RINHewS

The Newsletter of the Rhode Island Natural History Survey

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The President's Corner

by Richard W. Enser

"Through the help of wannabe land thieving local environmental extremists, the wildlife officials have listed as endangered or threatened many animals that were previously considered insignificant or even pestiferous disease carrying vermin such as shrimp, flies, rats, mice, snails and spiders. Once listed the government effectively has no end to the amount of money they will spend to protect these creatures, or to hurt people under the guise of species protection. In Colton, California a hospital project was held up for months.....to protect the endangered Delhi Sands Flower Loving Fly. So here we have a fly being held in such high esteem that it is used by bureaucrats to hurt lives by the delay of a hospital."

First, let me apologize for the quote, but a former journalism teacher often stressed how important it was to capture your reader's attention in the first paragraph. We are all familiar with the kind of rhetoric expressed in the above statement, generally used by special interest groups in response to perceived notions of governmental abuse, in this case directed against the Endangered Species Act. This particular argument was found on the web page of *Citizens for Private Property Rights*, an organization based in California but representative of many such groups throughout the country. Although we might bristle at such diatribe, it is probably more important for us to pay more attention to the inaccuracies of information presented. Regardless of the author's intent or personal beliefs, the fact is that biased and false information is commonly disseminated and continues to confuse the public. In this example, the message is: any animal smaller than a Chihuahua is nothing but a pest and hardly worthy of concern.

Although it would be easy to disregard these arguments as the ramblings of minority extremists, it is also a fact that there are legislators, decision-makers, and other public figures who share their views. Private property rights, over-regulation, consumption of natural resources, and access to federal lands are some of the principal issues, and the misuse of scientific data has become the mechanism to sway an unsuspecting citizenry. I would submit that our response should not be to debate the legitimacy of the issues, but rather to do our job as ecologists, naturalists, and biologists by focusing our efforts on the gathering and dissemination of sound science.

In the short span of ten years the Rhode Island Natural History Survey has significantly progressed in providing a forum for the scientific community to educate the public in the diversity and complexity of this state's natural world. The venues have included seven conferences, over 40 lectures, five special publications, and numerous consultations and referrals. As we near the end of the Survey's first decade, the future holds much promise in expanding our means of communication through online databases, as well as providing new information in the form of management planning for natural areas. But there is still much to be done.

Some may argue otherwise, but I suspect that a majority of the public is still uncomfortable with anything smaller than a Chihuahua—that once they learn about the existence of a particular organism, they might respond with the oft-heard phrase, "What good is it?" All insects (with the exception of butterflies) are considered vectors of disease and therefore logically dealt with by a variety of inventions, such as the "Bug Zapper" aptly advertised as capable of ridding your yard of all flying pests.

This apprehension with the small has long been a human trait, but there also seems to be a tendency today either to fear or dislike larger organisms as well: the deer that consumes the ornamental hedges, the coyote that consumes the family pet,

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What's Inside?

Research Reports

Narragansett Bay: The World's Finest Estuary

by Perry Jeffries

This is a bold claim but one that can be defended: Narragansett Bay deserves distinction among estuaries—those coastal indentations where fresh water dilutes entering seawater. Justification of this claim requires looking at the facts, a task long overdue.

The facts fall into four categories: geology, history, economics, and natural science. Add the facts, forgetting the "apples and oranges" problem, and you obtain the following sufficient argument.

Geology

The last glacier carved interlocking channels, following courses laid down during previous glaciations. As the ice retreated and sea level rose to inundate rivers large and small, dams grew and then collapsed, forming the major basins: Upper Bay, East Passage, West Passage, Mt. Hope Bay, and Sakonnet River. Habitat complexity resulted, creating opportunities for flora and fauna, including us, to explore niches and nooks. Narragansett Bay is not the esthetically boring, biologically monotonous, funnel-shaped basin that its neighboring drowned river valleys present to the world.

The geologic fall line cuts across the Blackstone River in Pawtucket and swerves inland going westward. As the only coastal area combining waterpower and shipping access, America's industrial revolution started here.

History

For its size, Narragansett Bay's history is unmatched. Roger Williams landed bayside after expulsion from the Massachusetts Colony. He befriended the Narragansett Indians and prepared a dictionary of their language, two reasons, perhaps, for their continuing participation in the social milieu, more so than other Atlantic Coast tribes for whom estuaries are also named.

Even before Bunker Hill, Narragansett Bay inhabitants championed independence. A raiding party killed the captain of the Gaspee, a British ship, in reprisal for dastardly acts. Some historians trace the origin of the U.S. Navy to this incident.

Agriculture flourished in a Bay-moderated climate. The rich Bridgehampton load left by the glacier produced crops that exceeded local needs, so an export business arose. But exporting developed into the notorious triangle trade run out of Newport. Molasses from the West Indies became rum pouring forth from the city's 28 distilleries. The triangle's third apex, slavery, was hugely evil: the slave ships and associated vessels anchored in Newport Harbor once outnumbered our present-day Navy.

Hollywood immortalizes the West for lawlessness, but anything the James brothers or Frank Dalton concocted pales compared to exploits on the Bay during prohibition. Rum running started when fishermen and others took their "mosquito fleet" to the 20-fathom line, where booze in prodigious quantities was transferred from coastal vessels. Some of the contraband was dangerous if not deadly. The best liquor came from a trader named McCoy; hence the expression, "This is the real McCoy."

