RINHewS

The Newsletter of the Rhode Island Natural History Survey

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Right Track, Right Team: The President's Corner

On the inner door of my office is a poster that depicts two hands linked to a relay race baton. The baton is being passed from one hand to the other, a symbolic depiction of timing and cooperation in action. Below the graphic is this: TEAM—together everyone achieves more. Rest assured, the Survey is not contemplating sending runners to compete for a spot on the next U.S. Olympics track and field squad, but it is engaged in some high-energy teamwork with The Nature Conservancy of RI (TNCRI).

The teamwork in question emanates from recent discussions with TNCRI that culminated in the signing of a memorandum of understanding on 28 June 2002. That document outlines a collaborative effort in which the Survey will take over much of the science and stewardship previously carried out by TNC. Included in this charge are identifying gaps in inventory data, expanding and updating biota databases, monitoring selected species and communities, and crafting management plans for protected properties.

These endeavors should look familiar, because without exception, each has been a goal of the Survey since its inception in 1994. Perhaps more importantly, each was reaffirmed as a primary focus of action in the three-month Strategic Planning Consultancy that took place last winter, well before the first glimmers of a possible TNCRI partnership appeared on the horizon. Additionally, the Survey will oversee the completion of the Rhode Island Odonata Atlas and will administer the Wald Research Grant Program. While obviously neither could have been a specific goal of the Survey from day one, both fit perfectly into the goals of our newly formulated strategic plan. The Atlas will help fulfill our publications and collections vision, and the Wald Program will enable us to provide grants up to $3000 in support of original research on the biota, ecological communities, and geological systems of Rhode Island.

How fortuitous, then, that we could provide, and wanted to accomplish, exactly what TNCRI needed. Conversely, TNC was able to provide exactly what we needed to accomplish our collective goals. That is, financial support. The salaries of four Survey employees—a Conservation Biologist; a Coordinator for our Ecological Inventory, Monitoring, and Stewardship Program; a Data Manager; and an Odonata Specialist—will be covered by TNC for the first two years of our partnership.

To ensure that this exciting venture thrives and grows beyond year two, we need to be both innovative and vigilant. In our quest to secure long-term funding for this initiative in particular, and operating funds for the Survey in general, TNCRI has made available 30% of the time of one of its development officers. It is our intention to utilize this financial acumen to build an endowment and to create a revenue stream that will support the Survey far into the future.

Partnering with TNC is a bold new step for

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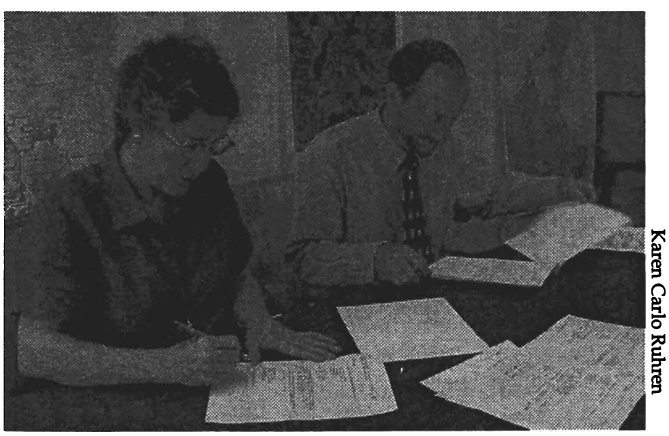


Karen Carlo Ruhren

RINHS executive director Lisa Gould and TNCRI state director Terry Sullivan signing the partnership agreement on June 28, 2002.

What's Inside?

Research Reports

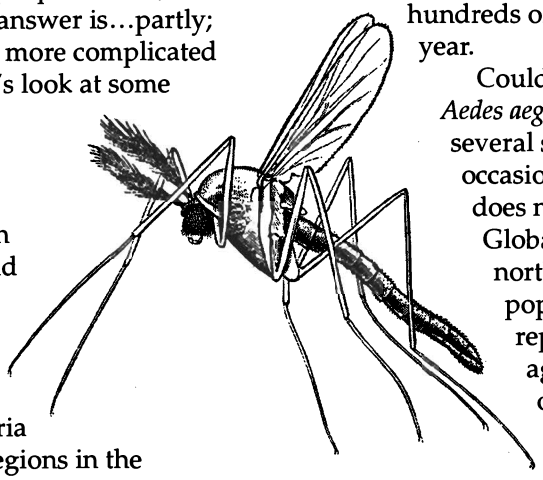
Global Climate Change and Vector-borne Diseases

by Howard S. Ginsberg

Temperatures are rising, and it's starting to feel hot around here. Chunks of the polar ice caps seem to be breaking off in standard "Rhode Island size" units. The fact is, global temperature trends showed substantial increases in the last half of the 20th century (Jones and Wigley 1990), and estimates suggest that mean global surface air temperatures will increase by 1.4 to 5.8 °C above 1990 levels by 2100 (Houghton et al. 2001). Conventional wisdom has it that these increasing temperatures will result in northward spread of nasty tropical diseases, like malaria and dengue, threatening people in new, even temperate areas. Is this true? The answer is...partly; sometimes yes, sometimes no; it's more complicated than that (Harvell et al. 2002). Let's look at some examples.

Malaria. Worldwide, malaria is undoubtedly the most important parasitic disease, causing illness in hundreds of millions of people and well over one million deaths each year. It is primarily tropical in distribution, and global warming could, indeed, result in an expanding range. However, malaria has occurred outside of tropical regions in the past, and was quite common in temperate North America in the early 1900s. The primary vector was *Anopheles quadrimaculatus*, a species that is still commonly collected in this area. The decline in malaria in the northeast resulted from human activities such as habitat modification, pesticide application, and medical treatment. Larval *An. quadrimaculatus* live in permanent ponds and marshes with shallow edges and emergent vegetation (e.g., cattails). Modification of these types of wetlands to provide dry land for development, or to produce farm ponds with clean edges (useful to store water for irrigation and fire suppression) resulted in sharp declines in the abundance of this species. Malaria still occurs in the U.S., almost exclusively in people who have traveled to malarious parts of the world and returned with the parasite. Occasionally, one of these people is bitten by an *Anopheles* mosquito, which can then transmit it locally. This happens every once in a while, but is rare. Climate change is not likely to affect malaria transmission in the northeast because the vector is already here. The rarity of locally transmitted malaria results largely from human activities.

Dengue. The primary vector of dengue in the Western Hemisphere is *Aedes aegypti*. This container-breeding African species was introduced into the New World on slave ships. Efforts to control *Ae. aegypti* (which also transmits yellow fever) resulted in substantial declines of this species in many Latin American countries by the mid-1900s. However, *Ae. aegypti* populations have increased dramatically in recent decades (Service 1989). This has resulted from relaxation of management efforts and from urbanization, especially the growth of poverty-stricken areas at the edges of large cities, with accompanying poor sanitation and abundant *Ae. aegypti* larval habitat. Another factor is the ease of global travel, with accompanying introductions of various serotypes of dengue virus into these urban areas. Dengue fever is now epidemic in South and Central America, with hundreds of thousands of cases each year.



Could dengue spread into the U.S.? *Aedes aegypti* is already common in several southern states, and occurs occasionally in Rhode Island, but does not overwinter this far north. Global warming could result in northward spread of *Ae. aegypti* populations and more rapid viral replication in mosquitoes, but again, the vector already occurs in the southern U.S., where dengue is extremely rare (Gubler et al. 2001). Human activities, especially urbanization, global travel, and sanitation of artificial containers (the primary larval habitat of *Ae. aegypti*), will probably have greater influence on dengue transmission than will climate change. Interestingly, global transportation has resulted in another kink in the dengue story. The Asian Tiger Mosquito, *Ae. albopictus*, was recently introduced into southern North America from Asia. This species, also a container breeder, is displacing *Ae. aegypti* in many areas. Although *Ae. albopictus* can transmit both dengue and yellow fever, it is not as good a vector of either as is *Ae. aegypti*, so its spread might lessen the likelihood of these diseases becoming problems in this country.

