



RINHewS

The Newsletter of the Rhode Island Natural History Survey

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President's Corner

by John F. Paul

What's exciting about the Rhode Island Natural History Survey?

Well, we've just finished one of our best-ever conferences. It was held at the CCRI Flanagan Campus and introduced the 1999 recipient of the RINHS Distinguished Naturalist Award, Frank Golet [see article on p. 13]. We had the highest number of non-student attenders, two excellent plenary speakers, excellent presentations, and top-notch posters and organizational exhibits. I heard from numerous attenders that the conference pulled together an outstanding group to discuss the *Challenges and Opportunities Facing Rhode Island's Biodiversity: The Science Behind the Issues*.

This was our annual event to bring together individuals from across the state to discuss topics on the Rhode Island environment, and the members of the Conference Committee, led by Larry Taft, outdid themselves in pulling it off. Congratulations and thanks go to all those who helped with this conference, and to the Virginia B. Butler Fund and the Rhode Island Foundation for helping support attendance of high school students and teachers at the conference.

Our exciting publications list continues to grow. If you're looking for a publication unique to the Rhode Island environment, then this is the place to start. Just this last year we published the first volume in our own series on the Biota of Rhode Island: *Vascular Flora of Rhode Island*. The second volume in the series, *Vertebrates of Rhode Island*, is due out this year. If you are thinking about publishing on a topic of interest to the Rhode Island environment, give our office a call to see if it might be suitable for us to publish.

We completed another successful year in our annual lecture series. We had presentations on Arctic-nesting geese, the Wood-Pawcatuck Watershed, Rhode Island amphibian population dynamics, and hurricanes. We are now developing the lecture series for next year, so if you know an interesting speaker who would like to speak on a topic of interest to the

Rhode Island community, please contact the RINHS office.

We have an enthusiastic and dedicated Board of Directors who represent a range of interests from across the state. I know this may not mean much to the average member, but the Board is very important for the operation and functioning of RINHS. Without this enthusiastic and dedicated Board we would not have been able to do the exciting things that have been happening.

The Rhode Island Natural History Survey continues to hear that members think we are doing the right things. This is extremely encouraging, because we do need the feedback on how we as an organization are meeting the needs of the members. Besides, it is awfully nice to hear we are doing some things right. We have a unique niche to fill in the Rhode Island environment, and we need encouragement and support in doing this.

What is exciting about the Rhode Island Natural History Survey is that we are actually bringing together the state's ecologists and naturalists to fulfill our mission: to advance the scientific knowledge of the state's biota, ecological communities, and environmental resources; to facilitate and coordinate the gathering and dissemination of information on the state's biota and natural communities; and to enhance communication among the state's environmental and life scientists.

What is exciting is that we are actively pursuing the mission of the RINHS, and our members are telling us that we are doing the right stuff!

Thank you for your support and encouragement!

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Research Reports

Numbers of Fall Migrant Songbirds Declining on Block Island

by Steven E. Reinert and Elise Lapham

For 31 years beginning in 1968, Elise Lapham and her daughter, Helen Lapham, have been mist-netting and banding songbirds in habitats surrounding Elise's house in the "Clay Head" area on the northeast corner of Block Island, RI, ten miles off the state's mainland coast. Sadly, Helen died of ovarian cancer in 1997. Her spirit, however, lives on at the station in the minds of Elise and her team of dedicated volunteers including Kim Gaffett, who will succeed Elise in carrying on the banding tradition at the site; Sue, Mark, and Sarah Carr; and more recently, Scott Comings of Block Island's Nature Conservancy Field Office.

Running between five and ten 8-foot tall by 42-foot long mist nets during most days of each spring and fall migratory period, the Lapham team has amassed over 155,000 net-hours of effort in the 31 years, capturing over 70,000 birds of 155 species in the process. This list includes such east-coast rarities as Summer Tanager; Say's Phoebe; Yellow-headed Blackbird; Bewick's Wren; and Prothonotary, Golden-winged, Cerulean, and Yellow-throated warblers. Birds captured in the fall (57,632 total) far outnumber spring birds (16,716), this due to the vast numbers of recently hatched birds (hatch-year, or "HY" birds) that head south from their northern breeding grounds at the end of each breeding season. Indeed, 93% of all fall songbirds captured at the Block Island station are HY birds.

Recently, the authors presented an analysis of the first 28 years (1968-1995) of fall banding data at the Audubon Society of Rhode Island's 1999 Birder's Conference. This article will summarize some of those results and introduce ideas for future analyses. The data presented here are from files provided by the Federal Bird Banding Laboratory (BBL), which each year computerizes annual reports from all

banders. Also underway is an effort incorporating 15 volunteers to enter all records from the 31 years at the Block Island Station, including data on the time of capture, wing-length, weight, fat-class, and molting, none of which are available in the BBL files.

Table 1 presents the breakdown of captured fall migrants by wintering destination. Although US-wintering migrants comprise 63% of the total number of captured birds, those wintering in Central and South America, and the islands of the Caribbean, the so-called "neotropical migrants," comprise over 55% of the 108 fall migrant species.

Analyses of Breeding Bird Census data during recent decades have documented the declines of some eastern-breeding neotropical migrants, such as the Wood Thrush (e.g., Askins et al. 1990). These discoveries have resulted in a vast amount of attention in the ornithological literature devoted to the population trends of these songbirds. An objective of this report is to present data illuminating the population trends of some of the dominant fall migrants on Block Island, as calculated from the banding capture data. Results presented, however, must be interpreted while considering some of problems inherent in the data, including (1) dramatic habitat changes at the net-lane sites over the 30+ years: habitats have grown from knee-high old-field communities, to shrub communities as tall as or taller than the nets; (2) new net sites were added as years progressed; (3) some birds were caught in baited ground-traps, and they cannot be separated (in the BBL data) from birds captured in nets; (4) recaptures of birds banded in previous seasons or years are not included in the BBL data; (5) finally, nets were left open for fewer hours per day in the earlier years than in the later years.

The last-named concern is especially problematic in analyzing a commonly-used index of capture abundance, "birds per net-hour." This index adjusts capture numbers for differences in netting effort among years, thus enabling valid comparisons of bird abundance over time. Because netting efforts at the Block Island station were concentrated in the peak early-morning hours during the early years,

Wintering Destination	Total Captured	Percent Captured	Total Species	Percent Species
Northeast US	533	0.9	11	10.2
Southeast US	35,587	61.8	37	34.3
Central Am./Carib.	15,455	26.8	40	37.0
South America	6,046	10.5	20	18.5
Totals	57,621	100.0	108	100.0

Table 1. Block Island Fall Migrants by Wintering Destination Class

however, birds-per-net-hour calculations are inflated for those years. In later years, nets were left open into the afternoon hours when capture rates are reduced, thus deflating the birds-per-net-hour values.

Thus, we chose an alternative means of examining changes in the numbers of fall migrants over time. Table 2 presents the mean number of birds captured per year for the 12 years 1968-1979 vs. the 16 years 1980-1995 (this split follows methods of researchers at the Manomet Bird Observatory [Hagan

et al. 1992] who reported on similar fall migration capture data for the years 1970-1989). A quick glance down the column presenting the percent difference between the means reveals a preponderance of negative changes, the mean capture numbers for many species in the more recent period reaching only half or less of the numbers from the late 60s and 70s. These negative changes prevail despite fewer mean total net-hours per year in the earlier period (mean=4,163) than in the later years (mean=6,489). A

Species	Winter Dest ²	% Total	Mean Capt 68-79	Mean Capt 80-95	% Diff Means	Mean ln Capt 68-79	Mean ln Capt 80-95	P ³	% HY Birds ⁴
1 Yellow-rumped Warbler	SE	35.8	1081	478	-55.8	74.6	40.0	<0.01	98.4 (96.8, 98.5)
2 Gray Catbird	CA	12.9	274	260	-5.0	59.6	58.5	0.85	96.4 (96.1, 96.4)
3 Red-eyed Vireo	SA	4.8	149	60	-59.9	35.1	17.2	0.04	98.8 (98.6, 98.8)
4 Golden-crowned Kinglet	SE	4.3	91	93	2.5	20.5	16.5	0.22	99.8 (77.3, 99.8)
5 White-throated Sparrow	SE	3.1	83	49	-41.6	22.5	13.1	0.03	98.3 (93.6, 98.4)
6 Common Yellowthroat	CA	2.4	68	36	-47.4	17.8	8.1	0.02	90.2 (88.1, 90.4)
7 Song Sparrow	SE	2.3	82	23	-71.5	22.1	4.7	<0.01	95.6 (85.1, 96.1)
8 Swainson's Thrush	SA	2.3	81	21	-73.9	18.5	4.3	<0.01	96.5 (95.7, 96.5)
9 Ruby-crowned Kinglet	SE	2.1	55	34	-38.2	12.2	7.5	0.19	98.4 (51.8, 99.1)
10 Hermit Thrush	SE	1.9	55	26	-51.9	14.2	6.7	<0.01	98.3 (98.2, 98.3)
11 Dark-eyed Junco	SE	1.8	45	30	-32.7	11.7	7.1	0.06	98.4 (97.4, 98.4)
12 American Redstart	CA	1.8	44	31	-31.2	11.2	7.3	0.53	95.5 (94.4, 95.6)
13 Brown Creeper	SE	1.7	28	41	48.4	6.6	10.4	0.50	98.3 (87.6, 98.5)
14 American Robin	SE	1.4	45	18	-61.3	10.9	3.0	<0.01	90.6 (86.1, 91.1)
15 Veery	CA	1.4	39	20	-49.1	10.5	4.5	0.04	96.4 (96.1, 96.4)
16 Black-throated Blue Warbler	CA	1.2	22	28	26.8	4.4	6.6	0.18	96.9 (95.0, 96.9)
17 Swamp Sparrow	SE	1.2	32	18	-43.2	8.3	4.5	0.10	96.4 (92.4, 96.5)
Gray-cheeked Thrush	SA	1.2	42	11	-74.1	8.9	1.7	0.01	97.6 (97.0, 97.6)
18 Eastern Towhee	SE	1.1	30	18	-38.6	6.7	3.4	0.04	92.9 (92.3, 92.9)
20 Blackpoll Warbler	SA	1.1	40	10	-75.1	9.9	1.5	<0.01	90.0 (88.7, 90.1)
21 Cedar Waxwing	CA	1.0	35	11	-69.1	8.8	2.5	<0.01	95.4 (94.5, 95.5)
22 Red-breasted Nuthatch	SE	0.8	22	19	-14.0	5.5	4.5	0.86	85.8 (77.7, 87.2)
23 Eastern Phoebe	SE	0.7	14	15	2.6	2.9	3.5	0.82	88.0 (51.3, 93.0)
24 Northern Waterthrush	CA	0.7	24	8	-68.9	5.5	1.2	0.01	94.4 (92.8, 94.5)
25 Black-and-white Warbler	CA	0.7	14	14	-3.3	2.8	2.5	0.96	94.9 (93.3, 95.0)
26 Ovenbird	CA	0.7	16	12	-28.4	3.0	2.0	0.21	94.8 (92.8, 94.9)
27 House Wren	SE	0.6	17	9	-46.2	3.2	1.2	0.05	96.9 (92.5, 97.0)
28 Winter Wren	SE	0.6	16	8	-48.2	3.7	1.2	0.10	99.6 (94.5, 99.6)
29 Cape May Warbler	CA	0.5	20	5	-77.6	4.2	0.6	0.12	99.6 (98.9, 99.6)
30 Scarlet Tanager	SA	0.4	12	8	-38.4	2.3	1.3	0.06	95.0 (93.1, 95.1)
31 Blue-headed Vireo	SE	0.4	7	11	62.6	0.8	1.9	0.10	97.3 (87.8, 97.5)
32 Magnolia Warbler	CA	0.4	12	6	-47.4	2.1	0.7	0.01	96.4 (94.5, 96.5)
33 Western Palm Warbler	SE	0.4	14	5	-65.0	2.7	0.9	0.01	98.8 (96.7, 98.9)
34 Brown Thrasher	SE	0.4	14	3	-80.4	2.6	0.3	<0.01	88.0 (73.5, 90.0)
35 Baltimore Oriole	CA	0.3	17	6	-68.1	4.3	1.3	0.04	94.2 (65.3, 96.0)
36 Northern Cardinal	NE	0.3	4	7	98.2	0.5	1.2	0.14	79.5 (60.6, 84.4)
37 Philadelphia Vireo	CA	0.3	10	2	-83.2	2.1	0.1	<0.01	97.4 (95.0, 97.5)
38 Northern Parula	CA	0.2	8	3	-58.8	1.4	0.3	<0.01	97.3 (93.2, 97.4)
39 Purple Finch	SE	0.2	7	3	-57.1	1.1	0.4	0.01	90.9 (75.0, 92.5)
40 Black-capped Chickadee	NE	0.2	2	6	147.1	0.4	0.6	0.41	91.0 (51.5, 94.9)

