

# RINHewS

## The Newsletter of the Rhode Island Natural History Survey

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April 2000

### **Bioblitz 2000!**

by Richard W. Enser

In last year's spring issue of *RINHewS*, Survey President John Paul began his column by asking, "What's exciting about the Rhode Island Natural History Survey?" He answered the question with a review of our conference, publications, and lecture series, and concluded that these programs were truly bringing together the state's ecologists and naturalists. With this column, I would like to introduce a new and exciting pursuit.

**Bioblitz.** The name conjures the image of a particularly nasty form of biological warfare, but in reality the term refers to something much more benign. *Bioblitz* is simply a 24-hour census of the biological resources within a specified area. The first *Bioblitz* event conducted in the United States was sponsored by the National Park Service and the National Biological Service and was held in 1996 at Kenilworth Park in Washington, D.C. This park is surrounded by residential and industrial development and was considered by many to be devoid of any significant biological diversity. However, scientists tallied over 900 species during the *Bioblitz* and thereby succeeded in illustrating the value of small parks within urban environments. Since the first *Bioblitz*, other organizations have adopted the concept with other parks being successfully "blitzed" in Pittsburgh, Philadelphia, and Albany. Most recently the Connecticut Natural History Museum sponsored that state's first *Bioblitz* in June of 1999 at Keney Park in Hartford, finding over 1300 species during the event, including four species not previously known from the state. Encouraged by their success, Connecticut will hold its second *Bioblitz* on June 2-3, 2000.

In Rhode Island, the Natural History Survey is poised to introduce the state's first *Bioblitz* on June 9-10, 2000. Held at and cosponsored with Roger Williams Park in Providence, the event will combine biological inventory and opportunities for the public to learn how scientists do their work. Tally Boards at each of the Park's major venues (Zoo, Natural

History Museum, and Greenhouse) will provide hourly species updates.

Why conduct a *Bioblitz*? This effort clearly serves the mission of the Rhode Island Natural History Survey, in "bringing together Rhode Island's ecologists and naturalists to advance the scientific knowledge of the state's biota, ecological communities, and environmental resources." The *Bioblitz* will effectively illustrate to the citizens of Rhode Island how we do our work, at the same time educating the public about the biodiversity in their own backyard. In that light this is the most important reason for conducting a *Bioblitz*—to generate public awareness of the concept of biodiversity, showcase the biological resources that exist in areas that many people consider to be wastelands, and prove that urban areas do support more than rats, starlings, and popcorn mallards. In addition, the data obtained during the *Bioblitz* may be useful as an indicator of environmental quality and serve as a baseline for future monitoring and management in the park.

This column serves as a call for participants. Everyone, including scientists, amateur naturalists, students, and interested volunteers, are encouraged to take part in *Bioblitz 2000*. If you can spare an hour or two (or more) between 3PM Friday, June 9 and 3PM Saturday, June 10, we want to hear from you. All disciplines are welcome, although it should be no surprise that experts in some of the less popular groups, such as nematodes, flies, fungi, and others, are needed (the Washington D.C. *Bioblitz* cataloged

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### **What's Inside?**

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## Research Reports

### *Burrowing a Better Future: Earthworms and the Life of the Soil*

by Mary C. Savin and  
José A. Amador



Earthworms are often called "ecosystem engineers" because they actively redesign the physical structure of the soil environment. Earthworms such as *Lumbricus terrestris* (nightcrawlers) pull litter from the soil surface into semi-permanent, vertical burrows that they create as they move through soil (the technical term for this type of earthworm is *anecic*). They ingest this litter as well as soil particles, depositing casts on the surface as they move about. Through their activities, earthworms translocate and compress soil particles. Charles Darwin initially became interested in earthworms when he noticed their ability to "bury" marl and cinders under casts left on the soil surface. Earthworm activity has a profound impact on ecosystem functioning, affecting availability of organic detritus that serves as food for microorganisms (bacteria and fungi) and changing the habitat of microbes and microfauna such as nematodes and protozoa. Since organic residues, microorganisms, and microfauna constitute the base of the detrital food web, earthworm activity significantly influences nutrient cycles.

At the Laboratory of Soil Ecology and Microbiology at the University of Rhode Island, we, in conjunction with Josef Görres, have taken a multidisciplinary approach to the study of earthworms and nutrient cycling. To better understand the role of earthworms in soil nutrient dynamics, we have focused on the interrelationships among the physics, ecology, and biogeochemistry of earthworm burrows.

Earthworms stimulate the decomposition of plant residues and feed selectively. When presented with different types of leaf litter, they will preferentially consume the more easily digestible litter. We have found that earthworms consume oak and maple leaf litter as well as corn leaf litter, so they can and do impact both forested and agricultural ecosystems. In an experiment using soil cores containing three earthworms, we measured litter consumption rates of up to 18 g/m<sup>2</sup>/day.

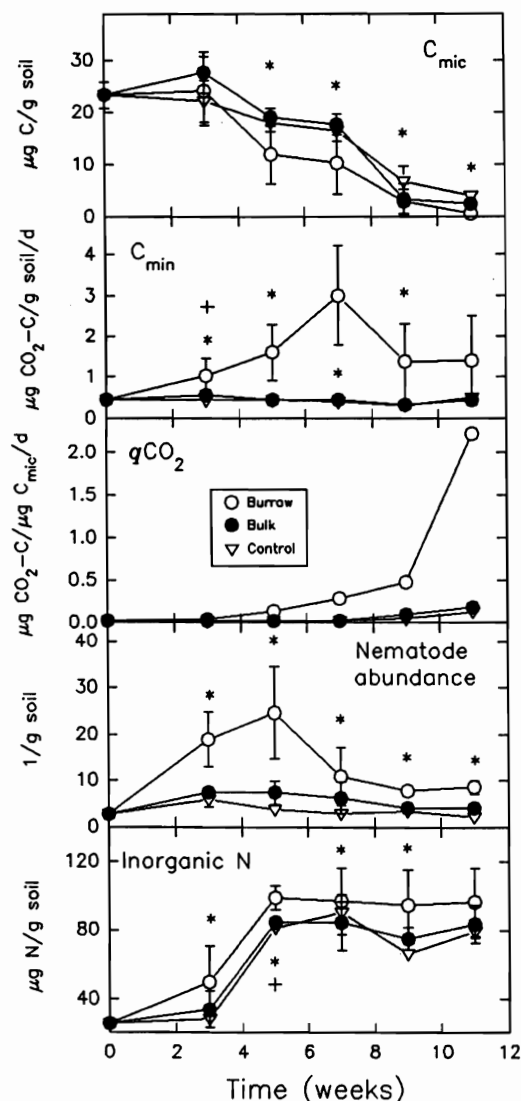
In addition to quantity, earthworms also affect the quality of litter inputs into the soil. In our experiments, the carbon and nitrogen content of litter remaining on the soil surface decreased over time in earthworm treatments, but not in their absence. In

addition, the litter left on the surface had a lower nitrogen content than what the worms pulled into their burrows. This suggests to us that earthworms preferentially consume the parts of the plant with higher nutritional value and leave behind the more recalcitrant structural portions, which are harder to degrade and provide fewer nutrients.

Organic detritus, whether it be of plant or animal origin, is broken down primarily by soil bacteria and fungi, ultimately to its inorganic constituents. Carbon dioxide is released as the complete oxidation product of carbon; this release is a common measure of microbial activity. Research in our laboratory has shown that carbon dioxide evolution can be five to ten times higher in earthworm burrows than in soil unaffected by earthworm activity. This indicates greater microbial decomposition of organic material in the presence of earthworms.

Nitrogen is generally the nutrient most limiting for plant growth. We have found that inorganic nitrogen levels are significantly higher in earthworm burrows relative to bulk soil. In a laboratory experiment comparing nutrient levels in artificial and natural burrows, the presence of litter in artificial burrows caused a much smaller increase in carbon turnover and inorganic nitrogen levels than in earthworm burrows. These results suggest that other aspects of earthworm activity, beyond the mere introduction of leaf litter into the soil, are responsible for the significant measured increases in carbon and nitrogen.

Some of the effects observed in earthworm burrows may be related to how earthworms engineer the soil. We have observed that cast and burrow soil have a distribution of pore sizes that differ markedly from soil not affected by earthworms. This difference is significant because soil pores constitute habitat for microbial and microfaunal populations. Earthworms line their burrows with mucus, which mixes with soil particles, and creates and stabilizes soil aggregates, providing a microbial food source. Microbial and microfaunal community structures change in soil affected by earthworms because these organisms are ingested and only some survive earthworm gut transport. Those that survive, however, may benefit from soil cast out by the earthworms. Protozoa and nematodes consume bacteria residing in the same soil pores, removing part of the microbial biomass and stimulating the activity of the remaining microbes. In addition, since microorganisms are enriched in nitrogen relative to microfauna, the protozoa and nematodes grazing on microbes excrete inorganic N. The distribution of soil pores and pore openings is important to the grazing of microbes by soil microfauna because pores are better interconnected in moist soil. It is the connections among



Changes in microbial biomass ( $C_{mic}$ ), carbon mineralization ( $C_{min}$ ), metabolic quotient ( $qCO_2$ ), nematode abundance, and inorganic nitrogen (nitrate + ammonium) levels in burrow, bulk and control soil. (\*) Indicates statistically significant difference between burrow and control soil; (+) indicates significant difference between bulk and control soil. (From Görres et al., 1997)

water-filled pores that are important for grazing interactions to occur. Earthworms create a pore structure where these connections are more prevalent.

Our studies show that earthworms affect the distribution of litter and soil pore sizes as well as ecological interactions in the detrital food web. All of these factors are important in controlling microbial activity and nitrogen availability in forest and agricultural soil. The effects of earthworms on soil have management implications. Earthworms improve the soil structure, enhancing aeration and water infiltration, which is beneficial for root penetration and growth, possibly reducing the need for tillage. Greater turnover of plant litter and increased

microbial activity lead to increased nutrient availability to plants. Populations of these ecosystem engineers may thus be managed to enhance soil quality and decrease inorganic fertilizer applications, leading to more sustainable agricultural ecosystems.