The Coast Guard took a dim view, and conflicts escalated. New boats appeared that could cruise the Bay at 40 knots, emit a smoke screen, and escape silently into a cove. Several had Liberty aircraft engines left over from WW I. A backyard mechanic built a stainless steel transmission that harnessed the power of three engines. The Navy tried to duplicate it but failed. A Detroit engineer hired to determine how these so-called yokels reduced noise looked into the engine compartment of a captured boat and said, "You know, they got everything just right."

While some fishermen were making a buck running rum, oyster poachers took advantage of privately planted grounds in the Upper Bay, using the remarkably efficient rocking chair dredge invented in Tiverton for this purpose.

Life on the Bay is tamer today but remains spirited as quahoggers and other fishermen comment on management. Bob Rayhill spent 30 years on the Bay. A former president of the Shellfishermen's Association, he voiced opinions supported by genuine eco-savvy.

During the early 1900s, shellfishermen suffered the demise of a rich oyster crop. A burst of scallops during the depression hardly compensated. Then came WW II and good wages earned off the Bay, to be followed by reliance on the quahog's vicissitudes and an expanding lobster population. The latter may collapse, as did the Winter Flounder, which declined 96 percent during the last 20 years. You might say that the determination of Bay people to stay in the game harkens to the spirit of the Independent Man statue atop the statehouse.

Economics

Save the Bay's former director, Trudy Coxe, made the case, "As the Bay goes, so goes the State of Rhode Island" when she valued the tourist industry at a billion dollars annually. Economists come and go speaking of imbroglio, but their equations connote gradual change, not the chaos inherent in systems

that embody subtle preferences. Small perturbations portend drastic consequences, as when a visitor looks up at a container ship plying the East Passage and says to herself, "This is not what I had in mind," and tourism collapses.

Combined sewer overflows buried in a mosaic of exponentially increasing sewage pipes create insidious problems. Untreated discharge—two billion gallons annually—closes one-third of the Bay to shellfishing, a figure that has not changed for decades, which led a noted economist to conclude that the Bay serves primarily as a sewer.

This 100-year-old problem is to be solved, we're told, by storing runoff mixed with sewage, then pumping the dissimilar products out for processing. Construction costs exceed one half-billion dollars spread over 20 years. But is this not a half-baked scheme avoiding the real problem: separating wastes from runoff at their sources? This would mean replacing much of the piping beneath the streets of Providence-Cranston, a costly proposition, but probably cheaper and more efficient in the long run.

Natural science

Saving the best for last, we come to Narragansett Bay's living system, second to none when the forces and factors shaping it are seen as an interrelated whole. First is its position in the biogeographic scheme of marine life, a strategic location between arctic and tropical realms. Water temperature ranges from freezing to about 25 degrees Celsius, establishing conditions for a seasonal parade of species populations that mix and compete with an indigenous biota cunningly adapted to the extremes—a story in itself.

Except for fall, the system hardly rests. Plankton production remains high even during winter, as northern populations move southward to be replaced during spring and summer by southern populations migrating northward. A twist of fate arose recently. Following collapse of the Bay's resident Winter Flounder population, southern migrants charged in and caused havoc in the fishery.

Estuarine populations—visitors and residents alike—face two challenges: the first is retention of water-borne reproductive products; second is adjusting or acclimating to the salt content varying from full-strength seawater to fresh. Both handicaps are mitigated in certain embayments that balance flushing against circulation patterns and salinity gradients. When the average flushing time is low, less than a week or two, eggs and larvae do not have time to develop before being swept to the ocean; conversely, if flushing time is long, stagnation may result, and life becomes untenable.

Narragansett Bay's month-long average flushing time is about ideal, which allows quahogs, for example, to reproduce successfully. Vertical mixing abets bottom oxygen concentration, in concert with gentle deep currents directed landward that retain eggs and larvae.

Narragansett Bay has a gentle salinity gradient. From Rhode Island Sound to the Providence River, salinity at the bottom of the Bay generally decreases less than 0.2 percent. Numerous species migrating along the coast can withstand this moderate drop in salt content, so the Bay offers a welcome of sorts to adults and then becomes a nursery for their young. The Bay also attracts invasive species. These scourges are increasingly favored as winters become warmer and cold-water survival no longer limits their northward expansion.

Implications

The eminent mythologist Joseph Campbell asked a student to define a metaphor. Pausing, the student replied, "John runs like a deer." Professor Campbell corrected him, "Not quite, John is a deer; that's the metaphor!"

Take that lesson a step further: "Narragansett Bay is not a symbol for Rhode Island, it is Rhode Island." Here is proper recognition for the world's finest estuary and a rallying point to insure that Narragansett Bay retains pre-eminence—a good lesson to remember.

Acknowledgments

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the suspicion that any observed wild animal is rabid. Some opinions are justified and many are not, but the trend suggests a greater need for accurate information. Moreover, not only do we need to populate the data fields of the natural history catalog, but we must also foster an awareness of the value of biodiversity and that we are definitely not hurting anyone by working for the protection of all species.

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Declining Pollinators and Natural Communities

by Howard S. Ginsberg

Are pollinating insects—including familiar bees—declining in the wild? This question was raised in 1996 by Steve Buchmann and Gary Nabhan in their book, *The Forgotten Pollinators.* They were concerned about loss of pollinating species based on their own experience in the Sonoran desert of the southwestern U.S., where they recorded case after case of populations lost to habitat destruction, pesticide use, or the effects of invasive species. This is no trivial concern, because the Sonoran desert is the area with greatest bee diversity in the Western Hemisphere. That's right, even greater bee diversity than in the tropics.

