Bowdoin Scientific Station

Report of Activities

2010-2013

The Bowdoin Scientific Station (BSS) is a multidisciplinary field research station and wildlife sanctuary operated by Bowdoin College and located on the Bay of Fundy's Three Islands chain (Kent, Sheep, and Hay Islands). BSS is dedicated to:

- *Promoting world-class research by providing access to the organisms and habitats of the Three Islands region for scientists and students,*
- *Providing a working and living environment that is free of distractions, allowing scientists and students to become fully immersed in their work,*
- *Training students to become future leaders of their fields,*
- *Protecting the native flora and fauna of Three Islands,*
- *Providing a focal point to encourage collaboration and discourse among all members of the Bowdoin community, and*
- *Supporting the liberal arts mission of Bowdoin College and the activities of the broader scientific community.*

Director's Note:

As director, I wear many hats: inn keeper, cook, dishwasher, logistics technician, personal shopper, EMT, safety officer, taxi driver, boat captain, handy man, scientist, teacher, mentor, morale officer, administrator, public relations specialist…the list goes on. The tasks are diverse and, unfortunately, it is probably not possible to do them all well. It's a matter of choosing my battles.

Despite the demands of the day-to-day chores needed just to keep the Station functioning, we have managed to accomplish many significant goals. For example, in the past 4 years, 17 undergraduate and graduate theses have been produced based on research conducted at Kent Island and 21 scientific papers have been published. This year, we surpassed 200 publications (206 and counting). We have broadened our scientific focus by expanding our work seaward, while maintaining our traditional strengths in areas such as ornithology. Since 2007, BSS has averaged 1,255 user-days per year. In 2013, we had a record number of undergraduates use the Station (723 user-days). Of particular importance is that over the past four years, BSS has received the greatest infrastructure investment of its entire history, including a $167,000 renovation of the dormitory, funded by the National Science Foundation.

As you will read in the pages that follow, BSS has been productive in recent years. Very productive. Where I have fallen short is in communicating the results of all this great work to the Kent Island community. It has been far too long since the last time that I reflected on our

accomplishments, plotted a course for the future, and communicated with the Station's supporters. This report should be a step toward rectifying this situation. Of course, anyone who may have questions about BSS should feel free to contact me for information. It is always nice to hear from alumni and friends.

Best Regards,

Damon P. Gannon

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2010 students, faculty, and staff showing appreciation for our Wicked Joe's coffee.

Personnel:

User-days by category for 2007-2013.

User Groups	Years								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**	**Total**
Undergrads	608	655	656	688	574	675	723	**654**	**4,579**
Grad Students	-	124	112	296	120	-	113	**109**	**765**
Senior Scientists	148	256	241	174	284	299	283	**241**	**1,685**
Technicians/ Research Assistants	44	92	187	264	197	21	68	**125**	**873**
Other Professionals	-	3	-	5		-	37	**8**	**45**
High School Students	-	-	-	-	-	-	15	**2**	**15**
Visitors	96	121	105	78	83	128	209	**117**	**820**
Total, All User Categories	**896**	**1,251**	**1,301**	**1,505**	**1,258**	**1,123**	**1,448**	**1,255**	**8,782**

Overall use of BSS has been steady or trending upwards, with a slight dip during 2011 and 2012, which coincided with the dormitory renovation project. There were a record number of undergraduate use days in 2013. Also for the first time, the Station hosted high school students from Maine participating in the *Upward Bound* program.

2012 students, faculty, and staff.

Sampling of Student Projects

Blue Flag Iris Pollination

Annabel Boeke, Bowdoin '12

This summer, Claire Ellwanger and I studied the pollination biology of Iris versicolor, the blue flag iris. Claire looked at inbreeding depression in the irises and I identified their insect pollinators. While waiting for the irises to bloom, we did a trial run of Claire's cross-pollination experiments on the island's star-flowered Solomon's Seal population. While pollinating these tiny flowers by hand proved to be a task requiring endless patience, I greatly enjoyed my first foray into field biology. In addition, I practiced my insect identification skills by surveying the Solomon' Seal pollinators and trying out various sampling methods.

The irises began to bloom in mid-June. After my initial panic upon seeing the first bloom, I jumped right in with some early experiments. I first looked at the effect of removing petals, anthers and sepals (leaving only the female part of the flower) on insect visitation rate and behavior. Modifying the flowers in this way lowered insect visits and successfully prevented insect pollination. Additionally, I did many surveys of iris visitors at different locations, times of day, and weather conditions to assess the effects of these conditions on their density and diversity. Finally, I observed bumblebees for two minute intervals and recorded average time spend on each flower, number of flowers visited per clone, and distance flown between clones. Hopefully, these studies will allow me to determine the effect of temperature on pollinator behavior and the ensuing limitations on iris pollination.

