Annual Report of the Bowdoin Scientific Station 1999

Since the Last Annual Report

Chuck Huntington's surprise 80th birthday party in December provided the occasion for a flood of warm remembrances from Kent Island alumni. Several people gave tributes to Chuck's talents as a match-maker-at least five Kent Island romances have flowered into marriage. There were allusions to generations of Chuck's trademark caribou sweaters, mixed reviews of his peanut butter soup, a proposition from Don Griffin (who studied homing in Leach's Storm-Petrels on Kent Island in the 1930s) to undertake a new joint research project, and more than one account of a hair-raising field trip with Chuck at the wheel of the van scanning for rare birds. Recollections came in the form of prose, haiku, photographs, songs, and a gift bucket of salt-free peanut butter. John Howland composed a triad of commemorative poems, one of which appears at the end of this report. Only twice as old as some of his beloved storm-petrels, Chuck seems as young as ever and is busily planning next year's research on Kent Island.

This coming summer, for the first time in 14 years, I'll be taking five weeks off from Kent Island to write. I'm eager to make progress on a synthesis of my collaboration with students and faculty colleagues on the ecology of Savannah Sparrows. Fortunately, Bob Mauck (currently a Visiting Assistant Professor at Kenyon College) will take over the helm as co-director of the station. Mark Murray, who teamed up with Russell Ingalls as caretaker of the island, will also be returning to tackle various carpentry projects.

The Summer of 1999

We've made a head start on one of those carpentry projects. Complaints about the dampness, chill and odor of the Hodgson House finally became so boisterous that we decided at last to defuse them. Donated to the field station in 1938, the prefabricated two-room cottage was originally situated with views of both the eastern and western shores. White Spruces gradually closed in, so the first thing we did was cut down several overhanging trees. The removal of the low porch roof allowed sun to reach the building and stream through a new glass door and windows put in by Russell Ingalls. The ancient mildew-trapping insulation paper was ripped out, and everybody on the island pitched in to panel the walls with pine boards.

Mark Murray's week-long visit inspired a historic renovation of the Radio Shack. Chuck now enjoys a four-poster double bed and corner shelves. An east-facing window and freshly painted white walls and ceiling have brightened up the interior considerably. One of the discoveries from the little attic space was Otis Minot's painting of the Radio Shack (from the 1940s?).

Research in 1999

- Leach's Storm-Petrels

Rachel Seabury ('01) helped Chuck with his long-term Leach's Storm-Petrel project. Currently, the oldest known storm-petrel, Aphrodite, is 35-years-old-exactly 35, according to Chuck, who banded her as a nestling back in 1964. For the second time in the past few years, hatching started in late June, an unusually early date which is consistent with other evidence of global warming. Rachel's independent project was to quantify egg weight-loss during the 42-day incubation period, which could provide a method for aging eggs of unknown laying date. Comparing her measurements with measurements Bob Muack made in 1991, Rachel found that

individuals were relatively constant in the sizes and shapes of eggs that they laid, but overall eggs were smaller in 1999. Interestingly, birds that laid large eggs in 1991 were more likely to survive until 1999.

University of Portland (Oregon) Professor Katie O'Reilly returned to Kent Island to continue her work on the effect of age on reproductive hormones. Joe Baker (U. Portland '00) worked as her field assistant. One of the goals of their research was to determine whether the adrenocortical response to stress (reflected by levels of corticosterone circulating in the blood) is reduced as birds age. They also aimed to establish the time course for the hormonal stress response in Leach's Storm-Petrels of different ages and sex. Small blood samples were drawn five times over a 90-minute period from about 200 birds. Katie will be able to compare the stress response of Leach's Storm-Petrels to that of a closely related Antarctic-breeding species, Wilson's Storm-Petrel, captured by chumming birds during our Right Whale expedition in the Bay of Fundy. Based on 49 Leach's Storm-Petrels that Chuck had banded as nestlings and later recaptured, Katie estimates that 1-2% of all nestlings banded on Kent Island return to breed on the island. Natal dispersal is surprisingly local: most nestlings that return to Three Islands as adults go back to the precise colony (Petrel Path, Crockett's Point, or Hodgson House) where they were born.