¹ Presents differences in the mean annual daily capture totals per species and the annual means of the totals of the natural log of daily captures per species for the years 1968-79 vs. the years 1980-95. Mean annual net-hours for years 1968-79=4,163; 1980-95=6,489.

² Principal wintering grounds: CA=Central America/Caribbean; NE=Northeastern US; SA=South America; SE=southeastern United States.

³ P-value of a Wilcoxon rank-sum test of the annual means of the totals of the natural log of daily captures for the years 1968-79 vs. the years 1980-95.

⁴ The interval in parentheses represents the % HY calculation with all birds of unknown age included as AHY and HY birds, respectively.

Table 2. Changes in Abundance of the Dominant Fall Passerine Migrants at Block Island, Rhode Island¹

conservative statistical analysis of the differences (Wilcoxon rank-sum test of the annual means of the totals of the natural log of daily captures per species for the years 1968-79 vs. the years 1980-95; see Table 2) reveals that 22 of the 40 most abundant fall migrant species are significantly ($P \leq 0.05$) less abundant in the more recent period vs. the 12 years from 1968-79, while no species were significantly more abundant in the latter years. Of the 22 species exhibiting significant declines, 10 have their principal wintering grounds in the southeastern US, 8 in Central America/Caribbean, and 4 in South America; they represent 53%, 57%, and 80% of the species in those three migrant classes, respectively.

Although we believe that numbers of fall migrants have indeed decreased on Block Island during the study period, and that our data present strong evidence for such declines, we can only conclude positively from the data presented in Table 2, that the numbers of birds hitting the mist-nets have declined. In extending our data to fall migrants in general, the concerns with the data presented above must be considered. In particular, changes in the composition of vegetation in the net lanes over time could clearly influence the bird species attracted to the sites, while the taller vegetation present in the latter years could result in birds passing over the nets (which in earlier years would have been captured).

Also to be considered in evaluating our data on declines is the preponderance of HY birds captured. Presented in the last column of Table 2 are the percent of HY birds per species calculated using the fall data from 1970-1994 (years 1968 and 1969 were omitted because the aging technique of skulling was not employed regularly until 1970). The large proportions of HY birds during fall migration at Block Island further substantiate Ralph's (1981) theories regarding the "coastal effect": i. e., the large percentage of HY birds migrating along the coast in fall indicates that the coast is on the periphery of the migratory corridor for these species. Most of the migrants listed in Table 2 exhibit a markedly higher percentage of adult birds along inland "coastal plain" routes (Ralph 1981), suggesting that these inland corridors represent the centers of migratory movements for these species.

Discussions of combining the Block Island bird-banding data with data from other southeastern New England coastal banding stations in Manomet, MA (T. Lloyd-Evans, Manomet Observatory for the Conservation Sciences), Fire Island, NY (P. A. Buckley), and Kingston, RI (P. Paton, D. Kraus) are already underway. We look forward to revealing the results of combined analyses in the years to come.

Literature Cited

- Askins, R. A., J. F. Lynch and R. Greenberg. 1990. Population declines in migratory birds in eastern North America. *Current Ornithol.* 7:1-57.
- Hagan, J. M. III, T. L. Lloyd-Evans, J. L. Atwood, and D. S. Wood. 1992. Long-term changes in migratory landbirds in the northeastern United States: evidence from migration capture data. In: J. M. Hagan, III and D. W. Johnston, eds., *Ecology and Conservation of Neotropical Migrant Landbirds*. Smithsonian Institution Press, Washington, D.C.
- Ralph, C. J. 1981. Age ratios and their possible use in determining autumn routes of Passerine migrants. *Wilson Bull.* 93:164-188.

Steven Reinert has studied wetland and coastal birds in southeastern New England with URI, the Lloyd Center for Environmental Studies, and other groups for over 25 years.

Elise Lapham has banded migratory birds on Block Island since 1967, and is personally responsible for the preservation of hundreds of acres of wildlife habitat at the north end of the island.



Monitoring Amphibian Communities in Southern Rhode Island by Peter Paton

When I moved to Rhode Island three years ago, I had no idea how abundant frogs and salamanders were in New England. My first encounter with this secretive community occurred in the spring of 1996, when I had the opportunity to go road running with Chris Raithel. Chris, who works for the RIDEM Division of Fish & Wildlife, is an extremely dedicated biologist and is one of the preeminent herpetologists of the region. We went out on a warm, rainy night in May during a torrential downpour. What astounded me was the number of frogs and salamanders we saw that night. They were everywhere, and it got me thinking about the vital role that amphibians must play in eastern forests.

By the following spring I had initiated research projects to assess community structure and population trends of amphibians at various sites in southern Rhode Island. With the help of Bill Crouch, an M.S. candidate, and wildlife students in the URI Department of Natural Resources Science, we now monitor seven ponds for as long as 275 consecutive days each year.

We modeled our research design after visiting a pond on the URI Alton Jones campus that Dr. Robert Shoop, retired URI professor, and Dr. Tom Doty, a professor of biology at Roger Williams University, have been monitoring since the 1970s. The data they have accumulated over the years represent one of the best long-term data sets on salamander population dynamics in the world.

In Rhode Island, we've found that ponds where amphibians breed successfully typically hold water for only 6-10 months out of the year. These seasonal ponds lack fish and large invertebrate larvae (e.g., odonates), which are voracious predators of amphibian larvae. As a result, species richness in seasonal ponds in southern New England is quite impressive. There are at least eight species of frogs (Wood Frog, Spring Peeper, Gray Tree Frog, American Toad, Fowler's Toad, Eastern Spadefoot, Green Frog, and Pickerel Frog) and three species of salamanders (Spotted and Marbled Salamander and Red-spotted Newt) that breed in seasonal ponds. Many of the ponds used as breeding sites are relatively small (e.g., one is only about 25' across). Therefore, there is no room for spatial segregation among species, rather interspecific competition appears to have driven this amphibian community toward extreme temporal segregation.

Wood Frogs are the first adults to arrive at the breeding ponds each spring, usually around the first of March depending on weather conditions. Wood Frogs are also among the most abundant species at seasonal ponds; a small pond (0.25 hectares) can support over 1,000 breeding adults. Spotted Salamanders are the next to arrive, starting in mid-March, with 2-130 breeding adults typically found in the ponds we are monitoring. By the end of April, virtually all of the adult Wood Frogs and Spotted Salamanders have deposited eggs and headed back into the woods, where they spend most of their life. Their departure coincides with the arrival of Spring Peepers at the ponds. Although peepers are diminutive, measuring less than 1.5" long, their vocalizations mask their true size. Standing by a pond full of calling Spring Peepers can be deafening, but also one of the first true indications that spring has finally arrived.



Peepers are another species that minimizes the amount of time they spend in the pond, with most adults in and out within one month.

About the time that peepers start to leave the ponds, another arboreal frog

begins to arrive. Gray Tree Frogs are found near seasonal ponds from early May into mid-June. Like peepers, the total abundance of tree frogs at the breeding ponds is difficult to determine, as they are agile climbers and often climb over our drift fences. The last frogs to arrive at the ponds are three species belonging to the genus *Rana*: Green Frogs, Pickerel Frogs, and Bullfrogs. As opposed to the previously-mentioned species that are obligate breeders in seasonal ponds, these latter three species sometimes breed in more permanent waters. Green Frog larvae take 1-2 years to undergo metamorphosis to their terrestrial form, while Bullfrog larvae take 2-3 years. In addition, adult ranids typically remain in the pond throughout the summer, rather than leaving immediately to the surrounding forested wetlands as the other frogs. Adult and subadult ranids establish territories in the ponds, and their densities are an order of magnitude lower than the obligate vernal pond frogs. Based on our mark-recapture population estimates, we usually find fewer than 20 adults of each ranid in ponds of about 0.25 hectare.

There are two caudates (salamanders) that I have not mentioned, Red-spotted Newt and Marbled Salamander. Red-spotted Newts have the most complex life cycles of any of the amphibians using seasonal ponds: aquatic larvae undergo metamorphosis into terrestrial eft, then remain terrestrial for 1-3 years, and then undergo another transformation into the sexually active adult stage, where animals become aquatic again. In Rhode Island, aquatic adults overwinter away from the breeding ponds and usually enter the water again in April. Breeding takes place during the early spring and both adults and larvae remain in the pond throughout the summer. Larvae leave the pond from early September through October; we documented 140 young leaving from a pond on Trustum Pond National Refuge, where approximately 100 adults breed.

