



RINHewS

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The President's Corner

by Richard W. Enser

"No living man will see again the long-grass prairie, where a sea of prairie flowers lapped at the stirrups of the pioneer. No living man will see again the virgin pineries of the Lake States, or the flatwoods of the coastal plain, or the giant hardwoods."

--Aldo Leopold

We can try to imagine what it was like when the components of wilderness that Leopold eulogized once existed, before they were "hammered" into "the artifact called civilization." But, because we natives of southern New England were born long after the demise of truly virgin wilderness in our homeland, we must let inadequate fractional remnants serve as our points of reference to the definition of nature. As described by David Wilcove in *The Condor's Shadow*, we form our understanding of the natural world as youngsters, and what we personally witness serves as our benchmark for observing and assessing the changes, good and bad, in wildlife populations, ecosystems, and all things natural. In this manner, each successive generation is imprinted on the conditions of its time and thus oblivious to the accumulation of changes that have transpired during previous generations.

Wilcove illustrates this predicament with a simple story of his own experience as a fledgling birdwatcher, when more experienced observers often complained how migration just wasn't like it used to be. (Birders may still recognize this scenario with the often-heard statement, "there just don't seem to be as many birds anymore.") In his youth, Wilcove rationalized these ramblings as coming from older birdwatchers who were losing their sight and hearing, but in later years he began to admit to the same truths. He realized he would never truly know how

many songbirds there were 60 years before his time and that those starting today would never know what it was like 30 years ago. He concluded that we all suffer from a so-called "generational amnesia," and that it is probably the greatest impediment to a lasting conservation ethic.

There are numerous examples of species and natural habitats that have slowly declined through time, in the process not making any particular impression on one generation. Only after the passage of several generations does the gradual erosion coalesce into a clear picture of decline. We might consider any endangered species, but I often think of a particular place because its remnants are visible from my office window in Providence. Here, at the time of Roger Williams's settlement near the National Park bearing his name, lay the Great Salt Cove, several hundred acres of estuarine habitat that was probably very similar to present-day Hundred Acre Cove in Barrington. The scant information existing from the time suggests that this cove was bordered on the north by a beach and sandy bluff that rose steeply to a crest where the State House now sits. To the east was a narrow estuary fed by the Moshassuck River, and to the west a broad valley of tidal marshes extending inland more than a mile along the slowly flowing Woonasquatucket River. As late as the early 1800s the cove and associated

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Research Reports

Monarch Butterfly (*Danaus plexippus*) oviposition on Black Swallowwort (*Vincetoxicum nigrum*)

by Richard A. Casagrande and Jennifer Dacey

Black Swallowwort, *Vincetoxicum nigrum* Moench, ranks high among the several invasive plants that we have been considering as potential biological control targets. This plant grows rapidly and has a twining vine growth habit that enables it to grow over other plants in fields, fence rows, and natural areas, where it eliminates native plants (Christensen 1998). In reviewing the literature on this plant, we were surprised to learn that in addition to threatening plants, *V. nigrum* may also directly threaten Monarch Butterflies (*Danaus plexippus*). Haribal and Renwick (1998) found that in the laboratory, Monarch Butterflies oviposit on *V. nigrum* when given a choice between this plant and their native host, Common Milkweed (*Asclepias syriaca*), also in the family Asclepiadaceae. The larvae that result from eggs laid on swallowwort fail to develop. They also noted that in some locations in the United States, *V. nigrum* has displaced native vegetation, including the milkweed hosts of Monarch Butterflies. Thus swallowwort could adversely impact Monarch Butterflies in two ways: by displacing native hosts and by causing inappropriate oviposition. We conducted a series of laboratory and field experiments in the summer of 2000 to investigate the impact of this invasive weed on Monarch Butterfly oviposition.

In the laboratory we confined butterflies in a 0.61 X 0.91 X 0.91-meter cage and gave them no-choice and choice tests where they were provided with either milkweed or swallowwort alone, or provided with both plants together. We also gave them choice tests using Oriental Lilies (*Lilium orientalis*) and Green Beans (*Phaseolus vulgaris*), where these non-hosts were combined with either milkweed or swallowwort. In all tests, four plants were left in a cage with two males and two female butterflies for 24 hours. These butterflies laid more eggs on milkweed than on swallowwort in both the choice and no-choice tests. In six days of no-choice tests, when provided either milkweed or swallowwort, they laid 20.3% of their total of 335 eggs on swallowwort. On the six days that they were given a choice with two

plants of each species, they laid 21.7% of their 711 eggs on swallowwort. Their preference for milkweed was found significant ($p = 0.05$) with a Wilcoxon matched pairs test. No eggs were laid on the lilies or beans.

In an outdoor cage test we initially released 39 laboratory-reared Monarch Butterflies in a 1.5 X 2.1 X 2.1-meter screen cage. As butterflies died, cages were stocked with new adults for the 30-day duration of the test. The butterflies were provided with five milkweed and five Black Swallowwort plants. We examined plants and removed eggs daily.

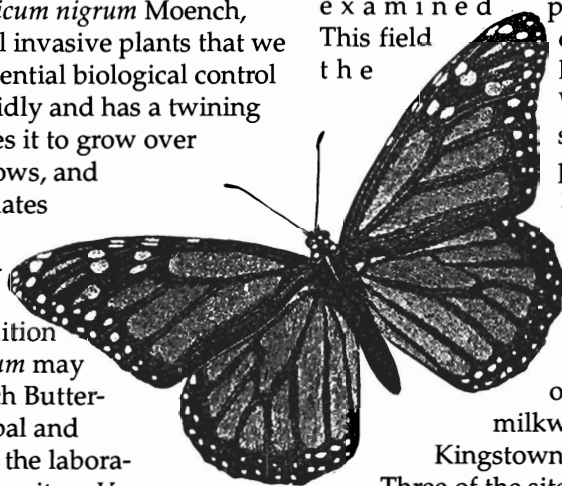
This field cage test gave results similar to laboratory test. Again, a Wilcoxon matched pairs test showed a significant ($p = 0.05$) preference for milkweed, but 24.5% of the eggs were laid on swallowwort. As in the laboratory test, larval mortality was 100% on swallowwort.

We then conducted a field study in which we counted eggs on both Black Swallowwort and milkweed plants at five sites in North Kingstown and South Kingstown, RI.

Three of the sites had both plants growing in close proximity. The remaining two sites had either one plant or the other. Between August 4 and September 21, we took a total of 14 samples in the three sites with both plants growing together and three samples in each of the single-species sites. For each sample we randomly selected 50 milkweed and 100 swallowwort stems. Over the course of this study we examined 1150 milkweed stems and 2300 Black Swallowwort stems. In this field study we found no intact eggs on swallowwort, however we did find some Monarch eggshells left behind after eclosion. Adjacent to each empty eggshell was a small feeding site where a new larva began feeding and then died. We found a total of 43 intact Monarch eggs on milkweed (39 of them in mixed plantings) and 7 eggshells on swallowwort (all in mixed plantings).

These field results were somewhat surprising. Based upon the laboratory cage and field cage studies, we expected to find 20 to 25% of the eggs laid on milkweed. Instead, with approximately the same amount of sampling effort on both plants, we found 43 eggs on milkweed and not a single intact egg on swallowwort. The eggshells found on swallowwort indicate that Monarchs occasionally oviposit on this plant in the field, but the lack of any intact eggs indicates that this oviposition is infrequent.

It is clear that Monarch Butterflies prefer milkweed to Black Swallowwort for oviposition, in open fields and in cages. Even though they will lay 20-25%



of their eggs on Black Swallowwort in cages, they still distinguish between this plant and less attractive plants such as beans and lilies where they lay no eggs. Our preliminary work indicates that oviposition on Black Swallowwort represents only a minimal threat to monarch populations in nature. However, further field investigations are warranted, perhaps looking at plants of various sizes growing in different habitats and sampling for Monarch eggs throughout the season.

Vincetoxicum nigrum has spread aggressively throughout the Northeast, in some locations replacing most of the natural vegetation, including milkweed species. At present it appears that this is the primary manner in which this plant may pose a threat to natural populations of Monarch Butterflies.

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Haribal, M., and Renwick, J.A. 1998. Identification and distribution of oviposition stimulants for Monarch butterflies in host and nonhosts. *Journal of Chemical Ecology* 24(5): 891-904.

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The Problem of Valuing Nature's Goods and Services by Dan Campbell

The well-being of society depends on the production of useful goods and services and a healthy economy, but economic production is not possible without the use of natural resources (soil, water, petroleum, minerals, etc.). In addition, economic production concentrates and processes these raw materials, relocating materials and producing wastes that alter the patterns and processes that nature evolved over millions of years to provide an environment eminently suitable for life. Since the beginning of the industrial age (around 1850), the extent of human impacts on nature has grown so that today these disturbances affect all scales of natural organization, from local areas such as a river reach or farm pond up to global processes such as the planetary CO₂ budget that regulates the earth's climate. So the well-being of society depends not only on economic production but also on the conservation and preservation of the environmental goods and services that support that production. To make informed public-policy decisions about the inevitable trade-offs between economic production and its effects on the environment, society needs methods that accurately value the goods and services provided by nature, on the same terms as the goods and services provided by the economy. The valuation method presented

here is meant to assist concerned citizens and their representatives in making decisions. It is not proposed as substitute for markets and prices in determining economic exchange.

