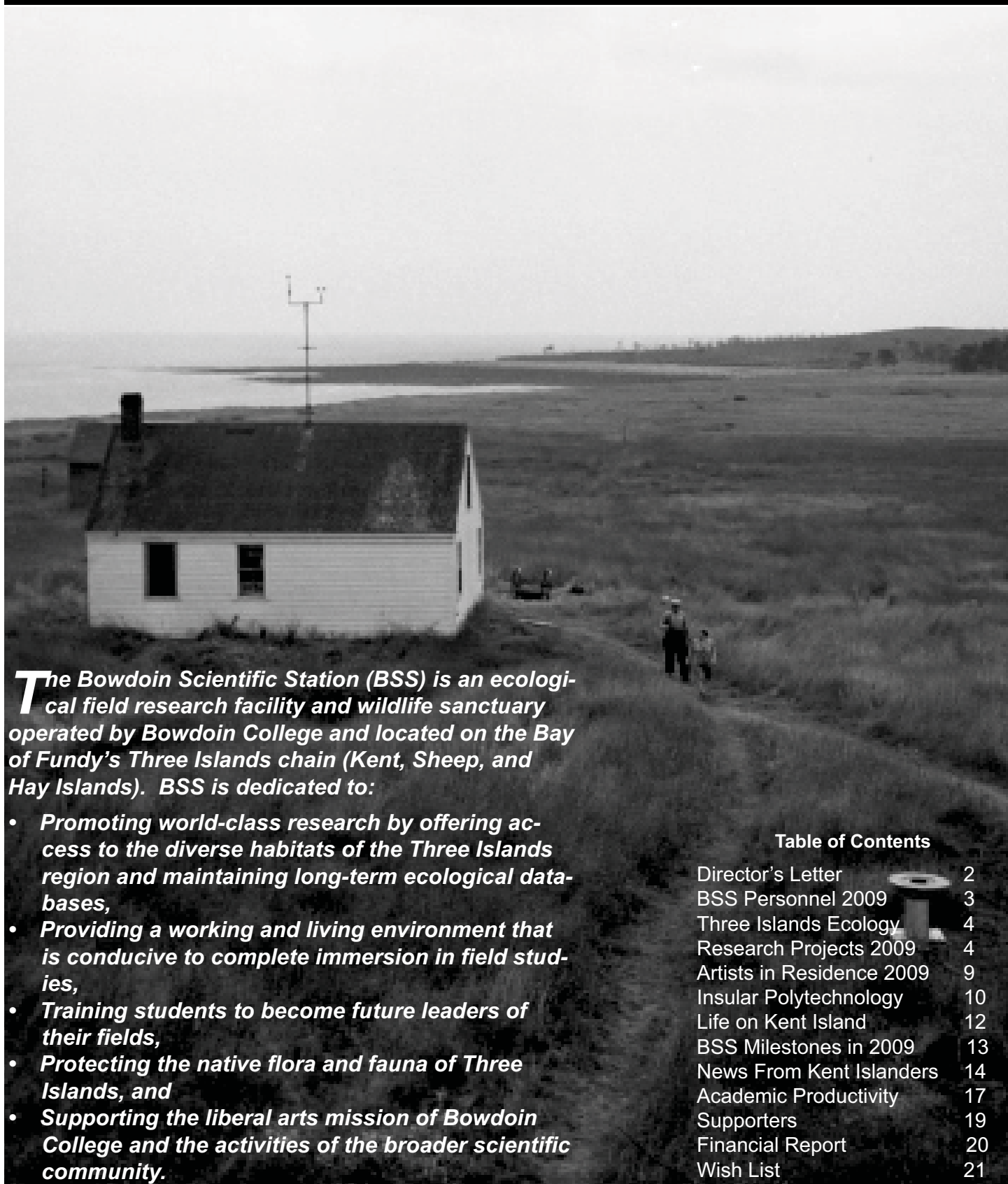


Bowdoin Scientific Station

2009 Annual Report



The Bowdoin Scientific Station (BSS) is an ecological field research facility 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 offering access to the diverse habitats of the Three Islands region and maintaining long-term ecological databases,***
- ***Providing a working and living environment that is conducive to complete immersion in field studies,***
- ***Training students to become future leaders of their fields,***
- ***Protecting the native flora and fauna of Three Islands, and***
- ***Supporting the liberal arts mission of Bowdoin College and the activities of the broader scientific community.***

Table of Contents

Director's Letter	2
BSS Personnel 2009	3
Three Islands Ecology	4
Research Projects 2009	4
Artists in Residence 2009	9
Insular Polytechnology	10
Life on Kent Island	12
BSS Milestones in 2009	13
News From Kent Islanders	14
Academic Productivity	17
Supporters	19
Financial Report	20
Wish List	21

From the Director



"It changed my life." This is a phrase that I have heard from many of the BSS alumni whom I have met in the past year. Their Kent Island experiences affected them profoundly. Thanks in part to BSS, students have been inspired to become such things as research scientists, professors, natural resource managers, environmental advocates, teachers, and even documentary film makers. BSS alumni have undoubtedly made the world a better place.

BSS has trained and inspired thousands of young scientists by giving them the opportunity to work as part of a community of scholars. Top scientists from all over North America come to BSS. These visiting scientists, in turn, become a resource for the Bowdoin students and faculty.

BSS has an international reputation in the fields of ornithology, marine biology and meteorology. In 2009, BSS hosted researchers from eight different colleges and universities in the U.S. and Canada. These scientists were attracted by:

- the long-term databases on Kent Island's organisms and weather, which make it possible to conduct certain types of research that would not be possible elsewhere;
- Kent Island's unusual ecology (e.g., boreal characteristics despite its temperate latitude, large number of self-compatible plant species, extreme philopatry among its nesting seabirds and songbirds, macro tides, isolation from the mainland, and strategic location within the migratory corridors of many animals);
- the opportunity for collaboration with talented students and senior researchers; and
- the simple existence on Kent Island, which provides a great atmosphere for concentrating on your work, reflecting, and forming close personal bonds with fellow station inhabitants.

Bowdoin College is extremely fortunate to have BSS. Few small colleges own field stations. Thanks to the efforts of Bill Gross and his fellow "Kent Island Pioneers," Bowdoin College became the first liberal arts college in North America to

have a field research station. Of the few small colleges that have since acquired field stations, most use them primarily as outdoor classrooms rather than as working research stations. Although BSS gets significant use by classes and other non-research programs, its core mission is scientific research. This is important because if we are trying to train people to be scientists, then there is no substitute for real research experience. This experience should be exhaustive, from formulating original hypotheses and designing the research plan, all the way through publication. The first peer-reviewed, scientific paper based on data from Kent Island was published by Bill Gross in 1935. This early research productivity set the tone for how BSS would operate: it would be a bona fide research station that would give undergraduate students the opportunity to conduct novel research and to publish their results.

As you will see in the following pages, 2009 was a productive year for BSS in terms of academic accomplishments. We also honored the memory of the Station's founder and most loyal advocate, Bill Gross; celebrated the 75th anniversary of the first Bowdoin-sponsored scientific expedition to Kent Island (the "Four Pioneers" expedition, which was led by Bill Gross); and marked the 55th year of Dr. Chuck Huntington's study of the Leach's Storm-Petrels on Kent Island.

BSS offers students a rich and rewarding field experience. Because of this, it has made the world a better place. Those of us whose lives have been enriched by the Kent Island Experience need to ensure that this experience remains available for generations of students to come.

Keep In Touch,

Damon P. Gannon

Damon Gannon, Director
dgannon@bowdoin.edu
(207) 798-4267



Front Cover: View of Kent Island from atop the Dorm, looking southward at the South Field. BSS's first caretaker, Ernest Joy, and his housekeeper, Carrie Chase, are walking past the Warden's House. Bob Cunningham's anemometer is on the roof of the Warden's House and his rain gauge is in the foreground, to the right of the Warden's House. Photo taken between 1937 and 1948, probably by Bob Cunningham.

Left: The same view in 2009. Not much has changed besides the invention of the frisbee that the students are using, the appearance of a few white spruce trees around the Radio Shack, and the disappearance of the forest on the south end of the island. Bob Cunningham's rain gauge and anemometer are still in use.



The summer research season is always the busiest time of year at BSS. But the Station had many other uses in 2009. In total, 53 undergraduate students, 4 graduate students, 5 research assistants, 6 Bowdoin faculty, 8 non-Bowdoin faculty, and 44 visitors used BSS this year.

Undergraduate Researchers & Artists

- Katie Blizzard ('11)
- Clara Cooper-Mullin (Kenyon College '09)
- Evan Fricke ('11)
- Evan Graff ('11)
- Colin Matthews ('10)
- Mary Helen Miller ('09)
- Carina Sandoval ('10)
- Marie Sears ('09)
- Kevin Smith ('11)
- Rolanda Steenweg (Dalhousie University '10)

Graduate Students

- Sandy Camilleri (M.S. student, University of North Carolina Wilmington)
- Morgan Gilmour (M.S. student, Bucknell University)
- Greg Mitchell (Ph.D. student, University of Guelph)
- Sarah Wong (Ph.D. student, Dalhousie University)

Bowdoin Faculty & Research Associates

- Damon Gannon (BSS, Biology)
- Janet Gannon (Biology)
- Chuck Huntington (Biology-emeritus)
- John Lichter (Biology, Environmental Studies)
- Nancy Olmstead (Biology)
- Nat Wheelwright (Biology)

Visiting Faculty & Research Associates

- Don Dearborn, Bucknell University
- Tony Diamond, University of New Brunswick
- Heather Koopman, Univ. N. Carolina Wilmington
- Bob Mauck, Kenyon College
- Amy Newman, University of Guelph
- Ryan Norris, University of Guelph

- Rob Ronconi, Dalhousie University
- Heather Williams ('77), Williams College

Research Assistants, Volunteers, and Guests

- Peter Cunningham
- Dre Gager
- Joan Ingalls
- Mike Janssen
- Scott Matthews
- Katie Mauck
- Susie Mauck
- Marie Miller
- Nina Murray
- Seth Murray
- Jon Olmstead
- Jan & Liz Pierson (BSS alums)
- Fraser Shepherd
- Joanne Sliker
- Andrew Westgate (Univ. N. Carolina Wilmington)
- ~30 people for Bill Gross's Memorial Service

Station Staff

- Nancy Donsbach, Budget Coordinator
- Damon Gannon, Director
- Russell Ingalls, Caretaker
- Mary Helen Miller, Cook
- Mark Murray, Caretaker
- Julie Santorella, Administrative Coordinator

Class Field Trips

- Bio 225 Community, Ecosystem, and Global Change Ecology (John Lichter & Nancy Olmstead, instructors)
- Bio 274 Marine Conservation Biology (Damon Gannon, instructor)
- Bio 397 Advanced Winter Ecology (John Lichter, instructor)

In addition, twelve first-year students at Bowdoin, led by three upper-class students, ventured to Kent Island for a 4-day pre-orientation trip in August.



