

BOWDOIN COLLEGE

BOWDOIN SCIENTIFIC STATION

BRUNSWICK, MAINE 04011

2001 Annual Report

Since the Last Annual Report

Kent Island was featured prominently in the press in 2001. On August 5 the *Boston Sunday Globe* ran a front-page tribute to Chuck Huntington and Bob Cunningham's long-term research projects on Kent Island, aptly entitled "A Patient Breed." Susan Hand Shetterly's September 6 cover story in the *Maine Times* ("Defending the Pristine") captured not only the excitement of scientific discovery at the Bowdoin Scientific Station but also the island's special magic. More recently, the *New York Times Magazine* makes reference to Chuck's work over the last half-century.

Much of the media's attention was focused on the year-long battle over a proposed salmon aquaculture site along Kent Island's eastern shore. Articles appeared in the *New Brunswick Telegraph-Journal*, *Quoddy Times*, *Working Waterfronts*, and *Bangor Daily News*. There were also pieces on Maine Public Radio's "Maine Things Considered" and on the Canadian Broadcasting Corporation. National Public Radio's "Living on Earth" covered the story, broadcasting from coast to coast the sound of Russell Ingall's boat steaming into Three Islands Harbour. Dozens of passionate letters to the New Brunswick Department of Agriculture, Fisheries and Aquaculture (DAFA) from Kent Island alumni eloquently argued the case for protecting Kent Island. When the Canadian Wildlife Service and the Grand Manan Fisherman's Association joined our cause, the battle was won. In April, DAFA formally declined the application of Kelly Cove Salmon Ltd. and declared the area around Kent Island an exclusion zone for aquaculture.

News of the plight of the Bowdoin Scientific Station reached many who had lost touch with Kent Island, particularly those who were students from colleges other than Bowdoin. After reading the *Globe* article, Charlie Ruckstuhl (MIT '42) renewed a friendship with Bob Cunningham that began when both spent the summer of 1939 on the island. Research that summer included Fred Sargent's measurements of Kent Islanders' blood CO₂ levels after a "five-day all-beef diet..." (an experiment for which

most of us would probably prefer to serve as a control).

Olin Sewall Pettingill, Jr. (Bowdoin '30), a former student of Professor Alfred O. Gross as well as author of the first textbook in ornithology for many of us, died last month at the age of 94. In 1939 Dr. Pettingill published *The Bird Life of the Grand Manan Archipelago*, and thereafter he remained a life-long supporter of the Bowdoin Scientific Station. He will be missed by many of us.

The Grand Manan Museum, where Nat gave a talk in July, presented an exhibition about research at the Bowdoin Scientific Station.

In 2001 Kyle Apigian ('98), who studied ground beetles on Kent Island and is now a PhD student in entomology at Berkeley, became the most recent Kent Island alumnus to be awarded a prestigious National Science Foundation Graduate Fellowship.

The Bowdoin Scientific Station has recently joined the Ecological Monitoring and Assessment Network (EMAN), a New Brunswick-based collaborative effort that will make Kent Island's long-term databases on avian demography and the meteorology of the Bay of Fundy available to government, university, and non-governmental scientists involved in environmental monitoring. Because Kent Island provides critical habitat for migrating shorebirds and nesting seabirds, the island and the Grand Manan Archipelago have been designated by the Canadian Nature Federation and Bird Studies Canada as one of Canada's Important Bird Areas.

Summer of 2001

For the second year in a row, Nat spent most of June and July in Brunswick and left the direction of the summer program in the capable hands of Bob Mauck, who has just accepted a position as Assistant Professor at Kenyon College. Long-time Kent Islanders Ed Minot ('70, grandson of Bowdoin Professor Alfred O. Gross, and currently a professor at Massey University in New Zealand) and his wife, Midge, provided invaluable support. Mark Murray ('75) returned to share caretaking

responsibilities with Russell Ingalls and to help with carpentry, crosswords, and cribbage. Mark applied his boat-builder's sensibility to a face-lift of the Rat Shack that moves it and its oceanfront view into the high-rent category.