When most people think of bees, they think of honeybees and bumble bees. In fact, there are roughly 25,000 species of bees worldwide, mostly solitary creatures that nest in small holes in the ground. Nobody knows why diversity is so great in the southwestern desert. One contributing factor might be the seasonal pattern of flowering: diverse plants flower suddenly with the spring rains, and others flower intermittently in response to occasional summer rain. Furthermore, plant species change from river basins to desert areas to montane habitats. Perhaps because of the sudden and intermediate pattern of resource availability, numerous specialized species of bee are adapted to exploit these brief periods of diverse flowering. The result is a highly diverse bee fauna in a mid-latitude region of low productivity. Obviously, survival can be tenuous in this fragile environment, and a shopping mall built on a bee nesting site might doom a local population.

Buchmann and Nabhan were concerned with vertebrate pollinators as well. Many bird and bat species are important pollinators, co-adapted with numerous plant species in warm climates. Many of these vertebrate pollinators are migratory, and without "nectar corridors" (protected areas that provide flower forage along the migration route), these species are also threatened.

The Forgotten Pollinators spawned a debate among pollination biologists about the current status of pollinator populations. Were the examples described in the book simply anecdotes, and not indicative of a general trend? Or were these examples like the canary in the coal mine, indicators of greater devastation to follow? The debate was given extra urgency by the dramatic declines in honeybee populations in recent times, fueled largely by the invasive *Varroa* mites and tracheal mites. Of course, the honeybee (*Apis mellifera)* is not native to the Western Hemisphere, having been introduced by the early colonists. Nevertheless, pollinator decline was soon on the agenda in agricultural circles as well as among conservationists.

In 1998, the Society for Conservation Biology published a position paper on the potential implications of pollinator declines (Allen-Wardell et al. 1998). In 1999, the U. S. Department of Agriculture (USDA) and the Department of Interior (DOI) held a joint workshop on declining pollinators (Tepedino and Ginsberg 2000). Later that year, the National Science Foundation sponsored a conference on the technical aspects of tracking pollinator populations and determining whether they were, in fact, declining (published in the online journal *Conservation Ecology*, http://www.consecol.org/vol5/iss1).

The general consensus is that we don't know for sure whether populations of wild bees, wasps, moths, flies, beetles, and other pollinating insects are declining overall, because there are no long-term monitoring programs to track these species. The warning signs are abundant, however, and it is generally agreed that appropriate monitoring programs need to be established quickly. Unfortunately, given the patchy distributions, variable population sizes, and difficulty in identifying many of these species, the technical problems are considerable. As an important first step, a collaborative field study is currently underway involving scientists from academia, the USDA, and the U. S. Geological Survey to establish sampling protocols for wild bee monitoring programs.

Pollinators are obviously important in the production of fruit and seed crops. Farmers generally rent honeybee hives from beekeepers, so that millions of bees can be rapidly moved into areas that need pollination. Interestingly, wild species are more efficient than honeybees as pollinators of some crop species, such as blueberries and alfalfa. Compared to their role in agriculture, however, far less thought is given to the importance of pollinators in natural communities. Anything that influences plant reproduction can influence the growth and genetic structure of plant populations. This can, in turn, influence the structure of natural communities. Pollinators and their host plants potentially form "keystone mutualisms" that can be critical determinants of community dynamics. Unfortunately, this area of community ecology has received little study.

A consortium of organizations—including representatives from academia, government agencies, and non-governmental organizations—has formed recently to address the issues raised by the potential decline in pollinators. The North American Pollinator Protection Campaign (NAPPC), initiated by

the Coevolution Institute (an environmental organization from San Francisco), now includes participants from Canada, the United States, and Mexico. The NAPPC approaches the issue from several perspectives: addressing research needs, promoting education and awareness of the issue, developing conservation and restoration practices for pollinators, considering the implications of policies and practices, and developing special partnerships with appropriate organizations. Interested people can contact the NAPPC at (415) 362-1137 or by e-mail to NAPPC@coevolution.org, or can view their web page at http://www.nappc.org.

What is known about the status of pollinators in Rhode Island? This is a difficult question to answer, because the history of pollination relationships has been muddied by the major landscape changes of the past few centuries. The mature forest that covered the Northeast when the European settlers arrived was mostly cleared for farming during the 1800s, and numerous alien plant species were introduced. As the Midwest was opened for farming, much of the agriculture moved west. Rhode Island forests grew back through the 1900s, but the contemporary forest is nearly all second growth, quite different in physical and biological characteristics from the original forest, and highly fragmented by roads and towns. What's more, roughly one-quarter of the Rhode Island flora consists of introduced species (Gould et al. 1998). These changes have had substantial implications for pollinators (Ginsberg 1981). Some species have benefited, such as *Halictus ligatus*, a nondescript-looking, social sweat bee (family Halictidae) that nests in disturbed soil and forages readily on a wide variety of weedy flower species. However, the status is far less certain for many pollinators, especially those that specialize on rare plants. Unfortunately, nobody is tracking the populations of most of these species.

What can be done? Obviously, preserving healthy habitats is important, but the specific actions that are needed depend on the nature of the threat. The first priority is to establish monitoring programs for pollinators, so that the threats can be identified and mitigating actions taken. These actions could include providing nesting habitat (appropriately prepared open areas, or selected species of woody plants for twig nesters), or planting flower species that provide pollen and nectar at times of seasonal dearth of floral resources. With appropriate knowledge and planning, even modest efforts can have substantial benefits for pollinator populations.