Back row, from left: Greg Mitchell, Rob Ronconi, Mark Murray, Don Dearborn, Katie Blizzard, Carina Sandoval, Clara Cooper-Mullin, Marie Sears, and Colin Matthews. **Front row, from left:** Janet Gannon, Damon Gannon, Kevin Smith, Evan Fricke, Rolanda Steenweg, Nancy Olmstead, Morgan Gilmour, and Evan Graff. **Lying on ground:** Ryan Norris.

Three Islands Ecology



The **snowshoe hares**, which were introduced in the 1950's and devastated the plant communities on Hay and Kent Islands, appear to be gone for good, and the tree seedlings have responded explosively. The extraordinary changes in seedling recruitment over the previous year were immediately obvious. On the northern end of the island, where there was open ground under the forest canopy in 2008, stood a waist-high understory of heart-leaved birch in June 2009. By September, these baby birches were as high as an elephant's eye. A thick carpet of **balsam fir** seedlings has sprouted up around the Shire. **White spruce** and **heart-leaved birch** seedlings are marching across the fields. This latter observation presents an interesting problem. To maintain the long-term studies of **Savannah sparrows** and **tree swallows**, we need to begin a well-planned land management scheme to keep some of the fields open. Nat Wheelwright did some initial work in the fall to clear seedlings in one area, and quickly discovered that this job is too big for any of the mowing equipment that we currently possess. We will need a large bush hog mower attachment for our tractor if we hope to keep ahead of the seedlings and thus maintain good nesting habitat for the Savannah sparrows and tree swallows. The fields would likely be mowed on a 3-year rotation, with 1/3 of the 50 m × 50 m grid cells being mowed each year (in the fall, after the sparrows have fledged). Some trees will be allowed to grow in the Savannah sparrow/tree swallow study areas, but it will be maintained as open space. Outside of these study areas, forest succession will be allowed to proceed.

In 2008, we had an outbreak of **spruce bark beetles**. Many of the large **white spruce trees** on Kent and Hay Islands died as a result of infestation. Fortunately, Nathan Elliott ('09), Allison Weide ('08), and Meredith Steck ('09) thoroughly documented the beetle species responsible and

the distribution and severity of the infestation during 2008. Kevin Smith ('11) followed up this initial work to see whether the infestation was still active, and to determine the fates of trees that had been infested during the previous year. Thankfully, no signs of an active infestation were discovered in 2009 and no living **bark beetles** were found. Although many **white spruce trees** that had previously been infested were dead, some survived. Cold winter temperatures are thought to control spruce bark beetle populations. As the climate changes, spruce bark beetle infestations may become more common on Kent Island. With the uneven distribution of ages among trees caused by the snowshoe hares (disproportionately high number of old trees resulting from the hares selectively feeding on seedlings), the forests of Kent and Hay Islands are particularly vulnerable to beetle infestations.

Common terns returned to Sheep Island this summer with a vengeance. Since the colony has just begun to re-establish itself, it is vulnerable to human disturbance and predation by gulls. Tern abundance in the colony has to reach a critical threshold so that they can fend off predatory gulls. Since they are vulnerable, we were not able to conduct a nest survey but there appeared to be at least as many terns in the colony this year as there were in 2008. So there is good reason for hope...

...**Tree swallows**, on the other hand, are not looking so positive. Over the past 20 years, tree swallow numbers on Kent Island, and across much of North America, have been declining steadily. This summer's cool, rainy weather just made a bad situation even worse for Kent Island's tree swallows. Clara Cooper-Mullin (Kenyon '09) and Kevin Smith ('11) maintained the nest boxes and monitored nesting success. There were seven nests, but unfortunately only two of those nests survived to fledging.

Foggiest of Notions

Since its founding, this little outpost has been making large contributions to science. For example, in 1941, Bob Cunningham published a research paper documenting that the tiny water droplets in Kent Island's famous fog were acidic and that their acidity varied depending on wind patterns. He concluded that the source of the acidity was industrial pollutants from the midwestern states. Thirty years later, his findings were confirmed by the now-famous studies of what became known as 'acid rain.' Bob's research at BSS was part of the scientific underpinning for the passage of the federal Clean Air Act, a landmark piece of legislation that has significantly improved air quality and reduced the problem of acid rain. Most people know about acid rain, but few know about the role that Bob Cunningham and BSS played in documenting it, identifying its source, and reducing it. Bob continued his work for more than 60 years, studying such things as trends in fog acidity and the effects of acidic fog on forest health.

2009 Research Projects



Water, Water Everywhere But Not a Drop to Drink Clara Cooper-Mullin, Kenyon College '09

Many factors influence, and limit, the survival of nestlings in a breeding season, including diet, growth rates and individual quality. Last season, Priscilla Erickson compared

growth rates of nestlings given lysozyme (an immune system-enhancing enzyme), to those given distilled water and those given no treatment (control treatments). She found that nestling growth was affected neither by lysozyme nor water supplements. However, Greg Mitchell's radio tracking

Research, cont.

and mist netting activities in the fall showed that the fledglings that had been given either the enzyme or water supplement as nestlings had greater survival rates than did those in the control group. This led us to believe that water availability during early growth and development may have an effect on the nestling's ability to survive the fledgling period. To explore this, under the supervision of Bob Mauck, I gave nestlings within a nest PBS, distilled water or air as a control. PBS is a mixture of water and salts, much like Gatorade, which, in theory, should ward off dehydration better than distilled water.

I spent most of my days this summer tramping through the fields looking for Savannah sparrow nests and then checking them every other day for hatching. Once a nest hatched, I measured and gave treatments to the nestlings after two, four and seven days. On day seven I took a small amount of blood to measure hematocrit, which indicates the degree of dehydration. I also banded the nestlings on the seventh day so that later on in the summer, and next year, we can determine what treatments they were given. I am really looking forward to hearing about the effects my treatments had on Savannah sparrow survival through the post-fledging period and into next year.



Clara Cooper-Mullin preparing to administer experimental treatments.

Easter Egg Hunt, Kent Island Style Evan Graff, Bowdoin '11

For my summer research project, I studied Kent Island's population of savannah sparrows. With the help of Nat Wheelwright, I decided to focus my research on egg characteristics, including length, shape, volume, and coloration. My study is designed to investigate whether these traits are genetically determined or whether they are influenced by the characteristics of the surrounding habitat or by their diet. To do this, I will look for patterns within clutches, between first and second clutches from the same parents, by geographic location, and by relatedness of females. I also will look for any relationship between the amount of variation in these

characteristics and a female's seasonal breeding history.

In the past, it has been difficult to study savannah sparrow eggs because they are extremely fragile. To avoid damaging eggs, I took all of my measurements photographically. I photographed the eggs with a gray color standard and a ruler for use as a length reference. To keep light conditions consistent, I placed the tray and camera inside a dark box that Marko adapted for this purpose. I also recorded details on nest type, nest orientation, and local habitat. I will be analyzing my data back on campus during the coming year.

I love photography in general, so when I wasn't doing sparrow work, I also took time to create images that capture the unique feel of Kent Island. It was incredible to see how many different settings and subjects exist on an island of this size. I'm really looking forward to sharing the wonder of this island with those who have never visited. The experience of intensive scientific inquiry, combined with the strong community atmosphere and nature of life on Kent Island, has made this summer one that I will treasure for years to come.

Tracking Movements of Savannah Sparrows with Electronic Tags Greg Mitchell, Ph.D. Student, University of Guelph

My advisor, Dr. Ryan Norris, and I were among this year's group of Sparrow Wranglers. Beginning in June, we helped search for Savannah sparrow nests and captured unmarked individuals within the study site. In September, I began outfitting both adult and juvenile Savannah sparrows with miniature radio transmitters. Using three towers that I constructed, each equipped with multiple antennae and an automated radio telemetry receiver, as well as handheld receivers and antennae, I was able to track the movements of instrumented birds. This allowed me to measure survival on Kent Island prior to migration, and the direction of departure at the commencement of migration. Survival prior to migration is of interest because there are currently few estimates of survival for songbirds during this potentially critical period. We were also interested in the direction of migration because the shortest (energetically least costly) route is likely to be the riskiest route since it takes the birds across open ocean where there is no opportunity to rest and there is a chance of being blown off course by storms. So a trade-off exists, and birds with different levels of experience or fitness might differ with regard to the migration routes that they choose. This year's research was a great success; I was able to measure survival for a group of 50 birds and was able to track departure directions for 42 birds who had commenced their fall migrations. Ryan and I look forward to following up this effort next year as well as trying to track some of the individuals once they leave the island and migrate down the Atlantic coast.

Song learning in the Savannah Sparrow Heather Williams ('77), Professor of Biology, Williams College

I continued my long-term study of Savannah sparrow song

learning dynamics. Once again, I recorded most (90-95%) of the males singing in the main study area (South Field) and in the North Field, and also extended the recording area to the south of South Field. Using a high-speed camera from within Nat's blind, I obtained video recordings of birds singing so as to match their beak gape patterns to the acoustic features of individuals' songs. Comparing Kent Island songs to those sung by an inland, apple-orchard-dwelling population near Williams College, I found that the two populations appear to have trade-offs in the pulse length and pitch of their songs' buzzes and trills. I gave a presentation on female choice of Kent Island males' song characteristics at the fourteenth annual Bird Song Conference in Millbrook, NY.



Savannah sparrow chick.

Demography and Burrow Selection By Leach's Storm-Petrels Katie Blizzard, Bowdoin '11

I spent my summer on Kent Island studying Leach's storm-petrels. Kent Island boasts an impressive petrel study site, affectionately known as the "Shire," consisting of hundreds of underground petrel burrows. As one of this year's petrel researchers, I helped continue the island's ongoing population survey of petrels within the Shire. While at first this job seemed simple enough, in retrospect, I had no idea what I was getting myself into. During my first week on the island, I was introduced to the practice of "grubbing," which involves sticking your arm down into a petrel burrow in hopes of finding a bird, egg, or later on, a chick. If you're lucky, the bird will bite your fingertip, therefore making it easy to pull the bird out by its beak, which is the preferred method of removal. After the first couple of weeks, having mysterious bites and scratches covering my hands and forearms had simply become a way of life. The work was dirty, but very rewarding. Having the opportunity to work in such a well developed study site was an incredibly valuable experience that has definitely peaked my interest in field research.