Research in 2001

• Leach's Storm-Petrels

Chuck's long-term study of Leach's Storm-Petrels marched onward with the assistance of Jon Philipsborn (Kenyon College '03). Chuck and Jon concentrated on Petrel Path, where in July they saw a young Saw-whet Owl perched in a tree, feeding on a storm-petrel—unbanded, much to Chuck's relief. As a side project, Jon thoroughly censused the area across the Basin (a.k.a. Ricklefs's study site), restoring burrow markers and banding birds. Long days spent grubbing and talking with Chuck piqued Jon's interest in Kent Island history. He spent the summer taking notes and musing about a story worthy of a book.

Laura Minnich ('01) returned to Kent Island in late June to finish the storm-petrel nest census she had started the previous year. In two summers, Laura has covered 41 east-west transects and more than 500 different 10m² plots. She found an average of 0.64 active burrows per plot in the northern half of Kent Island and 0.18 per plot in the southern half of the island, yielding an estimate of between 19,500 and 31,500 breeding pairs. Apparently the population size of storm-petrels on Kent Island is 10-times bigger than we had thought, based on a preliminary survey in 1983.

Alexis Blackmer, completing the final field season of her PhD research at U. California-Davis, joined up again with Bob and converted the Lower Lab into a quiet zone in order to measure basal metabolic rates (BMR) in storm-petrels. With BMR measurements for more than 100 known-age storm-petrels, this data set is one of the most thorough for any species. It will not only help determine whether metabolism underlies differences in survival and reproductive success between individuals, but will also provide important information on whether BMR declines with age and whether repeated measurements of metabolic rate on the same individuals yield similar results. Alexis returned to Kent Island in August with her thesis advisor, Gaby Nevitt, to begin a study of

olfactory development and sensitivity in storm-petrel chicks.

Katie O'Reilly (U. Portland) returned for another research season, bringing along her student Alex Coverdill (U. Portland '03). Katie is exploring the relationship between hormone levels (particularly testosterone and the stress hormone corticosterone) and such factors as age, stage of reproduction, and mating status in storm-petrels and Savannah Sparrows. Although testosterone dropped precipitously during early incubation in some male storm-petrels (which is the typical pattern for many bird species), in others it remained elevated through late incubation. The latter may have been late-arriving individuals, or perhaps some males continue to secrete testosterone at modest levels to enable them to fertilize a replacement egg should the first one fail.

Carol Vleck (Iowa State U.) arrived in early July with graduate student Mark Haussmann and undergraduate student Kareem Dixon (Iowa State U. '03) to apply a novel technique to determine the ages of free-living animals by measuring the length of a portion of the chromosome, the telomere. They selected Kent Island as a study site to evaluate the technique because, thanks to several long-term studies, there are marked, known-aged populations of three species: Leach's Storm-Petrels, Tree Swallows, and Savannah Sparrows. Samples from 23 Savannah Sparrow are currently being analyzed, and results from 14 swallows showed the expected decline in telomere length with age. The big surprise, however, is that telomeres in storm-petrels appear to be shorter in nestlings and longer in adults, leading Carol to ask, "Are these long-lived birds expressing the enzyme telomerase in their somatic tissues so that they don't 'age'?"

• Savannah Sparrows

During the first week of June, Nat worked with Christine Canon ('02), Ed and Midge to orient them on his long-term population study of Savannah Sparrows, then left them to their own devices. One fine morning, after the initial inevitable frustration of not being able to find the cryptic nests, Christine found her first one and from then on she walked the South Field with that old-time Savannah Sparrow swagger. The sight of Ed and Midge hunting for nests in the morning sun was a reliable indicator that a new day had dawned. By summer's end, 82 nests

had been found and 105 breeding adults identified. Reproductive success was unusually high in 2001: 15 pairs successfully reared both first and second clutches, only three nests were abandoned, and less than 10% of nests were lost to predators. Typically, 20-30% of nests are preyed upon. The low predation rate may have partly been explained by the discovery of three Common Crow carcasses, apparently shot by duck hunters over the winter. With help from Ed, Midge, Katie, and Alex, Christine banded 75 adults and 237 nestlings in 2001. Christine's honors thesis will examine why certain females switch mates between years, despite the return of their previous mates.

Katie and Alex videotaped Savannah Sparrow nests when the nestlings were five days old to determine the influence of testosterone on male parental care. Testosterone levels varied almost 100-fold between individuals and sampling dates; in general, they declined as the season progressed. Compared to low-testosterone males, males with elevated levels of testosterone fed nestlings less often, if at all. Females mated to such males spent significantly more time at the nest than females mated to low-testosterone males. Whether this represents compensation for a lack of male help, or a strategic decision on the part of females to invest more heavily in the offspring of higher quality males remains to be seen.