Tracking Savannah Sparrow Migration

Sheela Turbek, Bowdoin '13

This summer, I worked on the long term study of Savannah sparrows under the supervision of Ryan Norris and Amy Newman. Given that sparrow density on the island was especially high this year, with over 70 breeding pairs on the study site, our work was certainly cut out for us. My daily schedule primarily consisted of searching for and monitoring nests, mist netting birds, and banding, measuring, and extracting blood from nestlings for DNA analysis. Due to the cryptic nature of Savannah sparrow nests, nest finding was particularly challenging, requiring a tremendous amount of patience and concentration in order to track females until they flew to their nest to incubate.

From each adult sparrow captured on the study site, we pulled a tail feather for stable isotope analysis. We also recovered 21 light-sensing geolocators, which Ryan placed on sparrows prior to migration last summer. Stable hydrogen isotope values in precipitation follow a predictable latitudinal gradient in eastern North America. Since stable isotopes are incorporated into feathers from food eaten during feather growth, stable hydrogen isotope values sampled from feathers grown during the pre-alternate molt can therefore be used to approximate

molting latitude during the winter. In the coming year, I plan to carry out an honor thesis comparing the accuracy of geolocators and stable hydrogen isotopes as methods of estimating wintering latitude and using stable hydrogen isotopes to analyze the effect of reproductive output and age on the overwintering site fidelity of Savannah sparrows.

When not stalking Savannah sparrows, I spent the majority of the summer admiring other fascinating bird species, playing cards, and exploring the small island, which is surprisingly rich in natural wonders. My summer on Kent Island was extremely informative, and the island's isolation provided a refreshing escape from the commotion of the mainland, allowing me to get to know a great group of people and gain a deeper appreciation for the world around me.

Tracking Red Tide Biotoxins through Kent Island's Intertidal Food Web
Sara Hamilton, Bowdoin '16

While on Kent Island this summer I began working on a research project about red tide toxin accumulation in marine snails. The Bay of Fundy is notorious for its severe annual blooms of the toxic algae Alexandrium fundyense, which contaminate shellfish throughout New England and Maritime Canada and cause widespread shellfish fisheries closures each summer. While there are hundreds of scientific articles examining how shellfish accumulate these toxins, far less research surrounds how the toxin travels through other parts of the marine food web. My project looks to find out if intertidal organisms accumulate this toxin and if the feeding strategy of different species affects how much toxin they accumulate.

To test this hypothesis, the experiment follows a 3-step process: 1) Collecting intertidal organisms during the summer algal blooms 2) preparing the dissected samples in a way that breaks down tissue and cells, so as to release any toxin harbored inside the cells 3) using an ELISA test (enzyme-linked immunosorbant assay) to analyze the amount of toxins in these tissues. I performed the first two steps of the experiment while on Kent Island this summer. I collected periwinkle snails, dog whelks, green crabs, tortoiseshell limpets and soft-shelled clams and then digested their tissues using a process that involved acid, boiling, centrifuging and macerating.

I look forward to working on the analysis part of my experiment back at Bowdoin in the fall. The road to results is still a long and confusing one, but I have fallen in love with research here and I can't wait to keep moving my project forward!

Ecological Effects of Rock Weed Harvesting
Christine Walder, Bowdoin '15

I spent the two-month field season on Kent Island setting up a long-term rockweed harvesting experiment. *Ascophyllum nodosum*, commonly known as rockweed, is

harvested commercially and used in fertilizers and the food industry. Current regulatory standards are based on Ascophyllum's ability to regrow, but have overlooked the possible impact that harvesting may have on the ecosystem as a whole. Ascophyllum covers nearly 100% of Kent Island's rocky intertidal zone, and is integral to the harsh intertidal environment because of the structure and shelter it provides from waves, dessication, and temperature fluctuations. However, claims that rockweed harvesting is sustainable have gone largely unquestioned until recently.

My project looked at how ecosystem biodiversity responds to the removal of rockweed at current regulatory levels. I followed a Before, After, Control, Impact (BACI) design, where I surveyed paired control and experimental plots before, immediately after, and one month following cutting the experimental plot to sixteen inches tall. The surveys were designed to look at biodiversity within plots—how many algal species and invertebrate species were present, as well as the number of each invertebrate species. There was an overall reduction in the number of invertebrates within each harvested plot, and the number of algal species also declined. Because species richness and biomass declined following the harvesting event, it can be concluded that cutting *Ascophyllum nodosum* reduces biodiversity within the intertidal zone in the short term. In addition to surveying my plots, I spent quite a bit of time permanently marking the plots so that they can be located and re-surveyed next year. Making anything stick in the ever-changing intertidal environment was quite challenging, and eventually involved two different kinds of paint, epoxy, marking tape, and a healthy portion of trial-and error.