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Earthworms–Our Exotic Friends?

by Joseph Gorres

Earthworms are most familiar animals to us. Who hasn't saved a worm from desiccation when it got stranded on a pavement after a storm? We consider them beneficial creatures, both economically and ecologically. We use Red Wigglers in vermiposting to accelerate composting of kitchen or garden wastes. Night Crawlers enhance the angler's odds to hook a fish. A variety of earthworm species improves agricultural lands by helping decomposition, nutrient cycling, drainage, soil tilth, and ultimately crop yield. Over longer periods, earthworms are agents of soil formation, translocating organic material from the soil surface to lower horizons. In addition, earthworms are regarded as ecosystem engineers that foster mutualistic relationships with other beneficial soil fauna, such as nematodes and protozoa.

Earthworms are, however, recent arrivals in the post-glacial landscape of the Northeast. There are about twenty species in New England. All of these species are exotic and can be invasive, if the environmental conditions are right. They came here with plant material imported from Europe. Some were brought over for composting purposes or they were imported by the bait industry.

Why are there no native species? Native species became extinct when glaciers pushed across the landscape during the last ice age. The glaciers left over 12,000 years ago. After they left, new soils formed. The present plant communities developed. But earthworms remained absent until European settlers inadvertently imported them. Ecosystems in New England developed without them.

Why had native worms not recolonized this area before the advent of settlers? Researchers estimate that earthworms travel about 2–5 meters a year. Since the glaciers receded, native worms could only have traveled 24 to 60 km (15–50 miles) under their own steam.

When exotic worms arrived with settlers in

the Northeast a few hundred years, they found their niches unoccupied. Unlike exotic plants, exotic earthworms did not have to compete with native species of their own ilk. However, now there are "worm watch" organizations (www.wormwatch.ca; www.nrri.umn.edu/worms/) that are concerned about the impact of earthworms on native ecosystems.

Why the concern? The answer lies within the function that earthworms take in ecosystems. Ecologically, earthworms are divided into three functional groups: *epigeic*, *perigeic,* and *anecic* earthworms. *Epigeic* earthworms live on the surface of the soil, feeding on litter and organic matter close to the soil surface. They do not form burrows. *Perigeic* earthworms live in the soil near its surface, ingest soil, utilize whatever nutrition they can extract from the soil, and form temporary, horizontal burrows. *Anecic* worms form permanent, vertical burrows and move litter from the soil surface to the lower horizons. Anecic earthworms, such as the common Night Crawler, can be voracious consumers of plant litter, which is a beneficial trait in agricultural ecosystems. However, in natural ecosystems that have developed with a certain decomposition rate, their "cleaning" of the soil surface and the upper soil layer of plant debris may disturb the synchrony between nutrient release and plant growth.

In ecosystems such as northern hardwood forests, where vegetation has developed in the absence of earthworms, the impact of earthworms on the ecosystem may be defined by how they alter the habitat of other species. Initially, concerns about earthworm effects on native taxa are not about competing earthworm species, but about species whose environment they change.

Minnesota WormWatch reports that forest soils are being altered (www.exstension.umn.edu/extensionnews/2002/EarthwormsDamageTheSoils.html). Earthworms feed not only on fallen leaves but also on the upper organic layer (duff layer) of the soil. The *duff* layer is spongy and is home to the roots of many plants. The duff layer is removed by earthworms and replaced by a mineral soil layer created by earthworm casts. The new surface layer is still rich in organic matter but more compact. The soil is no longer suitable for many of the herbaceous plant species of the forest floor and some of these plants are lost from the forest after an earthworm invasion. According to Cindy Hale of Minnesota Worm Watch, hardwood forests are most at risk, especially Sugar Maple stands. The experience in Minnesota has been that heavily infested areas lose plant biodiversity.

In Europe, by the way, two types of forest soil are distinguished. There are soils that have developed in the absence of worms. These soils have the "spongy," organic duff layer common to our hardwood forests where roots of herbaceous plants like to colonize. Soils that have developed in the presence of earthworms do not have this layer and have a different plant community. As the worm front moves farther into northern hardwood forests, a similar division of soils will undoubtedly develop over the years. This may occur whether the worms that invade the forests are exotic or native.

One of the factors that increases the risk of earthworm invasion is sport fishing. Anglers using earthworms as bait often dump leftover bait worms in the forest near their fishing site. The geographical distribution of worms in Minnesota hardwood forests is one clue that supports this claim. Worm infestations typically reach into forests from lakes that are used for fishing. Should anglers be held to a fishing code that includes: "Thou shalt not dump bait worms?"

Have earthworms escaped the angler's margarine tub and invaded forests in Rhode Island? Naturally, anglers dump bait worms. Whether significant areas have been infested by worms due to this practice is unknown because we have not looked. In other regions of North America, worm watch organizations (e.g., *Minnesota Worm Watch*: www.nrri.umn.edu/worms/ or *Nature Watch Canada* www.naturewatch.ca/english/wormwatch/intro.html) have been established. These volunteer networks include amateur naturalists as well as school children who monitor their patch of the landscape for earthworms. Networks like these have been successful in monitoring and mapping the distribution of worms and damage done by them. Maybe if we look, we will find similar patterns in our hardwood forests.

Potential changes in forest soil structure and the subsequent loss of biodiversity should concern those interested in biodiversity and conserving native plant communities. From this point of view, it may be timely to establish a network of worm watchers. Many of the tools required, such as sampling protocols and simple, but effective, identification guides are already available on the internet (see above mentioned web sites). But as a start, concerned naturalists may wish to keep an eye out for our exotic earthworm friends while walking through Rhode Island hardwood forests.