When I wasn't busy grubbing, I also worked on a project with Evan Fricke evaluating the structural characteristics of the petrel burrows in the Shire. Our project, not surprisingly, essentially entailed even more grubbing, but this time not in search of birds. There seems to be a high degree of variation

between individual burrows at all levels, from the size of the nest chamber to the density of the forest canopy overhead. Moreover, only about half of the burrows in the Shire are occupied in any given year, indicating that petrels may prefer certain burrows over others. In order to investigate what types of structural characteristics the petrels might prefer, we studied 10 characteristics involving the burrow interior, such as passageway length, as well as 4 characteristics pertaining to the burrow exterior, such as the slope of the immediately surrounding area. If possible, grubbing for structural characteristics turned out to be even messier work than grubbing for petrels. The data we collected will be the basis of both of our independent studies this coming academic year.

Where the Sun Don't Shine: Studying the Physical Characteristics of Petrel Burrows Evan Fricke, Bowdoin '11

I spent my summer with my arms shoulder-deep in the ground studying the microhabitat variations in the burrows of Leach's Storm Petrel. In any given breeding season, many burrows are occupied while others remain empty. Because some burrows are dry and some are wet, and some burrows are curvy while others are straight, petrels that come to breed are presented with a choice between an array of different burrows with a variety of potential benefits. Examination of how the characteristics of a burrow relate to its rate of occupancy provides insight about the preferences of petrels for certain features, and therefore why one burrow is chosen over another.

To study these burrow features, Katie Blizzard and I measured, for each burrow in the Shire, several internal specifications (burrow length, number of passage turns, nest chamber size, etc.), some variables related to the landscape around the burrow entrance (slope, soil depth, canopy density), and spatial factors (distance to other burrows, distance to forest clearing). Each characteristic may provide benefits ranging from insulation to predator avoidance. Meanwhile, we checked each burrow to determine the date on which each egg was laid, measured and weighed adults, recorded band numbers, and determined the date on which each egg hatched. Using these and previous records of occupancy from Bob Mauck's study, I will conduct an independent study in the fall, once my arms are no longer covered in dirt, to analyze how these characteristics relate to burrow occupancy.

When not immersed in petrel biology, I had the chance to tag along on other's projects, refined my knitting skills, learned (on several occasions) that the Bay of Fundy is no place for swimming, and found that a summer on Kent is a summer well spent.

Leach's Storm-Petrels: Nature's Seagoing Oil Refineries Sandy Camilleri, M.S. Student, University of North Carolina Wilmington

This summer I spent one week in July on Kent Island conducting a pilot study for my master's thesis research at the University of North Carolina at Wilmington. I am interested in comparing the relative costs and benefits of two provisioning strategies used by seabirds. Most seabirds supply

chicks with whole, unaltered prey. This contrasts with the strategy used by the bird Order Procellariiform, where adults concentrate the oils extracted from ingested prey for delivery of energy-rich lipids ("stomach oil") to chicks. This study will not only provide an opportunity to compare the evolutionary trade-offs of two parenting strategies but also investigate potential negative effects induced by modern deterioration of environmental quality (i.e., lipid-soluble toxins that are incidentally fed to chicks by their parents).

I collected samples of regurgitated oil from Leach's storm-petrels in the study area known as "The Ditch" to evaluate the quality of oils provisioned to chicks. I plan to compare the lipid content, energy value and contaminant concentrations of stomach oils with those of whole prey items that would be fed to other seabird chicks nesting in this area (e.g., Puffins and terns). We hypothesize that the "oil" strategy delivers food with greater energy content but a higher contaminant burden than does the "intact prey" strategy, leading to a greater potential contaminant exposure of chicks.

I was able to collect a total of 9 samples from 6 adults and 3 chicks. Preliminary analysis of the stomach oil shows that it is at least 6 times more energy rich than either Atlantic herring or *Calanus* copepods (potential prey items). Although my time on Kent this summer was short, this pilot study allowed me to work out the sampling logistics for my project, learn how to survey burrows, become familiar with petrel handling procedures, and how to collect the oil samples. I am looking forward to coming back next year to collect more samples!



Evan Fricke checks a leg band on a Leach's storm-petrel.

Winter Ecology and Subsequent Reproductive Effort of Leach's Storm-Petrels

Morgan Gilmour, M.S. Student, Bucknell University

My first season of Kent research introduced me to the dirty but fun activity of grubbing. I am interested in the little-known wintering ecology of Leach's Storm-Petrels. Seabirds spend the majority of their lives at sea, and only return to land for a few months during the summer to breed. It has been demonstrated in migratory birds that factors such as food availability and environmental conditions during the winter months affect the nutritional condition and breeding success of birds during the following summer.

My advisor, Dr. Don Dearborn, and I collected winter-grown feathers from 90 petrels breeding in the Shire. Feathers become metabolically inert after they have finished growing,

so that amounts of nutrients and hormones are preserved in the feather. Isotopic analyses (which are being performed in collaboration with fellow Kent Islander, Dr. Ryan Norris) will help to determine the trophic level at which these birds fed during the winter. Feeding at high trophic levels indicates that the birds are consuming high-energy prey, which contributes to a bird exhibiting a good physiological condition as well as lower stress levels. Analyses of a stress hormone, corticosterone, will also be performed on the feathers, which will establish the stress levels of the bird during the winter, as it attempted to find enough food. Low stress levels help birds allocate more energy to reproduction, so that they can successfully return to Kent to breed, and fledge a chick. In 2010, I will sample the same birds and compare trophic and corticosterone levels, and reproductive effort, between years in order to determine whether individual petrels perform consistently over time.



Rolanda Steenweg working in the Station's lab.

Foraging Ecology of Gulls in the Bay of Fundy

Rolanda Steenweg, Dalhousie University '10

I spent my summer on Kent Island investigating the foraging ecology of gulls in the Bay of Fundy. Specifically I am interested in the diets of chick and adult Herring Gulls and Greater Black Backed Gulls during different breeding stages. This can increase our understanding of current decreasing population trends. Moreover, seabirds are also important indicators of marine fish stocks, therefore understanding changes in bird populations can help identify problems in the marine environment. To characterize gull diets, I collected blood and feather samples for stable isotope analysis and collected "pellet regurgitate" samples from nests.

The beginning of my field season consisted of intense training by Rob Ronconi, Sarah Wong and Tony Diamond on how to trap and handle the gulls, with the most important part being how to avoid being bitten and dive bombed during the process (being pooped on however, proved unavoidable). During this period we also attached satellite tracking tags to three Herring Gulls to track their movements.¹ Throughout

the field season, the other students and Damon helped out with my data collection. During my final week on Kent Island, when most of the chicks had hatched, Rob helped me trap and sample the chicks of the parents that I had sampled previously. In the coming school year, I will analyze these data for my honours thesis.

¹See maps showing the movements of the three herring gulls tagged on Kent Island during May of 2009 at http://www.seaturtle.org/tracking/index.shtml?project_id=428. These birds were fitted with solar-powered satellite tags that transmit their locations.

Ecology of Kent Island's Muskrats Marie Sears, Bowdoin '09

I came to Kent Island this summer to study muskrats. Although many muskrats are trapped and removed from the island every spring, they are rather elusive critters and we know relatively little about their behavior and habitat use on the island. What we do know suggests that Kent Island's muskrats differ from their mainland relatives in terms of their ecology and behavior.

Working with Nancy Olmstead, I set out to study muskrat habitat preference and their effects on vegetation, as well as to generate a rough estimate of the size of the population on Kent Island. I began my summer by surveying the island for signs of any muskrat activity. I walked 50 transects across the island and recorded the location of muskrat burrows, runs and scat along each transect. I was then able to categorize the muskrat signs I observed by the habitat categories created by Nathan Elliot in 2008. In a preliminary analysis of these data it appears that muskrats prefer the wetland and field areas of the island over forested areas, in particular mixed fields and wetlands over balsam fir forests.

To address the question of habitat preference, Nancy and I live-trapped muskrats in different habitats across the island. We also hoped to use mark re-capture methods to estimate the size of the Kent Island muskrat population. However, despite a total of 422 trap nights we only caught 11 muskrats. With such a low catch rate we were unable to complete the mark re-capture study, but we did collect habitat data for our trapping effort. Hopefully more animals can be caught next year and these data can be compared by habitat type.

To answer our question about the effect of muskrats on vegetation, we built 6 exclosures, and 6 control plots of approximately two meters square around the island. We placed three exclosures in wetland habitats and three in fields. They were dug down into the ground to prevent the muskrats from tunneling underneath. We surveyed the plant community in each plot, and hopefully they can be monitored over time to document vegetation changes as a result of muskrat activity.

"The experience of intensive scientific inquiry, combined with the strong community atmosphere and nature of life on Kent Island, has made this summer one that I will treasure for years to come."

-Evan Graff, Bowdoin '11



Marie Sears shows off one of the "exclosures" that she and Nancy Olmstead constructed to determine how muskrats affect Kent Island's plant communities.

Forest Dynamics on Kent and Hay Islands Kevin Smith, Bowdoin '11

I investigated changes in forest composition in the wake of snowshoe hare eradication and the bark beetle infestation of 2008, with the help of Damon Gannon. Years of selective grazing on tree seedlings by the hares produced an increasingly homogenous age structure of the forest, which may have made it more susceptible to beetle infestation. My work was focused around evaluating the repercussions of this forest aging and understanding how these forest changes will affect seedling recruitment and survival in the future.

I began by evaluating the status of the recent spruce bark beetle infestation. I returned to white spruce trees that had been inspected and tagged in previous years, to check for beetle damage and search for signs of a current beetle infestation. I did not find a single bark beetle during my entire stay on the island (yay!), though I did find many trees showing signs of past infestations. A cold winter may have caused a crash in the bark beetle population, thereby reducing the visible effects of infestation this year. I tagged additional trees with the hope that more tagged trees will help us to understand more about the nature of the bark beetle infestation if there is ever a future spike in their population.