The final species, Marbled Salamander, is one of the more uncommon amphibians and has been the focus of Shoop and Doty's research for over 20 years. This is the only species of salamander that breeds in the fall in New England. At our sites, adults start to arrive in August when the ponds are usually dry depressions in the ground, with over 200 adults at our best pond. Females find suitable nest sites in the sphagnum moss layer and deposit their eggs, males fertilize the eggs, the males leave the pond in September, and the females remain with the eggs under the sphagnum until fall rains result in the pond refilling. Only then do the adult females leave the

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pond. Once the eggs are inundated with water, they hatch; the larvae overwinter under the ice, and are the first larvae to leave the pond in early to mid-June.

Among conservation biologists, there is increasing concern about the amphibians that breed in seasonal ponds. Recent research has documented local extirpations at a number of sites across the globe due to factors including habitat fragmentation, detrimental impacts of ultraviolet radiation on egg viability, and introduction of exotic species. In addition, biologists in North America have found a number of "hot spots" where high deformity rates among frogs have been documented, which are hypothesized to have been caused by parasites, pesticides, and pollution. I am most interested in the effects of habitat fragmentation on the community structure and population trends of amphibians in southern New England. I hope to develop management strategies that will minimize the detrimental effects of suburbanization of southern Rhode Island on the amphibians. They are an integral part of our natural heritage that deserves our attention.

Peter Paton is an assistant professor at URI's Department of Natural Resources Science, and serves on the RINHS Board of Directors.

Status of the Rhode Island Butterfly Survey: an Update

by Harry Pavulaan

In the November 1996 issue of the Newsletter of the RINHS (*RINHewS* 3(2): 6-7), I provided a description and status report of the Rhode Island Butterfly Survey. This report is to update the membership on the current status of the Butterfly Survey. Contrary to popular belief, generated by continued delays at my end, the survey is alive and well! Due to unfortunate time constraints, the database is still under construction, but will eventually contain several thousand individual records. This is an impressive amount of field data for a state as small as Rhode Island.

Since 1996, additional sources of data and specimens have been found, and new information continues to be added. Several new field reporters have contributed records, including some members of the Butterfly Society of Rhode Island. I have continued to make brief excursions to the state, to "blockbust" localities yet lacking in records. One important advancement was the discovery, in 1998, of a remarkable little piece of open space in the extreme southwest corner of Central Falls, a municipality which was previously considered an unlikely place for finding any natural habitat sufficiently large

to support healthy breeding populations of many species of butterflies. Also, one new species was added to the state list, with the report of a Queen (*Danaus gillipus*) in Jamestown.

One important feature of the survey, which differentiates it from other butterfly surveys in the region, is the inclusion of historical data. This allows trends in butterfly populations to be studied. One classic example is the decline of the Regal Fritillary (*Speyeria idalia*), which was once common in the northeast, and frequent in Rhode Island, as evidenced by earlier records from throughout the state.

Taxonomic changes are also happening, as new species are being recognized from older species-group names. This includes recognition of the Canadian Tiger Swallowtail (*Papilio canadensis*) and Summer Azure (*Celastrina neglecta*) as being distinct from the Eastern Tiger Swallowtail (*Papilio glaucus*), and Spring Azure (*Celastrina ladon*),

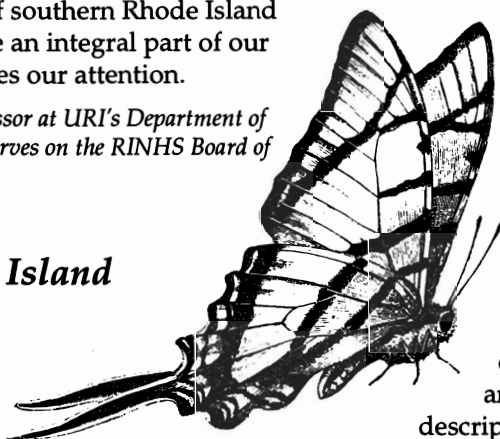
respectively. There have also been some recent name changes resulting from historical taxonomic research, such as resurrecting older names over currently-used names (i.e., *Phyciodes cocyta* being determined to be the correct name for the Northern Crescent, currently going under a number of other names in field guides).

New species are also being discovered in our midst! Dr. David Wright and I are publishing a new species-

description for the Cherry Gall Azure, a

previously unrecognized butterfly, which was only discovered to be a species in its own right as a result of extensive field and laboratory research. All of these changes, among others, involve reexamination of historical data, and revising information in the database, and in the text of the Rhode Island Butterfly Guide.

The survey completion date has been extended through 2000, to close out the millennium. At that time, the database will be distributed to a number of organizations and individuals, not only in Rhode Island, but also to major museums and institutions which stand to benefit from the information. The Rhode Island Butterfly Guide will also be published at that time. This will not be another pictorial field guide, but, rather, a scientific record of the state's butterflies, with important new information, regional comparisons, and the latest taxonomic changes. The guide will include maps, habitat photographs, specimen photos where necessary (to point out important wing details not addressed in current books), phenograms (brood charts), and the butterfly database as an appendix or supplement in condensed format, possibly on a disk.



In the time remaining, I am still searching for new sources of butterfly data in the state. If anyone knows of any small private collections, or collections in public schools, that contain even only a few labelled specimens, I would be interested in obtaining the data, and possibly examining them. If anyone keeps field notes, records, dated photographs, or has done any sort of natural history survey work which includes butterfly records, I would be very interested in knowing about such work. I can be contacted by writing to: Harry Pavulaan, 494 Fillmore Street, Herndon, VA. 20170; telephone: (703)-709-0124 (evenings, collect is acceptable). E-mail is best: Hpavulaan@aol.com or Harrypav@hotmail.com

Harry Pavulaan is a cartographer with the National Oceanographic and Atmospheric Administration, and a member of RINHS. His work, A Checklist of Rhode Island Butterflies, is available from the RINHS Publications Listing.

1998 Summary of Diamondback Terrapin Population Study, Hundred Acre Cove, Barrington, RI

by E. Douglas Rayner, Charlotte B. Sornborger, and Seth Thompson.

Diamondback Terrapin (*Malaclemmys terrapin*) were observed nesting from June 9 through July 9 in 1998, a total of 59 individual terrapin, 54 recaptures, and 5 newly marked. These represent about 25% of the approximately 215 terrapin marked since the study began in 1990. Two of the marked terrapin and one unmarked are known dead (two run over by vehicles on nearby highways and one killed by propeller damage in the cove). One terrapin is known to have nested this year at a small beach near the White Church bridge.

The newly-marked terrapin were measured (an average of 204mm), but no attempt was made to measure recaptures. Newly-marked terrapin were also photographed, bringing the study to a total of 188 photographs of marked terrapin. Photo comparisons are definitive in distinguishing individuals; with their aid corrections were made to the records in 1998.

200 scavenged natural nest sites were counted, in addition to about 10 capped nests (some nests are "capped" with a wire grid to deter predation). Approximately two-thirds of the scavenged nests were found at the Point, the Sandpit, and the High Road. In early spring about one-half acre of overgrown fields was plowed and seeded with native grasses and wild flowers. Twenty-six of the scavenged nests were found in that area; in previous years few, if any, nests had been found there. The remaining scavenged nests were scattered on the hill, with only 6 found on the Beach. Heavy tidal wrack may have accounted for the lower-than-usual

number at that site.

In all, 19 nests were capped. Seven were capped individually, and 12 nests dug and moved to a larger, better reinforced rectangle "fortress" in the Sandpit. Some of the capped nests were scavenged from underneath, presumably by raccoons. However, even some of the nests in the "fortress" were reached and scavenged through poultry wire, possibly by a weasel. Chicken wire, which has a finer grid, would probably prevent small animal intrusion.

136 eggs hatched successfully and were inspected. No abnormalities were found. The hatchlings were returned to Nockum Hill, being left on different days in small groups at various sites near the nesting areas.

E. Douglas Rayner, Charlotte B. Sornborger, and Seth Thompson work with the Barrington Land Conservation Trust. An initial report on their work appeared in RINHewS (4)2:2-3, November 1997.

Local Systemic Change in Science Education: Why RINHS should take note

Significant changes are taking place in the K-8th grade science curriculum of nearly 40% of Rhode Island's public school children through two NSF-funded programs, GEMS-Net and KITES. Fourteen school districts have adopted a common curriculum using NSF-approved, nationally available, inquiry-based units to provide a balanced diet of life sciences, physical sciences, and geological sciences. GEMS-Net and KITES provide 100 hours of science training to each K-6th grade teacher in these districts.

Where does RINHS come into this? GEMS-Net and KITES are seeking to "Rhode Islandize" the units, that is, to bring in hands-on activities that apply the basic biological and geological science principles presented in the units to the Rhode Island environment. For example, all sixth-grade students work on a unit called "Ecosystems" in which they construct a coupled terrarium/aquarium to learn ecosystem concepts, and conduct pollution experiments to observe effects on the aquarium of contaminants added to the land system. Scientists from URI, Wood-Pawcatuck Watershed Association and Save the Bay have been extremely helpful in providing maps, illustrations, written material on watersheds, and in presenting material at workshops for teacher training.

Assistance is needed in "Rhode Islandizing" units on Plant Growth and Development; Insects; Pebbles, Sand, and Silt; Land and Water; Micro-worlds; and Ecosystems. For more information, contact Barbara Sullivan, Co-Director GEMS-Net, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882, Phone: (401) 874-6659; email bsull@gsoun1.gso.uri.edu.

Rhode Island Collections

The Rhode Island Beetle Fauna: Past, Present and Future

by Derek S. Sikes

I feel like an old war-horse at the sound of the trumpet when I read about capturing of rare beetles... It really almost makes me long to begin collecting again.

--Charles Darwin

Taxonomists, more so than most specialists in other fields of scientific study, are required to familiarize themselves with an often massive body of literature stretching back in time over 200 years. This is due primarily, of course, to the priority given to the first valid publications of new scientific names (for most groups the majority of names were described from Linnaeus' start in 1758 to the late 19th century). As a taxonomist of the Coleoptera, or beetles, I am no exception.

During my training in the study of the beetles I was always aware that I was walking in the footsteps of great taxonomists/naturalists/collectors who came before me. While collecting on the slopes of Pico Duarte in the Dominican Republic with my major advisor, Dr. Michael Ivie, I was told it was Philip Darlington Jr.'s precedent we hoped to build upon. I was nurtured on tales of Wallace and Bates' adventures in the Amazon and was particularly impressed by Bates' 11-year (almost entirely solitary) stay in Amazonia. The nearly complete destruction of Wallace's collections three weeks out to sea due to the consumption of his vessel by flames was a warning my advisor used to emphasize the value and risks of our undertakings. I'll never forget his words: "You must label your specimens promptly; that way, if you die, you will not compromise their scientific value."