Increasing temperatures can have numerous effects on pathogens and vectors, including modified pathogen replication, transmission efficiency, and vector longevity. The interplay of these factors can have profound effects on transmission dynamics of vector-borne diseases. Reeves et al. (1994) speculated, based on an elegant series of experiments and observations, that global warming would result in

the northern spread of St. Louis Encephalitis in California, but that Western Equine Encephalitis would likely disappear from southern parts of its range. The predicted decline resulted from increased modulation of viral multiplication by the vector, *Culex tarsalis*, at higher temperatures. Again, the effect of global warming on arboviral transmission can be counterintuitive.

Lyme disease. The tick species that carries Lyme disease in the eastern U.S., *Ixodes scapularis*, is common in the southeast. However, Lyme disease is far more common in the north. Apparently, this results from the abundance of ground-dwelling lizards (e.g., ground skinks) in the southeast. These reptiles are infested by ticks but do not harbor the spirochetes that cause Lyme disease. In the north, where the lizards are absent, immature ticks attach abundantly to White-footed Mice, which are efficient reservoirs of the Lyme spirochete. Another contributing factor is the shorter active season up north, which results in a two-year tick life cycle. Uninfected larval ticks hatch from eggs in midsummer. They take a blood meal (often picking up the infection) and emerge as nymphs the following spring. The infected nymphs feed (often infecting their hosts) and emerge as adults in the fall. The larvae (of a different population living in the same place) that appear in midsummer feed on many of the same hosts that were infected by nymphal feeding in spring and early summer. Thus the two-year life cycle results in two populations in an area, with the older (infected) nymphs appearing earlier in the season than the younger (uninfected) larvae. This phenological "flip/flop" results in efficient transmission of spirochetes (from nymphs to hosts to larvae), which is lost in southern areas with longer active seasons where larval phenology substantially overlaps, or in some areas even precedes, that of nymphs. Thus, global warming might foster northward spread of Lyme disease, but would probably lessen Lyme transmission in southern parts of the range.

Global warming will have different effects on different diseases because of the complex and idiosynchratic interactions between vectors, hosts, and pathogens that influence transmission dynamics of each pathogen. Human activities, including urbanization, rapid global travel, and vector management, have profound effects on disease transmission that can operate on more rapid time scales than does global climate change. The general concern about global warming encouraging the spread of tropical diseases is legitimate, but the effects vary among diseases, and the ecological implications are difficult to predict.

Howard Ginsberg *is an Ecologist with the U.S. Geological Survey, Patuxent Wildlife Research Center, located at the Coastal Field Station at the University of Rhode Island. He also serves on the RINHS Board of Directors.*

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What Impact is the Drought Having on Amphibians?

by Peter Paton

For the past six years, my students and I have been studying the ecology of pond-breeding amphibians in Rhode Island. As a brief introduction to their complex life histories, there are 18 species of amphibians that occur in Rhode Island, of which 14 breed in ponds and the other four breed in springs, streams, or upland habitats. Most species of pond-breeding amphibians prefer to breed in ponds that dry annually, which presumably is because seasonally flooded ponds do not support fish populations that can be major predators of both amphibian eggs and developing larvae. Because most ponds that dry annually tend to be relatively small (often less than 0.5 acres), these ponds often do not provide a great deal of space for developing larvae. To avoid predation pressure and minimize interspecific competition, one of the unique aspects of pond-breeding amphibian ecology is that species exhibit temporal segregation when using breeding ponds: that is, each species uses ponds at different times of the year (see Wilbur 1972, 1987).

In Rhode Island, adult Wood Frogs (*Rana sylvatica*) and Spotted Salamanders (*Ambystoma maculatum*) are the first species to immigrate to breeding ponds, typically migrating in early March on evenings with heavy downpours. Larval Wood

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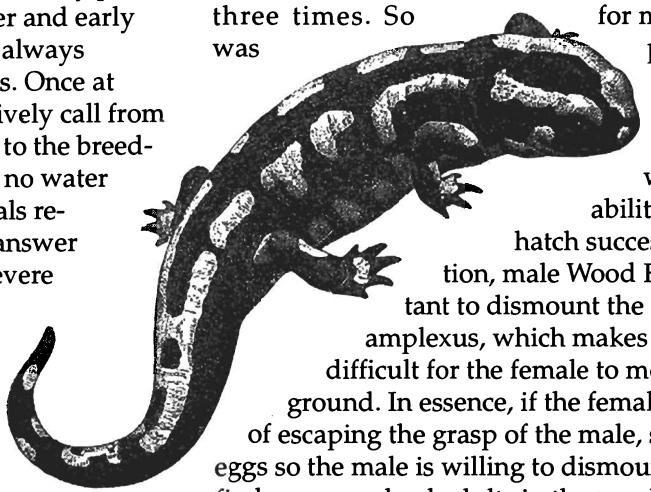
Frogs usually complete metamorphosis by early July, while most juvenile Spotted Salamanders take much longer to develop and do not emigrate from breeding ponds until mid-August. Thus, there is considerable variation in the hydroperiod requirements (i.e., days with surface inundation of water) of each species, with Wood Frogs needing water in pond basins about 112-144 days and Spotted Salamanders needing hydroperiod lengths of 155-211 days for successful larval metamorphosis (Paton and Crouch 2002).

In most years in New England, most dry pond basins are reflooded during the winter and early spring and adult Wood Frogs almost always immigrate to innundated pond basins. Once at flooded ponds, male Wood Frogs actively call from the water's surface to attract females to the breeding pond. Yet, what would happen if no water were in the pond—how would animals respond? We had a chance to begin to answer this question last spring due to the severe drought we experienced in southern Rhode Island. Many pond basins in the region that typically have 2-5 feet of water were bone dry in early March.



On 16 March 2002, I observed a natural history event that made me realize the 2002 breeding season was going to be extraordinary. I went out with my family to explore some ponds that I knew had breeding populations of Wood Frogs. It was a warm afternoon, over 55 °F, and we went to a large (1.5 acres), open canopy, pond basin that was completely dry, south of Carolina, Rhode Island. Immediately when we got out of our car, we heard the distinctive advertisement calls of male Wood Frogs in the distance, a sound that some people say resembles ducks quacking. The chorus was emanating from the woods at the edge of the pond basin, so we wandered toward it expecting to find a small puddle at the edge of the woods full of courting males. Instead what we found were about 90 pairs of Wood Frogs in amplexus (the male mounted on top of the female) calling from dry leaf litter in the forest about 25 feet from the edge of the pond basin. During the 20 minutes we watched this spectacle, we observed three females deposit their eggs on top of dry leaves. I revisited the site the next day and counted 56 egg masses in a communal deposition site in dry leaf litter in an area covering less than 1 square meter. There also were at least another 15 egg masses within a two-meter radius of the communal deposition site.

Over the next ten days, my colleagues and I documented six more instances where we found evidence of Wood Frogs depositing eggs in dry pond basins. At one dry pond basin in Arcadia Management Area, we counted 175 dead, desiccated adult Wood Frogs (primarily pairs in amplexus) and over 60 egg masses deposited on dry ground. So why were Wood Frogs depositing egg masses on dry ground? One potential explanation is that Wood Frogs do not breed until they are at least two years old and most Wood Frogs probably do not live much longer than 3 years, thus females probably only have one or two opportunities to breed. For example, Berven (1990) found in a Maryland population that approximately 84% bred once, 14% bred twice, and only 2% bred three times. So for many females this was potentially their only chance to breed, although there was a low probability the eggs would hatch successfully. In addition, male Wood Frogs are reluctant to dismount the female once in amplexus, which makes it extremely difficult for the female to move across dry ground. In essence, if the female has any chance of escaping the grasp of the male, she has to deposit eggs so the male is willing to dismount. Why did we find so many dead adults in the pond basin? I think one plausible explanation is the typical courtship behavior of Wood Frogs. In contrast to most other frogs in New England, male Wood Frogs actively call during warm afternoons when air temperature are over 50 °F. I suspect females were attracted to calling males, who promptly mounted females in the open pond basin, which had no canopy cover to protect the calling animals from the sun. Most amphibians are extremely vulnerable to dehydration, which is why major migration events only take place on rainy nights and courtship behavior usually takes place in pond water, where dehydration could not occur. Therefore, I believe the animals died of heat exhaustion and dehydration.