Alexis Blackmer, a graduate student of Gaby Nevitt's at the University of California-Davis, initiated her PhD dissertation research on Leach's Storm-Petrels in 1999. Her project deals with two questions: the relationship between pair bond duration and reproductive success, and the effects of researcher disturbance on breeding birds. She restricted her sample to pairs that had been together for different amounts of time, ranging from only one to up to six consecutive years. As expected, reproductive success was negatively correlated with "egg neglect," the proportion of days in which no adult incubated the egg. Contrary to her hypothesis, both egg neglect and hatching success were independent of pair bond length. To evaluate the effect of researcher disturbance, Alexis weighed adults either daily or weekly during the incubation period; a control group was weighed only once. Nests disturbed more frequently were more likely to be abandoned, as predicted, although the time of day of disturbance had no apparent effect. Alexis's PowerPoint presentation in the Club Dingleberry set new standards for end-of-the-summer seminars.

- Savannah Sparrows

Savannah Sparrows also began breeding early in 1999. My field assistant in 1999 was Steve Patterson ('01). During the hectic start of the breeding period in early June, Meredith Swett ('99), who had worked on the project in 1996, volunteered her nest-finding skills (honed by hunting for waxbill nests in South Africa with former Kent Islander, Justin Schuetz, '94). Sparrow densities were 50% higher than the previous year. That plus a surfeit of males may explain the infrequency of polygyny, the observation of bachelor males, and the first two cases of brother-sister pairings among Savannah Sparrows. Steve's independent project involved determining how sparrows pass their days. Using a hand-held Newton computer and a program called Ethoscribe (which Bob helped develop), Steve looked at the amount of time individuals spent in behaviors such as foraging, caring for offspring, mate-guarding, and perching as a function of sex, age, and reproductive stage. Based on 80 independent 5-minute observations, he found that females spent nearly twice as much time searching for food as males did. His data also demonstrated that foraging demands on parents increase dramatically during the fledgling period.

Katie brought video technology to the island to extend our collaboration on endocrine ecology in Savannah Sparrows. Our goal was to test the hypothesis that males with high testosterone levels invest less in paternal care because they are driven to spend more time seeking additional mates. We used a pair of SonyTR-V66 zoom cameras to document parental behavior

at 55 nests. Each nest was filmed for four hours, for a total of more than 200 nest-hours. We took blood samples from 19 different males whose attentiveness at several nests each was quantified, as well as from 26 known-age juveniles. Currently, Joe and other students at the University of Portland are examining the tapes and quantifying the birds' behavior. The sexes differ in several unexpected aspects of parental behavior. In terms of nest sanitation, for example, preliminary analyses suggest that females are more likely to swallow their offspring's fecal sacs, whereas males are more likely to carry sacs in their bills. Taxed by extra reproductive efforts, females may depend on nestling wastes to supplement their nitrogen budget. Conceivably, male immune systems are compromised because of their high testosterone levels, which may make it risky for them to ingest feces. Of possible relevance is recent work by Corey Freeman-Gallant ('91), who reports that male Savannah Sparrows in New York state appear to have higher parasite loads than females. On the other hand, he has also found that Kent Island Savannah Sparrows have zero incidence of plasmodium blood parasites.

- Tree Swallows

Tree Swallows had exceptionally high reproductive success in 1999, due in large measure to the favorable weather (see "Meteorology," below). Marci Brandenburg ('01) determined that clutches were initiated earlier than usual; the first clutch hatched on June 1, 10 days earlier than in 1998. Clutch sizes were unusually large in 1999, as well. Ninety-one percent of eggs hatched and 94% of hatchlings fledged; fewer than 9% of nests failed completely. As in previous years, one-year-old females (distinguishable by their brownish plumage) tended to arrive late and claim unoccupied nest boxes in the southern part of the colony, amidst the gulls. The eggs of one tardy breeder did not hatch until July 5.

The Kent Island Tree Swallow population seems to be recuperating from a decade-long decline that began in the late 1980s. In 1999 there were 35 active nests, still short of the 100+ nests in 1987 but double the number from several years ago. Unfortunately, populations of other swallows continue to decline. Just two pairs of Barn Swallows and one pair of Bank Swallows nested on the island in 1999. Cliff Swallows were absent altogether.