There are two common methods of valuation: 1) receiver-based value that is determined by the willingness of a person to pay for a product or service, and 2) donor-based value that is determined by what it takes to make a product or service. Willingness to pay is the method of valuation used in economic exchanges. However, money is only paid for the work of humans and not for the work of nature. Since natural products (raw materials) are necessary for economic production and natural functions are often diminished as a consequence of that production, money does not accurately reflect the lost value of nature. Also, economic valuation of environmental goods and services is difficult because many of nature's products and services are external to the economic markets. For example, there is no market to value clean air and water, yet our well-being as a society depend on having these amenities. Economists have attempted to compensate for this flaw by asking people what they would be willing to pay (a shadow price) to have a good or service of nature present as a part of their environment. Receiver-based value works well for the exchange of economic products and services between individuals; however, there are inherent and perhaps insurmountable difficulties in applying this approach to value nature's goods and services.

First, receiver-based values are subjective and have a high probability of error because decisions are not based on science. Second, accurate valuation is limited by the information available, which determines how well people understand the contributions that a natural product or service makes to their lives and to society as a whole. Third, the shadow prices assigned to nature's goods and services by economists are relative to the circumstances of the individuals of the particular area who are surveyed and therefore may differ between rich and poor areas, raising questions about the fairness of waste disposal and other environmental impacts.

A second method of valuation is to systematically account for all the inputs to a production process, in order to determine what was required to make a product or service in the economy or in nature. An example of this method of valuation that is known to many people is Marx's labor theory of value. Marx had the right idea but his valuation method failed because labor is not the only necessary input to an economic production process. Of course, human labor would be useless as a numeraire for nature's products and services. Energy, on the other hand, is a common factor for all production processes, economic, natural, or otherwise. Nothing is

produced by nature or the economy without the transformation of energy; therefore, a careful accounting of the work done and materials used in a production process can give an accurate measure of what was required to have the particular product or service as a part of the system.

The technocrats of the 1930s, led by Howard Scott, proposed an energy standard for valuation. This method also failed for two reasons: 1) the technocrats did not distinguish market value from public policy value, and 2) energy of different kinds has different abilities to do work when used within a natural or economic system.

The scientific concept of energy relates to a quantity that is conserved; under this definition, a calorie of sunlight, electricity, and human thinking all do the same amount of work. It is obvious, however, that these energies do very different kinds of work when employed in a real system. Thus the energy concept alone makes no allowance for the different levels of effort that are embodied in a calorie. The folk concept of energy does. In the past, energy was equated by common folk with the work done, thus, it takes more energy to build a barn than a chair or more energy allows one to build a bigger boat, etc. In this sense, when the boat is built all the energy has been depleted. Scientific expression of this folk idea of energy is accomplished by tabulating all the energies required to make a product. For example, to calculate the energy needed to produce a boat, in terms of one form of energy, e.g., a joule of sunlight, could provide a systematic method for valuing both the products of nature and the products of the economy on a common basis.

Such a method has been developed by H.T. Odum and has been used in many case studies as a means of environmental accounting to give an accurate and complete measure of the economic and ecological costs and benefits of alternative courses of action. Odum's new quantity is called *emergy*, which is defined as the available energy of one kind previously used up directly and indirectly to make a service or product. Its unit is the *emjoule*, which denotes the use of energy in the past.

Environmental accounting using emergy has arisen from the application of systems thinking and irreversible thermodynamics in ecology. This context provides a decision criterion centered on the maximum *empower*

principle (empower is the emergy produced or used per unit time), by which we can identify which, among several alternative courses of action, maximizes the well-being of humanity and nature (Odum 1996). The fundamental equation for emergy is:

$$\text{Emergy} = \text{Available Energy} \times \text{Transformity.}$$

For example, if we take solar energy as the standard (its transformity is equal to 1), then the solar transformity is the solar emergy required to make one joule of a product or service. Its units are solar equivalent joules per joule (sej/J). The transformity of a product is its solar emergy divided by its energy. The available energy or exergy of natural and economic products has been widely tabulated and many transformities are now available (Odum 1996), so emergy accounting can now be used in a fairly straightforward manner to calculate and compare the emergy required for natural, as well as economic, products and services. Where a needed transformity does not exist, it can be calculated by accounting for all the inputs to its production process expressed in solar equivalent joules (sej).

The emergy values of products and services can be related to the human economy as measured by the Gross Domestic Product (GDP) in a given year, by expressing the emergy value as an *emdollar* value. The emdollar value of a thing is the emergy value of the product or service divided by the emergy-to-dollar ratio for the economy in a given year. It gives the GDP dollars associated with a natural or economic product or service, if dollars are distributed in proportion to the solar emergy contributed. Under this system, natural products that are not valued in the GDP measure take their fair share of the total as determined by their emergy relative to the emergy of

<i>Forest Item</i>	<i>Emergy (sej)</i>	<i>Em\$ (1990 US \$)</i>
Average tree 12.7 m ² crown, 50 y old	4.4 E 13	22
Climax tree 500 m ² crown, 300 y old	5.25 E 15	2625
Support 1 ha monoculture 10 y old	1.75 E 15	875
Support 1 ha mature forest, 300 y old	2.1 E 17	105,000
Sustain 1 species in 128 ha for 1 y old	9.0 E 16	45,000
Evolve 1 species in 128 ha, 10,000 y old	9.0 E 20	450,000,000

economic products.

The table above shows emergy and emdollar values calculated for the El Verde rainforest in Puerto Rico (Odum 1996) and serves as an example of the

kind of numbers that come from this valuation process.

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Odum, H.T. 1996. *Environmental Accounting, Emergy and Environmental Decision Making*. John Wiley & Sons, New York, 370 p.

Disclaimer: This article represents the views of the author and does not necessarily reflect the views of the USEPA. This is contribution #AED-01-40 of the NHEERL's Atlantic Ecology Division.

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Mute Swan: A view of an invasive species in Rhode Island

by Charlie Allin

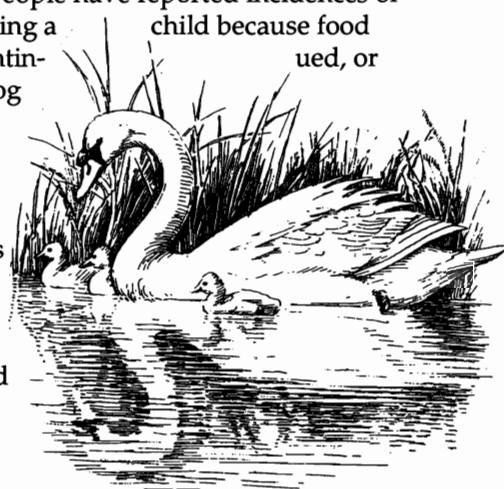
The Mute Swan (*Cygnus olor*) is indigenous to Europe and parts of Asia. Initially introduced into North America as a decorative waterfowl for parks, zoos, and private estates during the later 1880s, this species escaped captivity and established feral population status in the Atlantic Flyway by the mid 1900s. The earliest nesting record of wild Mute Swans in Rhode Island was in 1948 on Briggs Marsh, Little Compton. A population dynamics study of Mute Swans, conducted in Rhode Island during the 1960s, resulted in a recommendation for controlling this invasive species to a then "current limit" of 300 birds. During 1999, 113 swan nests were found in 21 of the 39 towns and cities of Rhode Island. The current Mute Swan population in Rhode Island reaches 1,500 birds during the summer.

Although nonmigratory, this species is currently found throughout the Atlantic Flyway from southern Ontario to North Carolina, with "semi-domestic" flocks ranging south to Florida. Regional growth rates in the Atlantic Flyway between 1986 and 1999 ranged from 43% in southern New England (MA, RI, and CT), 62% in the upper mid-Atlantic states (NY, NJ, and PA), to 1271% in the Chesapeake Bay Region (MD and VA). The growth of the Atlantic Flyway population during this 13-year period was 118%. Mute Swans favor (but are not limited to) Common Reed (*Phragmites australis*) and cattail (*Typha* spp.) for nesting material because they are able to penetrate the tall grass and hide their nests away from potential predators. Only a few predators prey on Mute Swans in their early stages of life. Raccoons will take advantage of an unguarded nest to sample the large

eggs, but if the adult is close at hand the mammal is chased away. During the first couple of weeks of life, Snapping Turtles will take cygnets. Average survival may fluctuate annually depending upon winter severity and available food sources. The percent survival rates increase as birds live longer. Due to poor frontal vision, Mute Swans often collide with power lines that are stretched over or adjacent to wetlands, breaking a wing or their neck. Life expectancy in the wild may reach over 25 years; however, the average is probably closer to seven years. Swans are capable of breeding by their third spring and will continue breeding throughout their lives.

The growth rate of Rhode Island's Mute Swan population has maintained itself at 5.6% annually since 1986, despite attempts by the DEM Division of Fish and Wildlife (DFW) to control the population at the recommended levels of the 1960s. Addling is one method of control followed by the DFW. Addling requires vigorous shaking of an egg from side to side until sloshing sounds can be heard. This method disengages the embryo and mixes it together with the albumin, thereby eliminating further embryonic development. Under certain circumstances drilling a small hole at one end of the egg and inserting a sliver of vegetation or wire into the egg is done to destroy the embryo.

The Mute Swan is a large white bird that has become a symbol for beauty, grace, tranquility, love, and a host of other anthropomorphic expressions. Its image can be found on hotel marquees, soap bar wrappings, postcards, beauty aids, and snack foods, to name a few. Unfortunately, the swan's personality does not match its image. It is quite capable of chasing off other waterfowl species from its declared territory, possibly killing young or smaller ducks, geese, and swans. People have reported incidences of a Mute Swan attacking a child because food handout had not continued, or attacking a small dog chained to a dog-house that was within the birds' territory. Not all adult swans are this aggressive, but people need to recognize that this is a wild animal and not a sweet, loving bird. An invasive species with few



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natural predators and the capability of significant population growth, its populations need to be controlled at a level that will allow both human appreciation and a limit on its competition with native waterfowl.