I also conducted work with seedling recruitment on Hay Island, extending the work done by students in previous years. Using Nathan Elliott's survey protocol, I collected habitat data in 10 x 10 meter grid cells on Hay Island. The hope was to evaluate and compare seedling recruitment rates and habitat types between the two islands while also understanding more about the biotic and abiotic factors conducive to seedling recruitment and survival. I recorded the vegetative cover, canopy characteristics, soil characteristics,

Research, cont.

and the prevalence of seedlings, saplings, and mature trees. With these data, comparisons between seedling recruitment rates and various habitat factors will be possible. The data will also help to supplement Nathan's habitat survey of Kent Island and provide a better understanding of the habitat types on Hay Island.

Back on Kent, I returned to the permanent plots set up by Anna Bender in 2007 to re-survey the plant communities in these plots. Three 1.5 x 1.5 meter staked off plots were set up in the five major forest types on the island (mixed forest, white spruce forest, balsam fir forest, mountain ash forest, and white birch forest). At each of these plots I evaluated vegetative cover and counted and measured seedlings found in the plot. I also recorded depth to mineral soil, canopy height, and canopy density at four points outside but near to the permanent plot. I hope to compare the data collected this year to the original plot data collected two years ago to evaluate changes in understory vegetative composition,

seedling prevalence and size, and canopy characteristics. The changes seen in the two-year period could be a good indicator of what to expect in the coming years as the forest recovers from the damage of the snowshoe hares.



Kevin Smith and Damon Gannon discussing field sampling protocols.

2009 Artists in Residence

Carina Sandoval, Bowdoin '10

I arrived on Kent Island with only vague ideas of how life would be and what work was done here. Having recently returned from a semester in Rome, I prepared myself for a drastic change of setting and was eager to take on the challenge. I had little planned for my work, not knowing how the island might inspire me. However, I did have two main goals: to experiment with new and diverse techniques, and to explore and develop a concept with depth and focus.

Having the opportunity to work in this secluded environment allowed me to focus on my art without the distractions of the modern world. One of my favorite places on Kent Island is cozy and isolated Fog Heaven, though I only discovered its greatness and claimed it as my studio a few weeks before the end of the field season. My work this summer ranged from portraiture and landscape painting to ink drawing to aluminum wire sculpture. These formed several small series, which gave me the opportunity to accomplish my first goal of experimentation. I also experimented with untraditional surfaces such as old wooden shingles (Marko was glad to see that I found a "higher purpose" for them). However, my main focus of the summer was a series of skull drawings. My fascination with skulls and bones began when I found a seal skeleton on the East beach on our first week here. After deciding that I enjoyed drawing bones, the many old skulls on shelves around the dorm and lab became my subjects. It was not long before people started coming up to me saying "Hey, I saw something today that you'd really like!" of course referring to a dead animal somewhere. The shocking part was that I actually got excited about these things, achieving an unexpected level of creepiness. I became the Georgia O'Keeffe of Kent Island, finding inspiration in ditches where ravens deposited gull remains in stead of on the deserts of New Mexico.

I ended up with four sets of drawings of muskrat, bird, seal, deer, and sheep skulls. Each set starts with a detailed

graphite drawing. For each of these I created four ink drawings on vellum isolating different elements of the initial image: contour, silhouette, shadow, and highlight. The transparency of the vellum allows the viewer to see the elements combined when the pieces are layered together. While looking at the individual elements I realized that the shapes created by the shadows made the subject harder to identify. This intrigued me, so I began using these shapes to create new abstracted compositions. This method allowed me to become comfortable working abstractly because the shapes were rooted in found rather than invented imagery. I plan on continuing to explore the direction I've taken with my art and look forward to getting feedback from my professors. I hope to show my work along with Colin's in an exhibit upon our return to Bowdoin this fall.²

When I wasn't making art, I took the opportunity to learn from my fellow Kent Islanders about subjects I had not known much about. I was happy to help people with their research on several occasions. Some of the most valuable lessons I've learned, though, have turned out to be completely non-academic. I have loved learning how to live life more simply and acquiring new skills such as bread baking. While working here, I got to meet people outside my field that I would have never met otherwise. It was interesting to see how scientists view the world always with curiosity, and being surrounded by them has led me to be more curious about the world around me as well.

Colin Matthews, Bowdoin '10

The harsh, abrupt coastline of Kent Island is filled with cliffs, boulders, and interesting rock formations. During my first visit to the island in October, 2008, I photographed the rocks of the southern end extensively. Upon my return in 2009, I took the southern end as my starting point, sketching rock faces. In the studio, I transferred the drawings onto



wood and created a pair of woodcut prints. Dissatisfied with the amount of time required for the intricate transferal process and subsequent carving (over a week per print), I started to freehand carve the wood blocks. Instead of sketching in the field, I collected visually interesting rocks to bring into the studio. I was principally interested in line values—interactions between different lines as they occurred on the wood block. Freehand carving from a small rock posed challenges of composition, as I found myself being forced to make deliberate decisions in order to convert the round face of a surf-worn pebble into a flat, rectangular print. Questions arose of how much of the surface of the rock should be observed—does a vein of quartzite running completely around a rock's girth translate as a straight line or a circle on the wood block? It's a matter of perspective, choice, and intention.

Throughout the summer, I photographed almost constantly. It was difficult, at times, to refrain from traditional landscape photography. The beauty of the island is such that certain clichéd photographs just scream to be taken. I felt challenged to use the raw power of Kent Island's scenery in an original, interesting way. My principal subjects were the rocks at the southern end of the island, dying trees in the south field, and various buildings around the island. I took over 2,600 photographs and have only just begun the editing process. At this point, it is difficult to foresee how a series of photographs from this summer might look.² I'm looking forward to editing and forming a cohesive body of work from all the material I have collected.

²Colin and Carina exhibited the fruits of their labor in a two-artist exhibit in the Bowdoin College Visual Arts Center. The exhibit was aptly titled "Island Bound."

Mary Helen Miller, Bowdoin '09

After spending last summer as an artist-in-residence who frequently helped out in the kitchen, I came back for another summer—this time to be the cook and to paint on the side. I spent most mornings painting or making grocery lists and menu plans, and I cooked for most of the afternoon. We planted a garden in a new cold frame, which provided us with delicious salad greens, basil, radishes, chard, and a little broccoli throughout the summer. Early in the summer, I initiated a philosophical discussion at dinner one night about the merits of having dessert every night. The general consensus seemed to be that, like having strong coffee every morning, having dessert every night was simply a quality of

life issue. By the end of the summer, the philosophical discussion turned to how we could most smoothly reenter a life without so many sweets.

Just a couple of weeks into the season, on a Sunday evening, one of the students set up a slack line, which is a kind of tight rope made out of climbers' webbing. I joined the rest of the students in trying to balance on it, and on my last try, I fell off and landed on my leg at the wrong angle. The next morning, my roommate in Gillette transported me to the dorm for breakfast in the pushcart. Shortly after, Marko fashioned a crutch for me out of driftwood and hose clamps, which I used to hobble around for the next week before deciding to head back to Brunswick to see a doctor. The crutch attracted much attention in Brunswick! Strangers' compliments included: "Sweet crutch," "Sick crutch," and "Rock on."

As it turns out, I tore my ACL and missed three weeks in the middle of the field season to go to physical therapy at home in Tennessee.³ I returned to Kent Island in early July for the final three weeks of the field season. When I got back to the island, everyone pretended that they had eaten only oatmeal in my absence, but I figured out that they had actually added cooking to the chore rotation and had eaten quite well! I finished paintings of the Cub Cadet tractor, the wash basin on the outside of the dorm, the back of the Warden's House, and the boat ramp from Gillette. And by the last night, the broccoli in the garden was finally large enough to eat for the first time of the summer.

³Mary Helen had surgery in August, which successfully repaired her torn anterior cruciate ligament.



Mary Helen Miller working at her easel.

Insular Polytechnology (Facilities & Maintenance)

Caretaker Tag Team:

Mark Murray and Russell Ingalls are magicians; they accomplish so many things with so little fanfare (and such a small budget). For example, in addition to all of his regular

maintenance activities, Marko replaced all of the windows on the second floor of the Dorm; replaced a window in the Radio Shack; removed a huge, dead spruce tree threatening to fall on the well; reconfigured the well pump power sup-



Insular Polytechnology , Cont.

ply; placed an additional concrete well tile on the well; made new covers for the well and water tank; made a new set of double folding doors for the shop; made extensive repairs to the bridge behind the lower lab; repaired the porch on the west end of the Dorm; and made two picnic tables for outdoor use.

Russell watches over Kent Island during the winter when and he is our go-to guy during the summer whenever we need anything done on Grand Manan or when we need a large load of supplies or people delivered. And he always manages to accomplish a major project at the Station each summer (see below). But more importantly, he is our safety net. From the moment the Station opens in the spring until the time it closes in late autumn, Russell is on call 24/7 for any situation. I certainly sleep better knowing that Russell and his wife, Joan, are on the other end of the VHF radio.

Much of what Mark and Russell do goes unnoticed, behind-the-scenes. But we'd certainly notice these things if they didn't get done!

Is there an Engineer in the House?

Seth Murray took time off from his regular job as chief engineer aboard the research vessels operated by the Sea Education Association to help us maintain our electrical systems and instruments. He spent a week on Kent Island in July and spent another week on the Island in late October to help his dad winterize the Station. BSS is extremely fortunate to have such a highly-trained engineer looking after its systems. Seth has been helping out on Kent Island since he was a kid, so he has an intimate knowledge of all of its systems. The fact that he does this as a volunteer is even more amazing. We couldn't afford to pay a comparably-qualified engineer to come to Kent Island for two weeks each year.



Marko Murray putting the finishing touches on the new doors for the Shop.

Internet installation:

In the 1930's, BSS possessed a state-of-the-art communications system: a short-wave radio that made it possible to communicate over vast distances. In fact, one major research focus at BSS during the early days was shortwave radio technology (see papers by T.A. Gross in 1937 and 1938). This technology was the internet of its day. Radio communications capabilities on Kent Island were then supplemented by telephone communications. A submarine

telephone cable once connected Grand Manan, Whitehead, Kent Island, and Gannet Rock. So throughout much of its history, Kent Island was at the forefront of communications technology.