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## Fishers in Rhode Island

by Charles Brown

The conversation usually starts with "It was big and black with a large, bushy tail," or "I've never seen anything like that before." What an increasing number of Rhode Island hikers, hunters, and people driving on rural roads at night are seeing are fishers, a furbearer that has been absent from the state's fauna for many years.

The fisher (*Martes pennanti*), or fisher cat as it is often called, is a member of the weasel family, and is intermediate in size between a mink and an otter. Fishers are somewhat stocky, with short legs, large feet, and an elongated body with dark fur ranging from black to dark brown. Upon closer inspection, tri-colored guard hairs on the back of the neck give a "grizzled" appearance, with white patches on the chest and stomach. The tail is usually very dark and appears bushy, particularly during fall and winter.

The name fisher may have originated from the French words *fitchet*, *fiche*, or *fitchew*, used to describe the European polecat, which has characteristics similar to the North American fisher. As with other closely related mustelids, fishers are sexually dimorphic. The weight range for adult male fishers is generally between eight and twelve pounds, while adult females generally weigh considerably less, usually between four and six pounds. Male fisher carcasses collected by the RIDEM Division of Fish

and Wildlife have ranged from eleven to fourteen pounds. Several hypotheses have been proposed to explain the large difference in body size between males and females. One hypothesis suggests resource partitioning: each sex utilizes somewhat different food resources, thereby reducing competition between sexes. Another hypothesis is that sexual selection favors large body size in males, whereas body size in females is restricted due to the energetic costs associated with reproduction (Powell 1993).

The fisher feet have five large, retractable claws. Front and hind tracks often appear asymmetrical, with the front track larger than the hind. Front tracks usually measure 2 1/8" to 3 7/8" long by 2 1/8" to 3" wide while the hind track usually measures 2 1/8" to 3" long by 2" to 3" wide (Rezendes 1999). Fishers have a variety of track patterns, including a bounding pattern common for mustelids. In snow, this pattern registers as two sets of tracks, followed by another set of two and so on. Fishers are capable climbers, and because they are able to rotate their hindpaws almost 180 degrees, can descend trees headfirst.

As with other mustelids, fishers possess scent glands that contain a musky, strong-smelling fluid used for scent marking. This, in addition to scat, is used by both sexes to mark scent stations along travel corridors to communicate territoriality. These scent stations usually consist of a stump, log, stone, or other elevated feature. I have observed where a large male fisher straddled and dragged its stomach over a small hemlock sapling, apparently as a marking behavior, in addition to urinating and defecating several feet away.

Breeding season for fishers occurs during April. Fishers have delayed implantation, a process whereby the fertilized egg does not implant immediately in the uterus but remains dormant until approximately ten months after fertilization. Following implantation, which is believed to be induced by increasing photoperiod, the embryo develops within 30 to 60 days, with birth usually taking place the following March or April. Average litter size is three. Mating takes place immediately after the litter is born.

Cavities within trees are used almost exclusively for natal den sites, and female fishers routinely move litters to different den sites. Males do not participate in the care of the litter. Fishers use brush piles, hollow logs, tree cavities, gray squirrel nests, and rock piles as temporary resting sites. One fisher I recently tracked in snow in North Smithfield used a large, man-made brush pile as a resting site.

Fishers are opportunistic predators, consuming

any animal that they can capture and kill. Small mammals are the mainstay of their diet, the most common items including shrews, mice, voles, red and gray squirrels, and rabbits. Fishers also utilize carrion, particularly deer, and will also eat fruit and nuts. Although fishers are excellent climbers, most hunting activity takes place on the ground where easily captured prey is available. The gastrointestinal tracts of fisher carcasses collected by RIDEM Fish and Wildlife have contained the remains of mice (whole and in parts), voles, shrews, deer, raccoon, blueberries, winterberries, and chicken (one large male fisher recently gorged itself on chicken before being dispatched by the homeowner). Fishers are one of the few predators that will regularly seek out and kill porcupines.

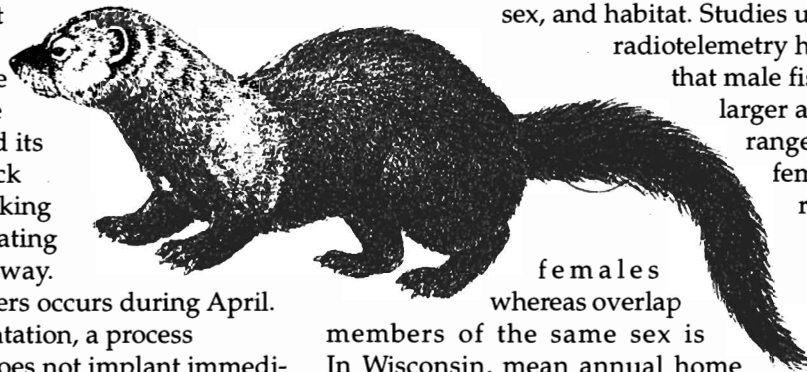
Fishers occur in a variety of habitats, including upland hardwoods, coniferous forests, mixed hardwoods and conifers, and second- and old-growth forests throughout their range. They avoid large areas without high overhead canopy closure, such as agricultural areas or extensive clearcuts. Availability of prey appears to play an important part in selection of habitat.

Food availability, topography, cover, location of dens, and weather conditions govern fisher movements (Chapman 1982). Home range size and population densities for fishers vary with season, sex, and habitat. Studies using

radiotelemetry have shown that male fishers have larger annual home range sizes than females. Home ranges of males and females overlap, but the overlap is minimal.

whereas overlap members of the same sex is minimal. In Wisconsin, mean annual home range size for males was 15.3 square miles and 3.2 square miles for females (Kohn 1993). Home range size for fishers in New Hampshire has been estimated at approximately 10 square miles for males and 5.8 square miles for females (Powell 1993). Population densities in New Hampshire have been estimated at 1 fisher per 1.1 to 4.1 square miles in summer and a winter density of 1 fisher per 3.2 to 7.7 square miles (Powell 1993).

Due to loss of habitat and unregulated harvest, fishers were extirpated from much of their historic range. Efforts to reintroduce fishers into their former range have proven successful in many states, including Massachusetts, Connecticut, Vermont, New York, Virginia, and Wisconsin. Remnant populations within states such as Maine and New Hampshire have been source populations for reintroduction



programs and have expanded due to protection and the regrowth of forests within New England.

The historical status of fishers in Rhode Island is not well documented. Although they probably did occur here at one time, I was unable to locate any study skin, mount, or written account of the species from Rhode Island prior to 1966. *The Mammals of Rhode Island* (Cronan and Brooks 1968) states "Up to and including the time of the 'Mammal Survey' there were no authenticated records for the fisher in Rhode Island. However, on November 11, 1966 Mr. Lloyd Letendre of Burrillville treed and shot a fisher at Cedar Swamp Pond, Burrillville." The next record is a sighting report from November 1983 near the Slack Reservoir in Johnston, followed by another sighting report from January 1984 at Buck Hill Management Area in Burrillville. Evidence of fisher reproduction in Rhode Island was confirmed in the late 1980s when woodcutters in Glocester felled a tree that contained a natal den. One of two young survived and was carried away by the female fisher; the other, which died as a result of the fall, was collected by RIDEM Fish and Wildlife and preserved as a study skin. RIDEM Fish and Wildlife recorded approximately 33 additional unsolicited sighting and road-kill reports between 1984 and 1997, with several specimens collected. During 1998, 15 sighting and road-kill reports were recorded from 10 different towns, followed in 1999 with 21 reliable sightings and 13 confirmed road-kill specimens from a total of 15 different towns, including urban areas of Warwick and Cranston.

Other than compiled sightings and road-kill reports, in-depth study of the status of fisher populations has not been conducted in Rhode Island, nor has there been reintroduction. It is likely that Massachusetts is the source population for the fishers we have in Rhode Island today. Research and management needs in Rhode Island include the determination of range, habitat requirements, population densities, estimate of the total population, and trends in the fisher population. Efforts are currently underway to develop research plans to achieve these goals. A long-term management plan for fishers needs to be developed to insure that healthy fisher populations continue to remain as part of our forest communities. Fishers are a protected furbearer in Rhode Island. The taking or possession of a fisher or its pelt is prohibited without special authorization from the Division of Fish and Wildlife. Sightings of fishers can be reported to the Great Swamp Field Office at (401) 789-0281.

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## 1999 Brings a Glimpse of "the Old Days" on Block Island

The Fall 1999 *Annotated Annual Report of the Block Island Banding Station*, prepared by Elise Lapham and Kim Gaffett, reports that fall 1999 ranked sixth for the greatest number of bird species (82) in the station's history, and the best since 1975; it also ranked eighth for the number of individual birds (2288), the best since 1976. The station logged 4588 average net hours during 1999, with an average of 50 birds per 100 net hours.

The top ten species captured in fall 1999 were Myrtle Warbler (492), Gray Catbird (439), White-throated Sparrow (148), Golden-crowned Kinglet (130), Blackpoll Warbler (105), Red-eyed Vireo (76), Brown Creeper (75), Hermit Thrush (66), Common Yellowthroat (57), and Ruby-crowned Kinglet (54). Especially interesting returns/recoveries included a grand total of 9 Saw-whet Owls, the most ever in a year; a Common Yellowthroat first banded at the station in May 1993; and a Myrtle Warbler banded at the station in October 1992 and recovered in North Carolina in September 1999. The count for Blackpoll Warblers was the highest since 1975.

The banders and assistants at the Block Island Banding Station during 1999 were Elise Lapham, Kim Gaffett, Scott Comings, Susan Carr, Mark Carr, Penny Anderson, Charlie Schnell, Curt Milton, Erica Anderson, and Rick Wetzel.

Elise Lapham and her daughter Helen started banding on Block Island in 1967, and banding has continued during spring and fall migration every year since then. Steven Reinert is working with Elise

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to analyze the Block Island data; one report on fall migration data was included in the April 1999 RINHewS.