I spent the years of 1991-1994 collecting for Dr. Ivie's research projects, which primarily focused on completing the beetle fauna of the Virgin Islands (15 years of collecting and over 34,000 specimens of 489 species), but he also worked on a more general survey of West Indian Coleoptera (hence our Dominican Republic trips). Perhaps the most memorable moment was within 20 minutes of landing on St. Thomas; I swept up a beautiful, metallic-green, long-horned beetle which caused my advisor to emit cries of joy. That species, *Callichroma rufescens* (Gahan), endemic to the Virgin Islands, had not been collected since the 1960s and had been presumed

extinct! (I, fortunately, had ruined my advisor's plans to use that species as an example of the tragedy of lost biodiversity).

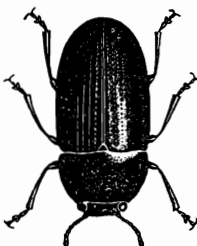
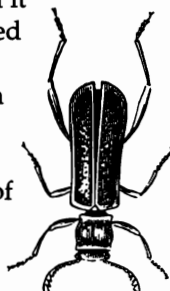
Within his laboratory there also flowed a river of beetles amassed via a five-year trapping project in Glacier National Park. The intent of that project was to determine if the fires of 1988 had affected the beetle fauna and thereby assess the use of beetles as finely-tuned ecological indicators.

You might ask: what does this have to do with the Beetle Fauna of Rhode Island? Well, I was freshly emerged from this coleopterological training regimen in 1995 when I found myself settled temporarily in Cranston, Rhode Island, awaiting both matriculation to the University of Connecticut that autumn to pursue a Ph.D. in Systematic Entomology, and the birth of my first daughter!

The following elements became apparent: it was summer, I relished beetle collecting, I essentially had no personal collection, and I wanted to keep honed my skills at identification, collecting, and processing specimens; Rhode Island lacked a modern faunal list of beetles (as do most states); Rhode Island has a unique size among our nation's states (advantageously small), and a new society, the Rhode Island Natural History Survey—which seemed like it would help, or at least be interested, in my efforts—had materialized since my last visit. With information supplied by various contacts at The Nature Conservancy, The Department of Environmental Management, and others, I obtained a collecting permit and began.

As the material began to mount and I started to become overwhelmed by the biodiversity of our state, I slowly began learning something about the history of entomology in Rhode Island. My first contact with the past occurred when I received a photocopy of C. Abbott Davis' 1904 *Instructions for collecting and mounting insects; Also a check-list of the Coleoptera of the state of Rhode Island, U.S.A. 3rd ed.* It was enlightening to think of turn-of-the-century Rhode Island and that indeed, I was again walking in the footsteps of prior naturalists.

I soon visited the Roger Williams Park Museum of Natural History to study their beetle collection (the collections of C. Bernard Lewis, some of E.E. Calder's material, and others) which originated circa 1890-1925. This fair-sized collection—47 Schmidt boxes—is certainly of historical importance (it hasn't been scientifically worked since it was created; the museum curator, M. Massaro, hopes to modernize the collection with new drawers, valid nomenclature, cabinets, etc.). So far, helped greatly by an inventory of this collection by the late Father



Charles Reichart, I have recorded over 580 beetle species. Thirty-eight of these species are new state records which are known from no other collection (because I can access these specimens I'll be able to verify the identifications of these new records... something one cannot do with literature-based records).

Davis cited the assistance of other collectors in the building of his list, and within their collections were vouchered numerous records from Rhode Island. These collectors were: Prof. E. E. Calder, H. N. Davis, and E.D. Keith. I know little about the whereabouts of their material, although I have seen E. E. Calder's specimens in the Museum of Comparative Zoology collection at Harvard, the Roger Williams Park Museum, and the Yale Peabody collection.

A significant collection of aquatic Rhode Island Coleoptera was recently acquired by the U. S. National Museum (USNM) when the late Father Charles Reichart's collection was deposited therein. In my humble opinion the value of Reichart's material, at least his beetles (since his specialty was Heteroptera), is in its use as vouchers for local faunistic and conservation work. Once his beetles are incorporated among the millions of other specimens in the USNM, finding them to extract data for Rhode Island projects will be intimidating, to say the least. Fortunately, workers at the USNM are making available on-line a database of their aquatic Coleoptera, searchable by state.

The University of Rhode Island also has a sizeable collection of Rhode Island beetles. Within the URI collection most of the specimens are labeled "Davis Collection" (not C. Abbott, who died in 1908). Of 4 Lane cabinets holding the Coleoptera, each with 25 Cornell drawers, I'd estimate 75-80% of the species include Rhode Island specimens, and probably 90% of these were collected during the 1905-1920s. Like Reichart's beetles, the value of the URI material lies in its use for local research and conservation efforts, and its numerous records of historical value. Unfortunately the future of the URI collection is uncertain and there is no active curation or maintenance; in fact, most of the curation of the beetles appears to date to the period during which they were collected.

One collector/taxonomist who is infamous among coleopterists for his "over-splitting" of species is Thomas Casey. He lived and worked for a while in Rhode Island around the turn of the century (most of his publications date from 1890 to 1926). His collections included at least 51 beetle species that he described as new from Rhode Island, none of which have been identified outside Rhode Island. These specimens, and thousands of his others, are in the Smithsonian awaiting evaluation by taxonomists. It is likely that some of these "species" are not valid, i.e., they are merely forms or varieties of more wide-

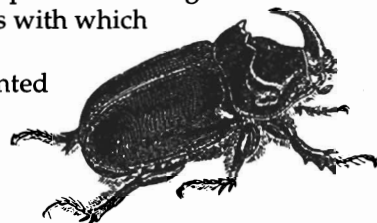
ranging species; however, at least one and perhaps more are, in fact, valid names that simply haven't been collected and identified from outside Rhode Island.

There are at least two other important collections of Rhode Island Coleoptera of which I am aware. These are the collections of Martin Bowe, entirely of Rhode Island beetles collected primarily during the period 1908-1928, and that of J. V. Nylen, which includes a fair number of beetles collected in the early 1900s (c. 1900-20). Both of these collections are in the Yale Peabody Museum. The Nylen collection was transferred from Brown University to Yale in 1980. I have not yet finished recording data from these collections, but so far the Bowe collection is truly enormous and contains many valuable records. Among his material are hundreds of new state records (I'm certain that once I finish working with the Yale material the list of species vouchered from Rhode Island will exceed 2,000 species).

There are other collectors in Rhode Island who have private collections, some of whom I have been fortunate enough to work with. These include wonderful specimens pulled in by both Chris Raithe and Richard Enser. They have deposited numerous new state records within my growing collection. I have yet to study the private collection of William D. Garrahan Jr., which, despite his interest in ants, should contain some worthy beetle records.

It is my own collection of Rhode Island Coleoptera about which I know the most. To date, my collection fills 6 California-Academy insect drawers. Most specimens are mounted on stainless-steel No.3 pins and bear archival-quality data labels. Sadly, my interest in the beetle fauna of Rhode Island remains only a "side-project" to my dissertation research: a systematic revision of the subfamily Nicrophorinae (Coleoptera: Silphidae), so I am not able to follow up all leads or collect as much as I'd like to. Nevertheless, I've accumulated a significant body of data. Due to time constraints I have built this project around a species-database rather than a specimen-database so information on detailed locality data within Rhode Island will have to await future efforts. I should mention that the most time-consuming and difficult aspect of this project is obtaining identifications. I can identify only a small fraction of the species collected—the rest are sent to specialists who graciously work up the species with which they are familiar.

To date I have documented 1,988 Rhode Island beetle species in 93 families from both literature and specimen sources. My own collection contains 628



identified

species, a mere third of the total fauna. However, the

most interesting result of my efforts so far seems to be the fact that of the 628 species in my collection, 254 of them appear to be new state records (unpublished, not necessarily uncollected by prior collectors). When I started I would not have guessed that 40% of the species I found would be unrecorded from the state.

Of course this observation begs an explanation. I am preparing a manuscript to analyze this and other findings of my Rhode Island beetle work in which I will go into greater detail than I will go into here. The first consideration when faced with a 40% new result is "how well was the state surveyed previously?" If prior workers had only documented 10% of the fauna, it would not be surprising that most recently-collected species would be new. However, in this case the fauna was at least fairly well documented. Davis' work resulted in a list of 911 species (after removal of 98 dubious/unverifiable names). Since the turn of the century other taxonomists/collectors added another 568 species on top of those listed by Davis. Thus, prior to my collecting the list stood at 1,479 species. Rough estimates of the total, based on the species known to occur in Massachusetts and Connecticut, is around 2,200. Thus, if the estimate of the total is close, prior to my collecting during the 1990s, roughly two-thirds of the fauna were documented. And even after my collecting, if this total estimate is close to being accurate, there remain another 210+ new state records to discover! With this level of prior coverage it is not too surprising that 40% of the species I collected are new.

However, one element not included in the above analysis is that of time. Let us pretend that the total estimate of 2,200 species is accurate. To demonstrate the time problem best one should ask "were all these 2,200 species always in Rhode Island, even 15,000 years ago?" and the answer, of course, is "not likely." More to the point, the list of 1904 includes many species that were apparently common at that time that I have yet to find. These total 222 possibly missing—or at least probably more rare—species. It is likely that there are numerous misidentifications among these 222 species, which is always a problem when dealing with literature-based records.

There remains a speculative explanation that is worth considering. The general habitat of Rhode Island during the late 1800s was far less forested than it is today. It seems likely that given the radical transformation of southern New England during the last century from 10-20% forested to 70-80% forested (rough estimates), that the fauna might have also changed. To explain both the large number of new records during the 1990s and the large number of species known from 1904 that have yet to be found, it seems likely that at least some of these 1904 species have either become locally extinct or at least less

common while other species have either migrated into the state or at least become more common. Thus, when the time element is considered one should not expect that all the 2,200 species could be found at the same time; but rather this total includes a mix of species that have disappeared and species that have migrated into the state.

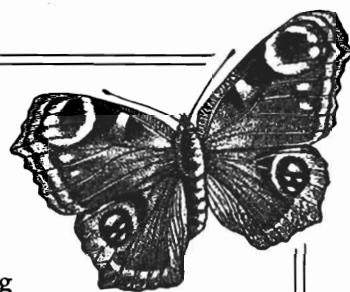
Although it is difficult to be certain of the causes behind the patterns, these results are nonetheless interesting and hopefully will lead to more focused studies. Through this work I have also been able to identify a number of species that could be of conservation concern. These I will describe in a forthcoming paper.