Recent studies by the RI Division of Fish and Wildlife indicate that Mute Swan concentrations will significantly reduce submerged aquatic vegetation during the summer in waters less than a half-meter deep. If populations of this species continue to grow unchecked, they will be a limiting factor in the amount of wintering foods available to migratory waterfowl within Rhode Island and along the Atlantic Flyway.

Many scientists have described the negative impact of non-native species that have been brought onto this continent, have subsequently escaped or were released, and have successfully established feral populations. The results have been mostly detrimental to native biodiversity. In 1994, a *Defenders of Wildlife Magazine* editorial raised the question of controlling invasive species and pronounced, "States also are primarily responsible for controlling exotics" and "Many states have been lax about eradicating exotic species and preventing introductions." More recently (1999), President Clinton signed an Executive Order on Invasive Species (Executive Order 13112) "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause." As the Mute Swan spreads throughout the continent, close examination should be kept on displacement of native waterfowl species and habitat competition. There is a need for the development of a national Mute Swan management plan and implementation of national control efforts.

Charles C. Allin is a Principal Wildlife Biologist (Waterfowl) at RIDEM's Division of Fish and Wildlife.

We've Moved!

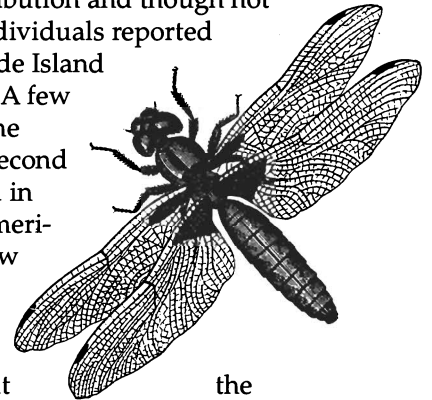
The Rhode Island Natural History Survey is pleased to announce its new office in the brand-new Coastal Institute in Kingston. Located in Room 101 (on the same floor with the main office for URI's Department of Natural Resources Science), the office has been able to expand and display our growing reference collection. We welcome visitors to come and browse through the collection and use it here in the office.

The Survey is grateful to the Cooperative Extension Education Center, which so generously housed us from 1994-2000.

Rhode Island Odonata Atlas: Year 3 by Virginia Brown

The Rhode Island Odonata Atlas completed its third successful field season in 2000. At this writing, staff and volunteers continue to catalog and prepare specimens collected during the 2000 field season. In total, 2,020 specimens were collected in Rhode Island last year. Records of note include the first American Emerald (*Cordulia shurtleffi*) ever recorded in the state. This brings the total dragonfly and damselfly species count in Rhode Island to 130. The American Emerald is a species of northern distribution and though not unexpected here, the first individuals reported were from the southern Rhode Island community of Charlestown. A few days after the discovery of the Charlestown population, a second population was documented in Burrillville. Although the American Emerald was the sole new species added to our Rhode Island list, field volunteers produced numerous other records of interest throughout state. New populations for northern dragonflies previously known from just one site each were also discovered in 2000. Single Beaverpond and Spiny Baskettails (*Epitheca canis* and *E. spinigera*) were taken in larger swarms of the super-abundant Common Baskettail (*E. cytosura*).

Two large spectacular dragonflies of conservation interest were recorded at new sites in 2000. The magnificent red Comet Darner (*Anax longipes*) was found at three new sites, although it was documented with a specimen at only one of these locations. It is unmistakable and easy to identify on the wing, but also very wary and swift in flight, making it exceedingly difficult to catch. We now have three specimen records for Rhode Island from southern communities, but additional sight records exist from as far north as Burrillville. The Spatterdock Darner (*Aeshna mutata*) is a startling blue and black insect with remarkable blue eyes and a very complex pattern of blue and black on its thorax and abdomen. It is a member of a genus of large, late summer and autumn flying dragonflies with very similar color and pattern that can be difficult to separate to species on the wing. The Spatterdock Darner, however, is unique in its early, spring flight season, and is usually on the wing in Rhode Island in May and June. Its English name relates to its association with Spatterdock (*Nuphar*), a yellow-flowered floating-leaved plant of ponds and marshy wetlands, in which adult Spatterdock Darners deposit their eggs. The species was documented in three new locations this year, but despite its conspicu-



ous appearance it is still known from just four Rhode Island wetlands and is considered rare or endangered in a number of eastern states.

Also significant was the Coppery Emerald (*Somatochlora georgiana*) recorded from Richmond. This stream-dwelling dragonfly is the rarest of its genus, a species of southern distribution known only from a handful of records north of New Jersey. It was first reported in Rhode Island in 1999 from two sites. Our 2000 record was apparently the only one found in New England this year. Curiously, all three Rhode Island records are females, and we have no reports (either specimen or sighting) of males in the state. Clubtails (Family Gomphidae) were scarce in Rhode Island this year (as reported elsewhere in New England), but two records of the Lilypad Clubtail (*Arigomphus furcifer*) represent the first for our state during the Atlas period. This pond-dwelling clubtail was collected at one site in the early 1990s, prior to this Atlas period. Most clubtails are associated with rivers and streams, and such species were indeed scarce in 2000. Streams that would normally be teeming with gomphids were unusually quiet and, in fact, Striped Emeralds of the genus *Somatochlora*, which also inhabit rivers and streams, were absent from many locations as well. I can only speculate that populations of these dragonflies were affected by 1999's extreme drought conditions, which reduced flow in streams to near nothing, leaving streambeds completely dry or reduced to isolated pools.

Last year I reported on the discovery of the Blackwater Bluet (*Enallagma weewa*) in Rhode Island in 1999, the first record of this southern damselfly in New England. In 2000, a large, new population was found in Charlestown along a small, sluggish, tannin-rich stream, bringing the state's total to three populations, all of which occur in the coastal communities of Charlestown and South Kingstown. These three populations remain the only occurrences of the species known from New England. We fully expect to find the Blackwater Bluet in Westerly, and suspect it may also be present in Connecticut. Two rare, range-restricted relatives of this damselfly, the Scarlet Bluet (*Enallagma pictum*) and the Pine Barrens Bluet (*E. recurvatum*), were also documented in new locations in 2000. These are species that are normally associated with emergent vegetation in coastal plain ponds. They were both recorded in good numbers this year from a stretch of quiet backwater along the Pawtuxet River. Although this segment of the Pawtuxet is very similar botanically to coastal plain ponds, I know of no other river populations for either the Scarlet or the Pine Barrens Bluet.

In addition to the notable records discussed above, Atlas volunteers made great progress in filling geographical data gaps. Many new records

were generated in townships such as Central Falls, Cumberland, Narragansett, North Smithfield, Providence, and Woonsocket, which had been under-sampled in the first two years of the Atlas. Despite this, fieldwork in the aforementioned towns is far from complete. Other towns, including Cranston, Middletown, Portsmouth, Tiverton, and the Warwicks, all need study in the final few years of the project. In contrast, Charlestown, South Kingstown, West Greenwich, and other towns in the Pawcatuck basin have been heavily sampled, and need less attention in the future.

With March upon us, we are planning our upcoming field season and relying heavily on analysis of current records to guide our attack. Township lists of species not yet recorded during the Atlas period (dubbed "hit lists") will guide us to specific habitats and localities for target species. We anticipate another great field season and hope to introduce new volunteers to the joys of working with dragonflies and damselflies. Anyone interested in participating in this project should contact Ginger Brown at The Nature Conservancy in Providence at (401) 331-7110.

Ginger Brown is Director of Science and Stewardship at the Rhode Island Field Office of The Nature Conservancy, and serves on the RINHS Board of Advisors.

TNC Wald Science Grants for Small Research Projects

In 2000, The Nature Conservancy introduced its Wald Science Grant Program, funding seven small research projects. This program, funded through an endowment, is designed to encourage scientific research on Nature Conservancy preserves and in larger landscape areas of interest, as well as research focused on species of conservation interest.

The endowment was established in 1997 with a generous start-up donation from the Wald family in memory of John Wald, who perished in a climbing accident. Over the next several years, The Nature Conservancy continued to build this endowment through its own fundraising activities, until the pot was large enough to support a number of small grant projects through the interest generated from the principal. The Conservancy will continue to enlarge this endowment fund so that it can support more projects in the future.

Proposals are due in January and awards are announced in early March, so that researchers planning an early field season can get started. A team of reviewers, including The Conservancy's Science Committee, review proposals prior to project selection. Some proposals are also sent for "outside" review as needed.

In 2000, the first year Wald grants were awarded,

seven projects were funded. Final project reports have been submitted for only a few of these, but the remainder will be completed in the next month or so. The 2000 projects were:

- A study of Fowler's Toad (*Bufo woodhousei*) populations at Trustom Pond Wildlife Refuge in South Kingstown and Goosewing Beach, a Nature Conservancy preserve in Little Compton. This project focused on population census, breeding habitat, and adult habitat, using a variety of methods including drift fencing, pitfall traps, call surveys, etc. The researcher, Todd Tupper of Southern Connecticut State University, plans to continue studying these populations in 2001.
- A study of butterflies in coastal grasslands, conducted by staff of the Audubon Society of Rhode Island. The project was designed to compare the butterfly fauna of restored grasslands with that of pastures, using a combination of Audubon and Nature Conservancy properties.
- Inventory of *Phragmites australis* stands for the stem-boring fly *Lipara similis*, conducted by Erin Siska, then of Brown University. Fieldwork took place in *Phragmites* stands across the state including Block Island.
- A study of breeding forest bird abundance and species richness in relation to agriculture and residential development, by Colin Studds of the University of Rhode Island. This is a continuation and expansion of a project initiated in 1999, focusing primarily on neotropical migrants and other forest nesting birds. In 2000, 12 additional study plots were added.
- An assessment of management strategies such as fire and mowing, and their effects on the Northern Blazing Star (*Liatris borealis*) on Block Island, by Ailene Kane of Brown University. This rare plant is a conservation target for The Nature Conservancy, which owns and manages land that supports populations of the plant on Block Island.
- Development and analysis of a technique that utilizes GIS-based data linked to levels of non-native species to measure ecosystem disturbance. This study was conducted by Kerri Vacher, of the University of Rhode Island, using existing data from plant inventories on Nature Conservancy properties.
- A study of the demographics of Quill-leaved *Sagittaria* (*Sagittaria teres*) in coastal plain ponds of