## **Rhode Island Odonata Atlas: 1999 Results**

by Virginia Carpenter

This past field season was by far the most exciting on record for Odonata studies in Rhode Island. 1999 was the second year of the five-year Rhode Island Odonata Atlas, a year which brought phenomenal results in all aspects of the project. From the very beginning it appeared that 1999 would be an unusual year, with early emergence of the first Ringed Boghaunter dragonflies to severe drought conditions that brought streams to a halt and wetlands to their lowest levels in years. And when I look back at the year I realize that the accomplishments of a relatively small but intrepid crew of volunteers are perhaps unequalled in my 20 years of work with Odonata.

Despite its focus on a spectacular faunal group, the Rhode Island Odonata Atlas is very much a people project. In the course of two sessions in March 1999, 40 volunteers were trained in field and laboratory techniques, dragonfly and damselfly natural history and ecology, identification, etc. These volunteers come from a variety of backgrounds, from professional and amateur naturalists or biologists to healthcare workers, highly skilled computer analysts, company executives, homemakers, moms, dads, and children. They chose to contribute to the project in various capacities. Some worked in the field, slogging bogs, streams, and ponds while others worked diligently behind the scenes on the tedious task of managing, updating, and analyzing the database, labeling and bagging countless specimens, and spreading the word through the media. Literally hundreds of volunteer hours went into the Atlas in 1999, and the work continues as I write this, with two volunteers completing taxonomic ordering of all 1998 and 1999 material and another volunteer analyzing our cumulative data for gaps in geographic and taxonomic coverage, abundance, township lists, etc. The Rhode Island Odonata Atlas project is almost completely volunteer based.

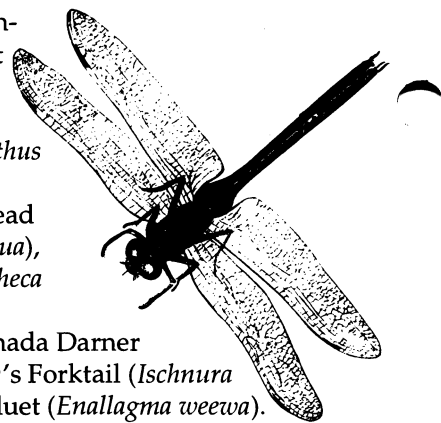
The scientific results of the 1999 Atlas are incredible. Over 2300 odonate specimens were collected during the season, spanning 87% of the species known from the state. Since the beginning of the project in 1998, approximately 3600 specimen records have been entered into the database. In total, eight new species were added to the Rhode Island Odonata list in 1999, bringing the state total to 129 species. All but one of these species was expected

here; i.e., they occur in neighboring states and/or habitat is present in Rhode Island. These new additions are the Single-striped Clubtail (*Lanthus vernalis*), Dusky Clubtail (*Gomphus spicatus*), Arrowhead Spiketail (*Cordulegaster obliqua*), Beaverpond Baskettail (*Epitheca canis*), Coppery Emerald (*Somatochlora georgiana*), Canada Darner (*Aeshna canadensis*), Rambur's Forktail (*Ischnura ramburii*), and Blackwater Bluet (*Enallagma weewa*). The Blackwater Bluet is especially significant as it represents the first record of this southern damselfly in New England. Specimens of the Blackwater Bluet were not discovered in the 1999 material until mid November when they surfaced in a pile of unidentified specimens, making for great post-season excitement. The Coppery Emerald discovered in Exeter is only the sixth record of this emerald dragonfly north of Virginia.

The 1999 field season also yielded two very significant specimen records for a fiery red dragon called the Comet Darner (*Anax longipes*), which was previously known in the state only by a (reliable) sight record.

One of the first specimens contributed in 1999 served to document a new population of the globally imperiled Ringed Boghaunter (*Williamsonia lintneri*), an early-flying dragonfly of cold, acidic, sphagnum-rich fens. The new record is the first population from Newport County. This species is known from only 50 locations range-wide, with 20 (40%) of those in Rhode Island. Its extant distribution, until recently, included only New England states. However, in 1998 and 1999, several populations were located in Wisconsin and Michigan, forming an interesting disjunct Great Lakes population. Ringed Boghaunters are the first odonate to take to the air in Rhode Island, and in 1999 they were out on April 15, about five days earlier than usual.

Also intriguing were numerous new records for the lovely and restricted Scarlet Bluet damselfly (*Enallagma pictum*), which had been reported from just three ponds in the state prior to this year. This species occurs in only six northeastern states, generally in the coastal plain. All three pre-1999 Rhode Island occurrences were in classic coastal plain ponds in South Kingstown and Charlestown, very typical to the species' preferences range-wide. In 1999, 10 new Scarlet Bluet populations were discovered here, expanding the local distribution of the species all the way to Foster and Burrillville and out of the realm of coastal-plain pond habitat. In addition to new records for globally rare species, the 1999 Atlas produced additional populations for five locally



uncommon species previously known from just one or two localities in the state.

In the course of the 1999 dragonfly season, a few hotspots of odonate diversity have surfaced which have led to conservation actions on the ground by multiple conservation agencies. One example is a pond and wetland system in Foster that has produced 51 species of dragonflies and damselflies, including one of the new state records (Canada Darner) and three species considered globally imperiled. This wetland system includes a grassy pond with relatively southern coastal-plain pond characteristics, a more northern beaver swamp, and a pristine forested stream. Because of the diversity of habitats and the mix of northern and southern vegetative and aquatic features, this site supports extraordinary diversity and numbers of dragonflies and damselflies. As a result, we observed an interesting mix of northern and southern species at this site. In a single swarm of giant darner dragonflies, the striking northern Canada Darner was flying side-by-side with the more southern and coastal Mottled Darner (*Aeshna clepsydra*).

Several fun and well-attended Atlas events took place this year. Volunteers gathered one evening each month at the Conservancy office to view fully prepared specimens and occasional living material, learn identification, and discuss issues or problems. In addition, monthly field trips brought the group together at local ponds and streams across the state. Volunteers were kept updated on progress and what to look for by monthly newsletters. Yet despite the successes of the early years of the Odonata Atlas, more field and lab help is needed. The call for Atlas Year 3 volunteers is out and on April 1, the 2000 season will kick off with a training and organizational meeting. Anyone interested in participating in the Year 2000 Atlas (and beyond) should contact Ginger Carpenter at The Nature Conservancy, at (401) 331-7110.

*Ginger Carpenter is Director of Science and Stewardship at the Rhode Island Office of The Nature Conservancy, and serves on the RINHS Advisory Board.*

### **1999 Summary of Diamondback Terrapin Population Study, Hundred Acre Cove, Barrington RI**

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

The nesting season this year started about May 30 and ended about July 14. We identified 81 individual terrapin, 10 of which we marked for the first time. Nineteen terrapin nested twice during the season, and one nested three times. Some difficulty at nesting attempts was noted late in the season, as the

ground was very hard due to the drought. On several occasions at Nockum Hill, we watched the nesting process come to a halt when the turtle could dig no farther; in another instance, tracks were found at the end of Henry Drive, in a place where there is usually a nest, showing several unsuccessful nesting attempts.

Thirty-five percent of the terrapin seen this year were marked in 1990, the first year of the study. Also, 17 terrapin had marks made by Doug Rayner prior to 1990 (some of these were part of the 35%). The average plastron length of all turtles measured in 1999 was 205 mm; of the newly marked turtles, 197 mm. The total number of terrapin marked for the duration of the study thus far is about 233. Excluding two that are known to be dead, there could be as many as 231 female terrapin in the Cove.

A new 6' X 12' nest cap was built of sturdy 2' X 6's and heavy-duty steel screening, and placed in the sandpit. Twenty nests were dug out immediately after being laid and transferred to the cap. 208 nests were found scavenged; added to the 20 saved nests, we could account for 228 nests laid, more than twice the number of nests we directly observed being laid. There may have been a few uncapped nests that hatched, because we found several hatchlings that may not have come from the cap. Possibly thanks to the recent clearing, good numbers of nests were laid on the Back Road (22) and the Wildflower Fields (18).

Most of the scavenged nests were found on the Point (51), the Sandpit (37), the Beach (29, more than usual), and the High Road (27). Skunks appeared to be the major scavengers, but tracks of raccoons, coyotes, and crows were also commonly present at the sites. No trapping of potential scavengers was done, although this has been suggested by several researchers.

Some of the eggs were infertile, others were partially eaten by maggots. Two hundred live hatchlings were released from the cap between August 6 and September 11. The releases were made at various points on the hill and the marsh, near where the original nests were laid.

*Douglas Rayner, Charlotte B. Sornborger, and Seth Thompson are with the Barrington Land Conservation Trust.*

**Managing the Modern Herbarium: An Interdisciplinary Approach**, D. A. Metsger and S. C. Byers (eds.) (1999, Society for the Preservation of Natural History Collections, Elton-Wolf Publishing, \$29.95) contains practical guidelines for the proper care of collections of preserved plants and fungi, with recommendations for their use in systematic research. Useful for professionals and amateur naturalists alike. Details available on the SPNHC website: [www.spnhc.org](http://www.spnhc.org), or email Elton-Wolf Publishing at [pnutubv@axion.net](mailto:pnutubv@axion.net)

## **Night Heron** **HARBOR & NATURE CRUISES**

Rhode Island's coastal salt ponds are natural laboratories for the study and enjoyment of estuarine ecosystems. The excursion vessel *Night Heron* was built to explore those shallow waters and secluded coves. Night Heron Harbor & Nature Cruises was founded in 1998 by lobster fisherman Dick Allen and marina owner Al Conti and is based at the Snug Harbor Marina on the shores of the Pt. Judith Salt Pond. Sailing into its third season, Night Heron Harbor & Nature Cruises was winner of the 1998 South County Tourism Council Excellence Award for Eco-adventure Tourism.

The *Night Heron* offers a wide variety of regularly scheduled cruises and special events. For the year 2000, in addition to the popular "Secrets of the Salt Pond" cruises, sunset cruises, and the unique "Nightsea Experience" cruise, the *Night Heron* has added "Salt Pond Scavenger Hunts," "Island Adventures," and a lobster-in-the-rough and cruise combination. Snorkeling trips to the "Apex" of the Pt. Judith Harbor of Refuge will be scheduled for Thursdays and Sundays in July and August this year and take advantage of the clearer ocean water that flows through the outer reaches of the harbor.