Regarding the future of this project I can state the following: my collection will eventually be deposited at the University of Connecticut (which is building a modern collections facility to house all their biological collections) where I hope its value to southern New England faunistics will be appreciated, and I expect to continue to add names to the list for many years to come. I have also created a website with a "queriable" database to allow users to find records based on various criteria (e.g., "species found on Block Island but not yet the mainland"). This website can be found at the following address: <http://www.eeb.uconn.edu/collections/insects/ribf/ribfcover.html>.

Rhode Island may not have a biota as exciting as the tropics, but even after over 100 years of collecting, there still remain many discoveries to be found. It is somewhat surprising that we remain ignorant of so much of our local biodiversity—a situation I am glad to see changing. The few collections that have been made of Rhode Island Coleoptera are critical sources of information regarding the past and present health of RI's beetle fauna—let us not forget their value!

Derek Sikes is a doctoral candidate in the Department of Ecology and Evolutionary Biology at the University of Connecticut.

The Butterfly Society of Rhode Island is looking for new members. Please call (401) 241-2513 for information on meetings and membership, including upcoming summer field trips and events. Look for us at the upcoming Earth Day celebration in April, the Tiverton Garden Show in May, and the URI GreenShare event in September. Butterfly Society of RI, P. O. Box 6585, Providence, RI 02940.



Focus On

RINHS Institutional Members:

The URI Environmental Data Center

by Pete August & Chuck LaBash

The activities of the Environmental Data Center (EDC) revolve around: (1) training students and citizens in the use of Geographic Information System (GIS) technology, (2) development and distribution of spatial data for Rhode Island, and (3) basic and applied research in using GIS for environmental problem solving. The lab is located within the Department of Natural Resources Science (NRS) in the URI College of the Environment and Life Sciences. The facility is a "soft-money" lab; the staff and infrastructure are supported in full by extramural grants and contracts. The EDC began in 1985 when NRS and the RI Department of Environmental Management (under the leadership of Robert Bendick) began a long-term collaborative project to develop GIS data and analytical capacity for the state. It was a win-win relationship: DEM had a number of pressing analyses and applications for the technology, as well as access to state and federal funds to purchase the software; URI had much of the necessary computer infrastructure to run the software and access to legions of students eager to learn GIS and spend long hours manually digitizing information off topographic and other maps for the state. Today, the lab is staffed by 5 fulltime research scientists, 2 graduate students and a host of undergraduates. Over the past 14 years, it has worked with many branches of federal government (e.g., EPA, USGS, NOAA, NPS), RI state government (e.g., DEM, Planning, DOT, Solid Waste Management, Health), and the majority of communities in the state to develop GIS data, expertise, applications, and solutions to environmental problems. This year the EDC was awarded a Special Achievement Award for excellence in GIS by Environmental Systems Research Institute in California (1 of 88 awarded from 100,000 GIS sites worldwide and the only academic institution recognized).

The lab uses GIS software from Environmental Systems Research Institute (Arc/Info and ArcView) running on a Microsoft Windows NT operating system. It uses three Intel Pentium Processor-based servers to store large databases and support intensive applications. The staff conducts day-to-day analyses on several NT-based workstations with large monitors designed to support high-end graphics. Spatial data input is carried out with a large-format digitizing tablet and a high-resolution flatbed scanner. Small and large-format ink jet plotters are used to produce graphic output. All the equipment is



EDC graduate student Duane Chapman (right) instructing National Park Service scientists in the use of GPS technology at Gateway National Recreational Area, NY.

interconnected on a TCP/IP local area network that is tied into the Campus-wide network and the Internet. The EDC provides 24-hour Global Positioning System (GPS) differential data over the world wide web (www.edc.uri.edu/gps) which enables users with GPS rover units to greatly improve accuracy of their field data. Each year scientists throughout the Northeastern United States access these data over 5,000 times. The EDC is currently engaged in a variety of projects that are relevant to the Rhode Island Natural History Survey, and a few are summarized here:

GIS Support to National Parks of the Northeastern

US. Three years ago, the EDC was awarded a 5-year grant to serve as the National Park Service Field Technical Support Center for GIS. The lab is responsible for providing GIS training, database development, spatial data analysis, and technical troubleshooting for (all) NPS field units in New England, New Jersey, and New York. Some of our ongoing applications include adjacent land use analyses, modeling vegetation dynamics in restored coastal wetlands, shoreline change dynamics, viewshed modeling, and inventory of natural and cultural resources. See www.edc.uri.edu/gate for an example of this work.

Web-based Distribution of Digital

Orthophotography. With a grant from EPA, the EDC is working with colleagues at MIT to develop a web-based system to view and distribute digital orthophotography. Digital orthos are aerial photos without (or with reduced) displacement/distortions from terrain, camera tilt, and optical aberrations. Scientists at the MIT Department of Urban Studies

and Planning have developed an incredibly powerful software tool to efficiently serve image data from the Internet. The EDC is working with them to migrate this software to a Windows NT platform and serve up 8 Gigabytes of RI orthos on a prototype system. Next spring, we will begin serving the RI orthos off our web system. See ortho.mit.edu for a taste of what is coming soon to the web browser nearest you!

Coastal Wetland Restoration. The EDC is involved in a number of projects dealing with restoration of coastal wetland habitats. The lab has provided GIS support to the Galilee project for the past 5 years and is currently working with RIDEM in developing a model to prioritize coastal wetlands for future restoration. The EDC is also a partner in a NSF-funded project headed by a team of resource economists at URI to include social and economic factors in coastal wetland restoration.

Spatial Data Distribution. The EDC is responsible for distributing spatial data using the WWW. The majority of the state's GIS data are available free over the web as are many other sources of important environmental information. Go to www.edc.uri.edu/ce for access to these data. A recent grant award from EPA will permit development of an extensive web-based atlas of natural resource maps (much like www.edc.uri.edu/southkingstown or www.edc.uri.edu/rirpp) that will show the geographic distribution of critical environmental resources throughout the state.

GIS Training. Through formal classes at URI (see www.edc.uri.edu/nrs/classes) and night classes given by the URI Cooperative Extension (see www.edc.uri.edu/gistraining), the EDC trains students and citizens in the use of GIS software and the RIGIS database.

Conservation Planning. For the past two years, lab scientists, in partnership with local communities and Land Trusts, have developed a GIS-based protocol to identify critical lands for acquisition and protection. The model works on the premise that lands supporting multiple, co-occurring natural resources (e.g., rare species habitat, in a groundwater aquifer, linking two existing reserves) offer more conservation benefit for the investment than areas only supporting a single resource. In a related research project, students and URI faculty have examined how well geomorphological factors (e.g., soils, topography) can be used to predict plant species diversity. They found very high correlation between landscape variation in soils and terrain with biodiversity; this implies that GIS assessment of extensive areas using off-the-shelf digital data can be a useful tool in identifying potential biodiversity hotspots.

Large Marine Ecosystems. Working with the NOAA NMFS lab and scientists in the URI Department of

Marine Affairs, we are developing a database of ecological and oceanographic profiles for Large Marine Ecosystems of the World. See www.edc.uri.edu/lme for an overview of this project.

Landscape Dynamics. Faculty and students working in the EDC are interested in landscape and watershed-scale patterns and processes. Recent projects include: examining the relationship between human disturbance and breeding bird diversity, identifying regions on the landscape that have potential to pollute water resources, land-cover change dynamics in coastal and tropical ecosystems, and assessment of the importance of landscape context in identifying critical habitat for a number of species of Neotropical migratory birds.

Peter August is director of the URI Environmental Data Center, and first president of the RINHS. Chuck Labash is a research associate at URI's Department of Natural Resources Science.

RINHS Institutional Members: Special News & Events

Humboldt Field Research Institute announces the 1999 Eagle Hill Advanced and Professional-level Seminars and Workshops in: Larval Dragonflies & Damselflies of the Northeast; Bryophyte Ecology; Caddisflies; Lichen & Lichen Ecology; Wetland Plant Communities; Water Quality Assessment; Ecology Field Studies for Educators; Forest Ecology; Herbarium Techniques & Management; Sedges, Rushes, and Grasses; Marine Botany; Biology of Spiders; and much more. For information contact Humboldt Field Research Institute, P.O. Box 9, Steuben ME 04680; (207) 546-2821; email humboldt@nemaine.com; <http://maine.maine.edu/~eaghill>

The Rhode Island Office of The Nature Conservancy, under the guidance of Ginger Carpenter, is beginning year two of the Rhode Island Odonata Atlas. RINHS has loaned two specimen cabinets (thanks to a grant from the Champlin Foundations) to help hold the odonate collection. Volunteers are needed in 1999 for collecting, cataloguing, data management, and curatorial activities; contact Ginger Carpenter at (401) 331-7110.

We thank the following organizations for becoming RINHS's newest Institutional Members:

*Brown University, Department of Ecology
& Evolutionary Biology*

Environmental Science Services, Inc.

Jamestown Conservation Commission

Night Heron Nature Cruises

Rhode Island Association of Wetland Scientists

Rhode Island Environmental Education Association

Smithfield Conservation Commission

South Kingstown Land Trust

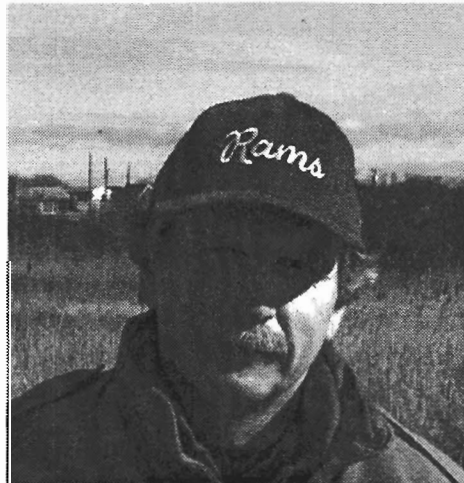
URI Watershed Watch

1999 RINHS Distinguished Naturalist

Francis C. Golet

When someone has any question related to the natural history of wetlands in New England, THE authority who people turn to is Frank Golet. No one else in the region knows more about wetlands than Frank. He is a walking encyclopedia whose depth of knowledge is staggering, as it spans wetland flora and fauna, hydrology, geology, and regulations. Frank's life and career have been dedicated to the study and protection of wetland ecosystems. In every aspect of his professional life—teaching, research, and service—Frank has excelled. It is Frank Golet's balanced, focused, and passionate commitment to wetland ecology and conservation that makes him the deserving recipient of the 1999 Rhode Island Natural History Survey *Distinguished Naturalist Award*.