• Tree Swallows

The first official activity of the season was the Great Nest Box Restoration of 2001. The last few winters have been particularly rough on nest boxes. Upon arrival at Kent Island, Mark Murray gave everyone a quick primer on nest box repair, both theory and application. With tools in hand, teams spread out across the island under the rallying cry "They shall stand a thousand years."

This effort was especially appreciated by Jeni McDonnell ('02), who served as swallow master this year. The swallow population increased slightly over last year, although it still has not rebounded from the complete nest failure of 1994. Eggs were laid in only 27 of the new-and-improved nest boxes, a marginal improvement over last year's 26 nests. Reproductive success was high, fortunately: 85% of the nests fledged young, and Jeni banded 113 fledglings.

• Bird Populations

A pair of American Oystercatchers took up residence in the area last summer and were observed regularly near the Basin. Eastern Bluebirds nested just west of Fog Heaven, a first according to Chuck. We hardly saw a Boreal Chickadee, but there were more Black-crowned Night-Herons than normal. Katie managed to capture on video a Peregrine Falcon taking a Common Eider duckling off the water.

For many years, Glen Fox and Deb Jeffrey of the Canadian Wildlife Service's National Wildlife Research Centre and, more recently, PhD student Emma Croisant (Wright State University), have been investigating the effect of environmental contaminants on gulls and other birds. In particular, they have shown that exposure to polychlorinated biphenyls (PCBs) suppresses the immune function of birds. Kent Island's Herring Gull population serves as a "clean control" for comparison with gulls in the Great Lakes. In 2001 they collected samples to develop techniques for isolating lymphocytes (which are involved in animal's responses to disease) and preserving them for later *in vitro* analyses in the laboratory. Their preliminary results show that lymphocyte proliferation is more likely to occur in gulls from contaminated sites.

From late April to late June, Rob Ronconi, Lesley Thorne, and Sarah Wong of the Grand Manan Whale and Seabird Research Station conducted detailed surveys of breeding seabirds in the Grand Manan Archipelago. Their censuses around Three Islands have given us the best estimates of population sizes in recent years. At Kent Island they counted 241 individual Black Guillemots, at Sheep Island 114, and at Hay Island only 1. Although only eight Common Tern nests were observed on Sheep Island, 33 adults were counted by June, and as many as 100 individuals were seen by late July, far more than any year since 1986. Common Eiders number around 480 pairs on Kent, 90 on Sheep, and 230 on Hay. Herring Gulls numbered almost 5800 pairs on Kent, 500 on Sheep, and 590 on Hay. Censuses showed 154 Great Black-backed Gulls on Kent, 58 on Sheep, and 11 on Hay, but given that on-the-ground summer-long counts in previous years have confirmed only 10-15 nests, this year's early season surveys doubtless included many transient individuals.

• Mammal and Forest Ecology

Trevor Peterson ('02) spent much of the summer studying the island's two exotic residents, Muskrats and Snowshoe Hares. The Kent Island Muskrat population is unusual because it has few natural predators other than Northern Ravens and the occasional transient owl. One possible consequence is that Muskrats use a greater variety of habitats on Kent Island than they do on the mainland. Instead of building lodges, Kent Island Muskrats occupy elaborate systems of connected underground tunnels and burrows. Muskrat densities were highest near the sloping banks of the wet areas surrounding the Basin. Muskrat activity diminished in the drier areas as the summer progressed.

Early on Trevor was struck by the paucity of young Balsam Firs and birches on Kent Island. To assess the impact of the abundant Snowshoe Hares on the island's forests, he surveyed seedlings, saplings and trees on Kent Island and nearby Wood Island. Saplings were taller and 25-times denser on Wood Island, where hares are scarce. Although the average diameter of mature trees did not differ between the islands, dead trees made up a higher proportion of the forest on Kent Island (22%) than on Wood Island (7%). Interestingly, seedling numbers were dramatically lower on Wood than on Kent Island, suggesting the presence of seed predators such as rats or Red Squirrels on Wood. Together with Akane Uesugi's ('01) findings from 2000, these data firmly establish the negative impact of hares on Kent Island's forest. Trevor's honors thesis, under the direction of Bowdoin professor John Lichter, will determine growth rates and age distributions of Kent Island's trees, and examine the effect on annual growth ring widths of climate (using Bob Cunningham's long-term weather data). Trevor cut complete cross-sections from 36 White Spruces that had fallen over the winter on Kent Island (including series of sections at 100-cm intervals for 13 trees) and took cores of 100 additional trees during an October trip to the island with John to quantify growth rates.