I have had an amazing summer on Kent Island, and working on my own research project has been incredible and educational. Kent Island is a breathtakingly beautiful place, and provides a wide range of opportunities for Bowdoin students and the community at large.

Fiction Inspired by Kent Island
Charlotte Rutty, Bowdoin '16

When I set off for my nine weeks on Kent Island, I was expecting to write poetry and nonfiction inspired by the island's natural beauty. While nature is a big part of island life and provided motivation, inspiration, and the mental peace and quiet to write, my writing ended up being much more informed by the people I met on Kent Island. The island has a fascinating history full of larger-than-life figures, people about whom Mark and Damon tell vivid stories. I was also interested in the diverse set of researchers, artists, caretakers, visitors, children, friends, and family that had been drawn to this place. The island has a way of tying tight connections between people who otherwise would not have crossed paths.

So it was fiction, rather than nonfiction, that Kent Island ended up inspiring. I spent the summer writing a collection of eight short stories (as well as one nonfiction essay about my experience on the island). All

feature vivid characters inspired, directly or indirectly, by observing my fellow islanders and listening to their stories. My characters were also informed by readings such as William Kennedy's Very Old Bones, Kazuo Ishiguro's Never Let Me Go, Vladimir Nabokov's Lolita, Kurt Vonnegut's Slaughterhouse Five, Elizabeth Strout's Olive Kitteridge, and the collected letters of Ernest Joy, the station's first caretaker. These readings, along with Elizabeth Bowen's The House in Paris, also helped me to experiment with aspects of my writing like point of view, tense, and chronology.

More directly, I found that the mood of my writing was largely determined by the weather conditions at the time, which reflects the extent to which life here is lived by the natural world. I incorporated many aspects of island life in my stories. One story was based directly on two nearby light stations that we visited, Gannet Rock and Machias-Seal Island, and another was based directly on Kent Island itself.

A large part of the summer's value, for me, was in learning how to manage my time as a writer and discovering my own writing process. I often took walks around the island in search of inspiration, finding a spot to sit and write in my notebook. During these sessions I planned and wrote parts of first drafts. Throughout this experience I learned that my writing works best when it is heavily planned and outlined, and I developed an effective process of planning that I will return to for future writing projects.

Sara Hamilton processing samples in the lab.

Claire Ellwanger, Annabel Boeke, and Ouda Baxter performing pollination experiments.

Sheela Turbek processing a young Savannah sparrow.

Infrastructure Improvements, 2010-2013:
In the past few years, we have performed many major maintenance and infrastructure improvement projects at BSS:

- Performed a major renovation of the Dormitory: replaced the foundation footings, sills, and carrying timbers, replaced roof, installed new doors and windows, installed new exterior siding, renovated the kitchen and lounge, renovated second-floor living quarters, and built a new enclosed porch/mud room (among other things). This was an enormous project, which came out beautifully thanks to our skilled and dedicated caretakers Mark Murray and Russell Ingalls (2010-2013)

- Installed a new solar water heater (2011)

- Installed small photovoltaic power systems on three of our outlying buildings (2011)

- Upgraded the battery bank, inverter, charger, charge controller, and backup generator on our main electrical system (2011-2013)

- Acquired an automated weather station (2011)

- Rebuilt our 140-ft wharf entirely (2012)

- Renovated *Fog Heaven* (a small out-building) (2012)

- Replaced the engine on our workboat, M/V *Ernest Joy* (2012)

- Replaced the foundation footings, sills, and carrying timbers of the *Captain Gillette* (our boathouse) (2013)

- Replaced the roof on the *Caretaker's Cottage* (2013)

- Replaced the foundation footings, sills, and carrying timbers of the *Lower Lab* and elevated it by two feet (2013).

These critical infrastructure improvements make it possible to live safely and work productively on Kent Island. Regular major maintenance will prolong the service life our infrastructure, thus saving the Station money in the long run. These efforts were made possible by donations from individual supporters, funds from Bowdoin College's Office of Academic Affairs and Office of the Treasurer, and a grant from the National Science Foundation.

We have made great progress against the forces of entropy, but there just seems to be no end to the list of tasks. Projects planned include a complete overhaul of the *Ernest Joy* to ensure its continued service for years to come (it has already been in service for two decades) and installation of a composting toilet to replace the outhouse near the wharf. On area of critical need is a renovation of the Warden's House, but a source of funding has yet to be identified

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Ernest Joy's new engine speeds a load of new chairs to Kent Island.

The newly-renovated dorm showing its new roof, windows, siding, and porch.