So will this drought have long-term impacts on breeding populations of Wood Frogs in the region? Obviously, short-lived species such as Wood Frogs are vulnerable to stochastic events including droughts. Yet in late March 2002, heavy rains began to fill many pond basins and a second wave of immigrant Wood Frogs was able to successfully deposit eggs in the water, and metamorphs were produced from ponds that were dry in early March. Therefore, although the drought did impact Wood Frogs, 2002 was not a total reproductive failure for Wood Frogs in southern Rhode Island. However, if a severe drought were to hit the region and prevent ponds from filling for two to three years in a row, the results could have major impacts on short-lived species such as Wood Frogs. In

contrast, long-lived species, such as Spotted Salamanders that live 20–25 years, are less vulnerable to short-term droughts because they can miss a breeding season or two without major long-term impacts to their populations.

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RHODE ISLAND ODONATA ATLAS: 2002 Summary

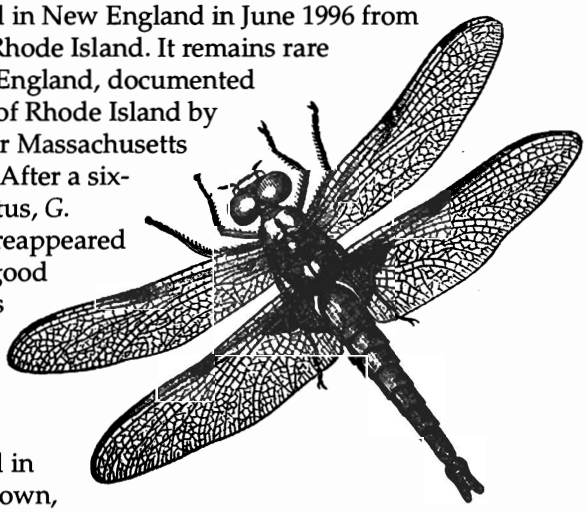
by Virginia Brown

The fifth season of the Rhode Island Odonata Atlas was characterized by low water, a marked increase in records of southern species, a dearth of river species, and a change of place for both the project and the collection. As of this writing, we have not yet received all of the collected 2002 material from volunteers, and the dragonfly season is certainly not over yet. However, the dedicated group of Atlas field volunteers has produced approximately 1,100 specimens to date, and the odonate collection has grown to about 11,000 specimens. The contributions of these volunteers and others involved in clerical duties and collection management are enormous. Approximately 550 volunteer hours were logged in 2002, most of these in the field. This figure will be slightly larger as end-of-season field forms and material come in. One hundred forty (140) sites were visited in 37 of Rhode Island's 39 townships. Only Block Island and Barrington were left un-sampled, but both of these townships received intensive effort in the first two years of the Atlas (1998 and 1999).

Although we did not add any new species to the Rhode Island fauna this year, during the five years of this project the state's odonate list went from 114 species to 133 species, increasing by 16.6% with the added effort of volunteers and staff. From a taxonomic perspective, many new records for both common and rare odonates were found in 2002. Distributions were completed—that is, specimen vouchers have been taken in every Rhode Island township—for two widespread, abundant species: the Blue Dasher (*Pachydiplax longipennis*) and the Fragile Forktail (*Ischnura posita*). A number of other species, including the Common Green Darner, Ruby Meadowhawk, Eastern Forktail, and Slender Spreadwing, also have nearly complete distributions. These and other species are needed from fewer than five and as little as one additional township.

Early in the 2002 season, a new population of the Ringed Boghaunter dragonfly, *Williamsonia lintneri*, was discovered in Richmond, bringing the total number of populations for this rare dragonfly in Rhode Island to 24. Richmond, with its abundance of shallow graminoid fens and relatively large areas of forest, supports nine populations of this species, 37.5% of Rhode Island's *W. lintneri* populations. The new Richmond site is less than a mile from two other wetlands containing breeding populations of Ringed Boghaunters and well within flight distance of two others. The close proximity of *W. lintneri* populations in Richmond clearly indicates that dispersal occurs between sites. A few of the fens in the Richmond metapopulation support large source populations, while others contain very small numbers of animals on a yearly basis, and still others support *W. lintneri* only in certain years. Although we have no data on the size of the new Richmond population, we intend to conduct exuvial (larval shell) counts in 2003 in order to quantify it.

Also of great interest in 2002 was an "incursion" of a southern dragonfly not previously reported during the course of this project (1998 to present). The Taper-tailed Darner (*Gomphaeschna antilope*) was first collected in New England in June 1996 from Exeter, Rhode Island. It remains rare in New England, documented outside of Rhode Island by only four Massachusetts records. After a six-year hiatus, *G. antilope* reappeared here in good numbers in 2002. In June, a male was collected in Charlestown, followed shortly by a male from South Kingstown, where several were seen at one time. Coincidentally, on the same day the South Kingstown animal was collected, *G. antilope* was again observed, this time in a West Greenwich gravel pit. Four to six individuals were seen foraging at the West Greenwich site, but avoided capture. Although we still have no evidence



of reproduction in the state, *G. antilope* is a bog species and all observations have been made near appropriate habitat.

Two other southern odonates were present in Rhode Island in good numbers this year. The Blackwater Bluet (*Enallagma weewa*) was collected at several stations along the Pawcatuck River in Charlestown, South Kingstown, and Richmond. To date, Rhode Island is the only place in New England where the Blackwater Bluet is recorded, making the new discoveries extremely significant. It is apparently thriving in our state, with large breeding populations known from five localities in southern Rhode Island. The nearest population continues to be on Long Island. Coppery Emeralds (*Somatochlora georgiana*) also appeared in the state in traditional as well as new locations in 2002. This southern dragonfly, the rarest in its genus and a conservation target for The Nature Conservancy, is well documented in Rhode Island and is breeding here in several locations. Like the Taper-tailed Darner it is represented in New England only by populations in Rhode Island and Massachusetts. It is a late-season stream species that has been regularly encountered in large mixed groups of foraging dragonflies, including other members of the genus *Somatochlora* as well as *Aeshna* and *Anax* (Mosaic and Green Darners). New populations were found in 2002 in Charlestown and Foster, and they are significant in that female vouchers were taken and ovipositing females observed, confirming breeding at these sites. Two locations in Rhode Island now have records for all three of these southern species, making them strongholds for some very rare New England odonates. It is likely that we are seeing the evidence of significant recent range expansions in at least two of these species, though the dynamics of these populations and their movements remain puzzling.

In contrast to the large numbers of southern odonates reported in 2002, several dragonflies normally abundant and widespread on forested streams or in temporary waters were either completely absent or encountered on only a few occasions. These include the Twin-spotted and Delta-spotted Spiketails (*Cordulegaster maculata* and *C. diastatops*), and the Mocha Emerald (*Somatochlora linearis*). The marked absence of these species in 2002 was as disappointing as it was interesting. Both the spiketails and the emeralds are impressive in size, color, and behavior, a challenging trio to work with. Their rarity this year may have been a response to weather conditions such as the droughts that occurred in recent years. The drought of 2000 reduced stream flow dramatically, and may have impacted the larval stage of these and other dragonflies. Two species of rainpool gliders, the Wandering Glider (*Pantala flavescens*) and the Spot-winged Glider (*P. hymenaea*), were also rarely encountered in 2002. These dragonflies breed in temporary rain pools and ponds, ephemeral habitats that were scarce throughout the northeast in this drought year.