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An Invasive Red Seaweed: Morphology and Recruitment in Rhode Island Waters

by Marilyn M. Harlin and Martine Villalard-Bohnsack

In earlier issues of *RINHewS*, we reported on the invasion of *Grateloupia doryphora* (Montagne) M. Howe, a large red alga we believe was introduced to Rhode Island waters by ballast water of ships. This species has continued to expand its geographical distribution from an initial sighting on Beavertail Point (1994), to extensive populations throughout Narragansett Bay and along Rhode Island Sound (Villalard-Bohnsack and Harlin 2001). The most recent (2002) distribution data include Sakonnet Point on the Sound and Mount Hope Bay (Figure 1). This updated article addresses relationships of blade size and shape to latitudinal and vertical gradients (Villalard-Bohnsack and Harlin 2001), and strategies by which the alga is competing and spreading in Rhode Island (Harlin and Villalard-Bohnsack, 2001).

Relationship of morphology to latitudinal and vertical gradients

We found that size and shape of *Grateloupia* vary on a latitudinal gradient within the Bay and on vertical gradients measured at three locations in the Bay. With increasing latitude, specimens were statistically longer and wider; the largest specimen (175 cm long by 40 cm wide) was collected at the most northern station on Prudence Island. On a depth gradient, the specimens were larger at lower depths down to 1-2 m below Mean Low Water (MLW), where there appeared to be a point of inflection and blades became smaller. *Grateloupia* populations disappeared at minus 5.5 m MLW. This pattern was repeated at each of the three stations examined.

Shape also varied with position in the Bay. The highest percent of entire (non-fragmented) specimens was found at the northernmost latitudes and at lower depths. Larger sizes and unfragmented morphologies could be related to slightly higher temperatures and nutrient levels, reduced salinity, and/or lower water motion at these positions. Elsewhere, these factors have been related to size or shape variations in *Grateloupia* and in other red seaweeds.

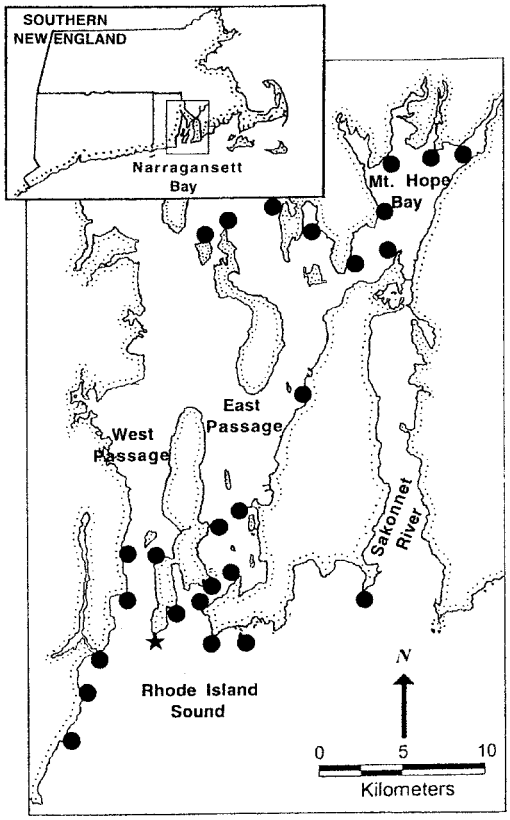

Figure 1. *Distribution of* Grateloupia doryphora *in Rhode Island waters by 2002. A star denotes the initial specimen found by Mary Engelhard (1994) at Beavertail Point on Rhode Island Sound. Black dots indicate established sites in Narragansett Bay, Rhode Island Sound and Mount Hope Bay.*

Growth rates and recruitment strategies for spreading a population

For field experiments, we glued uniform sand grains onto one half of circular, acrylic plates (13 cm in diameter) and bolted the sand-covered plates into the lower intertidal and upper subtidal zones at varying angles, depths, and time frames. The procedure was based on techniques developed for testing recruitment of native species (Harlin and Lindbergh 1977). We used a grain size that had favored *Chondrus crispus*, a native red alga. Our field experiments were performed on the eastern side of Narragansett Bay (Naval Air Station) and on the western side of Rhode Island Sound (Bass Rock). At both stations, plates were located in *Chondrus* and *Grateloupia* beds. To examine the life history more closely, we cultured spores from mature thalli in three different seawater media in laboratory conditions.

Growth rates were determined by measuring organisms on the same sand-coated plate over a series of months. The plates enabled us to collect information on time of settlement (any month) and percent of space occupied (up to 100%) in any time

period. For example, one of the plates set out in May displayed >300 individuals on sand-coated sections in June. By August, the blades had reached 25 cm (Figure 2) in length for an average growth rate of 8 cm mo^{-1}. Patterns of establishment and development were similar at the two experimental sites.

Four recruitment strategies were observed for *Grateloupia doryphora* in the field and in culture. They were: 1) spores to crust to blades, 2) blades growing from old crusts, 3) blades growing from the base of old, damaged thalli, and 4) new crusts and blades produced by filaments arising from crusts. Throughout the year, we found red crusts on sand-covered sections of plates, rocks, and other substrata in the lower intertidal and upper subtidal zones. Crusts expanded laterally into new crusts, each producing multiple blades of *Grateloupia*. In the field, we also observed blades proliferating from old crusts, and new blades growing from the base of old damaged thalli. In culture, spores germinated throughout the year into thin crusts, which also expanded laterally. This stage produced filaments that developed into new crusts and blades. We believe these four strategies enable *Grateloupia* to compete successfully and spread in Rhode Island waters. The crust form may be particularly critical for survival at near-freezing temperatures in winter and at warm temperatures of summer.