Climate Indicators: Data Sets Sought

The organizers of a climate workshop seek long-term data sets indicating climate change in the northeast. Adam Markham of "Clear Air-Cool Planet" in Portsmouth, NH is organizing a volunteer effort for indicators of change in the New England, New York, and New Jersey area, and the Rhode Island Natural History Survey (RINHS) may be able to help this effort. Candace Oviatt from URI's Graduate School of Oceanography has agreed to coordinate indicators of change in coastal waters. Other indicators are sought in forestry, fauna, agriculture, horticulture, human health, freshwater ecosystems, and hydrology-climate interactions. This effort is modeled on the effort in the United Kingdom's Centre for Ecology and Hydrology entitled *Indicators of Climate Change in the UK* (the report is available at <http://www.nbc.ac.uk/iccuk/> or DETR free literature, P. O. Box 236, Wetherby, West Yorkshire LS237NB England). The target indicators should be emblematic for the region, low cost, analyzed easily, long term, have continuing data collection, involve citizen science or the public, and tell a good story of climate variability.

RINHS members, with their collections of flora and fauna, their records of observations on all things natural, and their studies of plants and animals may have data sets on indicators with these characteristics. If you would like to participate in this effort call or email Candace Oviatt (401-874-6661 or coviatt@gso.uri.edu) with your candidate indicator. These candidates may be appropriate as continuing items for our RINHS newsletter and a vehicle for communicating our observations on climate change in this sensitive, northern boundary of the Virginian Province.

Wald Research Grants, continued

southern Rhode Island, by Hope Leeson. This state-endangered plant occurs at just a handful of sites in the state, and most populations are extremely small. This study seeks to examine which environmental factors influence the health of *Sagittaria* populations.

In early March 2001, six new projects were funded for the upcoming field season. We look forward to another year of exciting research, and to the results of projects funded in 2000. Anyone interested in applying for a Wald Science Grant in 2002 should contact Virginia Brown at The Nature Conservancy in Providence at (401) 331-7110.

brackish marshes were vegetated with stands of wild rice that likely supported scores of migrating waterfowl. Undoubtedly, native peoples once congregated here to take advantage of the productive anadromous fish runs and shellfish beds.

The development of Providence began to chip away at the Cove's integrity in the 1700s, but the first major alteration took place around 1844 with the advent of the Providence and Worcester Railroad, and construction of a terminal and railyard on filled land. By 1857, the Cove had been transformed into a circular walled basin with a promenade and park around the perimeter, and the state prison on the northwest side. Despite the attempt at beautification, the Cove soon lost favor as pollutants from up-river textile and dyeing plants began to accumulate, and as sewage draining into the Providence River was pushed inland on high tides and collected as "mud" flats in the Cove. In the early 1890s, the Cove was filled because it was a smelly nuisance, and there was a greater need for new railroad terminals. The Woonasquatucket River was channelized and a mosaic of streets, railroad infrastructure, and parking lots characterized the filled land. Today, the Cove has been transformed again through realignment of the rivers, development of a new train station and track layout, and construction of Waterplace Park, and of course, Providence Place Mall. Ironically, words such as "renaissance" and "reincarnation" have been used to describe this newest iteration of the Great Salt Cove, but there is no resemblance to what it once was.

Every urban center has experienced similar circumstances. An initial filling here or dredging there, expanded a few decades later to provide more land for development, reworked again the next century, until the compounded degradation has erased all that was once pristine and ecologically productive. (Have we learned anything in the process? Some would answer "yes," but did I hear someone else mention Quonset?)

George Santayana warned, "Those who cannot remember the past are condemned to repeat it." This is a truism certainly proven in regard to human social history, but is it not also applicable to natural history? Unfortunately, human beings have not been as conscientious in documenting our natural past. We know the names and life histories of every passenger on the Mayflower, but almost nothing about the native plants and animals that greeted them in Plymouth. Consequently, we are condemned to repeat the past simply because there is so little to recall about its true character.

A Natural History Survey can begin to rectify our diminutive and sometimes distorted view of the past

by providing some understanding of how we have interacted, impacted, and altered the natural world. It is the responsibility of natural historians to provide that documentation not only in analyzing the collections and notes of our predecessors, but also by leaving complete points of reference for those who follow. Eliminating generational amnesia can be the rallying point of our efforts.

Set Your Calendar for Bioblitz 2001!

The Rhode Island Natural History Survey's second Bioblitz will be held from 4:00 p.m. on Friday, **September 14** to 4:00 p.m. on Saturday, **September 15** in Middletown, Rhode Island. We will be based at Sachuest Point N.W.R.

A *Bioblitz* is a 24-hour census of the biological resources within a specified area. *Bioblitz 2000* was held at the Roger Williams Park Zoo in Providence, where 34 people identified 665 different taxa. We hope to have many more people helping--and identifying even more taxa--with *Bioblitz 2001*, which will be one of the first coastal *Bioblitz* efforts in the country.

Bioblitz 2001 will be co-sponsored by the US Fish & Wildlife Service, Norman Bird Sanctuary, and the Aquidneck Island Land Trust. Following the wrap-up of *Bioblitz 2001*, RINHS will hold its **Annual Meeting** at Sachuest Point National Wildlife Refuge on Saturday evening, September 15. It promises to be two days of great fun and learning!

Block Island Conference Proceedings Proceeding

RINHS editors Peter August, Virginia Brown, Lisa Gould, and Peter Paton are working hard to prepare the proceedings of the October 2000 conference, *The Ecology of Rhode Island's Islands: Focus on Block Island*, for publication. This will be the first RINHS conference to have published proceedings.

Chapters in the Proceedings include: *The Odonata of Block Island*, by V. Brown; *Block Island Wetlands: A Survey of Fish, Macroinvertebrates, and Amphibian Communities*, by M. Chandler; *The Ecology of Morainel Grasslands on Block Island, Rhode Island*, by J. Collins; *The Vascular Flora of Block Island, Rhode Island*, by R. Enser; *Forest History and Restoration on Clayhead, Block Island*, by B. Hammond; *Community-based Conservation on Block Island, Current Status and Future Trends*, by C. Littlefield et al.; *Marine Bottom Communities of Block Island Waters*, by S. Hale; *Marine Mammals and Sea Turtles of Block Island, Rhode Island*, by R. Nawojchik; *Small Island, Big Birds: Avian Biomass and the Persistence of the American Burying Beetle*, by C. Raithel; *Landbird Migration on Block Island, Rhode Island*, by S. Reinert et al.; and several chapters on the geology and hydrology of the island.

Rhode Island Collections

Harry S. Hathaway Library of Natural History of the Audubon Society of Rhode Island

by Sibi Rhodes

Harry S. Hathaway (1869-1946), a Providence native and noted documentarian of Rhode Island bird life, collected ornithological items throughout his active years. He wrote articles for many Rhode Island publications and acquired an impressive collection of books, pamphlets, and magazines relating to the birds of New England. The Audubon Society of Rhode Island (ASRI), with the assistance of Henry D. Sharpe and his sister Ellen D. Sharpe, purchased Mr. Hathaway's collection of books, photographs, birds' eggs, and study skins. This collection became the nucleus of the present-day Harry S. Hathaway Library of Natural History at the headquarters of the Society.

In its focus on natural history, the library preserves some of the best of the past while providing information about current research and trends. True to the aphorism of the Audubon Society, "Over 100 Years of Education, Conservation, and Advocacy," the library holds a range of materials on subjects from algae to zebra mussels. In addition to holdings in botany, mammalogy, ornithology, herpetology, and ichthyology, our books and pamphlets cover invertebrate life and habitat topics. Sections on technical, legal, and sociological contexts of environmental issues co-exist with volumes on land conservation and recreational enjoyment of natural resources. ASRI is not "just for the birds."

In our reference shelves are the 18 volumes in progress of *Birds of North America*, a series of monographs on the 467 avian species (treated-to-date) found on the continent. Droll Yankee, Inc. funded this holding. Reprints of the complete A. C. Bent treatise on American bird-life are housed in reference while originals are in locked access. A. C. Bent, hailing from nearby Taunton, collected and compiled field observations on the life histories of birds published under the auspices of the Smithsonian beginning in 1919. Available also in reference is the *Mammalian Species* series from the American Society of Mammalogists. New

monographs about species worldwide are added from time to time.

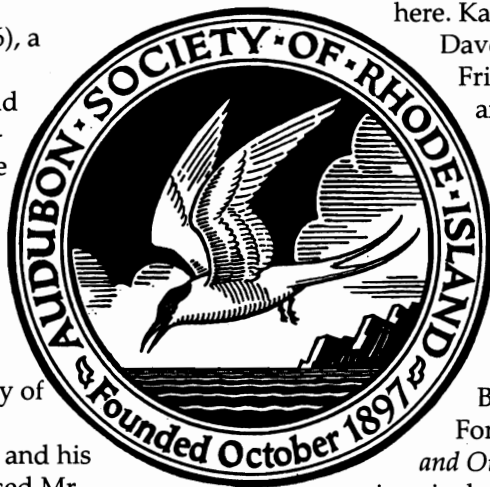
Among the special collections here are books that belonged to Edna Lawrence, curator of Rhode Island School of Design's Nature Lab, records of Doug Kraus, and the diaries that Elizabeth Dickens penned. Photographs of birds and eggs, a trip to Banff, and Rhode Island locales taken by Harry Hathaway are secured here. Kay Kinsey's book collection, Mabelle Davenport's Purple Martin survey, Jack Friedel's amphibian collection, and Ruth and Al Zurlinden's materials on wetlands have been donated to our care. Bookplates indicate the many friends of ASRI who have donated volumes to our collection.