In September of 2002, the Rhode Island Odonata Atlas, staff, and growing collection were moved from The Nature Conservancy office in Providence to the Rhode Island Natural History Survey at the University of Rhode Island's Coastal Institute in Kingston. As we close out the 2002 season and prepare for our sixth and final field season, we would like to acknowledge the cadre of loyal volunteers who are the backbone of the Atlas, who have assisted with every aspect of this project including the recent move. We also appreciate support from the Rhode Island Natural History Survey, The Nature Conservancy, and the Rhode Island Foundation.

__Virginia Brown__ is the Coordinator of the RINHS Ecological Inventory, Monitoring, and Stewardship Program.

Plant Sleuthing
by Francis Underwood

According to the Rhode Island Natural Heritage Program, there are more than 1,100 species of vascular plants native to Rhode Island. Sixty-two species have no extant populations (state historical) and 51 species are in imminent danger of extirpation (endangered). Since 1999 I have rediscovered four populations of state historical species as well as a few species that are State Endangered.

Lilaeopsis chinensis has been historical in Rhode Island since about 1900. There are three specimens from Rhode Island in the Harvard herbarium, dated 1843, 1844, and 1873. A member of the Parsley family, *Lilaeopsis* is a small plant that grows primarily along tidal rivers. It has leafless petioles called phyllodes, and an interesting tiny five-parted flower that rises from the base of the plant. The entire plant is submerged at high tide. I knew the plant only from photographs and illustrations. I was aware of a stretch of shoreline along a tidal river in Rhode Island, which looked like good habitat for *Lilaeopsis*. On June 19, 2000 I visited this area at low tide. I walked along the river side of the *Spartina alterniflora* mat and one of the first plants that I spotted was *Lilaeopsis*. It was growing in the shallow mud at the base of the *Spartina* culms. The plants formed a turf among the *Spartina* for a few hundred feet along the river. In the mid-Atlantic states, *Lilaeopsis* is found growing among *Scirpus americanus* plants.

In May 1999 in Glocester, RI, I discovered a large population of *Smilacina trifolia*, Three-leaved False Solomon's Seal. This plant, which was in bloom at

the time, resembles Canada Mayflower, and is a member of the Lily family. It grows in sphagnum bogs and mossy woods. I identified it through a digital photograph that I took. Rick Enser included this photograph on the cover of the *Rare Native Plants of Rhode Island*, 2002 edition.

On June 15, 2002 while walking through a swamp in West Greenwich, I spotted a sedge that was different from any sedge I had ever seen before. It turned out to be a new site for *Carex collinsii*, Collin's Sedge. This species occurs mainly along the coastal plain, and Rhode Island is at the northern limit of its range. On July 5, about one-half mile down the road, on the edge of a cow pasture, I found a second population of this sedge. These are the only known populations for this species in New England. It occurs in about thirteen eastern states and is critically imperiled or historical in four, and secure in only two states.

Irene H. Stuckey

Oxalis violacea, *a State-endangered species.*

Another plant listed as historical was *Cuscuta coryli*, Hazel-dodder. It is a parasitic plant, and, although its name implies that it grows on hazelnut, it can also be found on other herbs and shrubs. I found it in West Greenwich in August 2002, growing on an aster. It has mostly four-merous flowers with corolla lobes inflexed at the tips.

Violet Wood-sorrel, *Oxalis violacea* (whose flowers are more pink than violet), and Autumn Coral-root, *Corallorhiza odontorhiza*, are both State-endangered species. As of May, 1999, Rhode Island had two known populations of *O. violacea*, both occurring in Newport County. A third, previously unknown population, which I found on May 22, 1999, is in Washington County along a woodland trail. It was growing with Wild Geranium and was difficult to see because the flowers of the two plants are almost the same color. *Flora Conservanda* lists this species as a Division 2 plant, meaning it has fewer than 20 occurrences throughout New England. Massachusetts is the northern limit of its range in New England.

Autumn Coral-root is a rather elusive, leafless, native orchid, which blooms in September and October. Its small size, yellow-brown stems, and cleistogamous flowers make it quite inconspicuous in the leaf litter where it grows, and the waning sunlight of autumn further complicates the search for this denizen of rich woods. I have found this plant growing at two different sites. One site is in Lincoln where it had been previously reported, and a new site is in Cumberland. I have found it in woods dominated by Sugar Maple and Flowering Dogwood.

As wildlife habitat in Rhode Island continues to be destroyed by development, "sprawl," and off-road vehicles, more native plants will become endangered and some will be extirpated from the state. Fortunately many of the above-mentioned species are located in nature preserves or on state property and are presumably secure until they succumb to the inevitable ecological succession.

***Francis Underwood** is a Biologist with the Narragansett Bay Commission, and a walk leader for the Rhode Island Wild Plant Society.*

Assessing Change in Rhode Island's Ecosystems: RINHS 2003 Conference

The Rhode Island Natural History Survey's 8th conference will be held on Friday, March 7, 2003 at Rhodes-on-the-Pawtuxet in Cranston, Rhode Island. The theme of the 2003 conference is *Assessing Change in Rhode Island's Ecosystem.*

The day will begin with the 2003 Distinguished Naturalist Awards, a highlight of our conferences. Session I, *What Is the Meaning of Change: The Challenges to Assessment*, will feature two keynote speakers, Robert Costanza and William Michener. Costanza is director of the Gund Institute for Ecological Economics at the University of Vermont; his work has focused on ecosystem modeling and ecological and economic systems. Michener is associate director of the Long Term Ecological Research Network Office at the University of New Mexico, where he has specialized in the ecology of natural and anthropogenic disturbances, and ecological informatics.

Sessions II and III will deal more locally with the changes in the physical environment and in species composition, on topics including climate change, water flow reductions, habitat fragmentation, endocrine disrupters, water quality, invasive species, vector-borne disease, genetic dilution, and wildlife

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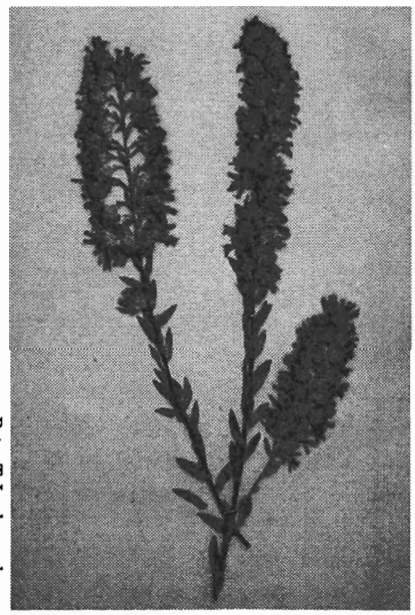
Rhode Island Collections

The Cora Deane Gardiner Collection

by Peter Lockwood

The Gardiner collection is a small assemblage of plant specimens received at the URI Herbarium (KIRI) in October of 1998. The collection, totaling 133 plants, is bound in a 11 X 15" ledger book with the inside front cover marked:

"Gathered from South Kinstown [sic] Rhode Island, Peace Dale, R.I., U.S.A." The collection is rich in goldenrods and asters and represents wildflower collections by Cora Deane Gardiner between 1892 and 1894. Each specimen is meticulously sewn onto folded paper sheets and carefully labeled in an Edwardian script. Ms. Kim Nordstrom of the Olin Library at Rollins College, Winter Haven, Florida kindly returned these plants to KIRI after having received them (we assume) from the effects of Ms. Gardiner or one of her descendants. There probably exist hundreds of wildflower collections of this age and type at various repositories in our country. The pastime of "botanizing" was especially popular during the latter half of the 19th century as an appropriate (even coeducational!) social activity for the mid- to late-Victorian gentry. However, the value of these small groups of specimens is often diminished in the eyes of professional taxonomists and herbarium managers. This is primarily attributable to lack of extensive specimen label data, occasional misidentification of plants, and poor quality or incomplete specimen material.