An interesting observation from experimental plates was that *Chondrus* failed to establish on the roughened surfaces. This finding contrasted with results two decades earlier, when *Grateloupia* had not yet arrived on Rhode Island shores. On sections of the plates not coated with sand (i.e., left smooth), *Grateloupia*, like *Chondrus* on earlier experiments, failed to recruit until encrusting coralline algae converted them to rough surfaces. The fact that: 1) only *Grateloupia* became established on this portion of the plate, 2) growth rate was rapid, and 3) multiple recruitment strategies were displayed, lends support to the hypothesis that this species may be able to outcompete native algae for space.

Discussion of invasive seaweeds

Reported earlier as an invasive in the north eastern Atlantic and in the Mediterranean Sea (reviewed in Villalard-Bohnsack 1997), *Grateloupia doryphora* continues to spread in Europe (Simon et al. 2001). In addition to *Grateloupia,* other invasive seaweeds have attracted attention worldwide, but their paths are not entirely predictable. *Codium fragile,* a cold water green alga, (Carlton and Scanlon 1985) competes with native seaweeds in parts of the North Atlantic and is detrimental to shellfish. On the Pacific coast, however, it does not form dense mats or have a negative impact on native organisms. A brown

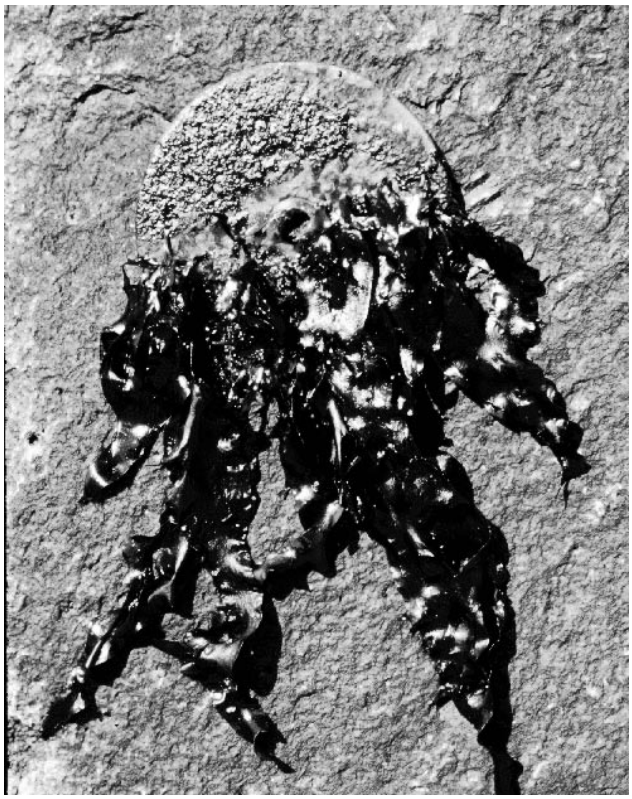

Figure 2. *A sand-covered plastic plate that had been bolted in a pool in the lower intertidal zone at Bass Rock (RIS) for three months (May to August 1999). These* Grateloupia *specimens were up to 25 cm long, with as many as 300 individuals on the sand-covered half. Note that no specimen developed on the bare portion of the plate.*

alga, *Sargassum muticum*, inhabits scattered patches in southern New England, but in Great Britain, large specimens of *S. muticum* dominate shorelines and have become a huge nuisance. A warm water green alga, *Caulerpa taxifolia,* has replaced native seagrass in parts of the Mediterranean Sea, and has recently entered bays and estuaries in southern California. We would not expect this species to invade the North Atlantic because of its intolerance to cold winter temperatures.

The appearance of *Grateloupia doryphora* in Rhode Island waters provides the opportunity to: 1) follow the invasion of one species from the beginning of its residency on the northeastern shores of North America, and to 2) determine its impact on the local biota. To date, there is no report (either in print or through personal communication) of this species in any adjoining state. Compared to populations of *Grateloupia* in other parts of the world, organisms in Rhode Island appear to be unique in their ability to monopolize substrata. They also survive extreme seasonal temperatures, unlike other sites where the species is found. We suggest that the multiple recruitment strategies described in this article enhance both spread and survival of this invasive species. As a consequence, we foresee no restriction to its penetrat-

ing other areas along the eastern shores of the North Atlantic.

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***Marilyn M. Harlin** is Professor Emerita of Biological Sciences, University of Rhode Island and **Martine Villalard-Bohnsack**, is Professor of Biology, Roger Williams University, and serves on the RINHS Board of Advisors.*