Each of the *Night Heron's* cruises has a slightly different focus, but all take advantage of the fascinating mix of natural science, history, culture, and relaxation offered by the calm waters of the Pt. Judith Salt Pond and Harbor of Refuge. The "Secrets of the Salt Pond" cruise deploys a small scallop dredge and hauls lobster and crab traps to obtain sea-life samples for on-board observation. On workdays, the aquafarmers at the Moonstone Oyster Farm are often seen tending their crop.

Passengers get a close-up look at the trawlers, gillnetters, and lobster boats that have made the fishing port of Galilee the eighth most valuable port in the nation.

The *Night Heron* visits

Smelt Brook Cove, whose secluded shoreline attracts herons, egrets, ospreys, cormorants, swans, and other sea and shore birds. The ride along the one-and-a-half mile breakwater, constructed at the turn of the century with ox carts and sail boats, includes views of the Point Judith Light House, Roger Wheeler State Beach, Salty Brine State Beach, and, on a clear day, Block Island.

The "Nightsea Experience" cruise is the only cruise on which the *Night Heron's* glass bottom is used. Underwater lights illuminate the shallow sand bar in the apex of the Pt. Judith breakwater to reveal lobsters, crabs, squid, and other sea-life in their natural habitat. With the lights off, millions of bioluminescent organisms streak by the glass bottom like shooting stars. The new "Salt Pond Scavenger Hunt" will take passengers to the shores of one of the many islands that dot the Salt Pond to hunt for a list of common and uncommon flotsam, jetsam, and intertidal organisms.

Year 2000 special events will include more of the popular "Succotash Salt Marsh" sunset cruises, which take advantage of extraordinarily high spring tides to glide through the channels of the Succotash Marsh. The narration on this cruise includes the results of research that uncovered a 700-year history of severe storm imprints buried in the salt marsh sediment.

Sunset-moonrise cruises are also popular, planned for the days when the full moon is rising in the east as the sun is setting in the west. Other special events include a "Focus on Fish Farming" cruise on July 13, an "Exotic Species and Bioinvasions" cruise on July 27, and a "Baby Lobster Census" cruise on August 19. Socially





oriented adult cruises include a sunset wine-tasting cruise on July 8, a sunset Scotch-tasting cruise on July 21, and a fine wine sunset cruise on August 19. For families the *Night Heron* will host three "Pizza on the Pond" sunset cruises on July 22, August 5, and August 26.

The *Night Heron* also offers a floating classroom program during the spring and fall. Programs for school groups include water-quality testing, plankton tows, sea-life sampling, and an instructive narrative about the salt pond and the fishing port of Galilee.

The *Night Heron* has become a popular venue for family and group outings and parties. The boat is available for charter and the cruise route and activities can be modified to suit the interests of the group. Lobster-in-the-rough can be served either on the deck of the Snug Harbor Marina, with a cruise before or after, or groups can enjoy their lobster while they cruise the pond.

The *Night Heron* can be chartered to operate on any estuary from eastern Connecticut to southeastern Massachusetts. A trip or series of trips on the *Night Heron* can be used as a fund-raising opportunity for groups and organizations. The *Night Heron* has slide-down windows that create an open-air atmosphere but can be closed for protection from the weather. The seats on the *Night Heron* feature seat-back tray tables and the boat has a rest room and a snack bar.

A full schedule of *Night Heron* cruises and special events can be found at [www.SnugHarborMarina.com](http://www.SnugHarborMarina.com). Interested persons can also call (401) 783-9977 or 1-(888)-NGHT HRN (644-8476).

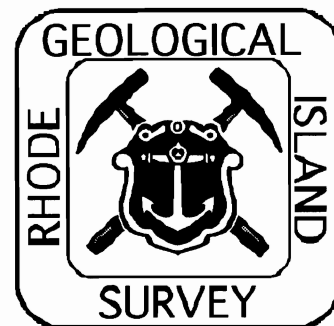
## **The Rhode Island Geological Survey**

by Jon Boothroyd

The mission of the Rhode Island Geological Survey and the Rhode Island State Geologist is to provide the people of Rhode Island with quality geologic information to facilitate informed decision-making for natural resource management, economic development, conservation planning, and regulation; to provide public assistance; and to promote education. The Geological Survey maps, assesses, inventories, and interprets Rhode Island's geology. The Geological Survey supports its mission by using computerized geographic information systems and databases, and by publishing maps and reports, including map publication on demand. The State Geologist collaborates with, and coordinates, federal geological programs that support the mission of the Geological Survey. The State Geologist further supports this mission by participating in national, regional, and state meetings, field trips and workshops applicable to Rhode Island geology.

### **A Brief History**

The State Geologist's Office has evolved through several stages. In 1975 the URI Graduate School of Oceanography (GSO) requested that Governor Noel appoint GSO faculty member Robert McMaster to serve as Associate State Geologist for Marine Affairs, in order to receive funding from the U.S. Minerals Management Program. In 1985, McMaster resigned his position and urged in his resignation letter that Governor DiPrete appoint Allan Cain, of the URI Department of Geology, as State Geologist. Dr. McMaster cited increased emphasis on land issues--such as landfills, sand and gravel mining, and groundwater--as the reason to formalize this position. Support for the Office of State Geologist came from the Statewide Planning budget (at that time Daniel Varin was director of that office, which is now the Division of Planning in the Department of Administration). For over ten years the Office of State Geologist was funded through cooperative agreements with the Division of Planning. With the reorganization of the Division of Planning in 1996, funding for the Office of State Geologist was removed. In 1998, the Office was reorganized as the Rhode Island Geological Survey, to better assist the people of Rhode Island. I am grateful to many people



### **Congratulations to RINHS members**

*Howie Ginsberg, Roger LeBrun, and Joan Pilson! Howie was named the Northeast Region's "Natural Resources Researcher of the Year" by the National Park Service, Roger received an award for excellence in education from the Entomological Society of America, and Joan received the 1999 "State of Rhode Island Award" from the New England Wild Flower Society, for her indefatigable service on behalf of New England's native plants.*

*continued on p. 12*

## In Memoriam: Douglas L. Kraus

Rhode Island's natural history community lost a long-time friend in late February with the death of Dr. Douglas L. Kraus of Kingston. He was 87. Dr. Kraus was Rhode Island's most venerable bird student and the recipient of the RINHS 1998 *Distinguished Naturalist Award*. Known to most birders as simply "Doug," his tenure as an active birder ran for 76 years, 1924-2000, the longest on record in Rhode Island.

Doug Kraus came to Providence as a boy in 1924, when his father accepted a position teaching Chemistry at Brown University. Already interested in birds, he developed his birding skills through the early 1930s as a member of the Audubon Society of Rhode Island (ASRI) and leader of birding field trips for the Society's education committee. Graduating from Brown in chemistry, he went to California in 1934 to work on a Ph.D. and graduated from UC Berkeley in 1937. Coming back to Rhode Island, he took a job teaching at URI in 1938. Birds continued to be his consuming avocational interest, and his position at URI set the stage for an unparalleled ornithological reconnaissance of South County and nearby regions in the coming decades. In 1939 he was among the several founders of the Rhode Island Ornithological Club (RIOCI) and he remained one of its staunchest members for more than 60 years.

Living in Kingston and Wakefield initially, he eventually bought an overgrown farm just east of Kingston village in 1950, from which he continued his constant field trips for birds to the South County coastal area and elsewhere. While not among the founders of the Kingston-based Little Rest Bird Club, he was for many decades the chair of the club's program of public field trips and screen tour lectures. In 1940 he organized the first annual Christmas bird count centered in the Kingston area for the National Audubon Society and he continued as its coordinator through December, 1999. He began mist-netting and banding birds on his farm in 1956 and kept up his "banding station" nearly to the end of his life. From about 1933 he kept an exceedingly detailed and meticulous set of books that recorded birds and other wildlife that he and others encountered in the field; these records now constitute the largest single-person trove of specific data on the state's birdlife in

existence. In the course of searching for birds he discovered two species never previously known to nest in Rhode Island, and found an unparalleled series of non-breeding rarities including innumerable out-of-season stragglers and lingerers. He added more new species to the approved state list of birds than any other observer. His records of nesting birds such as Grasshopper, Henslow's, and Vesper Sparrows, once locally common but now rare or extirpated, are classic. On his farm he was surrounded by abundant wildlife, most of which were noted in his record books. The huge garden he maintained for decades (asparagus a specialty) was one of the few with an electric fence for woodchucks. Foxes came out to eat at his feet, milk snakes lived in the well,

and his dazzling bird-feeding operation attracted everything from wintering Brown Thrashers and Dickcissels to Rusty Blackbirds and even a western Brewer's Blackbird. Living as he did for 45 years in an original-condition 200-year old farmhouse out of auditory range of the highway, he lived an idyllic life scarcely imaginable to harassed moderns. To those of us who regularly visited there, it was a world apart. His knowledge of South County's natural habitats and the history of changes in that landscape was impressive. For over half a century he watched with sadness as



much that was reasonably natural in southern Rhode Island became degraded by development. In 1998 he described the state of the natural world in his beloved South County as "about half destroyed."

Doug Kraus kept up his interest in Rhode Island's birds until the last; he was still leading public birding trips into his 85th year. Gradually more troubled by health issues, he was nevertheless out in the field searching for unusual birds within his last few weeks of life. A perennial member of the board of directors of ASRI, he made arrangements a little more than a year before he died to give his 84-acre farm and a substantial endowment to ASRI and URI, with the farm to be operated jointly as the Kingston Wildlife Research Station (KWRS). Under the direction of URI Professor Peter Paton, students took over Doug's banding activities (assisted by Doug himself) and have begun to initiate other studies of birds. Sizable pieces of wooded property are now rare this close to the university, and KWRS will undoubtedly grow in importance for student

and faculty research in the coming decades.