Peter T. Lockwood

*Figure 1. Putative Eastern Silvery Sster (*Aster concolor L.*) from the Cora Deane Gardiner collection, collected in Perryville, RI in the autumn of 1892. This regionally rare taxon, which is more common southward, is endangered in MA and NY, and is presently considered a State-historical species in RI, being last recorded from Washington County in 1925.*

Although it is true each of these shortcomings may be noted in the Gardiner collection (e.g., nearly all specimens lack roots), we should remember this collection was likely never intended for botanical documentation or voucher. Nevertheless, these "minor monuments" often give us an important partial representation of our past flora. They frequently provide important information on colloquial nomenclature and place names and sometimes provide meaningful locality data for species that have become scarce or are not presently known in our flora.

The botanical nomenclature of the collection appears to be consistent with the sixth edition of *Gray's Manual of Botany* (Watson and Coulter 1889), and many of the recorded common names are full of character. Are we presently in the process of forgetting such names as "Immortelle" for *Gnaphalium uliginosum*, "Whiteweed" for *Chrysanthemum leucanthemum*, or "White Alder" for *Clethra alnifolia*? It is also curious to see an annotation on a specimen of "Cornel" or Flowering Dogwood (*Cornus florida*) as "very rare."

There are interesting variations on place names, too, that may be of local historical interest or significance. For example, the present-day village of Mooresfield located near the intersection of Route 138 and Broad Rock Road in South Kingstown is uniformly spelled "Moresfield" throughout this collection. Also recorded are specimens from "Sassafras Rock" at Tower Hill and "Forest Hill" in South Kingstown. "Wolfs Rock," as recorded for a specimen of "Stone Clover" (*Trifolium arvense*), might suggest the place name is derived from the surname of "Wolf" rather than the *Canis lupus* connection implied by the present-day usage of "Wolf Rock" or "Wolf Rocks."

Of particular interest in this collection are fourteen specimens tentatively representing taxa of current conservation interest in Rhode Island or New England. These species are listed by the RI Natural Heritage Program (Enser 2000) as State Endangered (SE), State Threatened (ST), State Historical (SH), or Species of Concern (SC), or included in the New England Plant Conservation Program (NEPCoP) *Flora Conservanda* (Brumback and Mehrhoff et al. 1996). Although all of the identifications need to be confirmed, some of the more significant specimens include *Aster concolor* (SH; Figure 1), *Saxifraga virginiensis* (SC), *Viola pubescens* (SC), and *Gentiana andrewsii* (SH). Unfortunately, it is apparent that a few of these plants were misidentified (e.g., *Viola sagittata* identified as *V. palmata* [ST]), and two potentially important collections (*Aster macrophyllus* [SC] and *Gentiana crinita* [ST]) have no location data at all. Additionally, a few specimens might represent garden collections rather than wild native populations (e.g., *Geranium robertianum* [SC], *Monarda fistulosa* [SH]).

A large proportion of the specimens from this collection were gathered at "Saugatucket Farm" in Peace Dale and are ascribed to the "North Meadow,"

"North Spring," or "North Meadow Bog." Among these are significant records of *Solidago rigida* (SH), *Arethusa bulbosa* (SE), *Calopogon tuberosus* (SC), and *Gerardia tenuifolia* (SC).

To see if I could ascertain the location of Saugatucket Farm, I contacted Rick Gardner from Mooresfield to see if he had any information. He indicated that Saugatucket Farm was at the location of the former St. Dominic Savio retreat center on Broad Rock Road (now the location of the new Broad Rock Middle School). This might place the North Meadow, Spring, and Bog somewhere between there and Saugatucket Bridge, or perhaps north of Saugatucket Road in the large wetland to the southwest of Indian Lake.

Inspection of the Soil Survey of Rhode Island (Rector 1981) for this area reveals an abundance of poorly drained soils suitable for bogs and springs in association with the upper reaches of the Saugatucket River below Indian Lake. An examination of the 1939 aerial photography of this locality reveals a much greater percentage of open land, and an abundance of wet meadow habitat in association with the Saugatucket drainage. At the height of agriculture and forest clearance in New England around 1830, an estimated 60% to 80% of the land was cleared for pasture, tillage, and orchards (Foster and O'Keefe 2000). By contrast, forest land in Rhode Island now covers an equivalent area of the state, and the volume of wood in our forests, one indicator of forest maturation, has increased almost eightfold in the last half century (Butler and Wharton 2002).

So, what might we infer from this "cluster" of uncommon plants? As a result of the decline in widespread agricultural activities during the last several decades, large portions of this former pasturage is now forested or overgrown in shrub thickets. Therefore, we need to imagine a far more open and pastoral landscape at the time of Ms. Gardiner's presence—a landscape more supportive of pasture, wet meadow, and ruderal species. It is plausible that numerous species are less common, or even rare, today simply as a result of successional landscape change.

As illustrated by the Gardiner collection, a renewed interest in small collections and isolated records from the amateur botanist can be productive in the documentation of our past flora. In fact, on a regional basis, NEPCoP is currently researching New England herbaria in an effort to recover localities and document specimen records for species of conservation concern. Such efforts hold great promise in helping us to understand the natural history of our landscape in the context of time and change.

***Peter Lockwood** serves on the RINHS Board of Directors and is an Associate and Senior Environmental Scientist with Mason & Associates, Inc.*

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The President's Corner, *continued from page 1*

everyone involved. There is risk, but we judged it to be outdistanced by opportunity. There is uncertainty, but we are drawn to the possibility of learning at a more rapid pace than we can now. Although we are years away from ultimately deciding whether abandoning the solo trek for the team bus was the right decision, our combined optimism and enthusiasm suggest that we are on the right track, and on the right team. Together, we will achieve more.

Assessing Change, *continued from page 7*

populations. Speakers include Candace Oviatt (URI GSO), Virginia Lee (URI GSO), David Skelly (Yale University), Diane Nacci (US EPA), Dana Kester (URI GSO), Stanley Cobb (URI Department of Biological Sciences), Leslie Mehrhoff (University of Connecticut), Howard Ginsberg (USGS Patuxent Wildlife Research Center), Barry Costa-Pierce (RI Sea Grant), and Brian Tefft (RIDEM Division of Fish & Wildlife).

In addition to the invited speakers, there will be poster sessions and organizational displays. RINHS will once again be inviting high school students and teachers to attend the conference, thanks to a grant from the Virginia B. Butler Fund of the Rhode Island Foundation. The URI Coastal Institute is also co-sponsoring the conference. For registration information go to the RINHS website at www.rinhs.org—you can now register online!

Focus on RINHS Organizational Members

by Karen Carlo Ruhren

Anthropologist Margaret Mead once said, "Never doubt that a small group of thoughtful, committed citizens can change the world."

With this conviction, a group of conservation-minded individuals spawned The Nature Conservancy in 1951. In the early stages much of the Conservancy's work involved assisting in projects initiated by other conservation organizations. In fact, its first effort in Rhode Island in the 1960s was helping the Audubon Society of Rhode Island protect the Davis Memorial Wildlife Refuge in North Kingstown.

In the 1970s, the Conservancy launched several regional offices around the country. The Eastern Regional Office was established in Boston in 1971 to handle projects on the east coast, including Rhode Island's work. In 1983, the New England Field Office, serving Rhode Island, New Hampshire, and Massachusetts, was formed. During this time the Conservancy typically turned over the management of land it had acquired to other organizations, namely Audubon and the Department of Environmental Management (DEM).

But in 1983, the Conservancy entered a new era of partnerships. Once again galvanized by a group of local citizens—this time on Block Island—the Conservancy under the direction of Eve Endicott (director of the New England Field Office) sought help to conserve the Lewis-Dickens Farm. One of Block Island's most significant tracts of open space, the farm touched a chord on the Island. Noted philanthropic organization The Champlin Foundations, along with DEM, championed the cause and helped secure funding to preserve the Lewis-Dickens Farm. The partnership between the Conservancy, Champlin, and DEM has remained strong ever since.