Cilioprotist Diversity at a Bioblitz 2001 Site in Rhode Island

by Linda A. Hufnagel

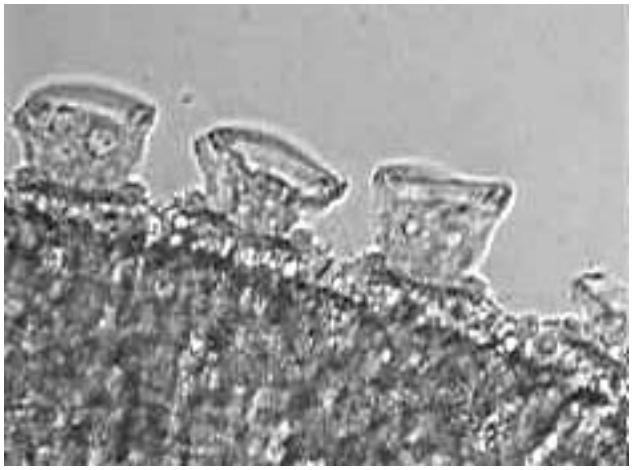
On September 15, 2001, a sunny day in late summer, my laboratory participated in *Bioblitz 2001*. Fourteen samples of water, moss, leaf litter, and soil were collected from 14 different locations at the Norman Bird Sanctuary, Middletown, Rhode Island. The locations included a small eutrophic freshwater pond, three streams, a small reservoir, and pathways through wooded and open areas. Each sample was scooped into a zipable sandwich bag and transported back to the University of Rhode Island for analysis.

In the laboratory, about 100 ml of each water sample were placed in a separate clean plastic culture dish. In additional dishes, small quantities of the soil, leaf litter, or moss samples were placed and about 100 ml of spring water were added. Then, 5 sterile rice grains were added to each dish and these "enrichment cultures" were maintained at room temperature. Over the next 5 weeks, the enrichment cultures were examined under a dissecting microscope and each appearance of a new ciliate species was noted and sketched. Efforts were made to examine each new species at higher magnifications (using 10X, 20X, 40X, and 100X objectives), by darkfield, phase contrast, and brightfield microscopy, and each species examined in this way was videotaped to provide a permanent record of the appearance and behavior of the organism. Many of the smaller species were not discovered until a sample from the enrichment culture had been transferred to a slide and observed at higher magnifications.

In all, a total of about 70 different species of ciliates, from over 31 different genera, were encountered. The greatest diversity (12 species) was seen in the sample from a stagnant stream next to Gardner Pond (the reservoir). This may be related to the abundance of decaying reeds in the water. The next most diverse samples were: 1) a stream containing mossy rocks (9 species); 2) a stagnant brackish-water stream which periodically empties from Gardner Pond into the mouth of the Sakonnet River (9 species); and 3) a small, eutrophic pond located in the middle of the Sanctuary (8 species). This last may be correlated with an apparent diversity and abundance of photosynthetic phytoplankton in this sample. Soil samples and the reservoir sample showed very little diversity.

Genera encountered most frequently included *Cyclidium*, *Vorticella*, *Aspidisca*, *Litonotus*, *Lacrymaria*, *Paramecium*, and *Colpoda*. Other genera identified included *Uronychia*, *Glaucoma*, *Stentor*, *Halteria*, *Lembadion*, *Condylostoma*, *Epistylus*, *Trichodina*, and *Trachelius*. Possible genera include *Baladyna*, *Critigera*, *Urotricha*, *Frontonia*, *Nassula*, and *Urosoma*. These last are being investigated further to determine their proper taxonomic placement. Numerous large hypotrichs were also encountered and are also being investigated further.

This study was conducted in part in order to obtain some parameters for designing future studies on diversity of ciliates in Rhode Island habitats. Ideally, we would like to use accepted criteria-based silver staining methods and transmission electron



These Trichodina *look like hats, perched on the surface of a* Hydra.

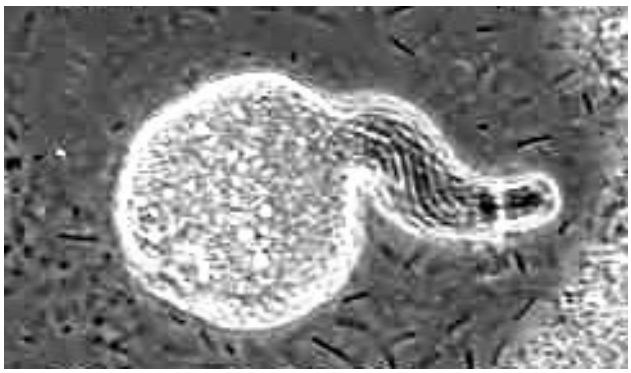
microscopy to confirm the identification of genera and pinpoint the species identifications. However, these are very time-consuming procedures and could only be applied to a few species. In studies in which the focus is on defining species diversity, it is expected that large numbers of different species will be encountered; the present study does confirm this. My laboratory is working on new methods that we hope will speed up the processing of samples to obtain the structural details of each species that are needed to confirm the identification of genera and species. We hope that our methods will include genetic fingerprinting and videotaping of the behavior of living cells, and the structure and behavior of cytoplasmic organelles, to provide, in combination with staining methods being developed in my laboratory, a more complete description of each species for identification purposes.

The samples we collected were observed every few days over a period of about 5 weeks. During this time we noted a distinct progression of species in most of the samples. Often, a larger species would become dominant near the end of the progression, after which all ciliates would disappear. In some cases, apparent cyst forms became abundant. It is likely that many of the species we encountered can encyst, to escape stressful conditions and provide the means to overwinter. This ability to encyst must be an important factor in the maintenance of species diversity in a particular habitat.

Many interesting examples of phagocytic activities, ciliary behavior, intracytoplasmic motility, and cell-cell interactions were documented in the videotapes. This information will be used to explore the diversity of physiological activity in these cells. One large ciliate, for example, exhibited a very graphic example of a "fishtrap" mechanism for accumulation of prey organisms prior to the formation of the phagocytic vacuole.

