater Sciences (CAUS) Level 1 scientific SCUBA Diver
Red Cross First Aid & CPR
DAN O₂ provider