- Bird Populations

Since 1989, I have conducted simple standardized censuses on three days in mid-June each year to get a rough idea of long-term population trends of forest songbirds, especially neotropical migrants. Claire Varian ('00) spent the summer expanding that project by carrying out more detailed censuses of breeding birds. Results from her alternate-day point counts over a two-month period suggest that only about two-thirds of breeding birds are counted during the three-day censuses. Claire estimates that in 1999 Kent Island held about 47 pairs of American Redstarts, 32 pairs of Black-throated Green Warblers, 29 pairs of Blackpolls, and 29 pairs of Northern Parulas. Fledglings of most warbler species first began to appear around July 5.

A talented nest-finder, Claire discovered three American Redstart nests. Two of them were destroyed by predators (presumably American Crows), but not before she was able to record incubation rhythms by placing in the nests temperature probes connected to Hobo Dataloggers, a technique pioneered on Kent Island by Janet Beagley ('99). Claire's results showed that female redstarts spend about 15 minutes on the nest during each incubation shift before taking a 4-minute break to forage. They feed their nestlings on average every 23 minutes.

Becca Hall ('99) experienced firsthand why so little is known about reproduction in Common Yellowthroats. Although yellowthroats are abundant, conspicuous, and vocal birds, their nests are maddeningly difficult to find. Females walk secretively on and off the nests and incubation

shifts are lengthy, which means that females come and go infrequently. Using dataloggers on two nests that she had ferreted out, Becca showed that yellowthroats spend an average of 28 minutes on the nest and 13 minutes off, far longer than most songbirds on Kent Island. Curiously, yellowthroats on the mainland allegedly spend even longer on the nest, averaging about an hour per incubation shift. Why incubation shifts would be only half as long on Kent Island is a mystery. Nestling feeding was infrequent on the island, occurring only every 37 minutes on average.

An unusual sighting was an adult Red-headed Woodpecker, spotted at the north end of the island on September 18. (In late May 1998, an adult spent several days in the north field.) But the prize bird of the summer was an adult female Sage Thrasher, which appeared on the lawn on July 20. Because it was such an oddity, we netted her, photographed her, and filmed her for confirmation. Her picture appears in the most recent issue of Birder's World.

About 70 Common Terns nested on Sheep Island for the first time in more than a decade. Several pairs of American Robins, White-throated Sparrows and, surprisingly, Ruby-crowned Kinglets bred on the island, and Claire documented the first Brown Creeper nest in years. There were no breeding blackbirds or vireos. Boreal Chickadees have gone locally extinct, coincident with the arrival and proliferation of Black-capped Chickadees. Shorebirds were generally uncommon, continuing the ominous trend of recent years. It was a good year for alcid reproduction, on the other hand, and from the island we commonly watched Atlantic Puffins, Razorbills and Common Murres with young. A small colony of Great-blue Herons nested on Hay Island.

Ohio Wesleyan University Professor Jed Burtt ('70) and his wife Pam (incidentally, one of the aforementioned Kent Island marriages) and their student Rebekah Howison spent 10 days in late July and early August sampling feathers of a variety of birds for bacteria. Jed has recently teamed up with microbiologists and chemists in an attempt to elucidate the distribution and impact of feather-degrading bacterial parasites.

Glen Fox and Debbie Jeffrey (Canadian Wildlife Service [CWS]) were joined this summer by Wright State University graduate student Emma Croisant. The team collected data to evaluate the effect of environmental contaminants on Herring Gulls and other seabirds as part of a CWS study that has been ongoing at Kent Island since the 1970s.

Kim Mawhinney, who recently completed her PhD at the University of New Brunswick, censused Common Eiders on Kent Island once again. Accompanying her were her advisor, Tony Diamond, and field assistants Dorothy and Murray McFarlane, Karel Allard and Tracey Dean. The group had hoped to inject ducklings with pit-tag transponders so that they could be uniquely identified once they reached adulthood, which would allow researchers to determine natal dispersal and the age of first reproduction. The Kent Island population proved to be more asynchronous in egg-laying and less dense (and the vegetation around their nests more dense) than expected so they moved their operation to other islands in the Gulf of Maine. Kim's research has uncovered surprising data on the extent of eider down collection from nests on Kent, Hay and Sheep Islands over the last decade. Although the CWS had issued permits for the down collection, we had been unaware of its magnitude. In 1993 alone, down was removed from 254 nests on the Three Islands. In a doubtless well-intentioned effort to provide insulation, the collector replaced the down with hay. Unfortunately, the hay apparently triggered an outbreak of lethal aspergillosus. Of 31 nests examined on nearby South Green Island, Kim found 14 dead hens on the nest.

