

BOWDOIN COLLEGE

BOWDOIN SCIENTIFIC STATION

BRUNSWICK, MAINE 04011

1987 Annual Report

Since the Last Annual Report

Much has happened at Kent Island in the 38 years since our last annual report. The 1949 report, a 23-page mimeographed bulletin, began with a description of the financial situation of the Bowdoin Scientific Station. In those days the station ran on \$850 per year, plus whatever donations of canned food and equipment the enterprising field directors could coax from corporations like the Hershey Chocolate Corp., Flako Products Corp., and Kalamazoo Stove and Furnace Co. The salary of the Warden, Ernest Joy, was by far the station's largest budget item at \$30/month. A series of photographs in the 1949 report prove that President Kenneth Sills visited the island the previous summer for two foggy days (during which he apparently never removed his necktie). That trip inspired Sills to write "in Kent Island we have a unique possession."

In the same report Field Director Raymond Paynter ('47) bemoaned the lack of equipment and, worse, the reluctance of students to spend the summer doing biological research at Kent Island. Instead, he complained, "many students feel it far better to work in an industry or attend the Bowdoin summer session." The war had interrupted the growth of the young station "towards becoming one of the outstanding biological field stations in North America." Nonetheless, Paynter and three students succeeded in banding over 3500 birds, censusing bird populations, investigating spider ecology, and documenting the exponential growth of muskrats which had colonized the island eight years earlier.

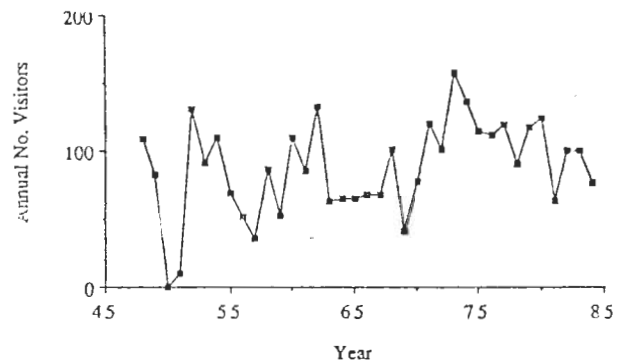
Ernest Joy has long since passed away. His successor, Myhron Tate, retired several years ago after an equally legendary tenure as Warden, and now Myhron's son, Bob, is caretaker. The Bowdoin Scientific Station has once again taken its place as a leading field station under the direction of Charles Huntington, Professor Emeritus of Biology at Bowdoin. Chuck's former students and other alumni of the island occupy prominent positions in the fields of ecology and ornithology nationwide. Having recently joined the Department of Biology at Bowdoin after teaching at Cornell University for several years, I will be succeeding Chuck as Director of the station.

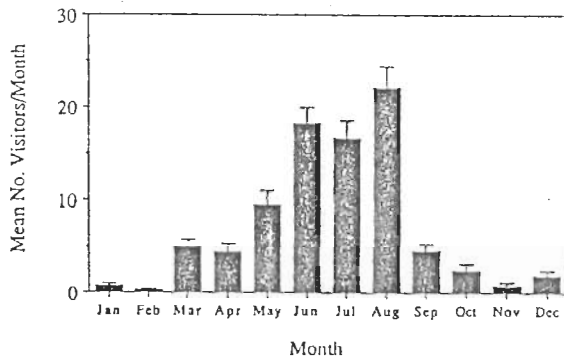
The rich history of the Bowdoin Scientific Station deserves a much fuller treatment than can be given here, but a sense of what has been achieved since the 1949 report is reflected in the list of 72 scientific publications resulting from research conducted at Kent Island. Beginning with this, the Tenth Almost-Annual Report, I hope to revive the tradition of yearly newsletters from the Bowdoin Scientific Station as a means of providing a historical record of year-to-year changes in populations of plants and animal (including scientists) and informing interested Kent Island alumni of events at the station. Your comments about the reports are always welcome.

Current Status and Future Plans

With strong and steady support from the College, the budget of the Bowdoin Scientific Station has grown to meet its increasing operating costs. Dedicated alumni of Kent Island have established and maintained several important funds (A.O. Gross Fund, Kent Island Fund, Heitzaburo Saito Fund, Roy Spear Memorial Fund, and Minot Fund) that help run the station and provide stipends for Bowdoin students undertaking summer research projects.

Since 1949, when use of the Bowdoin Scientific Station began to be monitored, over 3000 visits have been logged in the guest book. Each year an average of 88 individual visits are recorded, with 1973 boasting a record 158 visits (see Figure 1). Seasonally, the heaviest use of the station occurs during the summer, not surprisingly, although the station is used every month of the year (see Figure 2).