Like it or not, science has embraced the internet to the extent where it is now impossible to perform even the most basic functions in academia without the internet. Manuscript submissions to journals, proposal and grant application submissions to funding agencies, progress report submissions to funding agencies, and abstract submissions to conference organizers are all accomplished via the internet. Service to the academic community, such as manuscript reviews, proposal reviews, and submission of recommendation letters, is also accomplished via the internet. In particular on Kent Island, we often run into situations where students have questions about their research methods and need to get in contact with professors (who often turn out to be at other field sites themselves, and thus are difficult to reach by phone).

For me, the straw that broke the camel's back came when I was organizing a faculty site visit to Kent Island during the summer of 2008. I was already on Kent and I was trying to coordinate travel logistics for seven professors coming from Bowdoin and three others coming from other institutions. Communicating with such a large group required email, which meant that I had to go to Grand Manan. It took the better part of a day to make the trip to send a single email message. It took another day-long trip to retrieve the responses. Although I love a boat ride as much as anyone, it wasn't a very effective use of my time (not to mention the cost of fuel).

It was clear that we needed to take the plunge in the cyber pool, but it was also clear that we needed to find a way of obtaining the benefits of the internet without disrupting the Kent Island community. The plan we came up with was to have a single, wired, internet connection in the Warden's House. Since the Warden's House is not a public area, use of the internet could be limited to work-related purposes.

In early July, Fundy Bay Networks Inc., a small company on Grand Manan owned by Howard and Rebecca Small, brought the internet to Kent Island. Russell Ingalls also helped with the installation. The system consists of a transceiver on Whitehead Island that relays signals to an inconspicuous antenna mounted on the back of the Radio Shack (a fitting location, I must say). From there, a buried cable carries the signal to a tiny box inside the Warden's House, where it is converted into a data stream that a computer can recognize. A single wire provides access to the outside world for one computer in the Warden's House. The system could support a wireless router, enabling several computers to be online simultaneously from different parts of the island, but this is exactly what we don't want. People come to Kent Island to focus on their field research, not to spend time surfing the web. So for now we will stick with a single connection.

The system works superbly. Howard and Rebecca Small have provided great service at low cost. They worked hard to optimize our system's performance and gave us free in-

Insular Polytechnology , Cont.

stallation and equipment. Within the first few days of the internet installation, two manuscripts had been submitted for publication, a grant progress report had been submitted, data collection software tools had been downloaded, and faculty advisors had been consulted for advice on data collection methods. Just as importantly, the consensus among

students and faculty on the island was that the arrival of the internet had not caused a disruption to the community.

The real test came as final preparations were being made to host 30 people for Bill Gross's memorial celebration. Unlike the experience with the previous summer's event, communication and planning was easy this time around.

(Human) Life on Kent Island



Dr. Don Dearborn putting on a show in the greasy pole competition during the Canada Day celebration in Seal Cove. He makes it look so easy. Just wait until he hits that 50-degree water!

Recreational and social activities are crucial elements of the *Kent Island Experience*. The point of going to Kent Island is to accomplish a lot of work. But you can't work nonstop for two months. So we work hard and we play hard. Here is a sampling of the 2009's extracurricular activities:

Canada Day:

Much fun was had at the traditional Canada Day celebration in Seal Cove. Starting with the lobster pot hauling competition, octogenarian Junior Ingalls (Russell's father) teamed up with his granddaughter, Wendy Ingalls. Junior was on the oars and Wendy hauled the pots. They won their first race and advanced to the finals. They didn't come out on top but they certainly out-classed the competition.

BSS fielded five competitors in the greasy pole competition. Don Dearborn, who arrived on Grand Manan just in time to defend his title, successfully grabbed the little Canadian flag at the end of the 30-foot pole. This is his third successful year in a row. Kevin Smith was also successful.

Machias Seal Island Trip:

We celebrated the 4th of July by making our annual pilgrimage to Machias Seal Island. It seemed like a fitting day for our visit, since we were a mixed group of Canadians and Americans, and Machias Seal Island is claimed by

both Canada and the U.S. It is one of the few places where people can observe nesting puffins, razorbills, and murrelets without disturbing them.

On Machias Seal, we ran into Dr. Tony Diamond from the University of New Brunswick. Tony spent a few days on Kent Island back in June, teaching Rolanda how to catch and handle gulls. Tony is one of the world's true experts on seabirds and he runs a long-term field research program on Machias Seal Island. So it was wonderful to catch up with him and to learn about the research that he and his students are conducting.

Whale Watch:

Once the rain finally let up in late July, Russell took everyone out on *Island Bound* for our annual whale watching trip. We saw finback, humpback, and minke whales, as well as some harbor porpoises. There were a half-dozen finback whales charging around in tight formation. These are impressive animals: 60-70 feet in length and built for speed. We also watched a humpback whale breach over and over for about 45 minutes.

After we took a break to enjoy Russell's famous barbecued bacon, we took a look at an area east-southeast of Kent Island, called the Bulkhead, where huge standing waves form on every outgoing tide. Then we made a close

(Human) Life on Kent Island, Cont.

pass by Gannet Rock. The rock's lighthouse was manned until the 1970's. Since its automation, just the gray seals and harbor seals watch over it now. The whale watch this year was especially fun since fellow marine mammal biologist Heather Koopman was along for the ride.

Kent Island Cuisine:

Cooking for 20 people every day is not an easy job. And with fresh provisions only arriving every week or two, this job is particularly challenging on Kent Island. Being a successful cook at BSS requires a lot of planning and a heaping spoonful of creativity. (*"The recipe calls for what? We'll just have to find a reasonable substitute in the pantry."*) So you would expect that it would take a few weeks for a new cook to hit her stride. But this wasn't true for Mary Helen Miller; she brought her "A" Game on day # 1. Chicken curry and huevos rancheros were some of the many favorites.

Everyone was concerned when Mary Helen injured her knee—concerned for her health of course, but also for ours. Would we have to eat cold cereal and PB&J for the next 6 weeks? But everyone pitched in and took turns cooking. This experience revealed previously hidden culinary talents on the Island. Home-baked bread, "petrel burrow Bundt cake" (in honor of Chuck Huntington's 55th season of studying storm-petrels on Kent Island), and Colin's crème brûlée were big hits. Who knew that a plumber's torch could be so useful in the kitchen?

Although we continued to eat very well, we were all glad that Mary Helen was able to return to finish out the last three weeks of the season. The substitutes performed well, but it was good to have the Ace back in charge.

Top: Junior Ingalls warming up before the lobster pot hauling competition.

Bottom: Dr. Ryan Norris making breakfast for the Savannah sparrow crew.



BSS Milestones in 2009

Russell Ingalls' 20th year as BSS caretaker: Russell holds the distinction of being the longest-serving caretaker in BSS history, surpassing the legendary Myhron Tate, who served for 19 years (1962-81). The caretaker tag-team of Russell and Mark Murray began work 1990. Mark took a few years off but couldn't stay away from Kent Island for too long. BSS is extremely fortunate to have such skilled, dedicated, and good-spirited caretakers.

75th anniversary of the "Four Pioneers' Expedition": BSS celebrated the 75th anniversary of the first Bowdoin College-sponsored scientific expedition to Kent Island. During the summer of 1934, Arctic explorer Donald MacMillan brought a group of four Bowdoin students, led by sophomore

William Gross, to Kent Island aboard his schooner, the *Bowdoin*. MacMillan dropped the students off and they spent the next three months on the Island, mapping its geology, documenting its plant communities, and studying its nesting seabirds. Their work resulted in the first peer-reviewed scientific publications originating from Kent Island. In addition to performing the first scientific studies on Kent Island, these students, known as the 'Four Pioneers,' convinced J. Sterling Rockefeller to donate Kent Island to Bowdoin. The Bowdoin Scientific Station became the first field research station in North America to be operated by an undergraduate liberal arts college and has been a member of the Organization of Biological Field Stations since 1988. Under Bill Gross's leadership, the Four Pioneers started a research program



BSS Milestones, Cont.

that still thrives today.

55th year of Chuck Huntington's study of Leach's storm-petrels: We celebrated the 55th year of Dr. Chuck Huntington's demographic study of the small seabird known as the Leach's storm-petrel. Chuck is professor of biology emeritus and is **Director Emeritus** of the **Bowdoin Scientific Station** on Kent Island (DEBSSKI #1).

He started his storm-petrel research project in 1954, which is now thought to be the world's longest-running scientific study of any wild animal population to be conducted by a single investigator. Despite his retirement 22 years ago, Chuck continues to conduct field research on storm-petrels, collaborate with other researchers on scientific publications, and train students working at the Station. Nothing seems to bring him greater joy than 'grubbing' petrels (catching the birds in their nest burrows) and introducing students to the joys of field research. At the age of 89, he made his regular trip to Kent Island last summer and documented the oldest Leach's storm-petrel on record, which was 37 years old. Much of what scientists know about pelagic seabirds (those that come ashore only for reproduction) can be traced back to the work of Chuck and his collaborators working on Kent Island. Chuck's persistence laid the foundation for dozens of other researchers investigating various aspects of storm-petrel biology on Kent Island and elsewhere. There have been 55 peer-reviewed papers published on the storm-petrels of Kent Island since Chuck began his work, most of which wouldn't have been possible without Chuck's demographic database. Fifty-five years ago, nobody could have predicted the breadth of research questions to which Chuck's dataset could be applied. Chuck started his research in 1954, less than a year after James Watson and Francis Crick published their landmark paper describing the basic structure of DNA. Today, using data he has been collecting since Watson and Crick unlocked DNA's code, Chuck has been collaborating with Mark Haussmann and Bob Mauck to investigate structural changes in the DNA molecule that occur during the pro-

cess of aging. Kent Island's storm-petrels have become an important model species in studies of aging because of their long lifespans and Chuck's extensive database on the lives of individual birds. This just goes to show the importance of long-term studies and of the perseverance of individual scientists.



Top: Russell Ingalls making his signature barbecued bacon during the whale watch.

Bottom: Chuck Huntington admiring the storm-petrel burrow Bundt cake made in his honor.

News from Kent Islanders

Events:

Bill Gross Memorial: BSS hosted a memorial in July for William A. O. Gross ('37), leader of the "Kent Island Pioneers," the four students who undertook the first Bowdoin-sponsored scientific expedition to Kent Island in 1934. Bill passed away in September, 2008. The memorial event was a day-long celebration of Bill's life and his love for Kent Island. About 30 of Bill's family members and friends made the trip on *Island Bound* to join the students, faculty, and staff of BSS for a day on Kent Island. Many old friendships were renewed and new ones were forged. During a short ceremony, a granite marker was placed a few meters north-

west of the Dorm, where the main trail meets the back path. This location is near the site where Bill convinced J. Sterling Rockefeller to donate Kent Island to Bowdoin College, thus creating the Bowdoin Scientific Station. The inscription on the marker reads:

*Bill Gross
Kent Island Pioneer
Bowdoin Class of 1937*

This marker will serve to remind future generations of Kent Islanders about the contributions that Bill Gross and his family have made to BSS.