Many turn-of-the-last-century publications are found here, held under locked access, as are older journals. Books include Wilson and Bonaparte's *American Ornithology* and Forbush's series *Birds of Massachusetts and Other New England States*. Other holdings include a complete set of the *The Auk*, the journal of the American Ornithologists' Union; *The Condor*, publication of the Cooper Ornithological Society of the West Coast; *The Living Bird Annual*, from Cornell Laboratory of Ornithology; as well as *Ornithologist and Oologist*, *The Wilson Bulletin*, and *Bird Lore*. Babcock's *Turtles of New England* and miscellaneous other works are also in this section of the library. These materials may be used only in the library.

Another section of our library deals with the birds of the United States, arranged alphabetically by states. A few of the special ones are listed here: *Florida Bird Life* by A. H. Howell (1932), *Birds of Minnesota* by T. S. Roberts (1940), *Arizona and Its Bird Life* by H. Brandt (1951), and *The Birds of Maine* by O. W. Knight (1908).

A partial list of particularly interesting offerings for research, information, or enjoyment include *The Birds of California* in four volumes, *Oceanic Birds of South America* by Robert C. Murphy, Britton and Brown's *An Illustrated Flora of the Northern U. S., Canada and the British Possessions*, the four volumes of *The Waterfowl of the World* by J. Delacour, and *Moths and Butterflies* (1901) by Mary Dickerson, who was head of the Department of Biology and Nature Study in the Rhode Island Normal School. Among my favorites in the library are Louis Agassiz's *Album of Abyssinian Birds and Mammals*, *Wings of Paradise—The Great Saturniid Moths* by John Cody, *Aquatic Entomology* by W. Patrick McCafferty, *Birds of Surinam* by F. Haverschmidt, and *Eggs of North American Birds* (1890) by C. J. Maynard, with 10 plates handcolored by Mrs. Maynard.

A card catalogue in a golden oak cabinet lists all holdings by subject, author, and title. We do have a computerized version of the catalogue. The classification



system was developed by Alfred Hawkes, former Executive Director of ASRI, and refined by Tim Ramage, a former volunteer librarian who was, at the time, curator at the RISD Nature Lab. After conference with professional librarians, we have decided to retain this unique classification system and to use the Library of Congress subject headings.

The Hathaway Library is located at Audubon Society of Rhode Island headquarters, 12 Sanderson Road (Route 5 near the intersection of Route 44) in Smithfield. Open during the week from 9 a.m. to 5 p.m. and on Saturdays from noon to 4 p.m., the library is a public library, but registration separate from the CLAN system is required. The library functions thanks to devoted volunteers and the management of Eugenia Marks, ASRI's Director for Advocacy. We cordially invite you to visit.

Sibi Rhodes, a retired first-grade teacher, has volunteered at the Hathaway Library since 1989.

Rhode Island Invasive Species Council: A Cooperative Effort

Under the aegis of the Rhode Island Agricultural Experiment Station and URI Cooperative Extension, the Rhode Island Invasive Species Council (RIISC) formed in 1999 to bring together representatives of the nursery and landscape industry, conservation organizations (e.g., Audubon Society of Rhode Island, The Nature Conservancy, RI Wild Plant Society, and Save The Bay), representatives from municipal, state, and federal agencies (e.g., Coastal Resources Management Council, Environmental Protection Agency, Natural Resources Conservation Service, U. S. Department of Agriculture/APHIS, U. S. Fish & Wildlife Service, RIDEM, and RI Department of Transportation), and academics to discuss the issues surrounding invasive species in Rhode Island.

The first work of the Council was to define its mission and determine criteria for invasiveness. RIISC defined its mission and goals as follows: *To protect native biodiversity in Rhode Island. According to the Executive Order on Invasive Species, "invasive species means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." The Rhode Island Invasive Species Council will gather and convey information on the presence, distribution, ecological and economic impacts, and management of invasive species; promote uses of native species and non-invasive alternatives throughout Rhode Island; and work cooperatively with researchers, conservation organizations, government agencies, the green industries, and the general public to identify and manage invasive species pro-actively and effectively.*

The goals of Rhode Island Invasive Species

Council are:

- to protect native biodiversity;
- to conduct scientifically based assessment;
- to promote the use of native and non-invasive non-native alternatives;
- to manage and control invasives in minimally-managed habitats;
- to encourage research on control methods;
- to develop assessment methods for potential invasiveness;
- to educate the general public;
- to work cooperatively among all involved parties.

Using criteria initially developed at the George S. Torrey Herbarium at the University of Connecticut, and further refined by a number of groups, RIISC has begun to assess the non-native organisms (in all groups, not just plants) in Rhode Island, to determine what species are currently invasive, which ones are present and potentially invasive, and which species are "on our doorstep" in neighboring states or regions. For a species to be included as a "non-native invasive species" or as a "potentially non-native invasive species," it must be

- substantiated by scientific investigation;
- nonindigenous to Rhode Island;
- naturalized;
- have the biological potential for rapid and widespread dispersion and establishment;
- have the biological potential for dispersing over spatial gaps away from the site of introduction;
- have the biological potential for existing in high numbers away from intensively managed artificial habitats.

In addition, to be included as a **non-native invasive species**, a species must be documented to:

- be widespread in Rhode Island or at least common in a region or habitat type(s) in the state;
- have numerous individuals in many populations;
- be able to out-compete other species in the same natural community;
- have the potential for rapid reproduction and establishment in natural communities.

Other refinements of the list enable a species to be classified as "widespread and invasive," "restricted and invasive," or "potentially invasive."

RIISC will be sharing the results of its assessments, working with the nursery industry to suggest alternative non-native plant species in the landscape, helping to educate the public on this important issue (it has already held three public forums), and working to identify research needs. RINHS executive director Lisa Gould is the coordinator for the RI Invasive Species Council; if you are interested in more information, contact her at (401) 874-5800; email rinhs@etal.uri.edu

Focus on RINHS Organizational Members The South Kingstown Land Trust

by Clarkson A. Collins
and Charles M. Lewis

*From modest beginnings, an organization which is
beginning to make a difference in South County.*

Like so many other worthwhile projects, our organization started back in 1983 with no more than a handful of dedicated and energetic people who had a common dream: to see what could be done to preserve and protect open space, farmlands, woodland, coastal ponds, and properties with scenic vistas, by accepting donations of land and conservation easements. The mission then, as it is today, was to protect land in perpetuity in a part of Rhode Island where economic growth was accelerating and development was booming. The real worry at the time, which has become more alarming with the passage of the intervening years, was that time was rapidly running out for the acquisition of important properties of these kinds. In so many instances, all it has taken has been the death of last members of an older generation and...boom! ...the old family farm disappears from view and in its place appear forty new houses with garages, yards, and happy youngsters romping in new playgrounds. We've never been *against* building, but what we have been *for* has been to join in the race against time to save our beautiful and serene area for future generations to live in, visit, and enjoy.

We've grown and are thriving and have been blessed with good luck. We owe so much to those with whom we work hand-in-hand: The Nature Conservancy, the Town of South Kingstown Town Council and Staff, the Champlin Foundations, the Rhode Island Foundation, the Doris Duke Foundation, the RI Department of Environmental Management, and others. We are particularly proud of the rapidly expanding membership of our Trust itself and the way we and our mission are becoming more and more visible in our part of Rhode Island. We continue to be amazed at the way groups of interested residents want to become involved in helping with the success of one project after another. Such dedication and grassroots efforts helped us acquire 775 acres of open space in the last three years, upping our total to 84 parcels and more than 1450 acres under protection. We have made strides fostering cooperation in our work among the organizations mentioned above, and Joanne Riccitelli, our director



of Land Preservation, has worked with great success in the "art and science" of keeping communication open, projects moving, and funding flowing for numerous complex and important acquisitions. To capitalize on our momentum, we are hoping to kick off an ambitious Capital Campaign to raise substantial amounts for targeted land acquisition, land management, and programmatic funding. So there

is a lot going on down here and we are sustained by the enthusiasm and hard work of so many.

We have focused from the start on actually identifying and acquiring land, but for the last year or two we have been giving more and more attention to, "what happens when projects start to run out and we have gone as far as we can?" That will be the time when *Land Management* will receive primary attention and this is the reason why we value so highly our membership in the **Rhode Island Natural History Survey**. We are going to need help and guidance from the pros, and lots of it, as we reflect more and more on the question: "How best to manage our land holdings?" Our hope is that the diversity of our holdings will attract educational and professional talent looking for properties on which to study native and naturalized animal and plant species. Perhaps there will be students or experts who will be interested in helping us with our Land Management Plan or willing to evaluate the potentials in these pieces of special acreage. If we had access to such scientists at the *start* of a project, and were able to learn what plant and wildlife of interest might be prevalent in a particular area, such input would surely help with our grant applications. Perhaps there will be trained persons willing to share advice on the development of trails, nature walks, or other projects where the community can benefit from the availability of these open spaces. We look with admiration at the way trained volunteers interested in the conservation effort can make a real difference in helping organizations such as ours keep an eye on our properties by accepting stewardship responsibilities, such as hiking the boundaries and filling out a report once a year. There is going to be a lot to think about on how to maximize the value and worth of this land for the community over and above the way it contributes right now to the serenity and beauty of the area. So...we'll want to keep in close touch with **RINHS** as we scramble, like so many other land trusts, to acquire more important land while the opportunity still exists. Time is running out faster than most people imagine and we need all the help we can get!