The success of the partnership laid the groundwork for the two keystone events of the next phase in the Conservancy's history: the founding of the Rhode Island Field Office and the designation of Block Island as one of the Conservancy's "last great places."

The Conservancy's new Rhode Island Chapter was established in 1989. Staff increased, allowing for the active management of Conservancy-owned properties throughout the state and a larger conservation presence among like-minded partners. Towns, communities, and local land trusts became increasingly active participants in the chapter's protection mission.

In 1991, the Conservancy's international headquarters initiated the Last Great Places program focusing on ecosystems with global ecological significance. Block Island received this distinction and shortly thereafter a satellite, or community-based, office was opened to concentrate on protection efforts on the Island.

In conjunction with the Rhode Island Natural Heritage Program, the Conservancy continued to identify land for conservation based on specific scientific criteria. This ranking system helped set priorities for protection work. During the 1990s, the Conservancy in Rhode Island made significant strides: building partnerships and bolstering support for a successful $56 million capital campaign.

By 2002, at the culmination of its five-year capital campaign, the Conservancy had completed 347 land conservation projects, protecting more than 22,000 acres with the help of almost 5,000 members along with partners, foundations, and corporate supporters. A new emphasis on large-scale conservation projects, or landscapes, is now at the heart of the Conservancy's protection efforts, with a focus on four main areas: Block Island, Pawcatuck Borderlands, Sakonnet, and the Queen's River area. This *Conservation by Design* strategy underscores the need for the Conservancy as a whole to view conservation beyond its geopolitical parameters and conserve large expanses of land that are critical to plants, animals, and natural communities that know no borders.

Also in 2002, The Nature Conservancy of Rhode Island and the Rhode Island Natural History Survey announced their collaboration to advance scientific knowledge and stimulate land conservation in the state. By working together the two nonprofit organizations plan to share expertise and resources that will allow them to act more swiftly to save precious land, plants, and animals; to monitor and manage conservation land more efficiently; and to share their findings among the state's environmental leaders.

More than 50 years after its inception, the Conservancy has "grown up" in the face of escalating development, overpopulation, and dwindling natural resources. Unfailingly it has held fast to its

mission: preserving the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the land and waters they need to survive. In Rhode Island and worldwide, the challenge is great, the urgency is constant, and the hope remains.

***Karen Carlo Ruhren** is Director of Communications at The Nature Conservancy of Rhode Island.*

BioBlitz 2002

by Rick Enser

On June 21-22, the Rhode Island Natural History Survey held its third BioBlitz at the Marion Eppley Wildlife Sanctuary in West Kingston, co-sponsored with the Audubon Society of Rhode Island. By now regular readers of *RINHewS* know that BioBlitz is a 24-hour intensive inventory of all life forms inhabiting a specific area, and the more than 1,000 acres at the Eppley Sanctuary provided the 90+ surveyors a wide diversity of habitats in which to pursue their quarries.

First conducted in the Washington, D.C. area in 1996, BioBlitz has quickly become a staple annual event for many natural history organizations throughout the country. Designed to illustrate for the public the diversity of life that surrounds them, the appeal of BioBlitz has grown steadily among the participants. Where else can field biologists gather in a mass effort to do what they like to do best—get out in the field and find the organisms that fuel their passions. It is 24 hours of pure discovery that contributes a wealth of new data to our knowledge on the distributions of many species.

Spurred by the perfect summer solstice weather, participants for BioBlitz 2002 began arriving well before the 3:00 PM start time on Friday to register, prepare equipment, and study maps for planning their forays. One of the first to arrive was Peter Warny from the New York State Museum. In his own words, "I love BioBlitzing," having participated in two already this year. He soon departed for the ponds with collecting equipment in hand and volunteers in tow. Despite finding only 16 species in his specialty groups (herptiles and fish), he readily passed along his enthusiasm for natural history to the adults and children who joined him in the field.

BioBlitz 2002 benefited from several other out-of-state travelers. Rhode Island native Gordon Tucker, now at the Stover-Ebinger Herbarium at Eastern Illinois University, happened to combine a vacation visiting family with joining us on Saturday to contribute many plants, especially in his group of expertise, the sedges. Don Flenniken drove with his daughter from Ohio specifically for BioBlitz, and he toiled in the field and at the microscope to identify more than 30 species of lichens. Keeping his perfect record of attendance at Rhode Island BioBlitz intact, beetle expert Derek Sikes from the University of Connecticut recorded a respectable 178 species. But the lepidoptera (moths and butterflies) won the battle of the invertebrates with 194 species because of the work of first-time "blitzer" Mark Mello of the Lloyd Center for Environmental Studies in Dartmouth, Massachusetts.

Lisa L. Gould

Eugenia Marks, Ginger Brown, Nina Briggs, Sue Oppenheimer, and Zach Oppenheimer team up to search for odonates at BioBlitz 2002.

As usual the botanists ruled the day with 257 vascular plants recorded, or about one third of the final total of 912 taxa, and a new Rhode Island BioBlitz record. This number may seem depauperate compared to the more than 2,000 recorded at the 2001 Connecticut event, but we are still looking for additional local experts to fill the void in such specialties as spiders, flies, and several other invertebrate groups. But despite these gaps, a nearly 1,000 species total is clearly demonstrative of Rhode Island's natural diversity, and the life forms that can be impacted through our daily activities. BioBlitz can show us that there is much more to consider than a few endangered or otherwise arbitrarily chosen special species when making decisions regarding the development or management of the landscape.

A complete list of participants, volunteers, donors, and the species recorded on BioBlitz 2002 can be viewed at the RINHS web page (www.rinhs.org). Also, look for the gallery of photos taken at the event by H. Perry Jeffries. The date and place of Rhode Island BioBlitz 2003 have yet to be selected, so please send us your suggestions and get ready to take part in what has become an important and fun Survey event.

***Rick Enser** is Coordinator of the Rhode Island Natural Heritage Program and a past RINHS president.*

Meet the RINHS Staff!

Virginia Brown is Coordinator of the RINHS Ecological Inventory, Monitoring, and Stewardship (EIMS) Program. She is well known in Rhode Island, having served from 1990-2002 as Director of Science and Stewardship at the Rhode Island Field Office of The Nature Conservancy, where she was responsible for research, land management, various aspects of conservation planning, and management planning. Ginger is also the principal investigator for the Rhode Island Odonata Atlas Project, which began in 1998 and continues to the present, now under the auspices of the RINHS.

Ginger has a B.S. in Wildlife Biology from Kansas State University. She was Curator of Research and Collections/Naturalist at the Cape Cod Museum of Natural History from 1981-1990 and is the author of *Dragonflies and Damselflies of Cape Cod.* For fun, Ginger loves to slog bogs and swamps, read, garden, chase fast-flying dragonflies, ride a bike, hike, and run.

Jackie Sones is the Conservation Biologist in the RINHS EIMS Program. Jackie is originally from Scituate, Massachusetts where she spent summers lobstering and fishing inshore. While working toward her B.A. in Zoology (and a minor in Marine Science) at the University of New Hampshire, she participated in programs at the Shoals Marine Laboratory, the University of California at Santa Cruz, Friday Harbor Laboratories, and the University of Maine. From 1991 to 2002 she worked as a Master Naturalist and Ecological Management Coordinator for the Massachusetts Audubon Society at their Wellfleet Bay Wildlife Sanctuary on Cape Cod. Some of the projects she was involved with there included inventories (aquatic invertebrates, moths, beetles, and small mammals); rare species monitoring (plants, birds, amphibians, and reptiles); and a coastal heathland restoration. During this time she co-founded *Ode News: An Occasional Newsletter about Dragonflies and Damselflies in Southern New England* (www.odenews.net) and co-authored the *Stokes Beginner's Guide to Dragonflies and Damselflies* (now available from the RINHS publications catalogue). Most recently she assisted The Nature Conservancy with plant and butterfly surveys in coastal grassland communities along the Oregon coast.