Art Show: BSS artists-in-residence Colin Matthews ('10)



News, Cont.

and Carina Sandoval ('10), displayed the artwork that they created on Kent Island in an exhibition at Bowdoin's Visual Arts Center in September. The public exhibition was fittingly titled "Island Bound."

Film Screening: Documentary filmmaker and BSS alumna, Ann Johnson Prum ('84), screened her newest film, *Hummingbirds: Magic in the Air*, in Bowdoin's Smith Auditorium. Ann is the founder of Cone Flower Productions, and is an accomplished cinematographer, director, and producer. Her science documentaries have appeared on major networks, including National Geographic, Discovery, TBS, and PBS. *Hummingbirds: Magic in the Air* was commissioned by the PBS series Nature. It is a spectacular documentary with beautiful high-resolution cinematography. Consult the PBS broadcast schedule for dates and times of showings.

Lecture & Book Signing: Nature writer, Todd McLeish, gave a lecture on campus in December about his experiences researching material for his latest book, *Basking with Humpbacks: Tracking Threatened Marine Life in New England Waters*, which was published by University Press of New England in 2009. The experiences he described included a trip to BSS, which resulted in a delightful chapter on the Leach's storm-petrels (and storm-petrel researchers) of Kent Island. Visit www.toddmcleish.com or your local book store to get your copy.

Seminar: Jed Burt ('70), Professor of Biology at Ohio Wesleyan University and President of the American Ornithologists' Union, gave a seminar for Bowdoin's Biology Department on his research titled "Life in a Forest of Feathers." Jed's lecture was dedicated to his undergraduate mentor, Chuck Huntington, on the occasion of Chuck's 90th birthday.

Graduation News:

Thirteen Kent Islanders graduated in 2009. They are an accomplished group:

Nathan Elliott (Bowdoin)

Majors: Physics, Government and Legal Studies-Environmental Studies

Minor: Economics

Prizes & Awards: Cum Laude, Graduated with Honors (Environmental Studies), Academic Award in Environmental Studies

Nate Johnson (Bowdoin)

Major: Visual Arts

Mary Helen Miller (Bowdoin)

Majors: Art History, Visual Arts

Minor: Education

Prizes and Awards: DeAlva Stanwood Alexander Prize, Non-Fiction Prize (English Dept.), Paul Andrew Walker Prize

Sami Nichols (Bowdoin)

Majors: Biology-Environmental Studies

Prizes & Awards: Magna Cum Laude, Phi Beta Kappa, Graduated with Honors (Biology), Copeland-Gross Biology Prize



Four directors posing with the new granite marker honoring Bill Gross (l-r: current director Damon Gannon, and directors emeriti Chuck Huntington, Bob Mauck, and Nat Wheelwright).

Marie Sears (Bowdoin)

Majors: Biology-Environmental Studies

Prizes & Awards: Magna Cum Laude, Phi Beta Kappa, Graduated with Honors (Biology), Copeland-Gross Biology Prize

Meredith Steck (Bowdoin)

Majors: Biology, French

Prizes & Awards: Cum Laude, Goodwin French Prize (Romance Languages Dept.)

Elizabeth Carlton (Kenyon College)

Major: Biology

Prizes & Awards: The Maxwell Elliott Power Prize

Clara Cooper-Mullin (Kenyon College)

Major: Biology

Prizes & Awards: Biology Independent Study Prize, Fulbright Fellowship

Priscilla Erickson (Kenyon College)

Major: Molecular Biology

Prizes & Awards: The Robert Bowen Brown, Jr. Prize

Lisa Harn (Kenyon College)

Majors: Biology, English

Shaina Stewart (Kenyon College)

Major: Biology

Nina Murray (Wheaton College, Massachusetts)

Major: Music

Prizes & Awards: Summa Cum Laude, Phi Beta Kappa, Garabedian Prize in Music

Katie Mauck (Oberlin College)

Major: Chemistry

Prizes & Awards: Sigma Xi, Harrold and Virginia Baker Scholarship, Jean Dreyfuss Boissevain Undergraduate Award

News, Cont.

Conference News:

At the 2009 conference of the Society for Integrative and Comparative Biology (SICB) in Boston, Sami Nichols, Priscilla Erickson (Kenyon '09), Lisa Harn (Kenyon '09), and Kevin Matson (Ph.D. student, University of Missouri at St. Louis) presented the results of research they had conducted at BSS. BSS alumna Shaina Stewart (Kenyon '09) also made a presentation at the SICB conference. Evan Fricke ('11) presented results of his research from Kent Island at the President's Science Symposium.

Other news from Kent Islanders:

Meg Boyle ('05) represented What We Do (www.whatwedo.org), a climate policy advocacy organization focused on cultivating a new generation of leadership and groundbreaking action, at the United Nations Climate Change Conference in Copenhagen, Denmark in December. Prior to joining What We Do, Boyle was the global warming policy specialist at Greenpeace USA, where she focused on international climate negotiations.

Lauren Rae and **Greg Mitchell** jointly won the award for best student paper published during 2009 in the *Journal of Field Ornithology*. See the citation for Rae et al. 2009 in the list of BSS publications on P. 17.

Allison Weide ('08) is working aboard the 157-foot topsail schooner *Pride of Baltimore II*, a floating marine education center and maritime museum that travels around the globe.

Mary Helen Miller's essay about her summer as artist-in-residence at BSS, called *Natural Color*, won the non-fiction writing award from the English Department in 2009. She just started working for the *Chronicle of Higher Education*, the weekly trade journal about academia. Mary Helen is well-prepared for this job, since she was the editor of the *Bowdoin Orient* during the 2008-2009 academic year.

Clara Cooper-Mullin (Kenyon College '09) has a Fulbright Fellowship to study bird diversity in the Okavango Delta of Botswana.

Nathan Elliott and **Lisa Harn** are working at the Golden Gate Raptor Observatory in San Francisco.

Meredith Steck wrote two articles for the *Bowdoin Orient* in 2009 describing her experience on Kent Island during the previous summer. She worked for the Maria Mitchell Association last summer on a project to reintroduce the American burying beetle to Nantucket Island. She co-authored a report entitled "American Burying Beetle (*Nicrophorus americanus*) survey on Nantucket Island, Massachusetts, 2009." With Chris Majka and Nat Wheelwright, she is preparing a manuscript on the zoogeography of Kent Island's coleoptera (beetles). Meredith is teaching in France during the 2009-2010 academic year.

Sami Nichols entered a Ph.D. program in Conservation Biology at the University of Minnesota.

Priscilla Erickson had a research assistantship conducting

bird research in Santa Rosa National Park, Costa Rica. She is now working in an HIV vaccine development lab at the University of Wisconsin, and weighing her options for grad school.

Nate Johnson studied abroad in Ireland during the fall, then traveled in southern Europe.

Colin Matthews won the Art History Junior-Year Prize in 2009. Colin was also awarded a grant to conduct art history research in China during the 2009-2010 winter break.

Evan Fricke has been nominated by Bowdoin College to apply for a prestigious and highly-competitive Goldwater Scholarship. The Goldwater scholarship is a national program designed to foster the development of students who show outstanding potential and intend to pursue careers in the natural sciences, mathematics, or engineering. Each college and university is allowed to nominate just four students. Evan's research at BSS is the basis for his application.

Peter Cunningham, who has had a deep connection to Kent Island for his entire life, will exhibit his photography at the St. John Arts Center in St. John, New Brunswick during the fall of 2010. Peter has a wonderful gift for capturing the beauty of everyday scenes. See his photographs from Grand Manan and Kent Island at <http://www.wordwiseweb.com/grandmanan/index.html>.

Chuck Huntington celebrated his 90th birthday in December. He made two trips to Kent Island in 2009.

Both **Nat Wheelwright** (DEBSSKI #2) and **Bob Mauck** (DEBSSKI #3) are on sabbatical for the 2009-2010 academic year. Nat's leave is funded by an OPUS (Opportunities for Promoting Understanding through Synthesis) grant from the National Science Foundation. Look for a flood of publications in 2010 and 2011 resulting from their sabbaticals.

Janet and **Damon Gannon** hosted the Second Annual BSS Practice Thanksgiving dinner. It was a fun evening in which many of the 2009 BSS faculty, students, staff, and friends shared a traditional, home cooked Thanksgiving meal and had a chance to get reacquainted with friends.

If you have Kent Island news to share, contact Damon Gannon (dgannon@bowdoin.edu). Susie Mauck has also started a Kent Island page on Facebook (<http://www.facebook.com/group.php?gid=20164479206>). This is a great way to keep in touch with fellow Kent Islanders.

2009 Academic Accomplishments



(* denotes graduate students, ** indicates undergraduate students)

Art Exhibit:

Mathews**, C. and C. Sandoval**. 2009. "Island Bound: An exhibition of works from Kent Island." Visual Arts Center, Bowdoin College, September, 2009.