Chef extraordinaire Cailey Oehler at work in the new kitchen.

A couch from Bowdoin's main campus will furnish the newly renovated dorm.

All cozy in the dorm's new lounge.

The new wharf.

News from Kent Island and Kent Islanders

Bowdoin alum and award-winning documentarian Ann Johnson Prum led a team of filmmakers to Kent Island to film part of a PBS documentary at BSS. The film will take at least two years to produce, so it will likely air in 2015.

In 2013, BSS initiated a partnership with Upward Bound, a program that helps high school students get into and succeed in college. Upward Bound is a national program; the chapter based at Bowdoin College works with students from Maine. Three Upward Bound students spent a week in July on Kent Island, learning about the science taking place at BSS and conducting their own research on intertidal ecology.

BSS has been awarded a planning grant by the National Science Foundation to create a strategic plan and to have a team of experts evaluate the Station's programs and facilities.

Ryan Norris was interviewed on CBC radio about studying Savannah Sparrows on Kent Island in July of 2012. Ryan's work was also featured on *Science Now* in February of 2012.

BSS caretaker Mark Murray was given a Polar Star Award in 2012.

BSS and Bowdoin alum, Jed Burtt, was named the Ohio Professor of the Year in 2012. Professor Burtt is on the faculty at Ohio Wesleyan University

Evan Fricke was awarded an NSF Graduate Fellowship in 2011. He is now pursuing his Ph.D. at the University of Washington.

Anne Rothacker and Evan Fricke were nominated to Phi Beta Kappa in 2011.

Iris Levin's (Bowdoin '05) work, was featured in the "Editor's Choice" section of the Oct 22 issue of *Science*, as well as in *Science News*. Iris is a co-author on the paper (F. Hailer, E. A. Schreiber, J. M. Miller, I. I. Levin, P. G. Parker, R. T. Chesser, R. C. Fleischer. Long-term isolation of a highly mobile seabird on the Galapagos. Proceedings of the Royal Society B: Biological Sciences, 2010). Iris is a PhD student at U. Missouri, studying the population structure of frigatebirds across the Galapagos.

The October 19, 2010 *New York Times'* Science Times featured Chris Filardi (Bowdoin '89) in "Scientist at Work." Chris cut his teeth in field biology at the Bowdoin Scientific Station in the summer of '88, then went on to do his PhD at the University of Washington studying the evolution of birds on islands in the S. Pacific. He now works at the American Museum of Natural History.

During his summer research fellowship in 2009, Evan Graff studied heritability of morphological traits in Savannah sparrow eggs. It was gratifying work, but it left him little time to pursue his other passion: photography. So Evan returned to Kent Island in 2010 as a McKee Photography Fellow. Already an accomplished wildlife photographer, he came back to Kent Island

last summer with the goal of documenting the daily lives of the students, faculty, and staff living and working at BSS. The approach required to photograph people is very different from that used to photographing animals, so Evan had to learn some new skills. The result is stunning. His magnificent book contains 160 photos of the people, wildlife, and scenery of Kent Island. The book, called *Tides and Fog*, is available from Blurb.com.

Dr. Kevin Oh's research on the roles of physical appearance and social behavior in mate selection by house finches was featured in the July 13, 2010 edition of the *New York Times*. Kevin is a 2001 graduate of Bowdoin and a BSS/Kent Island alum.

The Natural History Museum of London's outdoor photography exhibition *Wild Planet* featured a photograph taken by Evan Graff (Bowdoin '11). The traveling exhibit appeared in several locations around the UK in 2010.

At its 2010 meeting, the Association of Field Ornithologists awarded Lauren Rae and Greg Mitchell the prize for best student paper published during 2009 in the *Journal of Field Ornithology*. Citation for the winning paper:

> Rae, L.F., G.W. Mitchell, R.A. Mauck, C.G. Guglielmo, D. R. Norris. 2009. Radio transmitters do not affect the body condition of Savannah Sparrows during the fall premigratory period. Journal of Field Ornithology, 80(4):419-426. DOI: 10.1111/j.1557-9263.2009.00249.x. (BSS Contribution No. 205)

Publications, 2010-2013

Gannon, D.P. and J.G. Gannon. 2010. Assessing trends in the density of Atlantic croaker (*Micropogonias undulatus*): a comparison of passive acoustic and trawl methods. Fishery Bulletin, 108:106–116. (BSS Contribution No. 206)

Haussmann, M.F. and N.M. Marchetto. 2010. Telomeres: Linking stress and survival, ecology and evolution. Current Zoology 56(6):703-713. (BSS Contribution No. 241).