In her spare time Jackie enjoys watercolors, photography, swimming, and beachcombing.

In her new role as Data Manager for RINHS, ***Patty Taylor*** is responsible for mapping and entering data on all of the state's rare species into the RI Natural Heritage database system. In addition, Patty acts as the office manager for RINHS, with a variety of different duties including managing the organization's finances, membership, website, and book sales. She also assists in publications layout and data management for the Biota of RI project.

Patty earned a B.A. in Journalism and English from URI in 1993, and has worked in the communications departments of several environmental and educational organizations in California, Connecticut, and Rhode Island including Save The Bay and RISD. Patty lives on a small farm in Charlestown, RI with her husband Erick, raising rare breeds of livestock and Labrador retrievers.

Nina Briggs, the RINHS Odonate Specialist, has worked as a beadmaker, making and selling both assembled jewelry and loose beads, since 1975. Although beadmaking is wonderful, she has always been fascinated by insects.

In 1988 Nina decided that she needed to know more about insects, so she began studies at URI, where she earned a B.S. in Plant Science. That major proved to be serendipitous, as she met Pat Logan, who became her major professor for graduate studies and also introduced her to Ginger Brown, who had just started work for TNC in Providence.

Ginger asked Nina if she would inventory populations of two species of damselflies, the Lateral Bluet (*Enallagma laterale*) and the Pine Barrens Bluet (*E. recurvatum*), and she was hooked. The following year she did the same work on the Ringed Boghaunter (*Williamsonia lintneri*). These undergraduate projects gave her the subject for her Masters Thesis work on the natural history of the Lateral Bluet and the Ringed Boghaunter, and Nina received a Masters Degree in 1996. She has been working with Ginger on the Rhode Island Odonata Atlas since 1998.

Stephen Doyle has been the URI Coastal Fellow for the summer and fall of 2002. The Coastal Fellowship program is a unique opportunity for undergraduate students to work with scientists on research and outreach programs. A sophomore at URI, Stephen is majoring in Horticulture &

Turfgrass Management. The main focus of his fellowship was to design a PowerPoint presentation illustrating the natural communities in Rhode Island's terrestrial ecosystems and highlighting the species found within them. This presentation was originally designed as a slide program; thanks to Stephen's work we can now create a CD-ROM version and make it available at a much lower cost. Stephen was also responsible for helping to sort and catalogue Irene H. Stuckey's slide collection, and for updating and maintaining the RINHS biota databases, which now contain over 5,000 species.

It wasn't computer work all the time: Stephen also assisted Lisa Gould during plant inventories and with the Invasive Plant Atlas of New England project. During these field trips, Lisa trained Stephen in basic plant identification and familiarized him with the state's flora.

When he's not working with RINHS or studying, Stephen likes to ski, play soccer, skateboard, and read.

RINHS Executive Director ***Lisa Gould*** (photo on page 1) has been with the Survey since it began in 1994. She earned a B.A. in Biology at the University of North Carolina at Greensboro, and an M.S. in Zoology at URI, where her specialty was the ecology and behavior of birds. Since then she has moved down the food chain, and today is best known for her work in plant ecology and the issues surrounding invasive species. She is co-author of *Coastal Plants from Cape Cod to Cape Canaveral, Vascular Flora of Rhode Island,* and *Vertebrates of Rhode Island,* and has written or edited several other non-fiction works on the topic of caring for the Earth. For fun Lisa likes to hike, botanize, do nature photography, read, sew, and write.

New Aquatic Invader on Rhode Island Shores?

Mudmat, *Glossostigma diandrum* (L.) Kuntze, a wetland plant native to Australia, New Zealand, India, and East Africa, was collected from Meadowbrook Pond in Richmond, RI this summer. Originally spotted in 2001 by Sindy Hempstead, its presence was confirmed in the pond during 2002 by Lisa Gould (RINHS), Dan Lawton (RIDEM Division of Agriculture), and Robert LaFrance (USDA APHIS). Donald Les of the Torrey Herbarium at the University of Connecticut confirmed the identification, and a specimen was placed in the University of Rhode Island Herbarium (KIRI).

A tiny member of the Figwort family (Scrophulariaceae), Mudmat has narrow, opposite, spatulate leaves, no longer than a fingertip. The stems root at the nodes and create turf-like mats in shallow water and on exposed shores. The flowers are only 1 to 3 mm wide and may be white, pinkish, or lilac; they are solitary, growing on slender stalks from the base of the leaves. The fruits are round, with two cavities and minute, brown seeds.

There is speculation that Mudmat was introduced into the mid-Atlantic region as an escape from aquarium culture. Canada Geese may be a vector in the regional distribution of this plant, which has now been reported from New Jersey, Pennsylvania, Connecticut, and Rhode Island. The ecological effects of this new non-native species are unknown; more research is needed to see how it will spread and what native species and/or ecosystem processes may be affected by it.

For more information on Mudmat, go to www.aphis.usda.gov/npb/mudmat.html.

Upcoming Events

February 6, 2003. ***Conflicts of Interest in the Paper Wasp, Polistes dominulus: A Comparative Study,*** an RINHS lecture by Elizabeth Arévalo, Assistant Professor in the Department of Biology at Providence College, 7:30 p.m., Weaver Auditorium, URI Coastal Institute in Kingston. Free. For information call (401) 874-5800.

March 7. Rhode Island Natural History Survey will host its 8th conference at Rhodes-on-the-Pawtuxet in Cranston, RI. The theme is *Assessing Change in Rhode Island's Ecosystems.* To register call (401) 874-5800 or visit www.rinhs.org (see article p. 7).

March 22. Smithfield Conservation Commission invites people to join them and naturalist Patti D'Ambra for a nature walk to identify the flora of Stillwater Walkway, at 10 a.m. The one-mile walk is not challenging, and Patti's popular anecdotes, history, and hands-on demonstrations are entertaining and educational. Call Sandra Mayer at (401) 232-5075 for more information.

April 10. ***The Conservation Biology of Tree Kangaroos & Rainforest Habitat: A Community-based Approach,*** an RINHS lecture by Lisa Dabek, Director of Conservation & Research at the Roger Williams Park Zoo, 7:30 p.m., Museum of Natural History at Roger Williams Park, Providence, RI. Free. For information call (401) 874-5800.

April 12. Join Earth Day activities with the Smithfield Conservation Commission. Volunteers are needed to clean up trash at two or three sites in Smithfield. Volunteers will meet at Smithfield Conservation Center, Pleasant View Avenue, Smithfield, RI (behind the Police Station) at 9:00 a.m. and work until the job is finished. Please call Sandra Mayer at (401) 232-5075 for more information.

April 26. Smithfield Conservation Commission will host its annual Tree Day on April 26, starting at 9:00 a.m. Held at the Smithfield Conservation Center, Pleasant View Avenue, Smithfield, RI, the event will feature free distribution of evergreen seedlings and the sale of flowering shrubs at a greatly reduced price to residents of the town, and an Earth Day information fair with booths representing environmental groups in Smithfield. Please call Sandra Mayer (401) 232-5075 for more information.

Natural History Opportunities for Volunteers & Students

Roger Williams Park Zoo (1000 Elmwood Avenue, Providence, RI 02907) is looking for outgoing, friendly people who share an interest in animals and wildlife conservation 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 2002. Classes are held on Thursdays or Saturdays. Enrollment applications are now being accepted for the next training class. Interested persons, 18 years of age or older, can contact Wayne Wohlschegal, Coordinator of Volunteer Resources, at (401) 785-3510 ext. 356 for information on the application and interview process.