The island looks much the same as it did in 1949. The old barn continues to serve as the main dormitory, kitchen, dining hall, and meeting place. The Warden's house is still furnished with metal cots and Ernest Joy's rocking chair, reupholstered to hide the historic bullet holes. The radio shack that Robert Cunningham helped erect 50 years ago remains in excellent condition, although the short-wave radio that we use to communicate with Grand Manan Island is now located in the Warden's house. Spruces shade the pre-fabricated guest cabin that Bill Gross, the station's first Field Director, convinced the Hodgson House Co. to give to the Bowdoin Scientific Station, but it still has a few years left. Our single most pressing need is for a new research laboratory to replace the building (opposite the crumbling "Captain Gillette" wharhouse at the edge of the Basin) that has been used as a lab.

Once we build a research laboratory, we will be able to house the advanced scientific equipment that a new grant from the National Science Foundation will provide. The \$35,000 competitive grant (matched by \$12,000 from Bowdoin) will outfit the station with a microcomputer and printer, two field "data-logger" computers, centrifuges, and other equipment essential for contemporary scientific research. Moreover, the grant will enable us to install a photovoltaic system for silent, low cost, sustainable generation of electricity. Last summer veterans of the Bay of Fundy wonder whether the sun shines enough on Kent Island to power a pocket calculator, much less a field station, be assured that the technology of solar power has apparently advanced to the point where bright overcast skies during at least 40% of summer days

provide sufficient electricity for the needs of a small field station. We will have a relatively quiet backup generator to carry us through July's prolonged foggy spells.

The grant has already purchased a Gravely mower which we used last summer to cut a system of trails in a grid pattern 50 meters on a side through formerly impenetrable raspberry thickets and thick grass in the central portion of the island. Not only do the trails open up new habitats for the study of plants, birds, and insects, but they allow researchers to pinpoint the location of nests, territorial boundaries, and strawberry patches on newly drafted detailed maps of the island.

Last summer was the first in which we left no solid waste in the overflowing trash pits on the island. Paper was burned, and cans and bottles were hauled back to Brunswick where they were recycled. Degradable material was composted for the island's garden (Kent Island's sun may be adequate for generating solar power but it was not up to producing peas or tomatoes; we did, however, produce a bumper crop of rhubarb and some memorable pies in 1987).

The 1987 Research Season

The 1987 research season was busy and productive, with more than ten research projects being conducted. From mid-May until late July, the station bustled with from 7 to 24 people. August was quieter until a group of Bowdoin freshmen descended on a very successful preorientation trip. Chuck and I brought several ecology students to the island during a fine stretch of Indian summer weather over the October fall break.

Meteorologist Bob Cunningham found 1987 "a rather poor summer for those collecting fog water," which means that the weather was great. Temperatures were slightly above average and there were only 31 days of fog between June 1 and August 31. The major research projects this summer focused on Common Eiders, Leach's Storm-Petrels, Savannah Sparrows, Tree Swallows, Herring Gulls, and climate.

- Common Eiders -- Peter Walsh, a graduate student from Yale University, opened the Bowdoin Scientific Station in 1987, arriving in late April to begin his Ph.D. dissertation research on the evolutionary advantages and disadvantages of colonial nesting in Common Eiders.

Common Eiders were threatened throughout northeastern North America and numbered a mere 20 pairs on Kent Island when J. Sterling Rockefeller gave the island to Bowdoin in 1935. Now about 900 pairs nest on the island. Mother eiders communally rear their offspring in groups known as creches, often with the assistance of females that apparently do not have young in the group. Peter's preliminary results indicate that creching costs: females in creches spend less time and forage less intensively than females that are not associated with creches. By marking and observing adults and their ducklings, he hopes to understand how such cooperative behavior has evolved.

- Leach's Storm-Petrels -- Leach's Storm-Petrels are associated with Chuck Huntington in the minds of anyone who has been to Kent Island during the last three decades. Since 1955 Chuck has banded over 20,000 storm-petrels and closely followed their reproductive success, mate choice, and nest site selection. Although recently retired from teaching, he continues his field research and is currently computerizing and analyzing one of the most complete data sets on avian life histories. Last summer, with the assistance of Sue MacDonald ('89), he recovered 588 banded birds, and banded 134 new breeding birds and 289 nestlings. The oldest, a male nick-named Prince Philip, was banded as a young bird in 1959. When Sue was not examining storm-petrels, she collaborated with Kirstin Silvius ('88) to assess techniques for censusing snowshoe hares on the island. Introduced to neighboring Hay island in 1959, the hares rapidly increased. Now they number about 200 individuals on Kent Island alone.