Kozlowski, C.P., R.A. Mauck, K.M. O'Reilly, J. Philipsborn, & R.E. Ricklefs. 2010. Changes in plasma hormone levels correlate with fledging in nestling Leach's storm-petrels. General And Comparative Endocrinology 169: 91-97. (BSS Conribution No. 215)

Rudershausen, P.J., J.A. Buckel, J. Edwards, D.P. Gannon, C.M. Butler, and T.W. Averett. 2010. Feeding ecology of blue marlin, dolphinfish, yellowfin tuna and wahoo from the North Atlantic with comparisons to other oceans. Transactions of the American Fisheries Society 139:1335-1359.

Vleck, C.M., M.F. Haussmann, and D. Vleck. 2010. Avian senescence: underlying mechanisms. Journal of Ornithology 148: 611-624, DOI: 10.1007/s10336-007-0186-5. (BSS Contribution No. 244).

Hope, D.D, D.B. Lank, B.D. Smith and R.C. Ydenberg. 2011. Migration of two calidrid sandpiper species on the predator landscape: how stopover time and hence migration speed vary with geographical proximity to danger. J. Avian Biol. 42: 523_530, doi: 10.1111/j.1600-048X.2011.05347.x

Mauck, R.A., J.L. Zangmeister, J.C. Cerchiara, C.E. Huntington, & M.F. Haussmann. 2011. Male-biased reproductive effort in a long-lived seabird. Evolutionary Ecology Research 13(1): 19-33.

Mitchell, G.W., C. G. Guglielmo, N. T. Wheelwright, C. R. Freeman-Gallant, and D. R. Norris. 2011. Early-life events carry-over to influence pre-migratory condition in a free-living songbird. PLoS ONE 6(12): e28838. doi:10.1371/journal.pone. (BSS Conribution No. 229)

Steenweg, R.J., R.A. Ronconi & M.L. Leonard. 2011. Seasonal and age-dependent dietary partitioning between Great Black-backed and Herring Gulls. Condor 113: 795-805. (BSS Conribution No. 230)

Chen, D., R.J. Letcher, N.M. Burgess, L. Champoux, J.E. Elliott, C.E. Hebert, P. Martin, M. Wayland, D.V. Weseloh, L. Wilson. 2012. Flame Retardants in Eggs of Four Gull Species (Laridae) from Breeding Sites Spanning Atlantic to Pacific Canada. Environmental Pollution 168 (2012) 1-9.

Mauck, R.A., Huntington, C.E., and Doherty, P.F., Jr. 2012. Experience versus effort: what explains dynamic heterogeneity with respect to age? Oikos 121:1379-1390, DOI: 10.1111/j.1600-0706.2012.20271.x.

Mitchell, G.W., A.E.M. Newman, M. Wikelski, and D. R. Norris. 2012. Timing of breeding carries over to influence migratory departure in a songbird: an

automated radio tracking study. Journal of Animal Ecology 81:1024-1033. (BSS Conribution No. 236)

Mitchell, G.W., N. T. Wheelwright, C. G. Guglielmo, and D. R. Norris. 2012. Short and long term costs of reproduction in a migratory songbird. Ibis 154:325-337, DOI: 10.1111/j.1474-919X.2012.01212.x. (BSS Conribution No. 231)

Sunderland, E.M., A. Amirbahman, N.M. Burgess, J. Dalziel, G. Harding, S.H. Jones, E. Kamai, M.R. Karagas, X. Shi, C.Y. Chen. 2012. Mercury sources and fate in the Gulf of Maine. Environmental Research 119: 27-41.

Wheelwright, N.T., E. Graff, and D. R. Norris. 2012. Relative consistency in size, shape and coloration of Savannah Sparrow eggs within and between breeding seasons. Condor 114: 412-420. (BSS Conribution No. 234)

Burgess, N.M., Bond, A.L., Hebert, C.E., Neugebauer, W.E., and Champoux, L. 2013. Mercury trends in herring gull (Larus argentatus) eggs from Atlantic Canada, 1972-2008: temporal change or dietary shift? Environ. Pollut. 172: 216-222.

Williams, H., I.I. Levin, D. R. Norris, A.E.M. Newman, and N.T. Wheelwright 2013. Three decades of cultural evolution in Savannah sparrow songs. Animal Behaviour 85: 213-223. (BSS Conribution No. 243)

Fiske, J.A., D.P. Gannon, and A.E.M. Newman. 2013. Effects of repeated investigator handling on growth rate and the acute stress response in Leach's Storm-petrels. Journal of Field Ornithology 84(4):424–431, DOI: 10.1111/jofo.12041 (BSS Contribution No. 244)

Shorty, J. and D.P. Gannon. 2013. Habitat selection by the rock gunnel, *Pholis gunnellus* L. (Pholidae). Northeastern Naturalist 20:155-170. (BSS Conribution No. 245)

Thomson, E. and D.P. Gannon. 2013. Influence of sediment type on predation risk and antipredator responses of soft-shell clams, *Mya arenaria*. Northeastern Naturalist 20(3):498-510. (BSS Contribution No. 246)

Wenzel, F., P. Polloni, D. Gannon, A. Read, P. Rosell, and J. Craddock. 2013. Food habits of Sowerby's beaked whale. Fishery Bulletin 111:381–389. (BSS Contribution No. 247)

Manuscripts Submitted (as of 01 October 2013)

Tsunekage, T, and R.E. Ricklefs. Lower levels of lipid peroxidation in embryonic tissue from species with longer development periods.