Peer-Reviewed Research Papers Published or In Press:

Berens McCabe, E.J., D.P. Gannon, N.B. Barros, and R.S. Wells. 2009. Prey selection by resident common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. *Marine Biology*, DOI 10.1007/s00227-009-1371-2. (BSS Contribution No. 208)

Butler**, M.W., J. Garvin, N.T. Wheelwright, and C.R. Freeman-Gallant. 2009. Ambient temperature, but not paternity, is associated with immune response in Savannah Sparrows (*Passerculus sandwichensis*). *The Auk* 126(3):536–542. DOI 10.1525/auk.2009.08179 (BSS Contribution No. 209)

Cohen, A.A., R.A. Mauck, N.T. Wheelwright, C.E. Huntington, and K.J. McGraw. 2009. Complexity in relationships between antioxidants and individual life-history parameters in a seabird and a songbird. *Oikos*, 118(12):1854 - 1861. DOI 10.1111/j.1600-0706.2009.17785.x. (BSS Contribution No. 202)

Gannon, D.P., E.J. Berens McCabe, S.A. Camilleri, J.G. Gannon, M.K. Brueggen**, A.A. Barleycorn, V.I. Palubok, G.J. Kirkpatrick, and R.S. Wells. 2009. Effects of *Karenia brevis* Harmful Algal Blooms on Nearshore Fish Communities in Southwest Florida. *Marine Ecology Progress Series*. 378:171-186. DOI 10.3354/meps07853. (BSS Contribution No. 210)

Gannon, D.P. and J.G. Gannon. In press. 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)

Goodale, M.W., D.C. Evers, S.E. Mierzkowski, A.L. Bond, N.M. Burgess, C.I. Otorowski, L.J. Welch, C.S. Hall, J.C. Ellis, R.B. Allen, A.W. Diamond, S.W. Kress, and R.J. Taylor. 2009. Marine foraging birds as bioindicators of mercury in the Gulf of Maine. *EcoHealth* 10 March 2009, DOI 10.1007/s10393-009-0211-7. (BSS Contribution No. 211)

Kraichak**, E., R.G. Pope, and N.T. Wheelwright. 2009. Habitat associations of macrolichens on a boreal island in the Bay of Fundy, New Brunswick, Canada. *The Bryologist*. 112(4):762-772. (BSS Contribution No. 194)

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. This paper earned an award for Lauren Rae and Greg

Mitchell for best student paper of the year published in the *Journal of Field Ornithology*).

Zangmeister**, J.L., M.F. Haussmann, J. Cerchiara**, R.A. Mauck. 2009. Incubation failure and nest abandonment by Leach's Storm-Petrels detected using PIT tags and temperature loggers. *Journal of Field Ornithology*, 80(4):373-379. DOI: 10.1111/j.1557-9263.2009.00243.x. (BSS Contribution No. 203)

Manuscripts Submitted for Review:

Rudershausen, P.J., J.A. Buckel, J. Edwards, D.P. Gannon, C.M. Butler, and T.W. Averett. In review. Feeding ecology of blue marlin, dolphinfish, yellowfin tuna and wahoo from the North Atlantic, with comparisons to other oceans. Submitted to *Transactions of the American Fisheries Society*.

Mauck, R.A., J.L. Zangmeister*, J.A. Cerchiara*, C.E. Huntington, and M.F. Haussmann. In review. Male-biased reproductive effort in a long-lived seabird, Leach's storm-petrel (*Oceanodroma leucorhoa*). Submitted to *Behavioral Ecology and Sociobiology*.

Theses & Independent studies:

Elliott**, N.K. 2009. Environmental correlates of seedling recruitment on Kent Island (New Brunswick, Canada) and resulting management implications. Honors Thesis, Bowdoin College. 93 p.

Erickson**, P. 2009. Brood size affects lipid peroxidation and telomere length. Honors Thesis, Kenyon College. 47 p.

Fricke**, E. 2009. Nest-site characteristics and burrow occupancy in Leach's storm-petrels. Independent Study, Bowdoin College.

Harn**, L. 2009. Don't count your chicks before they hatch: incubation effort in Leach's storm-petrel (*Oceanodroma leucorhoa*). Honors Thesis, Kenyon College. 55 p.

Lane*, H.A. 2009. Ontogenetic, seasonal, and annual variation in lipid content and composition of Atlantic herring (*Clupea harengus*) from the Bay of Fundy, Canada. M.S. Thesis, University of North Carolina Wilmington. 95 p.

Nichols**, K.S. 2009. Causes and consequences of nest site selection in an island bird population. Honors Thesis, Bowdoin College. 43 p.

Steck**, M. 2009. Zoogeography of Kent Island's Coleoptera. Independent Study, Bowdoin College.

Technical Reports:

Gannon, D.P., D. Fauquier, E. Berens, S. Camilleri, J. Gannon, J. Allen, and R. Wells. 2009. Ecological effects of harmful algal blooms on the wildlife communities associated with submerged aquatic vegetation. Final Report to Florida Fish

Academic Accomplishments, Cont.

& Wildlife Conservation Commission, State Wildlife Grants Program, Tallahassee, FL. Project No. SWG05_028. June 1, 2009.

Mauck, R.A. and M.F. Haussmann. 2009. RUI: Telomere dynamics and individual quality. Final Report to the National Science Foundation, Grant # 0516784.

Conference Presentations:

Erickson**, P.A., K.S. Nichols**, G.W. Mitchell*, R.A. Mauck, & M.F. Haussman. 2009. Don't put all your eggs in one basket: growth, self maintenance, and fledgling survival in Savannah sparrow (*Passerculus sandwichensis*) chicks raised in experimentally manipulated broods. Society for Integrative and Comparative Biology. Boston.

Fricke**, E. 2009. Nest-site characteristics and burrow occupancy in Leach's storm-petrels. President's Science Symposium. Bowdoin College.

Gannon, D.P., E.J. Berens McCabe, S.A. Camilleri, J.G. Gannon, M.K. Brueggen**, A.B. Barleycorn, V.I. Palubok, G.J. Kirkpatrick, and R.S. Wells. 2009. Effects of *Karenia brevis* Harmful Algal Blooms on Nearshore Fish Communities in Southwest Florida. Society for Integrative and Comparative Biology. Boston.

Harn**, L.J., Haussmann, M.F., & R.A. Mauck. 2009. Don't count your chicks before they hatch: an experimental manipulation of incubation effort in Leach's storm-petrel (*Oceanodroma leucorhoa*). Society for Integrative and Comparative Biology. Boston.

Matson*, K.D., E.D. Carlton**, J.L. Howard**, C.A. Hudak**, S.E. Lynn, & R.A. Mauck. 2009. Effects of an experimental immune enhancement, rather than an immune challenge, in a wild bird. Society for Integrative and Comparative Biology. Boston.

Nichols**, K.S., P.A. Erickson**, R.A. Mauck, & N.T. Wheelwright. 2009. Surf and turf: foraging choices of an island sparrow population. Society for Integrative and Comparative Biology. Boston.

Grants Awarded:⁴

Camilleri*, S.A. 2009. "Provisioning of chicks by Leach's storm-petrels (*Oceanodroma leucorhoa*): is a concentrated, energy-rich diet the best way to raise your offspring?" Lerner Gray Marine Research Grant, American Museum of Natural History (\$1,250 to the University of North Carolina Wilmington).

Gilmour*, M. 2009. "Investigating the relationships of winter corticosteroid levels, stable isotope signatures, and reproductive effort of a long-lived seabird, Leach's storm-petrel." Taverner Award from the Society of Canadian Ornithologists (\$1,000 to Bucknell University).

Gilmour*, M. 2009. "Investigating the relationships of winter corticosteroid levels, stable isotope signatures, and reproductive effort of a long-lived seabird, Leach's storm-petrel." Eastern Bird Banding Association (\$1,000 to Bucknell University).

Mitchell*, G. 2009. "Factors that limit individual performance of migratory songbirds during autumn migration." Animal Behavior Society Student Research Award (\$1,000 to the University of Guelph).

Mitchell*, G. 2009. "Factors that limit individual performance of migratory songbirds during autumn migration." American Ornithologists' Union Student Research Award (\$2,500 to the University of Guelph).

Norris, R. 2009. "Remote tracking laboratory for migratory animals." Leaders Opportunity Fund, Canadian Foundation for Innovation and Ministry of Research & Innovation (\$240,800 to the University of Guelph).

Olmstead, N. and D. Gannon. 2009. "Abundance, habitat selection, and ecological impacts of an island population of muskrats (*Ondatra zibethicus*)." Phocas Family Research Award, Bowdoin College (\$3,690).

Olmstead, N. and D. Gannon. 2009. "Abundance, habitat selection, and ecological impacts of an island population of muskrats (*Ondatra zibethicus*)." Lab Instructor-Faculty Research Award, Howard Hughes Medical Institute (\$4,550).

⁴There were ten additional grant proposals requesting a total of \$429,000 being reviewed as of December 31, 2009.



Left: Wrapping up after a long day in the field.

Right: Clara and Greg stalking Savannah sparrows.

Supporters



We wish to thank the generous donors whose support allows the Bowdoin Scientific Station to thrive:

Mr. Michael W. Butler '02
Mr. J.C. Cannell
Mr. Peter B. Cannell
Mrs. Amanda H. Cannell-Boone '77
Mr. Peter W. Davis '57
Ms. Ann de Forest '77
Mr. Clifton G. Eliason '70
Mr. Joseph A. Farrell, Jr. '77
Ms. Ruth A. Fogler '78
Mr. James L. Fox '73
Gifford Family Foundation
Mrs. Abby M. Gross
Ms. Cynthia C. Gross
Ms. Francine A. Hochberg-Giuffrida '97
Dr. Amy R. Lewis '92
Dr. Edward O. Minot '70
Mr. Ray B. Owen '59
Ms. Madeleine E. Pott '06

Dr. Thomas P. Skaling '62
Dr. Ivan M. Spear '44
Dr. C. Jeffrey Tannebring '73
Dr. Geoffrey C. Trussell '90
Ms. Ramsay Gifford Trussell '89
Mrs. Abby M. Walker '77
Mr. David Webster '57
Dr. Heather Williams '77

Fidelity Charitable Gift Fund
Heizaburo Saito Fund
Roy Spear Memorial Fund
Minot Fund for Kent Island
Kent Island Fund
Huntington-Wheelwright Field Station Endowment
Professor Alfred O. Gross Fund for Kent Island
Peter F. Cannell ('76) Fund for Kent Island

Many of the endowed funds listed above welcome further contributions. Contact Damon Gannon (dgannon@bowdoin.edu, 207-798-4267) or Nancy Milam (nmilam@bowdoin.edu) for information.

"When I wasn't making art, I took the opportunity to learn from my fellow Kent Islanders about subjects I had not known much about. I was happy to help people with their research on several occasions. Some of the most valuable lessons I've learned, though, have turned out to be completely non-academic. I have loved learning how to live life more simply and acquiring new skills such as bread baking. While working here, I got to meet people outside my field that I would have never met otherwise. It was interesting to see how scientists view the world always with curiosity, and being surrounded by them has led me to be more curious about the world around me as well."

-Carina Sandoval '10



Financial Report



If you are willing to read the Station's financial report, then you really are a Kent Island enthusiast. Your curiosity and devotion will be rewarded with more information than you ever cared to have...