Roger Williams Park Zoo internship programs provide an intensive work experience that allows participants to rotate throughout the Zoo to ensure complete exposure to all areas of animal husbandry. Interns work 32 hours a week, Tuesday–Friday from 8:00 a.m. to 4:30 p.m. The spring/fall internship runs for 13 weeks and 10 participants are recruited. The summer internship program is limited to 8 positions. Affiliation with a school or university is not required. Participants who are receiving school credit must present all the necessary paperwork prior to acceptance into the program. Tuberculosis tests are required for all animal area volunteers.

For more information on the docent and internship programs, contact Debbie Richmond, Interpretation & Training Manager, Roger Williams Park Zoo, (401) 785-3510 x 356; drichmond@rwpzoo.org.

Smithfield Conservation Commission announces that the Smithfield Friends of Cemeteries meets every two weeks (as arranged) on Saturday, at 9 a.m., at the Smithfield Conservation Center, Pleasant View Avenue, Smithfield, RI (behind the Police Station). The group works at Smithfield historic cemeteries, some very old and small in size, cleaning and maintaining the grounds. In inclement weather, the group restores and repairs damaged or vandalized stones, and returns them to their original sites. Volunteers are needed for all activities. Please call Bob Buonoccorsi at (401) 231-3618 or Don Burns at 231-8996.

Smithfield Adopt-A-Spot is in need of volunteers to plant and maintain several traffic islands in all areas of Smithfield. This is a great opportunity to demonstrate the old-town pride of Smithfield by beautifying highly visible sites. Please call Sandra Mayer at (401) 232-5075.

The New England Wild Flower Society (180 Hemenway Rd., Framingham, MA 01701-2699) is currently seeking applicants for a plant conservation program in Rhode Island called the *Plant Conservation Volunteer Program* (PCV). The PCV Program puts the skills of amateur botanists to work relocating and collecting data on populations of selected rare plants for the Natural Heritage Programs throughout New England. The information collected by the PCV Program enables state Heritage programs to update rare plant records that often haven't been updated in decades and is also finding many previously undiscovered rare plant populations. PCVs participate in field trips to botanically rich locales, help with habitat management projects that benefit rare plants, and conduct botanical surveys at no cost for

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Rhode Island Natural History Survey, Inc.
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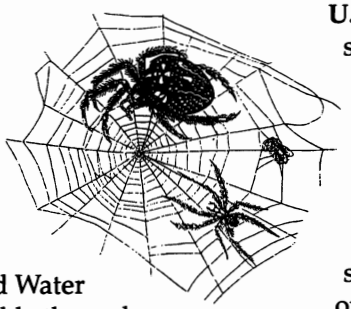
Weaving the Web: Electronic Resources



CSREES National Water Quality Program website builds upon the 10 Regional Water Quality websites (accessible from the address below) funded through the National Integrated Water Quality Program (NIWQP). Also available through the website are links to the existing four National Facilitation projects funded through NIWQP. The CSREES National Water Quality Program website offers a unique opportunity to access information about existing water quality programs and activities across the States and associated territories. **http://www.usawaterquality.org/**

U.S. Fish & Wildlife Service: Anyone who has ever looked for a picture of an eagle, a duck, or just a kid fishing can now find what they need in over 2,000 photographs now available via the Internet from the U.S. Fish and Wildlife Service. This unique collection of photographs is dedicated solely to fish and wildlife, wildlands, and wildlife conservation efforts. The copyright-free images have been digitized and loaded into a searchable database and are available for downloading in high and low resolutions from the new website.

The pictures include a comprehensive collection of waterfowl and wildlife species, as well as shots of wildlife habitats. The library also includes unique images of wildlife management and scientific field activities involving a wide variety of species. The site is searchable by subject, location, photographer, and the results appear in a grouping of low-resolution thumbnail shots linked to higher-resolution files suitable for high-quality printing in nominal sizes. **http://images.fws.gov/**

U.S. Geological Survey (USGS) has a new standardized web-searchable database of environmental methods that will allow scientists and managers monitoring water quality to compare data collection methods at a glance and find the method that best meets their needs. The tool also allows monitoring data to be shared among different agencies and organizations that use different methods at different times. This database was developed in conjunction with the U.S. Environmental Protection Agency (USEPA) and other partners in the federal, state, and private sectors.

Called NEMI, the National Environmental Methods Index, the tool is a free, web-based online clearinghouse of environmental monitoring methods. The NEMI database contains chemical, microbiological, and radiochemical method summaries of lab and field protocols for regulatory and non-regulatory water quality analyses. The site provides up-to-date methods information through a standard Internet connection and browser; users can directly access current methods information. In the future, NEMI will be expanded to meet the needs of the monitoring community. For example, biological methods will be added to NEMI, along with additional field and laboratory methods of importance to the monitoring community.

NEMI is a powerful tool, providing a summary of the procedures and performance data needed to assess methods. Critical data on sensitivity, accuracy, precision, instrumentation, source, and relative cost are produced as tabular reports, and full methods are linked to the summaries. **www.nemi.gov**

Benefits of membership in the
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2 free membership lists
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10% discount on all publications
1 free registration at annual conference
20% discount on subscription to the journal
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Thanks!

RINHS is grateful for the following additions to our library: *Journal of Ecology* 84(2), with an article about *Heracleum mantegazzianum* (Giant Hogweed), and Wetlands, 1991, a special issue of the *Journal of the Society of Wetland Scientists, Vol. II*, from Peter Lockwood; *NEAS Keys to Benthic Marine Algae of the Northeastern Coast of North America from Long Island Sound to the Strait of Belle Isle*, and a picture of Nero Mitchell in Bar Harbor, Maine, from Martine Villalard; *Avifauna of Hemlock-dominated Natural Communities of the Quabbin Watershed in Massachusetts* and *Rare, Unique, and Exemplary Natural Communities of Quabbin Watershed: Final Report*, from Jennifer Garrett; *Aquatic Hemiptera of Rhode Island*, Parts 1-5, by Charles V. Reichart, from the Museum of Natural History at Roger Williams Park; *Common Roadside Invasives, a Roadside Field Guide to Showy Herbaceous Weeds*, from Carl Sawyer; and *Rhode Island's Foliose and Fruticose Lichens, with Emphasis on the Nature Conservancy Preserves and Related Lands*, 2002, from Don Flenniken.

Rhode Island Natural History Survey
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Natural History Opportunities, *continued from p. 14*

municipalities and land trusts. The PCV Program is active in every New England state and currently enrolls just over 350 volunteers.

Candidates should ideally be committed to the conservation of the native flora of Rhode Island and knowledgeable about plants; however, we will train enthusiastic amateurs. We ask all potential volunteers to complete an application. If you know of any interested persons, we recommend that they return the application to us as soon as possible, as the required training session will be held in mid-March or April.

Please contact either Chris Mattrick or Brandon Mann to receive an application; Tel (508) 877-7630 ext. 3204, email bmann@newfs.org, or check out www.newfs.org.

The Massachusetts Audubon Society's Coastal Waterbird Program is beginning its search for wildlife biologists to help protect Piping Plovers and terns at 60+ sites. Responsibilities include: collecting behavioral and other biological data, erecting and maintaining protective fencing, and teaching beachgoers about the nesting birds and threats to their survival. Applicants must have strong interpersonal skills, be in good physical condition, and have their own vehicle. Experience in biological data collection and coastal bird identification is helpful but not a prerequisite. We will be offering both internship (10) and seasonal staff (7) positions. The internships come with free housing and a $75/week stipend and are excellent opportunities to gain field experience and receive college or graduate credit. To qualify for free housing, interns will be expected to work 35 hours per week for a minimum of 10 weeks. Seasonal Staff positions start at $7/hour and are full time; housing may be available upon request. Positions begin between April 15 and May 25 and end between July 31 and September 15. To apply, please send a cover letter (including dates of availability), resume, and list of three references to: Coastal Waterbird Program, Attn: CWP Internships, 2000 Main St., Marshfield, MA 02050. Interviews are beginning in January and all jobs will be filled (at the latest) by April 1, 2003. For more information contact Matthew Bailey at mbailey@massaudubon.org.

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