Tsunekage, T, and R.E. Ricklefs. Length of the incubation period predicts oxidative damage to DNA in avian embryos

Woodworth, B.K., Mitchell, G.W., Norris, D.R., Francis, C.M. & Taylor, P.D. Migratory and stopover movements of songbirds at an ecological barrier during fall

migration and how they relate to weather. (Submitted to Ibis).

Theses, 2010-2013

Evan Graff. 2011. Individual variation in egg morphology and coloration in Savannah sparrows. Honors thesis, Bowdoin College.

Shem Dixon. 2011. Effect of light availability and Ectocarpus sp. presence on growth of *Zostera marina* (eelgrass). Honors thesis, Bowdoin College.

Bryant Dossman. 2011. Using stable isotopes to determine the unknown wintering grounds of migratory Savannah sparrows. Honors thesis, Bowdoin College.

Elsie Thomson. 2011. The influence of sediment characteristics on predator-prey interactions between softshell clams and green crabs. Honors thesis, Bowdoin College.

Gilmour, M. 2011. Physiological Ecology and Reproductive Effort in a Migratory Seabird. M.S. Thesis, Bucknell University.

Mitchell, G.W. 2011. The Importance of Linking Periods of the Annual Cycle for Understanding Life History Tradeoffs in a Migratory Songbird. Ph.D. dissertation, University of Guelph.

Jacob Shorty. 2012. Intertidal Microhabitat Selection of the Rock Gunnel (*Pholis gunnellus*) and its Range Along the U.S. East Coast. Honors thesis, Bowdoin College.

Julia Fiske. 2012. Effects of researcher handling on growth and development *of Oceanodroma leucorhoa* (Leach's storm-petrels). Honors thesis, Bowdoin College.

Claire Ellwanger. 2012. Population genetics and phenotypic plasticity of blue flag irises on the islands of the Bay of Fundy. Honors thesis, Bowdoin College.

Graham Sorenson. 2012. Drivers of nest burrow switching in Leach's storm-petrels, Oceanodroma leucorhoa. Honors thesis, Kenyon College.

Claire O'Connell. 2013. Some like it hot: thermal conditions inside nest burrows affect growth and survivorship of Leach's storm-petrel chicks. Honors thesis, Kenyon College.

Noelle Schoettle. 2013. Foraging ecology of harbor porpoises. Honors thesis, Bowdoin College.

William Montag. 2013. Habitat selection of intertidal rove beetles and fungus beetles on Kent Island. Honors thesis, Bowdoin College.

Sheela Turbek. 2013. Winter range of Savannah Sparrows breeding on Kent Island: comparison of stable isotope and geolocator data. Honors thesis, Bowdoin College.

Tsunekage, T. 2013. Oxidative Stress in Avian Embryos. Ph.D. dissertation, University of Missouri-St. Louis.

Lightfoot, H. 2013. Factors influencing avian fall migration decisions in the Gulf of

Maine Region. MSc thesis, Biology, Acadia University, Wolfville, NS.

Camilleri, S. 2013. Fatty acid, caloric, and toxin composition of stomach oil from Leach's storm-petrels. M.S. Thesis, University of North Carolina Wilmington.

Books, 2010-2013

Graff, E. 2010. *Tides and Fog: Views from Kent Island*. (Available from Blurb.com at http://www.blurb.com/b/1693969-tides-and-fog)

Presentations, 2010-2013

Marchetto, N.M., E.D. Carlton, R.A. Mauck, & M.F. Haussmann. 2010. Red Hot: Lipid peroxidation and color based assortative mating in black guillemots (Cepphus grylle). Society of Integrative and Comparative Biology. Seattle. (This won the award for best presentation in the Ecology and Evolution section.)

Graff, E. 2010. Individual variation in egg morphology and coloration in Savannah sparrows. President's Science Symposium, Bowdoin College.

Fricke, E. & K. Blizzard. 2010. Longitudinal study of nest site selection by individual Leach's storm-petrels. President's Science Symposium, Bowdoin College.