Clarkson A. Collins is president and Charles M. Lewis is treasurer of the South Kingstown Land Trust.

2000 Distinguished Naturalist Award: Prentice K. Stout

Prentice K. Stout has devoted his career to teaching, lecturing, wildlife photography, and writing. He has taught at all levels from kindergarten through twelfth grade, university, graduate school, and public education classes.

Prentice grew up in New York City where his father, Gardner D. Stout, was a Wall Street broker. As a hobby, his dad was a dedicated birder, particularly of shore birds. During summers the family escaped the city for the shores of the Shrewsbury River in New Jersey. Here, boats and wildlife became part of Prentice's life. He used a rowboat to explore the marshes and used a "Brownie" to film wildlife. His first photograph of an American Egret was so small that the shop volunteered to give him a new roll of film because they thought they had printed the picture with a speck of dust on the emulsion.

Prentice did his undergraduate studies at Denison University and took his first job at the First National City Bank of New York in the Officer's Training Program. But instead of staying in banking, his father's true love of nature led him into nature education. His father, upon retirement from Wall Street, served as president of the American Museum of Natural History in New York for ten years. No doubt his mother, Clare, also influenced him; she was an accomplished artist and expert conchologist.

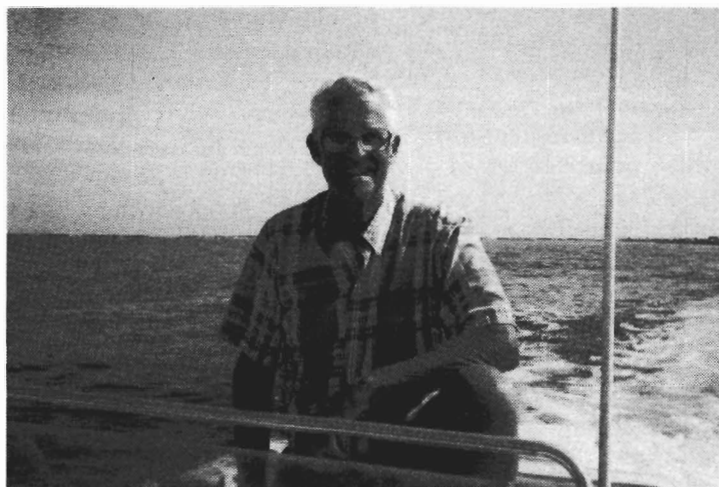
Prentice's career in education began at Hotchkiss School where he was a high school instructor in geology and biology. He also helped design the biology department of a new science building. He then moved on to the Far Hills Country Day where he taught marine biology, botany, physics, chemistry, earth science, and astronomy. In addition, his activities ranged from founding a yearbook to member of the Board of Trustees for Far Hill Country Day School. Prentice spent a couple of additional years in New Jersey as an education director for the American Littoral Society. His efforts in the state were recognized by the Governor's Award for Excellence in Science Education.

From 1974 to 1995, Prentice served as marine education specialist for the University of Rhode

Island's Graduate School of Oceanography. In this position he conducted classes for all ages on local marine flora and fauna, he presented public lectures illustrated by his own photography, and he authored several articles on science education, marine topics, and natural history. For example, his book, *Lands of Fire*, presents the natural history of the Potowomut River estuary, in East Greenwich, Rhode Island. While in Rhode Island, Prentice served as naturalist and lecturer for Save The Bay; he was President of Biological Media Services, a non-profit company dedicated to science education and he was executive director of the National Marine Education Association for four years and editor of its journal.

As a staff member at the National Audubon Society Camp in Maine, he worked with Helen Gere

Cruikshank, a respected naturalist and bird photographer, to learn natural history photography. He has shared his photographic talents with more than 50,000 adults and young people during his presentations. In recent years, he and his wife Patty have guided natural history trips to the Galapagos Islands, Costa Rica, Botswana, and elsewhere. His photographs of these



locations and in Norway, Ireland, Scotland, Turkey, and the Yucatan have enhanced his professional lectures.

Currently, Prentice is enjoying his retirement and researching a book on the human and natural history of Point Judith Pond in Wakefield, Rhode Island. Recently, he produced the video *This Place of Quiet Waters*. He continues as a member of several boards in the area and with his enthusiastic, humorous lectures on nature.

Written by Candace Oviatt, a professor at the URI Graduate School of Oceanography who serves on the RINHS Board of Directors.

At the 2000 Conference, the RINHS Board of Directors began a tradition of giving posthumous Distinguished Naturalist awards to natural historians who have helped form the basis of today's knowledge. The 2000 awards went to Elizabeth Dickens (1877-1963) and Mark Gould (1946-1999). For articles about them, log onto the RINHS website at www.uri.edu/ce/rinhs/pages/distnat.html

Backyard Biodiversity

by Garry Plunkett

The replacement of natural habitat for human habitat continues as a critical problem for global biodiversity. In the United States a primary culprit is residential development, where natural ecosystems are lost to streets, homes, and lawns. Even in New England, where environmental awareness is comparatively sophisticated, suburban subdivisions are swallowing increasingly larger bites of landscape, often in the name of "rural" subdivision design. This typically means large individual house lots. Two, three, and even five-acre lots are not uncommon. They are called "rural" because the population density is lower than in towns, but it also means that the habitat destruction rate per capita is higher. Even more distressing, owners often have little understanding of or inclination to learn the benefits of natural land use, so conventional landscaping results: large expanses of turf grass and specimen plantings, maintained by chemical treatments and tank-sized lawn mowers.

Consumptive land use, more commonly known as urban sprawl, is an enormously complex issue, and one with which I have had some direct association. On the one hand, nine years of service on my local town planning board, service which included an overhaul of our zoning ordinance, has demonstrated how land-use regulations contribute to environmental damage, and how resistant to change they are. On the other hand, I have personally contributed to the problem. Sixteen years ago I built a home on a two-acre house lot in Tiverton. It was the classic scenario: A family farm had ceased to be viable and was subdivided, and what was once open meadow and grassland became a suburban neighbor-

hood, one to which urban dwellers flee for a "rural setting." Of course, I was proud of the new home, but also saddened at what had disappeared. Partly out of this sense of guilt I decided to explore what was possible in terms of creating biodiversity on a small scale, and left an acre of my property natural (a decision made easier at a time when I was cutting grass with an



18-inch push mower.)

The original naive thought was to have some kind of backyard nature preserve. But, more than that, it was an opportunity to observe closely a spot of earth, to become intimate with a personal little habitat, and to examine its biological diversity over time. It has been an extended love affair. Simply watching what land does, learning how to create varied microhabitats and what is needed for equilibrium plant communities, has given me a deepening appreciation for the wonders of nature. It is marvelous proof of how the commonplace becomes extraordinary if one takes the trouble to observe it closely.

The first surprise was the plant diversity that evolved naturally. The most recent inventory included 192 vascular plants, 148 of which were originally present or occurred naturally. This is probably no surprise to those familiar with old fields, which was what I have allowed part of the acre to become. They are successional hot beds and amazingly vibrant plant communities. The land had been a farm since the early 1700s, and was either hayed or pastured right up until it was subdivided, so the initial plant community was a typical mix of cool-season forage grasses (e.g., Orchard-grass, *Dactylis glomerata*; Timothy, *Phleum pratense*; Velvetgrass, *Holcus lanatus*; foxtails, both *Alopecurus* and *Setaria*; Sweet Vernal Grass, *Anthoxanthum odoratum*; Kentucky Bluegrass, *Poa pratensis*; Upland Bent Grass, *Agrostis perrenans*; Redtop, *Agrostis gigantea*; Quackgrass, *Agropyron repens*). The only curiosity among the graminoids was several patches of a warm-season species, Nimbwill (*Muhlenbergia schreberi*).

Into this hay meadow old-field invasions began immediately. Squadrons of goldenrod (*Solidago* spp.), asters (*Aster* spp.), milkweed (*Asclepias* spp.), Curly Dock (*Rumex crispus*), knapweed (*Centaurea* sp.), hawkweed (*Hieracium* spp.), bindweed (*Convolvulus* sp.), buttercups (*Ranunculus* sp.), Ox-eye daisy (*Chrysanthemum leucanthemum*), Yarrow (*Achillea millefolium*), cinquefoils (*Potentilla* spp.), Cowvetch (*Vicia cracca*), St. Johnswort (*Hypericum perforatum*), and other meadow forbs quickly made themselves at home. The first three summers were absolutely exhilarating, as new species were regularly discovered and recorded. The forbs were gradually accompanied by old-field deciduous species: Eastern Red Cedar (*Juniperus virginiana*), sumac (the three common Rhode Island species came on board almost simultaneously, *Rhus copallinum*, *R. glabra*, *R. typhina*), arrowwood (*Viburnum* sp.), Burning Bush (*Euonymus atropurpureus*), Bayberry (*Myrica pensylvanica*), Winterberry (*Ilex verticillata*), Summer Grape (*Vitis aestivalis*), and Poison Ivy (*Toxicodendron radicans*), as well as a collection of brambles (*Rubus* sp.).

While there are no rarities, it is an intriguing list:

131 forbs, 27 graminoids, 19 shrubs, 5 ferns, and 10 trees. Noteworthy species that occurred naturally include One-flowered Cancerroot (*Orobanche uniflora*), a hauntingly lovely species that grows on goldenrod roots. There has also been a resident orchid, Ragged-fringed Orchis (*Habenaria lacera*), though it hasn't appeared the last few summers. Other species of interest (although all non-native) include Yellow Bedstraw (*Galium verum*), Hairy Willow-herb (*Epilobium hirsutum*), Ragged Robin (*Lychnis flos-cuculi*), Lessor Stitchwort (*Stellaria graminea*), and Rough-fruited Cinquefoil (*Potentilla recta*).