• Marine Ecology

Kent Island has recently been at the heart of issues that seriously affect the ecology and commerce of the Bay of Fundy. Now that the Bowdoin Scientific Station has been declared

off-limits to salmon aquaculture and rockweed harvesting, Kent Island has become a de facto marine refugium. Traditional fisheries will continue but the marine ecosystem will otherwise remain relatively untouched. However, these activities continue to grow throughout the Grand Manan Archipelago and Gulf of Maine. Peter Hill ('02) came to Kent Island last summer with a strong interest in both the biological and economic implications of these activities.

A conversation with Russell prompted Peter to examine one possible effect of aquaculture on the lobster fishery. Russell mentioned that many people in Seal Cove don't like to eat the tomalley (digestive gland, "liver," or, more properly, hepatopancreas) of lobsters caught under salmon pens because they turn an unappetizing black color during cooking. Peter decided to test the validity of this anecdote. With Russell's help, 29 lobsters were taken from alongside and underneath two aquaculture pens. Twenty-five control lobster were taken from deep offshore sites, away from the direct influence of the sites. Using digital photography, Peter analyzed color differences in the hepatopancreas between pen and control sites and confirmed local wisdom.

Peter's other project addressed the effect of rockweed harvest on the intertidal flora and fauna of Kent Island. He randomly selected 1-m² patches along the sheltered shorelines of Kent Island in which he cut rockweed (*Ascophyllum nodosum*) down to 40 cm, the recommended legal length for harvesting. Ten days later he measured species diversity from three randomly selected quadrats within the patch and three uncut control patches nearby. Species richness (the number of species) significantly decreased in cut sites. Although there was also a trend at cut sites towards lower species diversity (number of species, weighted by their abundance), it was not a statistically significant.

Peter's interest in rockweed extended to its reproductive ecology. The alga is dioecious, that is, individual "plants" are either male or female. Peter found significantly more male than female rockweeds in the exposed sites compared to sheltered sites. Additionally, males in exposed sites produced more gametes than males in sheltered sites, which raises questions about reproductive effort in different habitats and has possible implications for harvesting rockweed.

No summary of Kent Island marine ecology would be complete without some mention of

barnacles. Bob ran an experiment to determine whether group-specific barnacle hiding behavior is truly adaptive or just a by-product of barnacles' tendency to feed actively in moving water. The answer is still on video tape.

• Plant Ecology

Building on Sherri Kies's ('01) data from the previous year, Jeni looked at insect capture rates by the carnivorous Round-leaved Sundew. She hypothesized that neighboring flowers of different species may make more insects available to sundews. She transplanted 16 sundews to each of three sites in boggy areas of the West Beach. Half of the sundews served as controls; the other half were surrounded by the flowering herbs. Unexpectedly, neighboring flowering plants appeared not to affect insect capture rate by sundews. Total leaf area of the sundews had the biggest effect on capture rate.

A second experiment looked at insect capture rate as a function of weather. Jeni counted and removed insects from 10 naturally occurring plants each day, morning and evening. Every five days, she switched to new plants to avoid any negative effects of the manipulations. Insects caught in sticky traps set up next to each experimental plant were positively correlated with insects captured by the sundews, indicating that the carnivorous plants forage relatively randomly. Temperature and visibility were positively correlated with the number of insects captured, but no other measured weather factors had any effect.

On small remote islands like Kent Island, plants capable of self-pollination (autogamy) theoretically have an advantage because insect pollinators are not necessarily reliable. Sarah Rodgers ('02) tested the hypothesis that three clonal flower species—Star-flowered Solomon's Seal (*Smilacina stellata*), Three-leaved Solomon's Seal (*S. trifolia*), and Canada Mayflower (*Maianthemum canadense*)—are pollinator-limited on Kent Island. For each species, she administered one of four treatments: (1) hand-pollination with pollen from the same clone, (2) hand-pollination with pollen from a different clone, (3) simulated hand-pollination by rubbing a leaf across the flower, or (4) natural pollination. She administered the treatments in June, then counted fruit-set at the end of July. Natural pollination produced the highest fruit set for Star-flowered Solomon's Seal, whereas Three-leaved Solomon's Seal

showed no difference among treatments. Hand-pollination with pollen from a different clone produced significantly higher fruit set in Canada Mayflower. The fact that they produced fruit at all was a surprise, since Nat had warned fruits had never been documented for mayflowers on Kent Island.