- Snowshoe hares

Our March 1998 efforts to cull the population of introduced snowshoe hares (a.k.a. our "softwood release program") actually had an impact. Normally the hares decimate nearly all Balsam Fir seedlings within sight. Seedlings were suddenly abundant in 1999, carpeting the forest floor in certain places at densities of several hundred per m2. As a side project, Marci attempted to learn more about the hare population by setting traps, baited with vegetable scraps from the compost bucket, at 150 m intervals across the entire length of the island. In total she captured 29 different individuals. Females in her sample had larger feet and skulls than males but shorter ears. Although we frequently observe hares during the day, almost all captures occurred at night.

Grand Manan resident Frazier Shepherd trapped a number of snowshoe hares in April. He also netted about 240 muskrats but that seemed hardly to put a dent in their huge population.

- Butterflies

Andrew Graustein ('01) focused on Kent Island's butterflies in the first such study since Dave Maddox and Peter Cannell's ('76) investigation in 1979. Systematic censuses throughout the summer added a new species, Milbert's Tortoiseshell, to Kent Island's butterfly list and showed that Questionmarks, Gray Commas and White Admirals were more common than previously believed. Interestingly, they aggregate to feed on the excreta of Carpenter Ants tunneling in Speckled Alder. Initially, Andrew decided to work on American Coppers, which is how he learned the hard way that they have two distinct summer generations. Numerous in early June, American Coppers disappeared by June 28 and weren't resighted again until July 21. Before they vanished, Andrew documented that males defend small territories centered on sunny patches of Sheep Sorrel. If they are experimentally displaced 50 m, they tend to home in on the same location.

Andrew's main project dealt with egg predation in Red Admirals. A single female lays up to 30 eggs per day on their favorite host, Stinging Nettle; eggs hatch within 10-12 days. Half of the eggs, however, fall prey to red mites, which swarm over the nettles at densities averaging 25 mites per plant. One mite can suck out the contents of as many as five butterfly eggs per night.

- Barnacle behavior

Bob Mauck branched out taxonomically-his PhD dissertation was on Leach's Storm-Petrels- and examined how barnacles balance the benefits of foraging against the risks of predation, and how their foraging decisions are influenced by the density of neighboring barnacles. Bob and his field assistant Kelly Harkless (Kenyon College '99) noted that when they startled barnacles by passing a shadow over them, solitary barnacles remained closed up for longer periods than barnacles in groups. Experiments showed that barnacles could detect the presence of nearby barnacles. By creating groups of different sizes, Bob and Kelly demonstrated that barnacles switched their behavior in accordance with competition and predation-risk theory, spending only about one-third as much time in hiding when surrounded by other barnacles.

Becca applied her training in biomechanics to explore whether barnacles fastened to rocks at the mouth of the Basin and therefore exposed to unidirectional flow could sense their relative position within a colony. After being submerged by the incoming tide, barnacles on the downstream side of colonies tended to emerge earlier than upstream barnacles; the latter presumably intercept food particles flowing over the colony, which prompts the former to expose themselves to added risks.

- Meteorology

The big weather story of 1999 was the drought, which lasted from the end of March until mid-August. The total rainfall in June and July was less than in any summer since Bob Cunningham began taking meteorological data in 1937. In spite of near normal total rainfall in August, the three-month total was the second lowest in 50 years. Because of the parched ground, we often had difficulty erecting mistnet poles. The island's vegetation was stunted and thin and by late July "the fields looked rather fallish," according to Bob. The Mountain Ashes aborted virtually all of their fruits. But the drought must have been good for Cranberries and, remarkably, Lowbush Blueberries. Nobody can remember such a bumper crop; we even made several pies.

The warm (by Kent Island standards) June temperatures also broke records, and we had the second-highest July on record. Although air temperatures in June and July averaged about 17°C (63°F), ground temperatures reached or exceeded 38°C (100°F) on 11 days. This was due in part because the vegetation was so thin that direct sunlight could reach the ground even in mid-summer.

Bob set up the Campbell datalogger in Fog Heaven as usual, measuring air and ground temperatures, solar radiation, wind speed and direction, and precipitation at 10-second intervals throughout the summer. We also spread several Hobo recorders around the island (Petrel Path, in the ocean off Crockett Point, etc.) to get a picture of temperature fluctuations in the spruce-fir forest and in the ocean at different tides and times.