Dixon, S. 2010. Effect of light availability and Ectocarpus sp. presence on growth of *Zostera marina* (eelgrass). President's Science Symposium, Bowdoin College.

Dossman, B. 2010. Using stable isotopes to determine the unknown wintering grounds of migratory Savannah sparrows. President's Science Symposium, Bowdoin College.

Thomson, E. 2010. The influence of sediment characteristics on predator-prey interactions between softshell clams and green crabs. President's Science Symposium, Bowdoin College.

Camilleri, S.A., H.N. Koopman, A.J. Westgate, D.P. Gannon, R. Mauck, and J. Kucklick. 2011. Provisioning of chicks by Leach's storm-petrels: preliminary insights into energy content, lipid content, and contaminants of stomach oils. Annual Meeting of the Society of Environmental Toxicology and Chemistry, Boston, MA. Nov. 2011.

Lightfoot, H., Shutler, D., Taylor, P. 2011. Monitoring fall songbird migration around the Bay of Fundy using radar. Atlantic Society of Fish and Wildlife Biologists Conference, Antigonish NS.

Lightfoot, H., Thurber, B., Taylor, P. 2011. Monitoring around the Bay of Fundy using radar. Friends of Beaubassin Field Station, Au lac, NB.

Lightfoot, H., Shutler, D., Taylor, P. 2011. Late fall migration around the Bay of Fundy. Society of Canadian Ornithologists Conference, Moncton, NB.

Lightfoot, H., Shutler, D., Taylor, P. 2011. Late fall migration around the Bay of Fundy.

Acadia University Research Summit, Acadia University, Wolfville NS.

Fricke, E., K. Blizzard, D. Gannon, and R. Mauck. 2011. Nest site selection and burrow switching in Leach's storm-petrel. Technical Section of the Atlantic Seabird Cooperative, Portland, ME. Feb. 2011.

Gannon, D.P. 2011. Dealing with Today's Fiscal Challenges at Field Stations. Annual meeting of the Organization of Biological Field Stations. Bodega Marine Laboratory, Bodega Bay, CA

Gannon, D.P. 2011. Ecological research at the Bowdoin Scientific Station, Kent Island, Bay of Fundy. Savannah State University, Savannah, GA.

Tsunekage, T and R.E. Ricklefs. 2011. A comparative study of oxidative damage in avian embryos. Annual meeting of the Society for the Study of Evolution, Norman, Oklahoma.

Evan Fricke. 2011. Causes and consequence of divorce in a long-lived seabird. President's Science Symposium, Bowdoin College.

Smith, K. 2011. Forest regeneration following removal of introduced snowshoe hares on Three Islands, New Brunswick. President's Science Symposium, Bowdoin College.

Shorty, J. 2011. Intertidal Microhabitat Selection of the Rock Gunnel (*Pholis gunnellus*) and its Range Along the U.S. East Coast. President's Science Symposium, Bowdoin College.

Fiske, J. 2011. Effects of researcher handling on growth and development of *Oceanodroma leucorhoa* (Leach's storm-petrels). President's Science Symposium, Bowdoin College.

Ellwanger, C. 2011. Population genetics and phenotypic plasticity of blue flag irises on the islands of the Bay of Fundy. President's Science Symposium, Bowdoin College.

Shorty, J. and D.P. Gannon. 2012. Habitat selection by the rock gunnel, *Pholis gunnellus* L. (Pholidae). Northeast Natural History Conference, April 2012, Syracuse, NY.

Lightfoot, H., Thurber, B., Taylor, P. 2012. Fall migratory decision making in the Gulf of Maine region. North American Ornithological Conference, University of British Columbia, Vancouver BC.

Gannon, D.P. 2012. Marine ecological research at the Bowdoin Scientific Station, Kent Island, Bay of Fundy. Symposium: State of Marine Ecology in Maine, Brunswick, ME. May 2012.

Gannon, D.P. 2012. Bowdoin Scientific Station: history and recent developments. Invited lecture, Grand Manan Museum, Grand Manan Island, New Brunswick. July 2012.

Gannon, D.P. 2012. Recent Infrastructure Improvements at the Bowdoin Scientific Station. Annual meeting of the Organization of Biological Field Stations. Archbold Biological Station, Lakeland, Florida. Sep. 2012.

Gannon, D.P. 2012. Bowdoin Scientific Station's Artist-in-Residence Program. Annual meeting of the Organization of Biological Field Stations. Archbold Biological Station, Lakeland, Florida. (Sep 2012)

Matson, K.D., R.A. Mauck, S.E. Lynn, and B.I. Tieleman. 2012. Island life and innate immunity: combining comparative and experimental approaches to better understand avian immune system evolution. Society for Integrative and Comparative Biology, Charleston, SC.