Also exploring the biology of Leach's Storm-Petrels was R. Haven Wiley, Associate Professor of Biology at the University of North Carolina. Haven completed a second year of research on the abilities of storm-petrels to recognize their mates' vocalizations, a task that required carefully recording the calls of banded individuals under natural conditions and then playing tape-recorded calls to birds in their nest burrows under different experimental conditions. Haven's preliminary analyses, as well as Patricia Márquez's ('88) 1986 experiments, suggest that females and males have distinctive calls, and that they respond more vigorously to recordings of their own

or their mates' calls than to those of neighbors. Next summer Haven plans to replicate his experiments and to determine what acoustic features of storm-petrels' calls allow them to be recognized.

Inspired by Donald Griffin's classic homing experiments conducted at the Bowdoin Scientific Station in the 1930's, William Johnson, a Ph.D. student at the State University of New York at Albany, transported 18 storm-petrels 130 miles inland to Bridgewater, Maine. The birds were released on a foggy night from a firetower with luminescent capsules attached to their feathers to allow Bill to determine vanishing bearings. Within ten days, at least 11 of the birds had returned, some of them with a gain in weight. The results of the experiment demonstrate that storm-petrels can navigate overland from an unfamiliar location (albeit slowly), which raises the intriguing possibility of magnetic orientation.

Robert Ricklefs, Professor of Biology at the University of Pennsylvania, has studied growth and development of nestling storm-petrels at the Bowdoin Scientific Station with the assistance of various Bowdoin undergraduates for nearly a decade. Although unable to conduct research on Kent Island in 1987, Bob intends to return next year with graduate student Nina Stoyen and Alan Place, Associate Professor of Biology at the University of Maryland, to investigate storm-petrels' unusual ability to digest waxes found in the cuticle of marine invertebrates.

- Savannah Sparrows -- This summer I began what I hope will be a long-term investigation of the behavioral ecology and population biology of Savannah Sparrows on Kent Island. The drab, open-nesting sparrows are the most abundant land birds on the island. With Clara Dixon's Ph.D. research on the Kent Island population as an invaluable source of information and ideas, field assistant Peter Hodum ('88) and I individually color-banded virtually 100% of the sparrows (72 males and 71 females) nesting in the central part of the island; we also banded 248 of their fledglings. As part of his honors thesis research, Peter conducted a detailed study of reproductive success and nestling diets in different habitats. We were able to determine the sex of most fledglings as well as adults by their wing length. Female Savannah Sparrows, it turns out, nest at extraordinarily high densities (up to 5

females breeding simultaneously within a quarter-hectare quadrat) and males commonly have up to three mates simultaneously. The real pay-off for our banding efforts will appear next year, when I will be able to estimate male, female and yearling survival (Dixon had shown that a high percentage of birds return between years to Kent Island), and relate survivorship, mate choice, and habitat selection to previous reproductive efforts. Associate Professor Joseph Williams from Pepperdine University and I will collaborate next summer on a study of the energetics of breeding Savannah Sparrows.

- Tree Swallows -- The original colony of Tree Swallows established in 1938, when 70 boxes were erected, continues to thrive and offer opportunities for various studies of population biology, behavior, and physiological ecology. This summer nearly all of the more than 100 nest boxes were occupied, including several that had fallen over. Blinn Dorsey ('88), following up on Raymond Paynter's investigations, banded the entire Tree Swallow population and determined where and with whom all adults bred. Using model Herring Gulls he conducted an ingenious experiment to determine what effect gulls perching on Tree Swallow nest boxes have on the reproductive success of the swallows. Several times Blinn had noted gulls preying on unwary adult and fledgling swallows, and most swallows refused to feed their nestlings when a model gull was placed on their nest box. Nonetheless, adult swallows whose nestlings were neglected while the gull model was present were apparently able to compensate

for their nestlings' low weights by accelerating feeding rates in the absence of gulls. As evidence, we found no long-term difference in the weights of gull-plagued and "control" swallow nestlings.

Next summer the Bowdoin Scientific Station will join a large-scale collaborative project on the relationship of insect density to clutch size in Tree Swallows led by Dr. David Hussell, Research Scientist at the Canadian Ministry of Natural Resources.