Since early childhood, Frank has spent his life learning about wetlands. Frank grew up in Moodus, Connecticut along the shores of the Connecticut River. His father was a commercial shad fisherman, hunter, and trapper, who also trained dogs and raised pheasants and quail. Growing up in a household that lived off the land, Frank gained an early appreciation for a land conservation ethic. He spent every waking hour outside of school exploring the fields, woods, and swamps on his grandfather's land. One of his earliest hobbies was maintaining a Spotted Turtle collection, with up to 27 turtles. One of his earliest significant natural history observations, made when he was 9 years old, was that his best turtle collecting day was immediately following Hurricane Carol, because the very high water forced them out of local ponds. By the time he was 10 years old, he was a proficient fly-fisherman. By junior high he was an active hunter and trapped muskrats to earn spending money. His father managed land for the East Haddam Fish and Game Club, and Frank spent his summers during high school and college clearing trails, building duck blinds, clearing land, feeding pheasants, and planting food patches for game species. He gained a passion for wetlands during his childhood, and it has carried on through his academic and professional career.



Frank studied geology as an undergraduate student at Brown University, and wildlife biology (with a focus on wetland ecology) as a Master's student at Cornell and as a Ph.D. student at the University of Massachusetts (Amherst). His Ph.D. research focused on measuring the value of wetlands for wildlife habitat, and his assessment protocol was used across the Northeast.

Frank is now one of the leading scientists in the United States in wetland ecology, and has published some classic studies that are cited by scientists across the globe. He co-authored, with Lew Cowardin, Virginia Carter, and Ted LaRoe, a paper that changed the course of wetland science and conservation in the country, a classification scheme on wetlands and deepwater habitats that is widely used by federal agencies such as the US Fish and Wildlife Service. His most recent tome is the definitive synopsis of the ecology of Red Maple swamps, the most common wetland ecosystem in our region.

Frank is meticulous in everything he does and perfect prose is the hallmark of Frank's writing. Manuscripts and final projects proofed by Frank often are covered with more red ink than black. He is a notorious editor among undergraduates and graduate students in the University of Rhode Island Department of Natural Resources Science, where he has been a faculty member since 1972.

If you ask Frank Golet what his most significant contribution to science has been—the answer is immediate—it is his students. For each of the past 26+ years, 20-25 undergraduate and graduate students go through a grueling two-semester boot camp course in wetland science. They learn the geology, hydrology, botany, functions, and values of wetlands, as well as the policies and regulations that protect them. Graduates of his classes are the front-line of wetland research and management across the country. No fewer than 124 of his former students are professionally employed in wetland science by the US Fish and Wildlife Service, the RI Department of Environmental Management, the Army Corps of Engineers, RI Coastal Resources Management Council, Massachusetts Department of Environmental Protection, Connecticut Department of Environmental Protection, the Environmental Protection Agency, and a score of environmental consulting firms.

Frank's commitment to wetland conservation has required that he work in a foreign habitat not charac-

terized by poorly drained soils—the Rhode Island State House and the Floor of the United States Senate. Frank has been a key player in drafting wetland regulations in Rhode Island for two decades! His first assignment was a wetlands policy task force established by Governor Noel in 1976. In 1980 and 1985 he served on other wetland commissions established by Rhode Island government. Most recently (1995) he was appointed to a special commission to revise the RI Freshwater Wetlands Act which defines wetlands habitat and establishes the regulations that protect them. After no fewer than 53 meetings in Providence (starting at 7:00 am) and 350 hours of volunteer effort, a bill was drafted and introduced to the General Assembly. It failed, but this did not dampen the commitment of Frank and his many colleagues on the Commission. Slogging through thigh-deep muck and swatting clouds of biting mosquitoes develops one's fortitude and bulldog-like tenacity. The wetlands bill has been revised and resubmitted every session since 1996. Frank's authority on wetlands has taken him to Washington where, in 1991, he was asked to testify before the Senate Committee on the Environment on the implications of proposed changes to the national definition of wetland habitats.

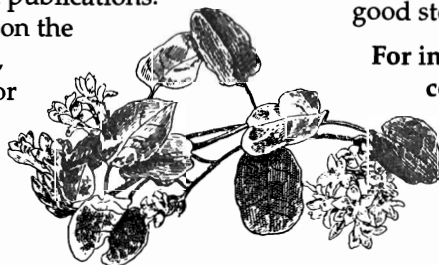
Through the years Frank has trained many ecologists who are committed to the science and protection of wetland ecosystems. There are few people who have walked the planet who appreciate and know more about wetlands than Frank Golet. We are extremely fortunate to have such a dedicated naturalist in our midst.

Peter August and Peter Paton are in the URI Department of Natural Resources Science, and both serve on the RINHS Board of Directors.

Keith Killingbeck Honored by New England Wild Flower Society

Keith Killingbeck, a professor at URI's Department of Biological Sciences and secretary of the RINHS Board of Directors, received the 1998 "Rhode Island State Award" from the New England Wild Flower Society, for his work as "a brilliant botanist, outstanding teacher, and strong supporter of plant conservation; a researcher of rare plants; and a prolific author of scientific publications."

In addition to serving on the RINHS Board of Directors, Keith has been a Trustee for the Rhode Island Wild Plant Society, and participates in the New England Plant Conservation Program.



More New Publications Available!

The RINHS Publications Listing just gets better and better, as we add new literature on the region's biota and ecosystems. New additions to the list include:

The Ecology of Atlantic Shorelines, by Mark D. Bertness, 1998, Sinauer Associates, Inc. A beautifully-illustrated introduction to the plant and animal communities of the Atlantic shores of North America. \$39.95.

Rhode Island Preserves, by Virginia Carpenter (ed.), 1997, The Nature Conservancy. An attractive guide to TNC preserves in Rhode Island. \$6.00.

The Uncommon Guide to Common Life of Narragansett Bay, by Frederick D. Massie (ed.), 1998, Save The Bay. A great educational tool and handy guide to common plants and animals found in Narragansett Bay. \$15.00.

Walks in the Watershed: A Hiker's Guide to Southwestern Rhode Island and Adjacent Connecticut, by Charles Hickox and Elly Heyder, 1997, Wood-Pawcatuck Watershed Association. Directions to trail sites, maps, and trail descriptions. \$4.50. Also available is *Wood-Pawcatuck River Routes*, 1997, WPWA. \$4.50.

Guidebook to Field Trips in Rhode Island and Adjacent Regions of Connecticut and Massachusetts: New England Geological Conference 90th Annual Meeting Guidebook, by Daniel Murray (ed.), 1998, URI Department of Geology. Detailed descriptions of field trips on coastal, glacial, and bedrock geology, with a road log of directions to each stop. \$20.00.

A number of books from the Brooklyn Botanic Garden, each full of sound information and practical advice, including: *Bird Gardens: Welcoming Wild Birds to Your Yard*; *Butterfly Gardens: Luring Nature's Loveliest Pollinators to Your Yard*; *Ferns: Wild Things Make a Comeback in the Garden*; *Going Native: Biodiversity in Our Own Backyards*; *Invasive Plants: Weeds of the Global Garden*; *Natural Insect Control: The Ecological Gardener's Guide to Foiling Pests*; *The Natural Water Garden: Pools, Ponds, Marshes & Bogs for Backyards Everywhere*. \$9.95 each.

The Narrow River Handbook: A Guide to Living in the Watershed, by the Narrow River Preservation Association, 1997. An attractive and useful guide to being a good steward of the Narrow River. Free.

For information on ordering, shipping costs, etc., contact the RINHS office for the complete Publications Listing.

In Memoriam: Michael A. Gardner

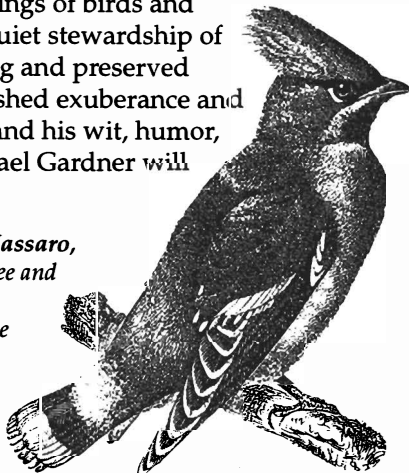
Michael A. Gardner, natural history collection consultant and former associate curator at the Museum of Natural History, Roger Williams Park, passed away on February 23, 1999, at the age of 50.

A native of Pawtucket, Rhode Island, Michael had a life-long interest in the natural world, particularly in birds and orchids. He was a long-time member of the Audubon Society of Rhode Island and the American Orchid Society. He held the post of associate curator at the Museum of Natural History from 1989-1994, and served as a consultant to the Museum in 1996, under a grant from the Nuttall Ornithological Club. In that time he conducted intensive taxonomic updating, identification, cataloguing, and conservation of the Museum's 5500 specimen bird collection. He also contributed the avian and botanical components to two major exhibits at the Museum: *Narragansett Bay Worlds* (1990-1997) and *Natural Selections* (1992-present), as well as offering many museum programs on birds.

Michael also served as training consultant for the conservation of two historic bird collections in the state: the Elizabeth Dickens Collection at the Block Island School in 1993, and the Edward Sturtevant Collection of the Norman Bird Sanctuary and Museum in 1994-1995. In 1996 he identified and catalogued the mounted bird specimens in the wall tableau located in the Stanley Ward Room at Moses Brown School in Providence. This assemblage, the oldest bird collection in Rhode Island, has an installation date of March 1861, as documented by a newspaper discovered by Michael in the floor of the tableau.

Michael was an ardent field naturalist who kept careful records of the birds that visited the many feeding stations and nest boxes he diligently maintained at home. In addition to growing a variety of orchid species, he also excelled at nature photography and color drawings of birds and mammals. For his quiet stewardship of Rhode Island's living and preserved avifauna, his unabashed exuberance and passion for nature, and his wit, humor, and creativity, Michael Gardner will be sorely missed.

Prepared by Marilyn Massaro, Michael Gardner's fiancée and companion of ten years. Marilyn is Curator at the Museum of Natural History at Roger Williams Park, and serves on the RINHS Board of Directors.



Night Heron Nature Cruises Wins Excellence Award

Night Heron Nature Cruises, one of the Rhode Island Natural History Survey's newest members, was presented with the 1998 Excellence Award for Eco-adventure Tourism by the South County Tourism Council. Night Heron Nature Cruises sponsors a variety of cruises and trips to study and enjoy coastal and marine habitats, operating out of Snug Harbor.