The overall legacy of Doug Kraus in the Rhode Island birding world cannot be underestimated. The state's field ornithology could be divided into perhaps three eras of roughly equal extent: (1) a primitive era, 1850-1899, as recorded in Howe and Sturtevant's *Birds of Rhode Island* (1899); (2) a Hathaway era (after the legendary Warwick native Harry S. Hathaway, who led Rhode Island's field ornithologists from around the turn of the century until around 1940); and (3) a modern era dominated by charter members of the RIOC including Kraus. This last era could easily be considered the Doug Kraus era of Rhode Island field ornithology, in which his leadership has been entirely by example. His energetic pursuit of birds in the field as well as his scholarly attention to bird identification has known no equals. No Rhode Islander has had a more indefatigable interest in discovering new aspects about Rhode Island birds or left behind such a sizable amount of information about them. Also left behind are a large coterie of friends and associates of many years who can scarcely imagine a Rhode Island birding scene without the familiar face, quiet demeanor, ready good humor, and cutting-edge knowledge of birds that they found in Doug Kraus. The Research Station, his innumerable friends, and volumes of information are among the lasting legacies of a life well-lived. The Japanese government has a tradition of declaring persons with specialized skills and great traditional knowledge as "national treasures." Doug Kraus was that kind of person. The Rhode Island birding community, like Alexander-the-Great's army, has lost its reigning king. He is missed by many.

*Richard Ferren is author of The Birds of Rhode Island (in preparation) and is a member of the RINHS.*

### **Other friends missed**

In addition to the deaths of Doug Kraus and Mark Gould (see November 1999 *RINHewS*) this past year, the Rhode Island natural history community mourns the passing of Gilbert George, Kay Kinsey, Thomas Perry, Jr., and Elizabeth Phillips. Each contributed to our knowledge of the state's flora and fauna and shared their passion for the natural world with many people. They are all much missed.

Another well-known Rhode Island naturalist, Irene Stuckey, has moved to a retirement community in Nashville, Tennessee, where she is eagerly awaiting publication of her book (co-authored with Lisa Gould), *Coastal Plants from Cape Cod to Cape Canaveral* (in press, UNC Press, Chapel Hill). The Rhode Island Natural History Survey and URI's Graduate School of Oceanography supported this book's publication.

## **RINHS Distinguished Naturalist: Call for Nominations**

The Distinguished Naturalist Award is presented at the Rhode Island Natural History Survey conference and recognizes an individual who has made outstanding contributions to advancing our knowledge of Rhode Island's fauna, flora, geology, and ecosystems. Previous recipients of the Award are Irene Stuckey, Richard Champlin, Douglas Kraus, and Frank Golet.

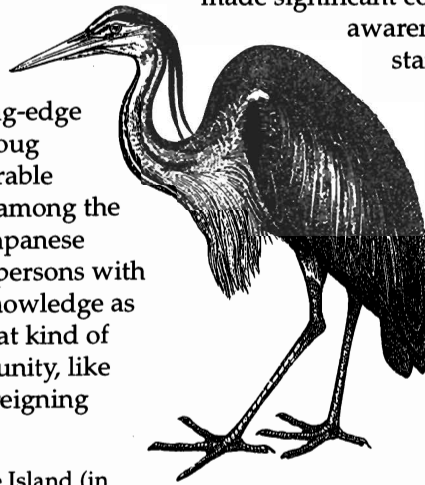
In particular, we want to identify those who have excelled in one or more of the following areas:

--made significant contributions in the advancement of scientific knowledge of Rhode Island's fauna, flora, geology, and ecosystems as evidenced by published books, scientific papers, and monographs;

--is recognized as an outstanding teacher and educator to students and the public on the form, functions, and ecological significance of Rhode Island's biota and natural systems;

--made significant contributions in enhancing public awareness of the importance of understanding the natural history of Rhode Island's ecosystems.

We now solicit nominations for the 2000 recipient of the RINHS Distinguished Naturalist Award. Send a letter of nomination (no more than one typed page) by **September 1, 2000**. The RINHS Board of Directors will review the nominations and announce the recipient at the November 2000 conference.



### **Wildlife Habitat Incentives Program**

The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, is accepting new applications for the *Wildlife Habitat Incentives Program (WHIP)* from March 15-May 15. The purpose of WHIP is to help landowners develop, restore, and protect upland wildlife habitat, wetland wildlife habitat, aquatic habitat, and threatened and endangered species habitats on private lands. Program participants will be reimbursed for up to 75% of the project costs.

For more information or an application, call the NRCS at (401) 828-1300.

from the other New England State surveys and members of the Association of American State Geologists who gave advice on the reorganization.

### **Rhode Island Geology Programs**

The Rhode Island Geological Survey has, and will continue to, support programs in the following areas:

- 1) **Coastal geology**, including Block Island Sound, Narragansett Bay and Little Narragansett Bay; with an emphasis on management of coastal geologic hazards and placement of dredged materials;
- 2) **Hydrogeology**, including groundwater and surface water;
- 3) **Glacial geology**, including mapping of surficial deposits with the goal of producing a Quaternary Map of Rhode Island;
- 4) **Bedrock geology**, including an update of the Bedrock Map of Rhode Island;
- 5) **Environmental geology**, combining aspects of the first four programs; an example is a recent study of radon in water and surficial materials and its bedrock source;
- 6) **Economic geology**, combining aspects of all the programs including sand and gravel resources, bedrock quarries, aquifer use, and sustainable development of the shoreline;
- 7) **Education**, including K-12 classroom initiatives and providing information to citizen organizations and groups in the state;
- 8) **Public Outreach**, including identification of rocks and minerals, fossil specimens, and providing other general geologic information to individual citizens of the state.

### **Cooperation with Rhode Island State Agencies**

The Rhode Island Geological Survey cooperates with State agencies to provide them with pertinent geologic input when needed. These agencies include, but are not limited to: Coastal Resources Management Council, Department of Environmental Management, Division of Planning including the RI Geographic Information System, RI Department of Transportation, Narragansett Bay Water Quality Management District Commission, RI Historical Preservation and Heritage Commission, RI Resource Recovery Corporation, RI Department of Health, RI Department of Education, RI Economic Development Corporation, and RI Port Authority.

### **Cooperation with Rhode Island Business and Industry**

The Rhode Island Geological Survey cooperates with business and industry to provide them with pertinent geologic input when needed. These include, but are not limited to: 1) sand, gravel, and

bedrock quarry operations; 2) transportation construction (roads, airports, rail lines, etc.); and 3) building construction.

### **Rhode Geological Survey Projects**

These include a range of projects, some completed, some underway, and others planned for the future. This is not an all-inclusive list; other projects will be added as needs arise.

- 1) **Bedrock Map of Rhode Island**: 1:100,000 scale map with text (completed); updates planned when needed.
- 2) **Quaternary Map of Rhode Island**: 1:100,000 scale map of the surficial deposits of the state (in the planning stage).
- 3) **Radon Map of Rhode Island**: 1:100,000 scale map with text illustrating soil-gas radon intensity (ongoing project).
- 4) **Bedrock and Surficial Quadrangle Maps**: 1:24,000 scale maps (planned project); updating and selected reprinting of published but out-of-date or out-of-print maps.
- 5) **Sand and Gravel Resources of Rhode Island**: 1:250,000 scale map (completed).
- 6) **Nearshore Geology of Block Island Sound**: Series of maps at various scales from 1:3000 - 1:24,000 (ongoing project).
- 7) **Minerals of Rhode Island**: Report (completed); needs to be updated and reprinted.
- 8) **Rhode Island, The Last Billion Years**: Report (completed); revision underway.

**Special Note:** The Survey is acquiring the capability to publish computer-generated maps and reports "on demand."

*Jon Boothroyd is the State Geologist, and serves on the Board of Directors of the Rhode Island Natural History Survey. The RINHS Publications Catalog carries several publications and maps prepared by the Rhode Island Geological Survey.*

### **Bioblitz 2000!**

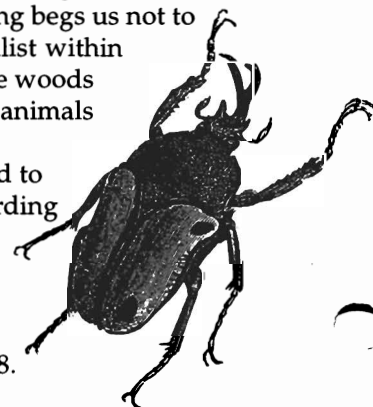
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10 species of bacteria!). Beyond the importance of the event as outlined above, it should be a great deal of fun. Of course, professional training begs us not to speak of fun, but the child naturalist within knows that crawling around in the woods and ponds identifying plants and animals is about as good as it gets.

All interested parties are asked to contact me with information regarding your area of expertise and the times you are available during the 24-hour *Bioblitz* period.

Email: [renser@dem.state.ri.us](mailto:renser@dem.state.ri.us)

Telephone: (401) 222-2776 ext. 4308.





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## **Upcoming RINHS Conference Focuses on a "Last Great Place"**

The annual RINHS conference will be held Saturday, October 28, 2000 on the University of Rhode Island campus. The theme for the conference is *The Ecology of Rhode Island's Islands: Focus on Block Island*. The keynote speaker will be Dr. Frank Moore, a world-renowned ornithologist from the University of Southern Mississippi. For the past two decades Moore has been conducting research on the stopover ecology of migratory birds, which will be the focus of his presentation in November. One of his former graduate students, Colleen Dwyer, worked on Block Island for her research site.

There will be a number of other invited speakers who will discuss their research on Block Island, on topics including geology, flora, birds, insects, and mammals. The proceedings from this session will be published. It will become the most complete reference on the natural history of Block Island.

We also have a poster session planned. There will be a call for abstracts for the poster session within the next two months. Anyone interested in presenting a poster relating to the natural history to any of Rhode Island's islands is encouraged to attend.

We think it should be a very exciting, informative session and we hope you will attend.

## **Upcoming Update of the Directory**

A *Natural History Directory of the State of Rhode Island*, the survey's compendium of people, organizations, and natural history collections, is about to be updated and expanded. The directory is a practical resource to find out about Rhode Island's environmental researchers, educators, consultants, and scientific and educational collections.