- Kent Island Climate and Acid Precipitation -- With the exception of a few years during the 1950's, meteorological data have been taken each summer since 1937 at the Bowdoin Scientific Station under the direction of Bob Cunningham. Ernest Joy made year-round observations for 12 years. The results (see Table) will be no surprise to anyone who has spent much time on Kent Island. It is a chilly, damp, and foggy place. Rather than complain about the weather, Bob has capitalized on Kent Island's fog by initiating a study of acid fog in collaboration with Associate Professors Joby Carlisle and Richard Jagels (University of Maine-Orono) and with the help of Blinn Dorsey ('88) and Sue MacDonald ('89). (Bob published the first study of the chemical composition of Kent Island's fog in 1941; the UMO team has been conducting an extensive study of acid fog along the Maine coast for several years.) The results of this summer's work are a good news-bad news story: the fog at Kent Island is less acidic than that of the rest of coastal Maine, but its pH measures an alarmingly low 3.6.

Summer Climate at the Bowdoin Scientific Station ¹

Month	Average Temperature in ° C (sd ³)	Precipitation in Centimeters (sd)	No. Days With Fog ² (sd)
June	10.7 (0.6)	8.59 (5.23)	10.9 (3.3)
July	13.1 (0.8)	8.23 (4.67)	15.4 (5.1)
August	14.1 (0.8)	7.70 (4.42)	13.4 (3.0)
September	12.8 (0.7)	12.80 (7.82)	7.4 (2.7)

¹ based on a 30-year record through 1985 (Cunningham 1985)

² visibility < 0.8 km at both 0800 hr and 2000 hr

³ standard deviation

• Herring Gulls -- Herring Gulls were the object of many of the early studies at the Bowdoin Scientific Station. By 1948 over 41,000 had been banded; 1554 banded birds were recovered from sites as far afield as North Dakota and Honduras. As late as 1949 Kent Island boasted the largest colony of Herring Gulls in North America. Last summer Sandra Lee, a graduate student at the University of Manitoba, and Janice Johnson (U. Manitoba '88) braved dive-bombs and other bombs to study incubation patterns in gulls. The previous year Sandra had discovered that breeding birds tended to be less attentive at the nest once the first two eggs (of a typical clutch of three eggs) had hatched, and she aimed to test the effect of "egg neglect" on the last-hatched chick. Surprisingly, neglected chicks may actually do better in terms of hatching synchrony and subsequent growth rates than non-neglected chicks. The mild summer may have been responsible for these unexpected results and for the abnormally high survival (70.4% of the third chicks lived to at least seven days of age).

Kent Island Life

Seventy visits were logged in the guest book for the Bowdoin Scientific Station during the 1987 research season. Two events were particularly memorable. This summer Bob Cunningham celebrated the 50th anniversary of his first visit to the island. His wife, Claire, and their sons, Peter, Jim, and Bill, accompanied Bob and the Cunninghams collectively provided moral and physical support for the excavation of the new outhouse hole. Alfred Gross's grandson, Ed Minot ('70), who is currently a Lecturer at Massey University in New Zealand, returned with his family to Kent Island, where Ed had completed his M.S. thesis on the feeding behavior of Common Eiders. Ed and Midge Minot's children, Hannah and Ethan, represent the fourth generation of Grosses to set foot on Kent Island.

Our chef par excellence during the summer was Maddy Butcher (Brown University '88 and daughter of Bowdoin Professor of Chemistry Sam Butcher) who spared no effort, imagination, or butter in her successful attempts to plump us up. Maddy spent her free hours working with Blinn on the Tree Swallow project.