Events coming up this spring and summer include:

May 22 **Bird-watching Cruise** and visit to Smelt Brook Cove, to see Osprey, herons, kingfishers, egrets, and other birdlife. Another bird-watching trip is scheduled for August 21.

May 29-31 **Summer Season Kickoff** cruises on Pt. Judith Pond and the Harbor of Refuge.

The cruises are narrated by trained naturalists. A variety of sunset and moonlight cruises are scheduled from May into October.

June 12 & 13; July 9 **Succotash Salt Marsh High Tide Sunset Cruises**, scheduled during the highest tides of the year so the boat can glide through the winding channels of Succotash Salt Marsh. Narration will include research results that track a 600-year history of severe storm imprints buried in the salt marsh sediment.

June 21 **Summer Solstice Squid Lighting Cruise** on Pt. Judith Pond and the Harbor of Refuge, to view squid, swarms of planktonic organisms, and bioluminescence through the boat's custom-designed glass-bottom viewing area.

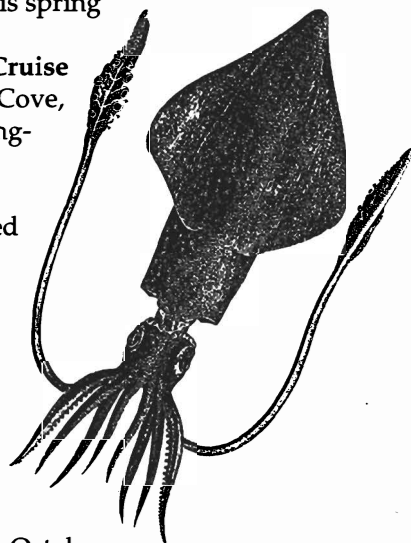
"Apex" **Snorkeling Cruises** on many dates in July, August, and September. The "Apex" is a little-known diving site off the Pt. Judith Breakwater, accessible only by boat.

July 21 **Aquaculture Awareness Day** at the Snug Harbor Marina and aboard the Night Heron, which will include a stop at a local aquaculture site.

July 24 **Salt Pond History Day** to local historic sites.

August 18 **Exotic Species and Bioinvasions Day** to observe and learn more about the invasion of non-native species that are affecting local biodiversity and ecosystems.

For a complete schedule of events, and information about fees, times of trips, and registration, contact Captain Dick Allen at (401) 783-9977, or toll-free 1-888-644-8476; website www.snugharbormarina.com; email rballen@netsense.net



Upcoming Conferences & Seminars

May 1 *First Annual Rhode Island Land Trust Conference*, sponsored by The Nature Conservancy. Will provide a broad range of information for land trusts & others who work to preserve open space, and is a great networking opportunity. Contact TNC at (401) 331-7110; <http://www.tnc.org/rhodeisland>

June 5 *R.I. Wild Plant Society Annual Plant Sale*, 9 a.m.-Noon, URI Kingston Campus. Contact RIWPS Office at (401) 783-5895 for more information about the sale and other RIWPS events.

June 18-20 *New England Lakes Conference*, Central Maine Technical College, Auburn, Maine. The focus of the conference will be workshops and sessions for volunteers, professionals, and others interested in New England lakes. Presentations will be geared for both a professional and lay audience. Organizational displays, equipment vendors, and field trips are also planned. For information: Roy Bouchard, Maine DEP, 17 State House Station, Augusta, ME 04333; email Roy.J.Bouchard@state.me.us

May 22; June 6, 12, & 13; August 19. *Wild Plant Identification Class*, Rhode Island Wild Plant Society. 5 days exploring terrestrial, wetland, and coastal habitats, and gaining hands-on skills in identifying the state's wild plants. Instructor Lisa Gould; \$125 RIWPS members; \$150 non-members. CEU credits available. Contact (401) 783-5895 to register.

July 23-25 *Society for Conservation GIS Conference*, Idyllwild, CA. For more information email rpickert@archbold-station.org or ccasado@lehmann.mobot.org, Christina M. Casado, Bryology, Missouri Botanical Garden, (314) 577-5180.

July 29-August 3 *5th World Congress of the International Association for Landscape Ecology*, Snowmass Village, Colorado. Contact: iale@lamar.colostate.edu; <http://lamar.colostate.edu/~iale/Congress.htm>

August 10 URI Oceanography Summer Lecture, *The Northern Atlantic Right Whale: Can It Be Saved From Extinction?* by Dr. Robert Kenney. 8 p.m., Spruance Hall, Naval War College, Newport. FREE, tickets required. Call (401) 874-6513 for tickets.

8-12 August *North American Chapter of the International Society for Ecological Modelling (ISEM)* will be held in Spokane, Washington, USA in conjunction with the annual meeting of the Ecological Society of America (ESA). Workshops, symposia, contributed paper and poster sessions, business meeting and social event are included. Contact Guy Larocque, Canadian Forest Service, Laurentian Forestry Centre, 1055, du P.E.P.S., P.O. Box 3800, Ste-Foy (Quebec), G1V 4C7 Canada; Tel: (418) 648-5791; E-mail:

glarocque@cfl.forestry.ca

August 18-19 *Stream Restoration and Protection Conference*, Radisson Hotel, Asheville, NC, sponsored by The North Carolina Stream Restoration Institute. Presentations will describe current government programs and technical topics associated with designing, implementing, and monitoring stream restoration and protection projects. Optional workshops are available for practitioners to learn more about river mechanics, field techniques for stream restoration, data collection and analysis. Register at: <http://www.bae.ncsu.edu/bae/programs/extension/wqg/>

September 13-16 *International Conference on Wildlife Ecology and Transportation*, Missoula, Montana, sponsored by the Environmental Management Office of the Florida Department of Transportation, in conjunction with the Federal Highway Administration, U.S. Forest Service and Defenders of Wildlife. The purpose of the conference is to bring together an international mix of those individuals working to reduce or eliminate the impacts of transportation on wildlife. Contact David Zeigler, Florida Department of Transportation, 605 Suwannee St. MMS # 37, Tallahassee, Florida 32399; (850) 922-7209; e-mail david.zeigler@dot.state.fl.us

September 22 *Rhode Island Natural History Survey Annual Meeting*. Location and lecture TBA.

September 25 *URI C.E. GreenShare Field Day*, 10:00 a.m.-3:00 p.m. Garden tours, lectures, demonstrations, plant sales, free soil testing, and plant problem diagnosis. Food, music, and lots of special activities for children. FREE and open to the public. Contact Marion Gold at (401) 874-5705.

October 13-16 *1999 Natural Areas Conference, "Conservation Planning: From Sites to Systems,"* Tucson, AZ. Contact Natural Areas Association, P. O. Box 5365, Tucson AZ 85703; email confreg@twp.org

October 18 *Rhode Island Environmental Education Association Annual Conference*, Roger Williams Park, Providence, RI. Theme: *Rhode Island Habitats*. For information contact Paul Dolan, (401) 222-1415.

September 21-24, 2000 *New England Environmental Education Alliance Annual Conference*, URI W. Alton Jones Campus, West Greenwich, RI.

See p. 18 for events at
URI's Coastal Institute
and p. 15 for events sponsored by
Night Heron Nature Cruises.

Opportunities for Volunteers & Students

Audubon Society of Rhode Island, 12 Sanderson Road, Smithfield RI 02917, welcomes volunteers to help with property surveys and inventories, checking property bounds, doing trail maintenance, and serving as trail wardens. Contact Director of Properties Larry Taft at (401) 949-5454.

Barrington Land Conservation Trust seeks help in the field (especially June and July) for an ongoing investigation of Diamondback Terrapin nesting ecology in the Hundred Acre Cove estuary [see article p. 7]. Activities include locating, capturing, measuring, and marking nesting terrapin, monitoring nests, and general field observations. Housing and stipend are possibilities; no field experience required. Contact Steven Reinert, evenings, (401) 246-0111.

Common Fence Point Improvement Association (CFPIA) needs volunteers to monitor the 3rd growing season at a small (5 acres) saltmarsh restoration site in Common Fence Point, Portsmouth, RI, on the northern end of Aquidneck Island.

We are in need of all aspects of biological monitoring in this estuarine environment, including monitoring plants, fish, and invertebrates. A photographic journal is another form of historic data we feel would be useful for future restoration projects. All levels of expertise are welcome. Contact Mil Kinsella-Sullivan at (401) 683-4549 or email milkinsell@aol.com

Lloyd Center for Environmental Studies, P. O. Box 87037, S. Dartmouth, MA 02748; (508) 990-0505. Summer Internships: Must have completed sophomore year of college; position available May 13-August 30, with housing & stipend of \$100/week. Send cover letter, resume, & 2 letters of reference.
(1) 1 Education Intern to work with school children, youth groups, and adults in programs teaching about the coastal zone.
(2) 1 Research Intern for field survey of Lepidoptera in pine barrens and coastal bogs.

The Nature Conservancy, Rhode Island Field Office, 159 Waterman Street, Providence, RI 02906 is looking for volunteers to monitor Piping Plover and Least Tern sites in Rhode Island; a minimum commitment of a half-day training session and 2 days of monitoring is expected. Unique opportunity to help endangered species! Contact Griff Venator at (401) 331-7110.

Night Heron Nature Cruises has full- and part-time positions available for the 1999 season, beginning in April, for naturalists, divemasters, and boat captains. The Night Heron, a 50-foot long, outboard-powered boat certified to carry 57 passengers and 2 crew,

operates in the calm waters of Pt. Judith Pond and the Harbor of Refuge, to educate the public on coastal ecosystems [see article on p. 15]. People skills are essential. Contact Dick Allen at (401) 783-9977.

Rhode Island's National Wildlife Refuges: Ninigret, Trustum Pond, Pettaquamscutt Cove, Sachuest Point, and Block Island Refuges need your help counting wildlife, banding birds, constructing nesting boxes, maintaining trails, leading nature walks, and assisting refuge visitors. The program offers you several areas of opportunity; these include biological, visitor interpretation, education and orientation, maintenance, and miscellaneous skills. For more information contact Gary Andries at (401) 364-9124.

Roger Williams Park Museum of Natural History, Elmwood Avenue, Providence, RI 02905 has a number of collection-related projects for (unpaid) student internships; projects include identification, nomenclatural updating, cataloging, and conservation of the museum's 80,000+ mollusk collection.

Opportunities to work with other natural and physical science collections exist as well. Independent research that earns college or graduate credit toward degree completion is encouraged and welcomed. For information contact: Marilyn Massaro, Curator, (401) 785-9457 ext. 248.