Production of the directory was a first step in establishing a Natural History Survey in Rhode Island. The first edition was compiled by Beverly Bowen, Tom Husband, and Lisa Gould, and published in 1993, a year before the formal incorporation of the RINHS. Copies of the second edition, published in 1995, were distributed to charter members of the survey and are still available for sale through the RINHS publications catalog.

Now that we have reached 2000, five years have passed since the directory was last updated. This spring we will send out a short questionnaire asking members to update their information and to help identify resources that don't have entries. It's our goal to make the directory as comprehensive as possible, including all the practical resources in the state associated with natural history. We expect over 1,000 entries in the third edition, and with support

and interest, we will publish the directory as a searchable database on the RINHS website.

The information gathered in the directory will also serve as a platform for other RINHS projects, such as a program that will assess the condition and significance of natural history collections in the state. This effort is designed to gather useful information about collections of Rhode Island taxa, identify collections in need, and to help rehabilitate and place state collections in curated facilities. Through this work we hope to centralize information about specimens of Rhode Island taxa, and to rescue and improve access to important scientific, historical, and educational collections. We will be seeking the talents of Rhode Island's taxonomists to help assess collections and identify priorities.

Look for your questionnaire in the mail this spring.

## **Invasive Plants Forum a Hit**

Over one hundred people attended a forum on *Invasive Plants in Rhode Island: Issues & Concerns*, held at the URI Bay Campus on February 2. The forum brought together a broad spectrum of participants, including representatives from the nursery and landscape industry; environmental organizations; federal, state, and municipal agencies, academia, MasterGardeners, and private citizens.

Invited speakers presented an overview of the issues involved with invasive species, discussed concerns of the nursery industry, explained state weed laws and regulations, and presented the possibility of forming a Rhode Island Invasive Species Council. The speakers were followed by an open discussion among all participants.

The discussion highlighted the importance of increasing public awareness of this issue, as well as working closely with the nursery and landscape business to avoid planting invasives and encouraging the planting of native and non-invasive introduced species. There was strong support for the formation of an invasive species council. Participants also expressed an interest in learning about specific control measures and how to restore habitats with native species.

Invasive species of concern to the largest number of participants were: Asiatic Bittersweet, Autumn Olive, Black Swallowwort, Common Buckthorn, Japanese Barberry, Japanese Honeysuckle (and bush honeysuckles), Japanese Knotweed, knapweeds, Multiflora Rose, Phragmites, privets, Purple Loosestrife, and Winged Euonymus.

The forum was sponsored by the R.I. Agricultural Experiment Station, R.I. Natural Heritage Program, R.I. Natural History Survey, R.I. Nursery and Landscape Association, R.I. Wild Plant Society, and URI Cooperative Extension Education Center.



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## **RINHS Organizational Members: Special News & Events**

**Humboldt Field Research Institute** announces the 2000 *Eagle Hill Field Seminars: Advanced, Professional, and Specialty Natural History Seminars and Workshops on the Coast of Maine*. Most classes are for one week and are taught by top specialists in the field; classes begin in mid-May and are offered into mid-September. Topics include vernal pool ecology, mayflies, caddisflies, fungi, lichens, mosses, vascular plants, wetland ecology, hydrology, geology, ecosystem studies, natural dyes, natural history illustration, ethnobotany, marine biology, and much more. For more information contact the Humboldt Field Research Institute, P. O. Box 9, Steuben, ME 04680; (207) 546-2821; email: [humboldt@nemaine.com](mailto:humboldt@nemaine.com); <http://maine.maine.edu/~eaghill>

**Norman Bird Sanctuary** in Middletown is hosting a series of great events. *Birds & Breakfast* will be held on Sunday, May 21, 6:30 to 11:30 a.m., and features guided bird walks and a delicious buffet breakfast. Celebrate the 4th of July with a *Clambake* at the Sanctuary, and enjoy the annual *Harvest Fair* on October 14 and 15. Contact the Sanctuary at (401) 846-2577 ([www.normanbirdsantuary.org](http://www.normanbirdsantuary.org)) for information about fees and registration.

**Rhode Island Wild Plant Society** will hold its famous Spring Plant Sale on Saturday, June 3, 9:30-12:30.

RIWPS offers a 5-day, hands-on Wild Plant Identification class, taught by Lisa Gould, on May 20, 21, and 27; June 4; and August 15. The course is now part of the New England Wild Flower Society's certification program; CEU credits are also available.

Celebrate Rhode Island Wild Plant week during May with walks in South Kingstown, Smithfield, Exeter, and Little Compton. Many other events and walks are scheduled by RIWPS throughout the year; contact (401) 783-5895 for the full calendar.

**Roger Williams Park Zoo** is featuring photographer Rosie Purcell on Thursday, April 20, 7:00 p.m., as part of the Zoo's *Conservation Lecture Series*. Rosie Purcell's lecture will place special emphasis on the birds, mammals, and fishes from Oceania and Australia. The lecture will be held at the **RWP Museum of Natural History**; pre-registration is required. Call (401) 785-3510 ext. 358 to register.

And don't forget to celebrate the 30th Earth Day on April 22, with all kinds of exciting events and displays at the Zoo.

**Roger Williams University** offers *Marine Biology Field Studies* for high school students during July and August. Two one-week sessions are available: July 23-29 and July 30-August 5. The program uses the state-of-the-art teaching and research facilities of the newly constructed Center of Economic and Environmental Development. Students will conduct laboratory studies in a modern 3,000

sq. ft. wet lab with flowing seawater, utilize the Learning Platform that extends 200 ft. into Mt. Hope Bay, use research vessels for field explorations and sampling, and live in waterside residence halls. For information contact Dr. Harold Pomeroy, Director, Summer Marine Programs, at (401) 254-3108 or email: [vals@alpha.rwu.edu](mailto:vals@alpha.rwu.edu); [www.rwu.edu](http://www.rwu.edu)

### **Broaden Your Horizons!**

What better place to learn than among the fishes and beluga whales? Mystic Aquarium offers three college courses in conjunction with the University of Connecticut. Our programs offer background content provided by Education Department staff and visiting professors, as well as hands-on activities and ideas for your own program or classroom. Space is limited in these special classes, so please register early!

We all know the nursery rhyme, "the foot bone's connected to the leg bone," but do we know the connections in the ocean that support all living things? What is phytoplankton and how is it connected to the fish that we eat and the oxygen in our air? Where is the North Atlantic Deep Water and how does it connect to local whale populations and global climate? How do scientists learn about the ocean and assess its health? This June join us for *Coastal Ecology*, a study of Long Island Sound, Block Island Sound and Narragansett Bay. After one week of preparatory lectures, you will live on-board a research vessel as a scientist, participating in plankton tows, water chemistry testing, analyzing the type and number of fish in trawls and organisms in the sediments. In addition we will learn about the maritime history of the coastal areas we pass and ports in which we dock. Dates June 22-24 (lectures), 26-30 (field & shipboard) and July 8 (exam). Program cost \$750 (includes credit and all shipboard accommodations). 3.0 undergraduate or graduate credits. Application deadline May 1, 2000.

Teachers! We offer a program on marine ecology especially for you. You will be immersed in three habitats of the Long Island Sound area, learning about the inhabitants and their interactions as well as the impacts of human use of the coast. A three-day research cruise will highlight the course. *Long Island Sound Experience for Teachers* will be held Aug. 5 (lectures), 7-11 (field & shipboard) and 19 (exam), 2000. 3.0 graduate credits or 4 CEUs. \$475 (includes credit and shipboard accommodations). Application deadline: July 30, 2000.

*Seminar on Marine Mammals* is a unique program, featuring experts from the field of marine mammal science who will instruct you in the physiology and behavior of cetaceans, pinnipeds and manatees. This course will be held Thursday evenings, Sept. 7 to

*continued on p. 20*

## ***The Rhode Island Natural History Survey Thanks its Many Supporters During the Past Year***

### ***Donations to the May 1999 Appeal to the Advisory Board & Organizational Members***

Peter August  
Allan D. Beck  
Brown University, Department of  
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Institute for the Environment  
David Blockstein  
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Lee C. Schisler, Jr.  
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South Kingstown Land Trust  
Everett Stuart  
Night Heron Nature Cruises

### ***Contributions Received in Memory of Mark Gould***

Emily H. Allen  
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Audubon Society of Rhode Island  
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Beaver; Jim & Beth Beaver  
Allan & Margaret Beck  
David E. Blockstein

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Louise & Gene Marlowe  
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A. David & Elizabeth McNab  
Roland and Mary Mergener  
Museum of Natural History  
at Roger Williams Park  
Harold A. Nomer  
Norman Bird Sanctuary  
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Rhode Island Environmental  
Education Association  
Rhode Island Wild Plant Society  
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Mary Beth Abel  
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Alfred & Marie Hawkes  
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Keith & Susan Killingbeck  
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Norman Bird Sanctuary  
Nancy Nowak  
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Harriet Powell  
John Pyers  
Beverly & Steven Reinert  
Rose Island Lighthouse  
Foundation  
Save the Bay  
Peggy & Henry Sharpe, Jr.  
Rosanne Sherry  
Martin & Charlotte Sornborger  
Raymond Vincent  
Martin Wencek  
Hugh Willoughby



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## Upcoming Conferences & Events

**April 13. *Nesting Amid the Tides: Songbird Survival in Southern New England Salt Marshes*, an RINHS lecture** by Steven Reinert (freelance ornithologist), 7:30 p.m., Center for Economic & Environmental Development, Roger Williams University, Bristol RI. Free. (401) 874-5800 for information.

**April 24-25. *The Narragansett Bay Summit 2000***, Rhode Island Convention Center, Providence, RI. Organized by the RIDEM Narragansett Bay Estuary Program (NBEP), this is a collaborative effort to provide a comprehensive update of the natural environment of and human dependence on Narragansett Bay. It will examine the principal uses of the Bay and explore their meaning to Rhode Island's economy and the Bay's ecosystem. Contact Richard Ribb or Tom Ardito, NBEP, (401) 222-3961; email [narrabay@earthlink.net](mailto:narrabay@earthlink.net)

**May 6. *Creating a Wildflower Meadow***, a slide lecture by Jeff Smith, Connecticut College Arboretum horticulturist. 10:00 to 11:30 a.m., New London Hall, Rm. 112. Free. Contact (860) 439-5060 for information about this and other Arboretum events.