Kent Island runs on an extremely lean budget. It truly is one of the best scientific investments ever made. Total core operating expenditures for the 2008/2009 fiscal year (which ended on June 30, 2009) were \$51,408. This figure includes casual wages (wages for one of our caretakers and any temporary workers), student fellowships (Bowdoin summer students), contracted services (e.g., specialized equipment repair), non-research supplies, research supplies for Bowdoin students, travel between Bowdoin and Kent Island (ferry, small boats, van mileage), 2 months' supply of food for 12 people, and all regular maintenance and operating expenses for the Station's basic infrastructure and equipment. This figure does not include salary for the director, funds used to support specific research projects, or capital equipment expenditures. As you look at the budget expenditures below, keep in mind that we have significant infrastructure to maintain on Kent Island, including: 13 buildings and several other small structures, 2 motor boats, a 145-foot pier, three boat moorings, four electrical generation systems, a water distribution system, a tractor, and a variety of other equipment. A dollar can be stretched pretty far on Kent Island.

We have several endowment funds that support various aspects of the Station's operation (see the list of funds above, in "2009 Supporters."). But these funds do not cover the Station's entire core operating budget. Bowdoin's Office of Academic Affairs fills in this shortfall in core operations and also pays the salaries of the Station's director and one of its caretakers.

Table 1. Forecasted Budget and Actual Expenditures for Core Operations for the Fiscal Years Between 2005-06 and 2010-11.

Fiscal Year (ends June 30)	Forecasted Budget	Actual Expenditures
2005-06	\$56,130	\$57,822
2006-07	\$56,550	\$54,910
2007-08	\$59,200	\$59,063
2008-09	\$60,425	\$51,408
2009-10	\$60,540	---
2010-11	\$60,540	---

In addition to the external grants received, there were ten

other grant proposals requesting a total of \$429,000 being reviewed as of December 31, 2009. Most of these proposals will be denied funding. Sad, but true. That old adage, "The only things in life that are certain are death and taxes," isn't quite true. Scientists can add "rejection" to their list of certainties. Proposal funding rates vary among grant programs, but they are typically between 10% and 30%. NSF proposals tend to be on the more competitive end of the spectrum. Of course, successful proposals are not chosen at random; the quality of the proposal is the primary determinant. But a lot of factors come into play as funding program managers attempt to diversify their funding portfolios.

Most of the funding proposals that we submit are for specific research projects or for infrastructure improvements. There are no proposals seeking support for day-to-day operations or regular maintenance because there are no funding programs for these activities. Foundations and government agencies would rather give money to support specific research or education initiatives, or to build physical infrastructure. These things are more "sexy" than are mundane aspects of day-to-day operations. This is why endowment funds are crucial to BSS. Without endowment funds, we would not have a research station at which to conduct our research or education.

Over the years, BSS has proven that it can support world-class research and education at relatively little expense. Due to recent economic conditions, we worked extra hard to keep expenditures low last year. Although frugality is a virtue, we have to make sure that we are not increasing our long-term expenses by delaying needed maintenance. The harsh weather of the North Atlantic takes its toll on our buildings and equipment. We have many needs with regard to facilities; the most pressing of which is shoring up the Dorm. The Dorm's foundation footings have begun to deteriorate. It is becoming a serious situation that needs to be addressed soon, before these problems become too advanced. The Dorm is the most crucial building on Kent Island: it houses our dining facilities, contains our primary electrical generation system, provides the greatest number of living spaces of any building, and is the social hub of the community. Without it, we could not run our programs.

We have applied for a grant from the National Science Foundation to perform major maintenance on the Dorm. We were still waiting to receive news on the proposal's fate as of the time that this report was printed. NSF grants are extremely competitive so it is unlikely that we will get the entire amount requested (if we get any money at all). So I will be working with Bowdoin's Development office, private and public funding agencies, and anyone else who is willing to help secure the resources needed to ensure the Station's long-term health. Anyone wishing to learn more about the Station's operations or about how they can help should contact me at dgannon@bowdoin.edu or 207-798-4267.

Wish List



BSS is in need of the following equipment and materials:

New boat to replace *Ernest Joy* (24-28 ft. work boat): *Ernest Joy* has seen a lot of use during the past 20 years, and the Bay of Fundy is a harsh working environment. Use of our small boats is increasing, as the number of marine-related research projects increases and we prepare for several major maintenance projects that will require a lot of transport trips between Kent Island and Grand Manan. \$50,000 - \$140,000 (\$50,000 for a 24-foot boat that is equivalent to the *Ernest Joy* and up to \$140,000 for a larger boat with greater capabilities).

Automated weather station (Vaisala HydroMet Station with temperature, wind speed, wind direction, solar radiation, relative humidity, barometric pressure, and rainfall sensors; a self-contained solar photovoltaic power supply; and satellite data communications capabilities): Meteorological studies have taken place on Kent Island since Bob Cunningham first arrived on the island in 1937, resulting in a very valuable database that not only helps us understand the dynamics of climate but also helps us understand the biology of the organisms living in that climate. Measurements are recorded manually by BSS personnel, but there is nobody on Kent Island for much of the year. Therefore, an automated weather station is necessary to understand the annual weather patterns. BSS installed an automated weather station in 2006. Unfortunately, this instrument was not designed to survive the rigors of Kent Island's weather. It has suffered multiple, persistent system failures and needs to be replaced with a more robust instrument. It is a bit ironic that the weather caused the weather station to malfunction. So we are hoping to install a more robust system that will provide accurate data 24 hours per day, 7 days per week, 365 days per year. Vaisala's automated meteorological instruments have a reputation for durability, and have been deployed successfully on land-based stations in the Arctic and Antarctic, as well as on weather buoys in the North Atlantic—environments that are even more harsh than that of Kent Island. The U.S. National Weather Service, FAA, and military all use Vaisala weather observing instruments. \$10,500.

18 High capacity 6-volt **deep-cycle batteries** (Deka Pro Master L16, wired in parallel/series to create 12-volt battery banks): These batteries are the heart of our solar energy systems. The solar panels charge the batteries, which then run our instruments, keep our food refrigerated, pump our water, and power all of the other electrical gadgets on the island. The existing batteries in the dorm are 10 years old. Have you ever had a car battery that lasted 10 years? And these batteries are required to work harder than any car battery. 18 batteries \times \$430 = \$7,740 (10 in Dorm = \$4,300; 4 in Warden's House = \$1,720; 4 in Lower Lab = \$1,720).

Solar water heater: Heating water (for cooking and washing dishes) consumes more fossil fuel on Kent Island than

does any other activity. With a solar hot water system, we would no longer need to heat dishwater on the stove and we can conserve propane by using pre-heated water for cooking. \$7,000.

Wood stoves, chimney pipes, and hearths for Dorm & Hodgson House (\$2,850 each): Kent Island's moist, salty air has taken its toll on the wood stoves in the Dorm and in the Hodgson House.

- Wood stove (2 \times \$1,500)
- Stainless steel insulated chimney pipe and accessories (2 \times \$1,100)
- Durarock, bricks & mortar, sheet metal (fireproof hearth): (2 \times \$250).

Composting toilets (Sun-Mar Excel NE): Outhouses have to be moved and redug every few years. Composting toilets would eliminate the need to move outhouses and they would be better for the environment. 2 \times \$1,500.

Bush Hog mower-42" (Waterman Farm Machinery, Bush-Hog/Model SQ42): Our success in ridding Three Islands of the introduced snowshoe hares is causing an interesting problem: white spruce and birch seedlings are colonizing the fields. It's great to see seedlings growing on Kent Island, but we need to maintain open fields for the Savannah sparrow and tree swallow research sites. \$1800.

Small-scale solar power units for outlying buildings (3 buildings, \$956 per building): These small systems would provide electrical lighting and a means of recharging electronic items that are capable of accepting 12-volt power. This would alleviate some of the demand on our over-worked primary electrical system.

- 25-watt photovoltaic solar panel (\$430)
- Global Solar charge controller (\$66)
- Deka Series 31 12-volt Gel Cell Battery (\$410)
- Wiring, connectors, fuses, outlet, LED light (\$50).

Replacement hardware for 2 **boat moorings** in Three Islands Harbor (shackles, chain, swivels, buoys, pennant lines). A mooring is only as secure as its weakest link. 2 \times \$600.

Hotpoint 24-inch freestanding **gas range** for the Warden's House: We are planning renovations of the Dorm. During part of this construction process, the kitchen in the Dorm will be unusable. Therefore, we will need an alternate means of cooking. \$500.

3 Charging/power consumption monitors (Heart "Link 10" monitors): Longevity of a battery depends on the number of charge/discharge cycles and on how deeply the battery is discharged. Therefore, battery life can be extended dramatically by managing power consumption very carefully. Good battery monitors make it possible to properly manage the consumption of power produced by our solar photovoltaic

Wish List, Cont.

systems. 3 × \$399.

4-burner outdoor **gas grill** (Master Forge Model #: GGP-2501): During the Dorm construction project (and at other times), it would be convenient to have a means of cooking outdoors. Currently, the only facilities we have for cooking outdoors is a fire pit, which is great fun to use on occasion but it's not practical for regular use. \$300.

Garden Cart (Carts Vermont 13.6 cubic foot cart, w/ flat-proof wheels): For transporting equipment around the island. \$290.

Multi-stage “smart” **battery charger** (Guest 10 Amp Charge Pro): We have lots of battery-operated equipment at the Station, so we are constantly charging batteries. Battery technology has become very sophisticated and there is a wide variety of battery designs. Standard battery chargers can ruin many of the new batteries, which can cost hundreds of dollars. \$250.

Contact Damon Gannon (dgannon@bowdoin.edu) if you can help procure any of these items.

Clockwise from top right: Students about to depart for Kent Island; aboard *Island Bound* for the final leg of the trip to Kent Island; unpacking groceries and gear; sunset over the Dorm (Greg Mitchell's telemetry receiver array is mounted on the roof); and fresh-baked bread just out of the oven.





Clockwise from top left: Evan Fricke scraping paint from the Warden's House; Kevin Smith preparing garden bed in May; Evan Graff heading out for the day to conduct his research on trait heritability of Savannah sparrow eggs; a humpback whale seen during the whale watching trip; Clara Cooper-Mullin fixing tree swallow nest boxes; and the garden with its new cold frame in late June.

Bowdoin Scientific Station on Kent Island
c/o Dept. of Biology
Bowdoin College
6500 College Station
Brunswick, ME 04011

<http://www.bowdoin.edu/kent-island/index>



BSS is a member of the Organization of Biological Field Stations.