Rose Island Lighthouse Foundation, P. O. Box 1419, Newport, RI 02840 needs volunteers and interns for spring and summer work to help develop school curriculum for grades K-5, and to guide at the lighthouse in the summer. Interest in education, lighthouses, history, birds, native plants and/or marine biology is helpful. Enthusiasm and reliability are required. For information contact: Charlotte Johnson, Executive Director, at (401) 847-4242.

South Kingstown Land Trust seeks volunteers to monitor and maintain existing SKLT properties and trails, conduct scientific inventories for plants and animals on existing and potential sites, contribute to the development of management plans for SKLT properties, and assist with research on potential funding sources. Contact the SK Land Trust office at (401) 789-0962.

URI Coastal Fellowship: an Avian Field Assistant is needed from May 17-August 31, fulltime (35-40 hrs/wk), on Prudence Island, Portsmouth, RI. Free housing, ferry, and on-island transportation; monthly stipend \$500-700.

Participate in an ongoing study of the distribution and abundance of birds on Prudence Island, a National Estuarine Research Reserve. The assistant will independently operate mist-nets, band a variety of bird species, and conduct point count surveys in upland and wetland habitats. Skills in identification of Eastern bird species by sight and song, and prior

Opportunities, continued from page 17

banding experience preferred but not required. Applicants lacking experience should be highly motivated and committed to undergo intensive training in bird identification and banding. Must be willing to work early hours (typically starting at 4:30-5:00 a.m.) and under demanding environmental conditions (i.e., biting insects, high temperatures, Poison Ivy, and Bullbrier). Great opportunity for students to gain extensive hands-on experience in wildlife research techniques. May '99 graduates not eligible. Application materials can be obtained from Deborah Grossman-Garber, Department of Natural Resources Science, Woodward Hall, URI, Kingston, RI 02881; (401) 874-5401, or email Deb DiQuinzio: ddiq5967@postoffice.uri.edu

URI Department of Natural Resources Science is seeking volunteers to work with Dr. Peter Paton for the summer field season, to assist in salt marsh (point count) surveys of birds, especially during June and July. Skills in identification of birds by sight and song important. Contact Deb DiQuinzio at (401) 874-5686 or email: ddiq5967@postoffice.uri.edu

URI Coastal Institute Events

- May 18: Friends of Oceanography Breakfast Series: 9 a.m., coffee at 8:45 a.m. *Restoration of New England's Salt Marshes* by Kenneth Raposa.
- Oceanography Explorer Day Camp*: 4 sessions in July, each Tue-Fri, 9 am-3 pm. Daily field trips to coastal areas, laboratory activities at URI's Graduate School of Oceanography, and a trip aboard a coastal vessel for school children. \$280 per child per session. Preregistration required.
- Beachcombing for Kids*: An educational beachcombing experience for children of all ages (must be accompanied by an adult). July 24 (10 am-Noon) & August 7 (9-11 am), Fort Getty State Park, Jamestown. FREE, no more than two adults per child please. Preregistration required.
- Historic South Ferry Walking Tours*: July 8 & 22, Aug. 5, 10:30 am. Orientation and walking tour of historic South Ferry area including the colonial port and ferry landing, the remains of military bunkers, and current home of URI's Graduate School of Oceanography.
- August 10-13 *Discovery of Rhode Island Coastal Environments: Sandy Beach, Coastal Pond, Salt Marsh, and Rocky Shore*: 10 am-2 pm. A four-day short course related to URI's Office of Marine Programs web site featuring four coastal environments (<http://omp.gso.uri.edu/doce.htm>). Program includes 90-minute classroom session and 2-hour field trip. \$50 per session or \$150 for all four sessions. Preregistration required.

The Coastal Institute is located at URI's Narragansett Bay Campus, South Ferry Road, Narragansett. The Coastal Institute Visitor Center has a bookstore and display, *Living on the Edge: An Interactive Coastal Exhibit*. Call the Office of Marine Programs for information, registration, or directions, (401) 874-6211.

Rhode Island Natural History Survey, Inc.

c/o Cooperative Extension Education Center
3 East Alumni Ave., URI, Kingston, RI 02881
Telephone: (401) 874-5800; Fax 401-874-2259
Email: rinhs@etal.uri.edu
Website: <http://www.edc.uri.edu/rinhs/nathist.htm>

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Allan D. Beck, Narragansett Bay National Estuarine Research Reserve
David Blockstein, Committee for the National Institute for the Environment
Jon C. Boothroyd, Rhode Island Geological Survey
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Virginia A. Carpenter, The Nature Conservancy
Richard W. Enser, R. I. Natural Heritage Program
Howard S. Ginsberg, USGS Patuxent Wildlife Research Ctr.
Mark D. Gould, Center for Economic and Environmental Development, Roger Williams University
Roger Greene, RIDEM Office of the Director
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Margaret Leinen, URI Graduate School of Oceanography and College of the Environment & Life Sciences
Christopher H. Little, Christopher H. Little & Associates
Peter T. Lockwood, RI Association of Wetland Scientists
Patrick A. Logan, URI Agricultural Experiment Station
Marilyn Massaro, Roger Williams Park Museum of Natural History
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David S. Reis, Coastal Resources Management Council
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Julia R. Sharpe, Narrow River Preservation Association
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Weaving the Web: Electronic Resources

Discovery of Rhode Island Coastal Environments website, exploring the salt marshes, coastal ponds, rocky shores, and barrier beaches of Rhode Island. Prepared by URI's Office of Marine Programs: <http://omp.gso.uri.edu/doce.htm>

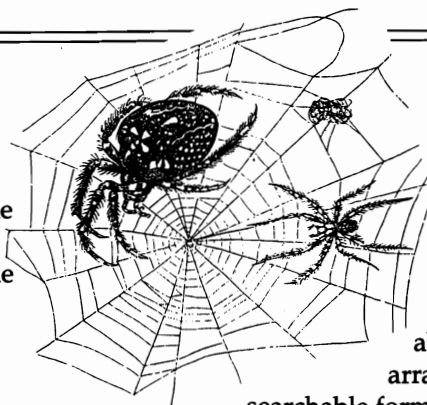
Harvard University Center for Health and the Global Environment website is dedicated to clarifying the links between human health and the health of the global environment. <http://www.med.harvard.edu/chge/newstoc.html>

IUCN Internet Web Site on the Economics of Biological Diversity: <http://iucn.org/>

The New York Botanical Garden web site now includes a searchable version of entries in the Index to American Botanical Literature at: <http://www.nybg.org/bsci/iabl.html>

The Index to American Botanical Literature has provided a service to the American botanical community for over a century, published initially in the *Bulletin of the Torrey Botanical Club* and subsequently in *Brittonia*. The Index is compiled from resources of The LuEsther T. Mertz Library of The New York Botanical Garden and contains entries dealing with various aspects of extant and fossil American plants and fungi, including systematics (traditional and molecular) and floristics, morphology, and ecology, as well as economic botany and general botany (publications dealing with botanists, herbaria, etc.).

The searchable database includes all those entries published in the Index since 1996, and thus includes botanical literature appearing since late 1995. The database is updated on a regular basis.



Submissions, subscriptions, etc.:
aceska@victoria.tc.ca
BEN is archived at <http://www.ou.edu/cas/botany-micro/ben/>

The Internet Directory for Botany (IDB) online is an immense collection of links and information about all aspects of the plant kingdom, arranged in an easily navigable and searchable form. Links are given to arboreta, herbaria, botanical gardens, and university botany and biology departments. Checklists of flora, taxonomic databases, and image collections are gathered here too. The result of an international effort, the IDB is hosted at the University of Regina, Saskatchewan, Canada, and mirrored in nine other countries. Botany Online: <http://herb.biol.uregina.ca/liu/bio/idb.shtml>

Committee for the National Institute for the Environment (CNIE), on-line National Library for the Environment has very useful information resources: non-partisan issue reports; environmental education programs & resources; environmental laws--local, state, federal & institutional; population-environment linkages; virtual library of ecology and biodiversity; information on environmental conferences and meetings; environmental careers and jobs.

Also available is a new Climate Change Briefing Book compiled by the Library of Congress's Congressional Research Service. <http://www.cnie.org>

Smithsonian Institution's Natural History Website: <http://nmnhwww.si.edu/nmnhweb.html>

Contemporary Herpetology website, a nonprofit, on-line journal. <http://alpha.selu.edu/ch>

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Discount on annual conference fee
20% discount on subscription to the journal
Northeastern Naturalist

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Thanks!

The Rhode Island Natural History Survey is grateful for the following donations to the library:

--*Guidebook to Field Trips in Rhode Island and Adjacent Regions of Connecticut and Massachusetts: New England Geological Conference 90th Annual Meeting Guidebook, 1998*, by Daniel Murray, URI Department of Geology, from Jon Boothroyd, RI State Geologist.

--*The Narrow River Handbook: A Guide to Living in the Watershed*, by the Narrow River Preservation Association, 1997, from Julia Sharpe.

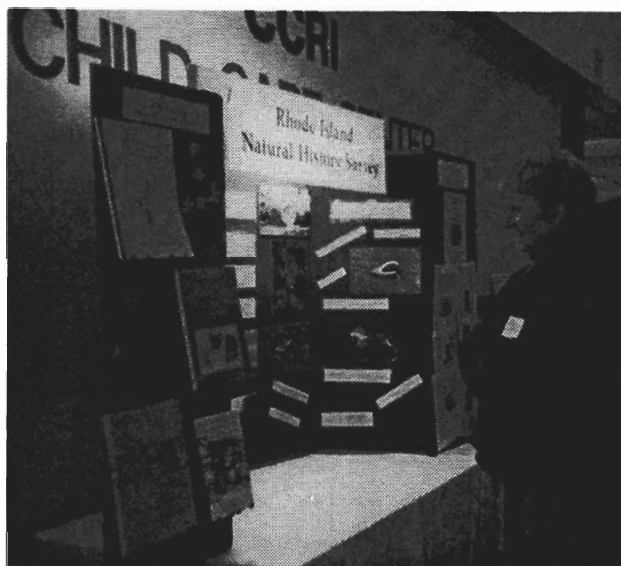
--*Conditions of the Mid-Atlantic Estuaries*, U.S. EPA, 1998, from Gerald Pesch.

--*A Field Guide to Insects: America North of Mexico*, by Donald Borror and Richard White, 1970, from Marion Gold.

--*Weeds, 2nd. Edition*, by W. C. Muenscher, 1980, from Carl Sawyer.

Rhode Island Natural History Survey
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Save the Bay's Morgan Hardwick-Witman takes a look at the new RINHS display at the March 12 RINHS conference. Purchase of the display board and materials were made possible by the Champlin Foundations.

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