**May 13-15. *Information, Technology and Partnerships: Natural History Collections into the New Millennium***, the annual meeting of the Association of Systematics Collections Association, Baltimore MD. Website: [www.ascoll.org](http://www.ascoll.org). Telephone: (202) 835-9050; email: [asc@ascoll.org](mailto:asc@ascoll.org)

**May 14 & 15. Spring wildflower walks** at the University of Rhode Island's W. Alton Jones Campus. Mother's Day walk on May 14, 1:00 p.m., led by Anne Wagner. May 15 walk with luncheon, 9:45 a.m., led by Lisa Gould. Pre-registration required; contact the Alton Jones campus at (401) 397-3361 ext. 6056.

**May 15 (Deadline). *Capturing the Beauty of Nature***: an amateur photography contest and exhibition sponsored by the Connecticut College Arboretum. Photos must be taken in the Connecticut College Arboretum between May 1996 and May 2000, and must be submitted by May 15, 2000. Contact the CT College Arboretum for mounting and entry details; (860) 439-5060.

**June 1-3. *Lake Management into the 21st Century: Unifying Theory and Practice***, 7th Annual "Our New England Waters" Conference, University of Connecticut, Storrs CT. Website: [www.ce.uconn.edu/ct-lakes.html](http://www.ce.uconn.edu/ct-lakes.html) or contact George Knoecklein, (860) 456-3179; email: [knoecklein@juno.com](mailto:knoecklein@juno.com)

**June 9-10. *Bioblitz 2000!*** 3:00 p.m. June 9-3:00 p.m. June 10, Roger Williams Park Zoo. Co-sponsored by the RINHS and the RWP Zoo. See page 1 for details.

**June 9-12. *Large-Scale Conservation: Genes, Landscapes, and People***, the 14th Annual Meeting of the Society for Conservation Biology, University of Montana, Missoula MT. Contact Brett Walker at (406) 243-4493; email [scb2000@selway.umd.edu](mailto:scb2000@selway.umd.edu)

**June 26-July 11. *Sculpture for Enhancing Wildlife Habitat***, a two-week course offered by the Edna Lawrence Nature Laboratory and the Fine Arts Division at Rhode Island School of Design (RISD). This 3-credit course focuses on contemporary environmental art with student participation in local environmental issues. Contact RISD Continuing Education at (401) 454-6200 ext. 1; email [cemail@risd.edu](mailto:cemail@risd.edu); [www.risd.edu](http://www.risd.edu)

**July 10-14. *Maritime Natural History***, the 15th Annual Meeting of the Society for the Preservation of Natural History Collections, Halifax, Nova Scotia, Canada. Website: [www.spnhc.org](http://www.spnhc.org)

**August 5-9. *Annual Meeting of the Animal Behavior Society***, Atlanta GA. Website: [www.animalbehavior.org/ABS/Program/](http://www.animalbehavior.org/ABS/Program/).

**August 8-9. *New York Empire Farm Days***, Seneca Falls NY. A free bus trip to the Farm Days, the Northeast's Agricultural Showplace, is being sponsored by the Rhode Island Center for Commercial Agriculture. A \$50 registration fee is required, but will be reimbursed on the day of the trip. Contact Karen Menezes at (401) 874-7142 or email [ricca@etal.uri.edu](mailto:ricca@etal.uri.edu).

**August 27-31. *Riparian Ecology and Management in Multi-Land Use Watersheds***, Portland OR, a summer specialty conference sponsored by the American Water Resources Association, the U.S. EPA, Ecological Society of America, and other organizations. Contact Jim Wigington, email [piw@mail.cor.epa.gov](mailto:piw@mail.cor.epa.gov); <http://www.awra.org/meetings/Portland/Portland.html>

**September 2-8. *4th International Conference on Integrating Geographic Information Systems (GIS) and Environmental Modeling (GIS/EM4)***, Banff, Alberta, Canada. Email: [gisem4@colorado.edu](mailto:gisem4@colorado.edu); [www.colorado.edu/research/cires/banff](http://www.colorado.edu/research/cires/banff)

**September 11-14. *Oceans2000 Conference***, sponsored by the Marine Technology Society, Providence, RI. Website: [www.OCEANS2000.com](http://www.OCEANS2000.com)

**September 18-20. *Fragmentation 2000: A Conference on Sustaining Private Forests in the 21st Century***, Annapolis MD. Contact Terri Bates, (703) 538-1134; email [Bates-Stasny@erols.com](mailto:Bates-Stasny@erols.com)

**September 20. *RINHS Annual Meeting. Place and speaker TBA.***

**September 21. *Day Trip: Exploring Plum Island***, Newburyport, MA, sponsored by the Rhode Island Wild Plant Society. This will be a day of botanizing and birding in the Parker River National Wildlife Refuge and Joppa Flats Wildlife Sanctuary. Contact RIWPS at (401) 783-5895 for fees and registration.

**September 23. *GreenShare Field Day*** sponsored by the URI Cooperative Extension, URI Campus, Kingston RI.

**October 16-20. *Managing the Mosaic: Connecting People and Natural Diversity in the 21st Century***, the 27th Annual Natural Areas Association Conference, St. Louis MO. Website: [www.conservation.state.mo.us/nac](http://www.conservation.state.mo.us/nac)

**October 17-21. *Spanning Cultural and Ecological Diversity Through Environmental Education***, the 29th Annual Conference of the North American Association for Environmental Education, South Padre Island TX. Contact NAAEE at (202) 884-8912; email [CSmith409@aol.com](mailto:CSmith409@aol.com); Website: [www.naaee.org](http://www.naaee.org)

**October 28. *The Ecology of Rhode Island's Islands: Focus on Block Island. 5th Annual R. I. Natural History Survey Conference***, Memorial Ballroom, University of Rhode Island, Kingston RI. Pre-registration required; (401) 874-5800.

**November 5-8. *Atmospheric, Surface, and Subsurface Hydrology and Interactions***, an international conference sponsored by the American Institute of Hydrology, Research Triangle Park NC. Website: [www2.ncscu.edu/ncsu/CIL/WRRI/aihconf.html](http://www2.ncscu.edu/ncsu/CIL/WRRI/aihconf.html)

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## ***Natural History Opportunities for Volunteers & Students***

***Aububon Society of Rhode Island*** (12 Sanderson Road, Smithfield RI 02917) welcomes volunteers to help with property surveys and inventories, check property bounds, do trail maintenance, and serve as trail wardens. Contact Larry Taft, Director of Properties & Acquisitions, at (401) 949-5454.

***Massachusetts Audubon Society*** (208 South Great Road, Lincoln MA 01773) has numerous opportunities for summer employment, including counselors in their day and overnight camps, camp maintenance workers, environmental educators and naturalists, volunteer coordinators, researchers, and monitors. A number of internships are also available in the areas of environmental education, advocacy, sustainable agriculture, ecological research, and inventory/monitoring. Call 1-800AUDUBON (general questions) or the MAS Job Hotline at (781) 259-9506 ext. JOBS; see also the website [www.massaudubon.org](http://www.massaudubon.org)

***The Nature Conservancy*** (RI 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! Call Griff Venator at (401) 331-7110.

TNC would also like volunteers to help with field, lab, and clerical work for the Odonata atlas being compiled by Virginia Carpenter (see article on p. 6), and Jane Jackson is seeking volunteers to help inventory TNC properties for birds, herptiles, invertebrates, etc. Especially needed this spring are people willing to do calling surveys and other amphibian work throughout the state, with particular needs in the Tiverton/ Little Compton area. Contact Ginger and Jane at (401) 331-7110.

***Rhode Island Home\*A\*Syst*** (210B Woodward Hall, URI, Kingston RI 02881) is looking for volunteers to inventory land uses in protected areas surrounding drinking water supplies throughout the state. The inventories are part of the State's Source Water Assessment Program as required by the Environmental Protection Agency. Home\*A\*Syst will be training volunteers to look for threats to drinking water quality in many towns during the spring and summer.

There will be an introductory meeting in each town to explain the project and the volunteer expectations. Once teams of volunteers are assembled, a two-hour training session will be held. Volunteers will then have about four weeks to complete wind-shield surveys of certain areas in the town. The

results will be used to update the State's land use data and to create an educational program for the town about protecting its water resources. For more information contact Alyson McCann at (401) 874-5398; email [alyson@uri.edu](mailto:alyson@uri.edu)

***Rhode Island Natural History Survey*** (C. E. Education Center, 3 E. Alumni Avenue, URI, Kingston RI 02881) is seeking volunteers for all taxonomic groups to participate in Rhode Island's first ***Bioblitz!*** (see *Bioblitz 2000!* on p. 1). Join us on June 9-10 for a 24-hour quest in Roger Williams Park, to identify as many organisms as possible and show the public just how diverse Rhode Island's biota is! Contact Richard Enser: email: [renser@dem.state.ri.us](mailto:renser@dem.state.ri.us); telephone (401) 222-2776 ext. 4308.

***Roger Williams Park Museum of Natural History*** (Elmwood Avenue, Providence RI 02905) has several curatorial projects for knowledgeable volunteers or student interns, including taxonomic updating, identification, cataloging, and organizing the herbarium and mollusk collections. Opportunities to work with other collections exist as well. Student research or internships that earn academic credit are encouraged and welcomed. For information contact Marilyn Massaro, Curator, at (401) 785-9457 ext. 248.

***Roger Williams Park Zoo*** (1000 Elmwood Avenue, Providence RI 02907) is seeking volunteers and docents. Monthly volunteer information seminars are held every second Friday OR Saturday of the month from 9:45 to noon in the Education Center; at this program, you will learn where your time, talent, and interests may lead you in your quest to serve the zoo. There are many types of volunteer positions available, including clerical, docents (who educate the public as they tour the zoo), PR ambassadors in the community, and public programs.

Especially needed right now are over 300 people to help with the Zoo's famous Dino Exhibit, which will be on display May 13 to Labor Day. This is a great opportunity for families, since children as young as 10 may volunteer with an adult family member; youth ages 14-18 may volunteer on their own. Contact Anna Linville, Director of Volunteer Services, at (401) 783-3510 ext. 356.