In July, Sarah switched her focus to the pollination ecology of the One-leaf Rein Orchis (*Habenaria obtusata*). Every morning and evening she recorded the number of pollinia (pollen bundles) available on each of 153 orchids along the L-transect to determine whether pollinators are diurnal or nocturnal. Pollinia removal was significantly higher during the night than during the day (1.7 vs. 0.9 per plant per day), implicating small moths and mosquitoes as the most important pollinators. Orchids also opened more flowers at night than during the day. Although individual plants had as many as 12 flowers, producing more than seven did not significantly increase the number of pollinia removed.

• Meteorology

According to Bob Cunningham (who should know, having studied Kent Island's weather continuously and in detail since 1938), the major weather event of 2001 was the record-setting temperature of 27°C (80.6°F) at midday on August 1. That day the ground temperature reached 43.9°C (111°F). Records taken at Kent Island since the 1930s carry the signature of global warming. In June, for example, the average daily maximum temperature was 1.5°C (2.7°F) above the 30-year norm for Kent Island. August's was even higher, 2.4°C (4.3°F) above normal. Summer rainfall has also apparently fallen off noticeably since the 1980s. Other than that, Bob reports that "the 2001 weather was great but rather dull: pleasantly warm, near normal amount of fog, and dry." Bob will spend the winter analyzing meteorological data taken all summer at Kent Island at 10-second intervals, using a Campbell Datalogger housed in our meteorological "laboratory," *Fog Heaven*.

• Artist-in-Residence

Catherine Williams ('01) surprised and delighted us throughout the summer not only with good cookin' but also, in her role as artist-in-residence, with sculptures built from native Kent Island materials and inspired by the work

of Andy Goldsworthy. When reflected in the water at the edge of the Basin, her first sculpture of driftwood and twine created the image of a full spider web. She then turned to marine algae and incorporated Frazier Shepherd's landing as the framework for a web held together by sea urchin spines. Russell's knot-tying seminar helped her with the challenge of building a web out of grass, which we found near the West Beach.

The sculptures, by their nature, were ephemeral. Catherine also left lasting marks on Kent Island. Early in the summer she asked everyone for drawings of their favorite Kent Island scenes and places, as well as ideas for group projects that would make use of everyone's creativity and natural artistic ability. The fruits of this were numerous. The next time you dine at Kent Island, look at the table top. You will see a beautiful and detailed map of Kent Island. Catherine's mural of Kent Island life brightens up the southeast corner of the Dingleberry. Fitting everyone's ideas and sketches into the confined space was a challenge, but Susie Mauck's suggestion to wrap the mural around a corner solved the problem. A favorite vignette is the Scrabble board in the lower left corner of the mural on which game pieces spell out "Kent Island."

• Life on Kent Island

It was a full ship this season. Chuck Huntington made a record number of trips—eight—to Kent Island in 2001. We may also have set a record for the average number of Kent Islanders per day. Although the volume of people sometimes stretched our ability to feed and house, it made for a full and interesting summer. Once again, music filled the evenings. Trevor arrived with violin, mandolin, mandolo, guitar, and the talent to play them all. Kitchen concerts often followed dinner. Peter's lead guitar melted wax. Bob's sister, Cici Groupé, spent a week on the island as cook while Catherine was gone and improved island vocals significantly. Between the violins (Laura, Trevor, Louise Huntington), the guitars (Mark, Catherine, Bob), flutes (Katie Mauck and Nina Murray), recorder (Midge), and Alex's sweet baritone, the musical variety satisfied every taste. With Trevor's help, Ross Mauck and Logan Groupé built their own instruments of indeterminate classification, but definite brio.