Mauck, R.A., C.E. Huntington, J.R. Doherty. 2012. Climate, weather, and a long-lived seabird: what can fifty years of data tell us? Society for Integrative and Comparative Biology, Charleston, SC.

Sorenson, G.H., C.E. Huntington, R.A. Mauck. 2012. Which way to turn? Within-colony movement patterns in a long-lived seabird. Society for Integrative and comparative Biology, Charleston, SC

Tsunekage, T and R.E. Ricklefs. 2012. A comparative study of oxidative damage in avian embryos. Annual meeting of the Society for Integrative and Comparative Biology, Charleston, South Carolina 2012 (poster)

Schoettle, N. 2012. Foraging ecology of harbor porpoises. President's Science Symposium, Bowdoin College.

Montag, W. 2012. Habitat selection of intertidal rove beetles and fungus beetles on Kent Island. President's Science Symposium, Bowdoin College.

Turbek, S. 2012. Winter range of Savannah Sparrows breeding on Kent Island: comparison of stable isotope and geolocator data. President's Science Symposium, Bowdoin College.

Villar, C. 2012. Nest site selection and reproductive success of Leach's Storm-petrels. President's Science Symposium, Bowdoin College.

Brown, E. 2012. Foraging ecology of Leach's Storm-Petrels. President's Science Symposium, Bowdoin College.

O'Connell, C., C. Villar-Leeman, E. Fricke, D. Gannon, J. Gannon, and R. Mauck. 2013. The heat is on: air temperature, burrow temperature, and reproductive success in a long-lived seabird. Society for Integrative and Comparative Biology, San Francisco. Jan. 2013.

Short, A. 2013. Ecological effects of manipulating densities of three species of snails within the rocky intertidal zone in the Bay of Fundy. President's Science Symposium, Bowdoin College.

Walder, C. 2013. Short-term effects of *Ascophyllum nodosum* harvesting on ecological community health. President's Science Symposium, Bowdoin College.

Art Shows

Martha Johnson. *Kent Island and the Albatross: 1913-2013*. Grand Manan Museum, Grand Manan, New Brunswick. July 2013.

Colin Matthews (’10), Carina Sandoval (’10), Evan Graff (’11), and Elsbeth Paige-Jeffers (’10). *Island Bound*: *Artwork from the Bowdoin Scientific Station on Kent Island.* St. John Arts Centre, St. John, New Brunswick. October 2010.

Evan Graff (’11). *Tides and Fog*. Bowdoin College, Visual Arts Center. October 2010.

Ben Livingston (’14) & Ouda Baxter (’12). *Island Found*. Bowdoin College, Visual Arts Center. Fall 2011.

In addition, Colin Matthews and Carina Sandoval had art shows in Portland galleries during the fall of 2010 and a photo taken by Evan Graff was featured in the Natural History Museum of London’s outdoor photography exhibition, called *Wild Planet*, in 2010.

Measuring a newly-hatched Leach’s storm-petrel.

Kasey Villeneuve tracking seabirds and marine mammals.

Student Quotes:

"Besides artwork, Kent Island is an amazingly beautiful place with extreme weather, and awesome people (even the scientists are OK). The simple lifestyle leaves everyone on the island more present and focused. What else is there to do other than hang out with each other? The community becomes so strong and your academic focus becomes a mere side project when compared to all the self-exploration and life skill learning that goes on. I am really so lucky to have spent a summer skirted by tides, hidden by fog, under the blazing stars, surrounded by great people."

- Ben Livingston, Bowdoin '13

"Kent Island was an incredible summer experience. I was incredibly fortunate to be able to spend every day outside, and see the island go through so many transitions. Being in a place where you can tell the whole dinner table about how you saw an Iris burst from a bud into a full flower that day or the specifics of how bumble bees pollinate—and everyone is genuinely interested—is something I really hope I can find again."

- Claire Ellwanger, Bowdoin '12

"Island living was an experience in itself. Not having anything better to do than socializing with the same ten people every day for two months was an amazing opportunity to have real interactions devoid of other diversions such as internet, television, phones, and the usual over-stimulation, and I have never seen brighter stars than the ones I saw on Kent Island."

- Kevin Wu, Bowdoin '14

"I was also very grateful for the opportunity to participate in many of the "events" that took place over the summer, such as lobster and herring fishing, whale watching and puffin viewing on Machias-Seal Island. My time on Kent Island was full of interesting research (good biology) and shared with fascinating people (good chemistry) – these combined to make a summer that I will never forget."

-Talia Sechley, graduate student, University of Guelph

Cailey Oehler and a curious humpback during 2013's whale watching trip aboard *Island Bound*.

The view of Kent Island from South Hill.