What is the ecological worth of backyard biodiversity? One first needs to ask, "Compared to what"? Small islands of biodiversity in a sea of residential development are of limited benefit compared to the area habitats that are destroyed. Threatened species often require either very large contiguous areas or very specialized environmental conditions, neither of which are backyard conditions. But when compared to conventional suburban landscaping, small natural areas certainly do less harm. They can have surprising plant diversity and not insignificant habitat for small vertebrates and invertebrates: my small pond and wetland are alive with insects, amphibians, and birds. Conceivably, given knowledgeable efforts to create specific microhabitats, they could also be repositories for threatened species. In spite of the wondrous personal experience with my natural area, enlightened land-use regulations actually would provide fewer opportunities for backyard biodiversity. They would discourage large house lots in favor of residential clusters with small lots and large, contiguous open space areas. This would provide for more ecologically significant natural habitat.

If one owns a large house lot, however, there is enormous enrichment in keeping some of it natural. Its greatest reward, perhaps, is in gaining an understanding and emotional attachment to land. Wendell Berry believes that the salvation of our landscape will come when property is returned to small, local owners, because it is they who understand its nature and spirit and will want to protect and nourish it. My experience confirms that concept. Even a small corner of one's property will provide endless fascination if nature is allowed to flourish. Thoreau's well-known quote comes to mind: "I went to the woods because I wished to live deliberately and see if I could not learn what it had to teach..." In all humility I would add, if you can't get to "the woods," check out your own backyard — it, too, can have a lot to teach.

Garry Plunkett is a walk leader for the Rhode Island Wild Plant Society and natural landscaping enthusiast.

RINHS Organizational Members: Special News & Events

Audubon Society of Rhode Island will hold its annual *Birdathon* on Saturday, May 9. This is a great opportunity for birders of all skill levels to have fun while helping to support ASRI's programs in education, advocacy, and habitat conservation. Participate on ASRI refuges, in your own backyard, or on an all-day team. Call ASRI at (401) 949-5454 for sponsor forms and other information.

Humboldt Field Research Institute announces the 2001 *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 field geology, vernal pool ecology, mayflies, caddisflies, spider biology, fungi, lichens, mosses, vascular plants, wetland ecology, hydrology, ecosystem studies, botanical 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; <http://maine.maine.edu/~eaghill>

Rhode Island Wild Plant Society will hold its famous Spring Plant Sale on Saturday, June 2, 9:30-12:00 noon (members may come at 8:30), at the URI Greenhouses on Flagg Road.

RIWPS Display Garden, *A Path Through Time*, which was based on Tom Wessels' book *Reading the Forested Landscape*, once again won the "People's Choice Award" at the 2001 RI Spring Flower & Garden Show.

Celebrate Rhode Island Wild Plant week, with the theme "Reading the Forested Landscape," from May 10-20 with events in Charlestown, Glocester, South Kingstown, Westerly, and West Greenwich. Many other events and walks are scheduled by RIWPS throughout the year; contact (401) 783-5895 for the full calendar.

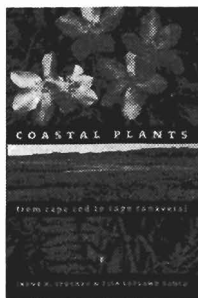
Roger Williams Park Museum of Natural History and Planetarium is Rhode Island's only natural history museum, and has over a quarter million objects pertaining to natural and cultural history. The museum also houses Cormack Planetarium, the state's only public planetarium. Current exhibits include *All Things Connected: Native American Creations*; *Natural Selections: Treasures from the Museum's Collection*; *Circle of the Sea: The Rich Tapestry of Oceanic Culture*; and *Savage Ancient Seas*, an exhibition of Cretaceous creatures. The Museum is open daily 10 am to 5 pm, year round. Call (401) 785-9457 for more information.

Book Review:

Much more than a field guide

by Charles Roman

***Coastal Plants from Cape Cod to Cape Canaveral*, Irene H. Stuckey and Lisa Lofland Gould. 2000. The University of North Carolina Press, Chapel Hill, NC. 305 pp. Cloth \$29.95, paper \$14.95.**



As I began reading, I asked, "Why do we need another guide to coastal flora?" There are many very good field guides available, some pertaining to particular regions along the Atlantic and Gulf coast and others that are for individual coastal states or specific habitat types. The answer became clear after just a few pages—*Coastal Plants from Cape Cod to Cape Canaveral* is different from the others. In fact, it's much more than a field guide. One hundred twenty-five plants are described in detail, each with a striking color photograph, information on taxonomy and nomenclature, comments on range and habitat requirements, then some details on key distinguishing characteristics, such as leaf shape, branching pattern, flower and/or fruit type and color, and height.

Most field guides end here, but Stuckey and Gould go to another level. For each species described, there are descriptive notes on similar or easily confused species, a feature that will be especially useful to the field botanist. And further, there are extensive comments and anecdotes on each plant, such as descriptions of wildlife uses, pertinent facts on nomenclature changes or derivation of a common name, and interesting remarks on both historical and current human uses. Each plant described encompasses two to three pages packed with information, not the single paragraph typical of many guides.

Stuckey and Gould define the scope of their book with a readable introductory discussion on vegetation patterns and fundamental processes of major habitats encountered along the Atlantic U. S. coast. Plants of beaches and mudflats, rocky shores, aquatic beds, coastal cliffs, dunes, tidal wetlands, coastal freshwater habitats (swamps, marshes, ponds, streams, bogs, fens, pocosins), and coastal uplands (scrublands, thickets, old fields, meadows, savannas) are included. The introduction also provides some practical advice on leading and participating in coastal field trips, a feature that I've not encountered in other guides. Finally, a list of publicly owned coastal places directs the field botanist to some wonderful natural areas for observing the diversity of coastal habitats from Massachusetts to Florida.

Stuckey and Gould have successfully transferred

their extensive knowledge of coastal flora and decades of experience to a book that will be a useful companion in the field or while keying out plants in the lab. Amateur plant enthusiasts, scientists, and others with an interest in coastal flora will find this a welcome addition to their bookshelves.

Charles D. Roman, Ph.D., is a coastal ecologist with the U.S. Geological Survey, stationed at the University of Rhode Island's Coastal Institute in

Narragansett. This article first appeared in WildFloraRI (the newsletter of the Rhode Island Wild Plant Society), April 2001.

Upcoming Conferences & Seminars

April 11. Findings of the First Rapid Assessment Survey of Marine Bioinvasive Species in Narragansett Bay, Rhode Island, August 12-18, 2000, an RINHS lecture by Kevin Cute (Marine Resources Specialist, Coastal Resources Management Council); 7:30 p.m., Center for Economic & Environmental Development, Roger Williams University, Bristol RI. Free. (401) 874-5800 for information.

April 16-21. Conservation Week and Earth Day Celebration at the Roger Williams Park Zoo: "Reduce, Reuse, Recycle." Special activities, theater programs, displays, and maybe a glimpse of that new baby Polar Bear. (401) 785-3510.

April 21-22. Mostly Coastal Earth Day celebration at the Mystic Aquarium, Mystic CT. Music, demonstrations, displays, and much more. (860) 572-5955; <http://www.mysticaquarium.org>

May 3. A Wildflower Garden Walk with Glenn Dreyer, director of the Connecticut College Arboretum, New London, CT. Free. (860) 439-5020; <http://arboretum.conncoll.edu>

May 5. 2001 Rhode Island Land Trust Conference, Roger Williams University Conference Center, Portsmouth RI. Contact Brad Bushcur at (401) 331-7110 x 39 or bbuschur@tnc.org

June 1-2. Our New England Waters: Shared Lakes, Shared Responsibility: Learning and Finding the Solutions for Lake Issues and Concerns. The New England Chapter of the North American Lake Management Society 8th annual meeting, held in Montpelier, VT. (802) 241-3777; <http://www.tec-i.com/2001-nec-nalms/conference.htm>

August 14-15. Invasive Plants Conference, sponsored by the Mid-Atlantic Exotic Pest Plant Council. Swarthmore College, PA. (215) 247-5777 x 149.

September 14-15. Bioblitz 2001, the second annual RINHS bioblitz. Sachuest Point N.W.R., Middletown, RI. (401) 874-5800.

September 15. RINHS Annual Meeting. 5:00 p.m., Sachuest Point N.W.R., Middletown, RI. (401) 874-5800.

October 16-19. Stream Repair and Restoration: A Focus on the Urban Environment, 4th Annual North Carolina Stream Restoration Conference, Raleigh, NC. <http://www5.bae.ncsu.edu/programs/extension/wqg/sri/>

Natural History Opportunities for Volunteers and Students

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! Call Cheryl Swinconeck 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 Brown, and Jane Jackson is seeking volunteers to help inventory TNC properties for birds, herptiles, invertebrates, etc. Contact Ginger and Jane at (401) 331-7110.

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 looking for outgoing, friendly people who share an interest in animals and wildlife preservation to join the *Zoo's Docent Program*. Docents are volunteer teachers who strive to increase the public's appreciation of wildlife through education about animals, conservation, and the role of the modern Zoo. Docent training is a 13-week course, running from January – April 2001. Classes are held on Thursdays or Saturdays.

Interested persons, 18 years of age or older, can contact Debbie Richmond, Coordinator of Volunteer Resources, at 785 – 3510 ext. 356 for information on the application, orientation, and interview process.

Rose Island Lighthouse Foundation (P. O. Box 1419, Newport RI 02840) needs volunteers to help gather data on snakes, ticks, plants, seals, and nesting birds at appropriate times of the year. The Foundation will provide transportation. Contact Charlotte Johnson at (401) 847-4242 or charlotte@RoseIsland.org

Save The Bay (434 Smith Street, Providence RI 02908) has internships available for fall, spring, and summer terms. Opportunity areas include Communications (PR & Marketing; Internet & Graphic Design), Habitat Restoration, Legislative Outreach, Membership & Marketing, Program Planning/Development, Public Programs & Field Education, and Puppetry/

Art. All internships are offered for academic credit with the hourly commitment per week varying by position.