Full-contact Scrabble often lasted late into

the night. Monopoly was also big, and inspired Katie Mauck and Nina to produce the version known as Kentopoly. Instead of Chance and Community Chest cards, it features FIM cards ("Fart in a Mitten," an expression Ernest Joy invented to describe how he used to run around when he had too much to do) and TBV cards ("Trust But Verify," popularized by President Reagan but used now as the code of Kent Island science) and a keen-eyed ranking of island locations corresponding to every property from Baltic (the Cow Barn) to Broadway (the Warden's House). The original now hangs in a frame on the Dingleberry wall, thanks to Ed's brother David Minot, who visited in August, with a color copy for general use.

Led by Catherine and Jon, both competitive swimmers, South End and Basin swims were more common than in previous years, which suggests that collegiate swimming programs may have an adverse effect on IQ. Jeni led the South Hill runs and Peter directed a few brave souls in daily "seven-minute abs" workouts.

Russell performed his usual heroics landing us on Machias Seal Island in particularly rough seas. Katie caught the whole thing on video, where we all seemed to disappear under a wave then emerge laughing in the sun. On the ride back from Machias, Russell took us on a tour of Yellow Murre Ledges and Gannet Rock. Late in the summer, aboard Russell's spacious new boat, *Island Bound*, we grilled burgers while surrounded by Right Whales in a sparkling sea. Perhaps the highlights of the trip were two sightings of Basking Sharks which swam right under the boat. On a night of pea-soup fog in July with everyone gathered around a fire on the East Beach, we heard whales in the mist between Kent Island and the Moustache.

The Third Annual Kent Island Fashion Show had many winners. Peter and Alex were the MCs and may have a future on MTV. Their rendition of "Oh, Kent Island" (to the tune of "My Darling Clementine") brought the house down (and was captured in Katie's wonderful video of the "KI Summer of '01"). In keeping with the rest of her art, Catherine wore a ten-gallon hat made from natural materials. Ed and Midge won the historical fiction award for their accurate portrayal of Ernest Joy and Carrie Chase. Trevor's lichen beard and hobo collection from the 4th of July beach cleanup was a favorite.

Carol Vleck captured the essence of Kent

Island life, writing, "We found Kent Island to be a most conducive place not only to collect invaluable samples, but a most congenial place to spend some time. You'd be hard-pressed to find such an interesting and eclectic bunch of people anywhere. We felt like we had been transported back in time where (sans TV and videos) conversation, music, games and high-jinx were not a lost art."

In July, Ed painted the kitchen white and took down the orange shelves which he had built there as an undergraduate 30 odd years ago. Mark filled the shelf space below the counters with cabinets and closed them in with doors, a response to a Muskrat invasion of the Dorm last winter. The crew that opened the station this year learned first-hand what living in a Muskrat burrow must be like.

Besides the visits from researchers, news media and friends such as Seth Murray, Amos Jeffrey, Bill Huntington and Kari Jueln, Kent Island was well used during the school year. Two ornithology class trips arrived in the spring, Trevor led the annual pre-orientation field trip in August, Ed led the September ecology trip, and the Huntington Club was there during the October fall break. Chuck was on each of the trips!

• **Kent Island Stationery**

Trevor has produced a set of pen and ink stationery (illustrated below) from sketches he made last summer. If you would like to purchase some, please contact him at tpeterso@bowdoin.edu.

Addenda to the List of Publications from the Bowdoin Scientific Station

More than 155 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. The complete list of publications can be found linked to the Kent Island web page (academic.bowdoin.edu/kent_island/).

**Conrad, K.F., P. V. Johnston, C. Crossman, B. Kempnaers, R. J. Robertson, N. T. Wheelwright, and P. T. Boag. 2001. High levels of extrapair paternity in an isolated,

low-density, island population of tree swallows (*Tachycineta bicolor*). *Molecular Evolution* 10: 801-808.

**Mauck, R.A., and K. Harkless. 2001. The effect of group membership on hiding behavior in the northern rock barnacle (*Semibalanus balanoides*). *Animal Behaviour* 62: 743-748.

Scott, J.D., K. Fernando, S.N. Banerjee, L.A. Duren, S.K. Byrne, M. Banerjee, R.B. Mann, and M.G. Morshed. 2001. Birds disperse ixodid (Acari: Ixodidae) and *Borrelia burgdorferi*-infected ticks in Canada. *Journal of Medical Entomology* 38: 493-500.

**Wheelwright, N.T., and R. Seabury. Fifty-fifty offspring sex ratios in Savannah Sparrows. *Auk*. *In press*.



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