Chronological List of Publications from the Bowdoin Scientific Station

- Gross, W.A.O. 1935. The life history cycle of Leach's Petrel (*Oceanodroma leucorhoa leucorhoa*) on the outer sea islands of the Bay of Fundy. *Auk* 52: 382-399. (1)**
- Gross, W.A.O. 1936. Kent's Island -- Outpost of Science. *Nat. Hist.*: 37: 195-210.
- Gross, A.O. 1937. Birds of the Bowdoin-MacMillan Arctic Expedition. *Auk* 54: 12-42. (2)
- Gross, T.A. 1937. Designing the first stage of the speech amplifier. *Q.S.T.* 21: 33-100.
- Gross, A.O. 1938. Eider Ducks of Kent's Island. *Auk* 55: 387-400. (3)
- Gross, T.A. 1938. Operation of zero-bias modulators. *Radio* 230: 21-23.
- Pettingill, O.S., Jr. 1939. The bird life of the Grand Manan Archipelago. *Proc. N.S. Inst. Science* 19: 293-327. (5)
- Griffin, D.R. 1940. Homing experiments with Leach's Petrels. *Auk* 57: 61-74. (6)
- Gross, A.O. 1940. The migration of Kent Island Herring Gulls. *Bird Banding* 11: 129-155. (7)
- Cunningham, R.M. 1941. Chloride content of fog water in relation to air trajectory. *Bull. Am. Meteorological Soc.* 22: 17-20. (8)
- Gross, A.O. 1944. Food of the Snowy Owl. *Auk* 61: 1-18. (9)
- Poor, H.H. 1944. Color-banded adult Herring Gulls. *Bird Banding* 15: 112-114.
- Gross, A.O. 1944. The present status of the American Eider on the Maine coast. *Wils. Bull.* 56: 15-26 (10)
- Gross, A.O. 1945. The present status of the Double-crested Cormorant on the coast of Maine. *Auk* 61: 513-537. (12)
- Gross, A.O. 1945. The present status of the Great Black-Backed Gull on the coast of Maine. *Auk* 62: 241-256. (13)
- Gross, A.O. 1945. The Laughing Gull on the coast of Maine. *Bird Banding* 16: 53-57. (14)
- Gross, A.O. 1945. The Black Duck nesting on the outer coastal islands of Maine. *Auk* 62: 620-622. (15)
- Gross, A.O. 1947. Recoveries of banded Leach's Petrels. *Bird-Banding* 18: 117-126. (16)

- Paynter, R.A. 1947. The fate of banded Kent Island Herring Gulls. *Bird Banding* 18: 156-170. (17)
- Gross, A.O. 1947. Cyclic invasions of the Snowy Owl and the migration of 1945-1946. *Auk* 64: 584-601. (18)
- Winn, H.E. 1947. The Black Guillemots of Kent Island. *Bull. Mass. Audubon* 31. (19)
- Gross, A.O. 1948. Gulls of Muskeget Island. *Bull. Mass. Audubon* 32: 43-46. (20)
- Paynter, R.A. 1949. Clutch-size and the egg and chick mortality of Kent Island Herring Gulls. *Ecology* 30: 146-166. (21)
- Winn, H.E. 1950. The Black Guillemot of Kent Island, Bay of Fundy. *Auk* 67: 477-485. (22)
- Paynter, R.A. 1951. Clutch-size and egg mortality of Kent Island Eiders. *Ecology* 32: 497-507. (23)
- Paynter, R.A. 1954. Interrelations between clutch-size, brood-size, pre fledging survival, and weight in Kent Island Tree Swallows. *Bird Banding* 25: 35-38, 102-110, 136-148. (24)
- Huntington, C.E. 1955. Age discrimination in a breeding colony of the Herring Gull *Larus argentatus*. *Acta XI Congr. Int. Orn.*: 467-469. (25)
- Huntington, C.E. 1956. The Bowdoin Scientific Station. *Maine Field Nat.* 12: 2-9.
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- Bullock, R.C. 1961. The intertidal molluscan fauna of Kent Island, New Brunswick, Canada. *Maine Field Nat.* 17: 27:31. (26)
- Benton, A.H., and V. Shatrau. 1962. Notes on a collection of bird fleas from Grand Manan, New Brunswick. *Can. Entomologist* 94: 743-745. (27)
- Emlen, J.T. 1963. Determinants of cliff edge and escape responses in Herring Gull chicks in nature. *Behaviour*. 22: 1-15. (28)
- Huntington, C.E. 1963. Population dynamics of Leach's Petrel, *Oceanodroma leucorhoa*. *Proc. XIII Int. Ornith. Congr.*: 701-705. (29)
- Gobeil, R.E. 1965. Butterflies of Kent Island, New Brunswick. *J. Lepidopt. Soc.* 19: 181-183.
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- Grubb, T.C., Jr. 1970. Burrow digging techniques of Leach's Petrel. *Auk* 87: 587-588. (35)
- Gill, D.E., W.J.L. Sladen, and C.E. Huntington. 1970. A technique for capturing petrels and shearwaters at sea. *Bird Banding* 41: 111-113. (36)
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- Grubb, T.C., Jr. 1972. Smell and foraging in shearwaters and petrels. *Nature* 237: 404-405. (39)
- McCain, J., Pike, R.B., and Hodgdon, A.R. 1973. The vascular flora of Kent Island, Grand Manan, New Brunswick. *Rhodora* 75: 311-322. (40)
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- Fox, G.A., A.P. Gilman, D.B. Peakall, and F.W. Anderka. 1978. Behavioral abnormalities of nesting Lake Ontario Herring Gulls. *J. Wildl. Manage.* 42: 477-483.

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** Contribution No. from Bowdoin Scientific Station

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20 December 1987