Save The Bay's offices are fast-paced; they seek interns who are organized, able to establish priorities, and work well independently.

Save the Bay also invites people to join the *Bay Discovery Corps of Volunteer Docents* in the field and classroom.

To apply for internships and volunteer positions, contact Stan Dimock, Volunteer & Internship Coordinator, at sdimock@savebay.org or (401) 272-3540 ext. 130.

U. S. Fish & Wildlife Service (RI National Wildlife Refuge Complex, Shoreline Plaza, Route 1A, P. O. Box 307, Charlestown RI 02813). Ninigret, Trustum Pond, John H. Chafee at Pettaquamscutt Cove, Sachuest Point, and Block Island National Wildlife Refuges offer many volunteer opportunities, including visitor services, trail maintenance, biological monitoring and surveys, and environmental education. Contact Kimberly Hayes, volunteer coordinator, at (401) 364-9124 ext. 29.

Rhode Island's Source Water Assessment Program, a unique approach through citizen involvement (Room 001D CIK, 1 Greenhouse Road, Kingston, RI 02881). The University of Rhode Island Cooperative Extension (URI CE) is working with the Rhode Island Department of Health to complete the State's Source Water Assessment Program, as required by the Environmental Protection Agency. This Program was established by the 1996 Amendments to the federal Safe Drinking Water Act and assesses threats to public water supplies throughout the State.

There are two different volunteer opportunities—*Inventory* and *Assessment*. Some volunteers will inventory land-use changes and potential sources of contamination within the public water supply protection areas, while others will provide input on the risk assessment model and analysis options. Volunteers can participate in one or both portions. **Inventory** and **Assessment** workshops have just begun (early April) within North Kingstown, Jamestown and Kent County. Volunteers will be sought in Westerly during the summer, 2001 and Bristol County, Tiverton and Little Compton during the fall, 2001.

If you would like to be involved, please contact: Holly Burdett or Alyson McCann at URI CE, (401) 874-5398 to find out more. A fact sheet describing the **Inventory** and **Assessment** volunteer time commitments and duties is available at URI CE.

URI Watershed Watch (Room 002, CIK, 1 Greenhouse Road, Kingston, RI 02881) is seeking volunteer

Opportunities, continued from page 17

monitors of all ages for the 2001 season! URI Watershed Watch is sponsored by URI Cooperative Extension, the RI Department of Environmental Management, and also by a number of municipalities, environmental, watershed and lake organizations, and the Narragansett Indian Tribe. Sponsoring organizations choose the monitoring locations, at last count more than 120 in RI and CT. We match volunteers to a location near to them or of particular interest to them. Volunteers receive classroom and field training in the basics of aquatic science, equipment and supplies, and detailed instructions on how to monitor their lake, river, stream or surfing spot. No prior scientific experience is expected of volunteers, just the time to devote to monitoring and the interest in the water quality of a favorite place.

Volunteers spend 1-2 midday hours each week from mid-May through mid-October monitoring their assigned location. Most monitoring is done mid-stream or mid-lake, rarely from the shoreline. Volunteers must provide their own boat/kayak/canoe, anchor, and personal flotation device (life preserver). We encourage teams of volunteers to share monitoring duties. The list of potential locations for the 2001 season is on our web page, and can also be sent to interested parties. To find out more about the program and the list of potential 2001 locations, please visit our web site at www.edc.uri.edu/uriww, email us at uriww@etal.uri.edu, or phone us at (401) 874-2905.

Support for RINHS Programs Helping Us Grow

Thanks to the support of its members and generous donations from the Champlin Foundations and the Sharpe Family Foundation, the Rhode Island Natural History Survey has made a strong start to the year 2001. In December 2000, the Champlin Foundations granted RINHS \$33,590 to equip a Biodiversity Center, purchase reference materials for our library, upgrade computer systems, provide display materials, and purchase equipment for the *Biota of Rhode Island* project.

The Sharpe Family Foundation donated \$10,500 in December, to provide general organizational support for the Survey. The Survey has also received pledges of support from the Block Island Conservancy, Block Island Land Trust, Ocean View Foundation, and URI Coastal Institute, to help fund the proceedings of the Block Island conference (see p. 9).

RINHS is very grateful for the on-going support of the Rhode Island Agricultural Experiment Station, the URI Coastal Institute, and URI Department of Natural Resources Science.

Rhode Island Natural History Survey, Inc.

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Peter V. August, URI Coastal Institute
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David Blockstein, National Council for Science and the Environment
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Marciana Caplis, U. S. Fish & Wildlife Service
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Weaving the Web: Electronic Resources

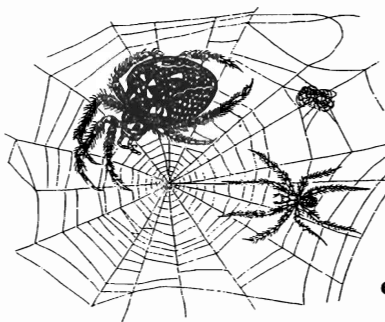
Association of Environmental and Resource Economists (AERE) was established as a means of stimulating research, exchanging ideas, and promoting graduate training in environmental and resource economics. www.aere.org/

Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance Document provides an extensive collection of methods and protocols for conducting bioassessments in estuarine and coastal marine waters and the procedures for deriving biocriteria from the results. Includes case studies and physical classification information. www.epa.gov/ost/biocriteria/

Green Volunteers, the World Guide and Information Network to Voluntary Work in Nature Conservation, is an excellent instrument for finding volunteers and volunteer opportunities. www.greenvolunteers.org

H. John Heinz III Center for Science, Economics, and the Environment is a non-profit organization devoted to environmental policy based on both scientific and economic principles. It works closely with all the groups involved with environmental policy: environmental professionals, academics, government officials, and business. The Center conducts scientific research and economic analyses and reviews nonpartisan options for environmental policies. www.heinzctr.org

International Society for Ecological Economics (ISEE) facilitates understanding between economists and ecologists and the integration of their thinking into a transdiscipline aimed at developing a sustain-



able world. It focuses on ecological modeling, economic and environmental indicators, trade and development's effect on environmental conditions, valuation of ecosystems, and implementation of policy tools. www.ecoeco.org/

Nature Serve, an online encyclopedia of life, is a source for authoritative conservation information on more than 50,000 plants, animals, and ecological communities of the United States and Canada. NatureServe provides in-depth information on rare and endangered species, but also includes common plants and animals. www.natureserve.org

National Center for Environmental Economics (NCEE) is part of the EPA Office of Policy, Economics, and Innovation and prepares economic analyses under its own direction, and functions as an internal resources for other Agency offices seeking information on benefit-cost research and techniques, economic impact models and measures, and economic incentive mechanisms. www.epa.gov/economics/

Student Conservation Association, Inc. is the nation's largest provider of experiential conservation intern opportunities, and offers college and graduate students thousands of expense-paid positions, in over 50 disciplines, at natural and cultural resource sites throughout the US. www.sca-inc.org

University of Maryland Institute for Ecological Economics (IEE) is a component of the University of Maryland's systemwide Coastal and Environmental Policy Program. IEE was established to fill the growing need to integrate study and management of ecology and economics. <http://kabir.cbl.cees/edu/miiee.html>

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RINHewS, the newsletter
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Listing in Program for Annual Conference
10% discount on all publications
1 free registration at annual conference
20% discount on subscription to the journal
Northeastern Naturalist



Prentice Stout, 2000 Distinguished Naturalist, receives the gift of a plankton net from RINHS Board member Peter Lockwood, at the RINHS October conference on The Ecology of Rhode Island's Islands: Focus on Block Island.

Thanks!

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

from Roger Goos: *A Third Checklist of the Lichens of the Continental United States and Canada*, by Hale and Culberson; from Martine Villalard-Bohnsack: *Biology, 5th Edition*, by Campbell, Reece, and Mitchell; *Biology: The Unity and Diversity of Life, 9th Ed.*, by Starr and Taggart; from Jon Boothroyd: *Earth's Dynamic Systems, 9th Edition*, by Hamblin and Christiansen, *Introduction to Environmental Geology*, by Keller, *Our Geologic Environment*, by Blatt; from Josef Görres: *Soils: An Introduction, 4th Ed.*, by Singer and Munns, *Soils in Our Environment, 8th Edition*, by Miller and Gardiner, *Introductory Soil Science Laboratory Manual, 3rd Ed.*, by Palmer and Troeh, *The Nature and Properties of Soils, 10th Ed.*, by Brady; from Peter August: complete set of *Conservation Biology*, complete set of *Mammalian Species of the World* fact sheets; from Lisa Gould: back issues of *Conservation Biology*, *Natural Areas Journal*, *Rhodora*, *Northeastern Naturalist*, *Worldwatch Papers*, and the *North American Native Orchid Journal*.

Farewell and Welcome

RINHS bids a fond farewell to Elizabeth Downing, who leaves her post as RINHS administrative assistant for a position at Casey Farm in North Kingstown.

Patty O'Biso is our new administrative assistant; she comes to us with lots of energy and many useful skills. Look for Patty at one of our upcoming events or when you visit the office.

Illustrations credits: p. 5, Mute Swan from *Birds on the Move: A Guide to New England's Avian Invaders*, by Neal Clark (1988: North Country Press); photo on p. 20 by Lisa Gould. Other illustrations from *Animals: 1491 Copyright-Free Illustrations*, by Jim Harter, 1979, New York: Dover Publications, Inc. and *How to Know the Wildflowers*, by Mrs. W. S. Dana, New York: Dover Publications, Inc.



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