Kent Island Life

True to form, Katie did not spend all of her time videoing sparrows. Applying her keen cinematographer's eye and sharp wit, she produced a priceless documentary about Kent Island life. In one episode Joe stars as "The Petrel Hunter" (Kent Island's answer to Animal Planet's "The Crocodile Hunter"). The midnight scenes of storm-petrels nosing about their burrows are magical. There is also footage of a chilly dip in the tide pool at the south end, a game of "run-the-bases" featuring the uncatchable Alex Wheelwright, students helping Russell fetch his lobster traps at the end of the season, and vignettes of various research projects. Captured on film is everything from the mundane-dish-washing chores-to the sublime-Russell leading an expedition to see Right Whales, which culminated in Claire's excited scream when a whale dove beneath the bow of the Misty Maid (Alexis calls such outbursts "whale-gasms").

And there was high culture on the island, including swing dance lessons on the lawn and a fashion show-not an easy event to pull off, with only our grimy field wardrobe at hand. One night we pushed back the tables in the dorm to make room for a floor-shaking contradance with Mark and me playing guitar, Genie playing penny whistle, and Rebecca Stanley calling the steps. Island life also featured a garden that had to be nursed along under a cold frame through July but which rewarded us with abundant lettuce and Swiss chard; a successful 4th of July beach cleanup (the winning entry in the category "most patriotic" was an unexploded missile of some type); the "hidey game" and Russell's now annual knot-tying seminar; the end-of-the-season song (to the tune of "The Fox Went out on a Foggy Night"); and the usual assortment of sports (homerun derby, frisbee, fitness club, running). The responsibility of cooking dinner for everybody fell to Emily Wheelwright. She was nervous at first but even unbiased observers testified that she was a wonder in the kitchen.

Visitors included Alice Liddell ('99), Marshall Miller ('00), Lucy LaCasse ('76) and her daughter Kaitlin, University of California-Davis graduate student Josh Ackerman, and Jackie Sones' group from Massachusetts Audubon. Susie, Katie and Ross Mauck joined Bob in July, and Seth and Nina Murray accompanied Mark and Rebecca. Janie and David Webster ('57) and friends Kitty and Mark Wheeler were enthusiastic guests, exploring the island from tip to tip during their visit. David shared his vivid journal entries from his first trip one frigid March more than four

decades ago, making us feel quite spoiled with our photovoltaics and solar shower. Associate Dean for Academic Affairs Allen Wells and his son David timed their visit for a spectacular trip to Machias Seal Island. Louise Huntington brought her violin and teamed up with flautist Rachel and vocalists Becca and Genie in a magnificent Bach performance at sunset on the lawn.

My ornithology class opened the station in late April. While we were mistnetting in the north field on an unseasonably warm afternoon, the sky suddenly darkened. Ten minutes later our nets were hidden in a snow squall which blanketed the island white. After that, we walked to the south end to watch five Harlequin Ducks. The last trip of the year was my ecology class field trip in mid-September, after which Russell closed the station down until next spring.

Addenda to the List of Publications from the Bowdoin Scientific Station

More than 140 articles have been published in peer-reviewed journals based on research on Kent Island. Papers with an author who was an undergraduate at the Bowdoin Scientific Station are indicated by asterisks. Numbers in parentheses represent Contribution Numbers from the Bowdoin Scientific Station.

**Freeman-Gallant, C.R. and M. D. Rothstein. 1999. Apparent heritability of parental care in Savannah Sparrows. Auk 116: 1132-1136. (141)
**Futamura, C.W., and N.T. Wheelwright. 2000. The mosses of Kent Island, New Brunswick. Northeastern Naturalist (in press). (139)
**K. Apigian, and N.T. Wheelwright. 2000. Forest ground beetles (Coleoptera: Carabidae) on a boreal island. Canadian Entomologist (in press). (142)
**Mauck, R.A., and K. Harkless. The effect of group membership on hiding behavior in the northern rock barnacle (Semibalanus balanoides). Animal Behaviour (in review).
**Freeman-Gallant, C.R., K. O'Connor, & M. Breuer. Sex-biased parasitism and the geography of Plasmodium infection in Savannah sparrows (Passerculus sandwichensis). Proceedings of the Royal Society, London, Series B (in review).

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Nathaniel T. Wheelwright
Director, Bowdoin Scientific Station
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