***Rose Island Lighthouse Foundation*** (P.O. Box 1419, Newport RI 02840) needs volunteers and interns for summer camp and summer guide programs. Interest in education, lighthouses, history, birds, native plants, and/or marine biology is helpful. Enthusiasm and reliability are required. Contact Charlotte Johnson, Executive Director, at (401) 847-4242.

***South Kingstown Land Trust*** (313 Main Street, Wakefield RI 02879) seeks volunteers to monitor and maintain existing SKLT properties and trails, conduct

## **Opportunities**, continued from page 9

scientific inventories for plants and animals on existing and potential sites, contribute to the development of managerial plans for SKLT properties, and assist with research on potential funding sources. Contact the SKLT office at (401) 789-0962.

**U. S. Fish & Wildlife Service** (Refuge Office, Shoreline Plaza, Rt. 1A, P. O. Box 307, Charlestown RI 02813) refuges--Ninigret, Trustom Pond, Pettaquamscutt Cove, Sachuest Point, and Block Island--offer many volunteer opportunities. Areas of interest include environmental education, visitor services, trail maintenance, biological monitoring, and surveys. Special projects include monitoring Piping Plover nesting sites, staffing the new Visitor Contact Station at Trustom Pond NWR, and developing educational curriculum on barrier beaches and endangered species (great opportunity for teachers during the summer). Contact Kimberly Brooks, Volunteer & Education Coordinator, at (401) 364-9124.

**Woonasquatucket River American Heritage Rivers Program** (EPA Region 1, One Congress Street, Suite 1100 (CRI), Boston MA 02114) is seeking volunteers. Do you have a special display or presentation on the natural history of Rhode Island that is family friendly? Set it up at the Annual Woonasquatucket River Greenway Festival, Saturday, June 10, 12 to 5 p.m. at Donigian Park on Valley Street in Providence. It is a day of family fun to celebrate the Woonasquatucket River and to raise awareness about the environment along it. We also need volunteers to help with set up and clean up. Contact Lisa or Norman at (401) 455-8880.

**URI Watershed Watch** program is seeking volunteer monitors for the 2000 season! URI Watershed Watch is a citizen volunteer water quality monitoring program, sponsored by URI Cooperative Extension and also by a number of municipalities, watershed and lake organizations, and the Narragansett Indian Tribe. Volunteers receive classroom and field training in the basics of aquatic science, and detailed instructions on how to monitor a lake, pond or stream. No prior scientific experience is expected of volunteers, just the time to devote to monitoring and an interest in the water quality of a favorite lake or pond.

Volunteers spend 1-2 midday hours per week from early May through late October monitoring their location. Volunteers must provide their own boat/canoe/kayak, anchor, and personal flotation device (life preserver.) To find out more, check out our web site at [www.edc.uri.edu/uriww](http://www.edc.uri.edu/uriww), email us at [uriww@etal.uri.edu](mailto:uriww@etal.uri.edu) or phone us at 401-874-2905.

**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: [rinh@etal.uri.edu](mailto:rinh@etal.uri.edu)  
Website: <http://www.edc.uri.edu/rinh>

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Peter V. August, URI Dept. of Natural Resources Science  
Allan D. Beck, Narragansett Bay National Estuarine Research Reserve  
David Blockstein, National Council for Science and the Environment  
Jon C. Boothroyd, Rhode Island Geological Survey  
Marcianna Caplis, U. S. Fish & Wildlife Service  
Virginia A. Carpenter, The Nature Conservancy  
Richard W. Enser, R. I. Natural Heritage Program  
Alex Frost, Biology Editors Company  
Howard S. Ginsberg, USGS Patuxent Wildlife Research Ctr.  
Roger Greene, Narragansett Bay National Estuarine Research Reserve  
Stephen S. Hale, U. S. Environmental Protection Agency  
Thomas P. Husband, URI Department of Natural Resources Science  
Keith T. Killingbeck, URI Department of Biological Sciences  
Hope Leeson, Rhode Island Wild Plant Society  
Margaret Leinen, National Science Foundation  
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  
Douglass H. Morse, Brown University Department of Ecology & Evolutionary Biology  
Scott W. Nixon, URI Graduate School of Oceanography  
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John F. Paul, U. S. Environmental Protection Agency  
Gerald G. Pesch, U. S. Environmental Protection Agency  
Chris Powell, RIDEM Division of Fish & Wildlife  
Christopher J. Raithel, RIDEM Division of Fish & Wildlife  
David S. Reis, Coastal Resources Management Council  
Lee C. Schisler, Jr., Audubon Society of Rhode Island  
Tim Scott, Center for Economic and Environmental Development, Roger Williams University  
Julia R. Sharpe, Narrow River Preservation Association  
Linda A. Steere, Applied Bio-Systems, Inc.  
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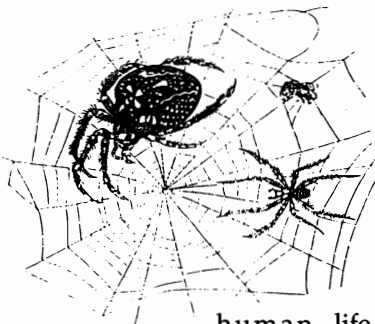
## Weaving the Web: Electronic Resources

**Aquatic, Wetland, and Invasive Plant Information Retrieval System** (APIRS) is expanding its website of invasive species. The site has fairly extensive information about some invasive species, and pictures and drawings of others. <http://plants.ifas.ufl.edu>

**Environmental Protection Agency** (EPA) has funded the National Association of Counties (NACo's) to develop the "Environmental Purchasing Starter Kit" to help local governments set up a cost-effective environmental purchasing program. The kit is designed for purchasing agents, county and city managers, recycling coordinators, local elected officials, product users, and vendors. It includes case studies on energy efficiency and pest control, a sample purchasing resolution, a glossary of environmental purchasing terms, and a baseline survey for internal local government use. The Starter Kit is available at NACo's web site: <http://www.naco.org/programs/environ/purchase.cfm>. EPA is also developing a variety of tools to help agencies "green" their purchasing practices; those tools will be available this year at: [www.epa.gov/opptintr/epp](http://www.epa.gov/opptintr/epp)

**Conservation/Geography** is a new website where you can find out about hundreds of organizations using GIS to protect nature and promote social justice. The URL is: [www.esri.com/conservation](http://www.esri.com/conservation)

**National Biological Information Infrastructure** (NBII) has a new quarterly publication, *Access*, available online at <http://www.nbii.gov/news>. Regular columns include topics such as partnerships, metadata training, Biological Informatics News, the Clearing-House Mechanism, the Inter-American



Biodiversity Information Network, and a calendar of events.

**The National Oceanic and Atmospheric Administration (NOAA)** has developed web sites detailing the major weather, water, and climate events of the 20th century; these events were chosen "for their atmospheric marvel or impact on human life." Background information, photos, and some animations are available. The URLs are: <http://www.noaanews.noaa.gov/stories/images/global.pdf> and <http://www.noaanews.noaa.gov/stories/images/usafactsheet.pdf>

**R. B. Allen Associates** has established a web site containing a wide variety of information on lobster resources and lobster fishery in the region. The URL is: [www.lobsterconservation.com](http://www.lobsterconservation.com)

**The USDA Forest Service** has a new web site that details tree characteristics, based on over 100,000 Forest Service plots, for 80 common trees of the eastern United States. It also provides current and potential future ranges for each species according to 5 possible climate change scenarios. The URL is: <http://www.fs.fed.us/ne/delaware/atlas>

**The Union of Concerned Scientists** has a web site for the evaluation of agricultural biotechnology. <http://www.uscusa.org/agriculture/index.html>

**The U. S. Geological Survey (USGS)** has digital versions of USGS topographic maps available at <http://www.terraserver.microsoft.com>. More than 57,000 maps are available and may be downloaded free of charge.

**Zoo Book Sales** has replaced Patricia Ledlie, Book-seller, as a leading natural history book dealer. <http://www.zoobooksales.com>

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**Thanks!**

The Rhode Island Natural History Survey is grateful for the following additions to the RINHS library: from Marilyn Massaro, a copy of *Endangered and Threatened Plants of the United States*; from the Ohio Biological Survey, *Catalog of the Neotropical Caddisflies (Insecta: Trichoptera)* and *Acaralogy IX Symposia Proceedings*; from Peter Lockwood, *Rhode Island Botanical Survey Checklist*, by Gil George; courtesy of Champlin Foundations funds, *North American Terrestrial Vegetation, 2nd Edition*, *Weeds of the Northeast*, *Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York*, and *Common and Scientific Names of Fishes from the United States and Canada*. RINHS members are welcome to use the RINHS reference collection here at the C. E. Education Center.



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**Broaden Your Horizons!** *continued from p. 14*

Dec. 14, 2000. 3.0 graduate or undergraduate credits. \$475 (includes credit and whale watch fee). Application deadline: July 30, 2000. We welcome applications from college students, teachers, or any adults interested in natural history and marine science. Registration is available only through Mystic Aquarium. Please call (860) 572-5955 x204 for more information and an application.

Other teacher workshops include: *Penguin Workshop*, 0.3 CEUs. May 13, 2000, 10:00-2:00 and *Deep Sea Exploration Workshop*, 0.3 CEUs. June 10, 2000, 4:00-7:00. Call (860) 572-5955 ext 204 for more information on teacher workshops or to receive a listing of Summer 2000 and 2000-2001 workshop topics and dates. [www.mysticaquarium.org](http://www.mysticaquarium.org)

**Strategies for Implementing  
a Municipal GIS**

URI Cooperative Extension is offering a three-day program focusing on the practical "how-to" steps of getting GIS into all phases of municipal government. Course instructors have a wealth of experience working with communities to implement GIS, develop parcel databases, train town staff, and assist with technical issues. There will be ample time for questions, discussion, and interaction with participants and instructors. April 10-12, 1-4 p.m., Coastal Institute, URI Bay Campus, Narragansett, RI. \$200. Contact Alyson McCann at (401) 874-5398 or [alyson@uri.edu](mailto:alyson@uri.edu).

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