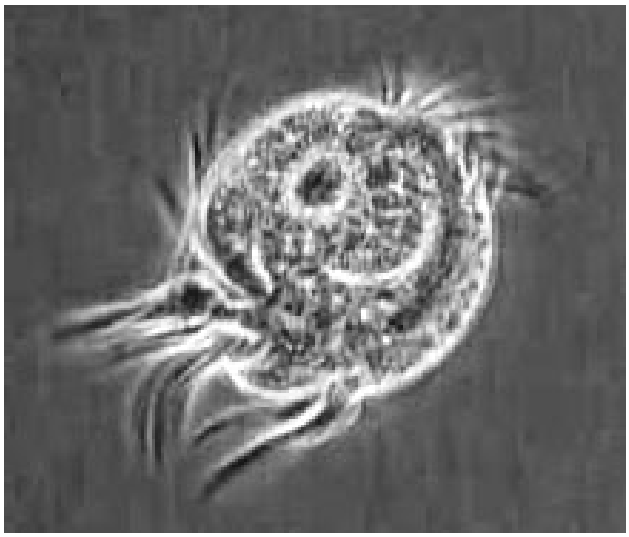
Digital videoclips and still images are now being prepared from the videotapes. These will be included in a profile of each species to be placed in a web-accessible database recently developed in collaboration with Dr. Joan Peckham (Computer Sciences, URI) and her students. The database, the Rhode Island Cilioprotist Micrograzer Survey (RICMS) can now be accessed via my Rhode Island Coastal Micrograzers website at http://athena.cs.uri.edu:8080/ricms/.

Linda Hufnagel *is a professor in the Department of Cell and Molecular Biology at the University of Rhode Island.*



Lacrymaria *extends its flexible proboscis to search for food.*

Chlamydodon *sucks up filamentous algae like spaghetti.*



This Uronychia *has strong cirri for darting about in the water.*

Morphological Characteristics for Field Identification of Native and Introduced Phragmites australis

by Adam M. Lambert

Common Reed, *Phragmites australis* (Cav.) Trin. ex. Steudel, is a perennial grass native to North America. Fossil records show that it has been present in the southwestern United States for 40,000 years (Hansen 1978). *Phragmites* was also present in 3,500-year-old peat cores from Connecticut (Orson et al. 1987). In the past century *Phragmites* has been rapidly increasing in distribution and abundance across North America, especially along the Atlantic Coast. This expansion has been attributed to anthropogenic changes to wetland ecosystems that facilitate *Phragmites* dispersal (Marks et al. 1994). The increase in *Phragmites* has also been attributed to introductions of European genotypes into the eastern US (Besitka 1996).

Kristin Saltonstall, a graduate student at Yale University, has recently identified genetically distinct strains of *Phragmites* with native and exotic origins (Saltonstall 2002). She sequenced two DNA markers (of haplotypes) in over 300 plants collected from around the world. Haplotypes are combinations of alleles that are located close together on the same chromosome. These segments of chromosomes often contain many single base variations that are inherited together. Saltonstall identified 11 native haplotypes, one exotic haplotype, and one haplotype of unknown origin. The 11 native haplotypes have different distributions and abundances throughout North America. The haplotype she designated "E" is the most abundant native haplotype with a range throughout northern North America. Haplotype I occurs along the Gulf Coast, and is most closely related to South American and Asian haplotypes. Haplotype M is the most abundant strain in North America, and is the one seen invading wetlands throughout the east. This haplotype is most closely related to ones in Europe.

We are presently evaluating morphological differences between the native and introduced haplotypes to allow for field identification of them. An easy and accurate identification key based on morphological characteristics will help land managers identify and preserve native stands that might otherwise be controlled by conventional methods. These methods include herbicide spraying, mowing, disking, burning, dredging, flooding, draining, and grazing. Our long-term goal is to identify, evaluate, and release biological control agents that will feed on the introduced haplotype.

Currently, there are no known populations of native *Phragmites* in Rhode Island. We need your help in locating potential populations. Table 1 presents the characteristics that differ between populations of native and exotic *Phragmites* from the East Coast that we have evaluated so far. With the analysis of more stands it is likely that some of these identifying characters will change. Bernd Blossey of Cornell University has developed a website on *Phragmites* (http://www.invasiveplants.net). This site begins with a general description of invasive plants, and includes a detailed section on *P. australis*, including diagnostic characteristics for identifying native and introduced haplotypes.

If you see stands of *Phragmites* that appear to be native, please notify us through the URI Biological Control Laboratory (401) 874-2750 or by e-mail (alam9114@postoffice.uri.edu).

Literature Cited:

Trait	Native Haplotypes	Introduced Haplotype
Stem color at base (spring/summer) Note: leaf sheath needs to be removed	Red to Chestnut	Tan
Stem color at base (winter) Note: leaf sheath needs to be removed	Light chestnut to light brown/gray	Tan
Stem texture	Smooth and shiny, often with black spots around nodes	Rough and dull (feels ribbed)
Stem growth form	Slightly crooked	Straight
Stem flexibility	High	Low
Stem toughness	Low	High
Stem height	Reduced	High
Stem density (stems per unit area)	Low	High
Node color (summer)	Almost purple	Tan
Node color (winter)	Light chestnut to light brown/gray	Tan
Flowering	July-August	August-September
Inflorescence	Sparse	Dense
Senescence	Early	Late
Ligule color at emergence	Red	Green
Leaf color	Yellow-green	Inland: Dark green/gray Coastal: yellow green to dark green/gray
Rhizome density	Low	High
Clonal expansion rate	Low	High

Table 1. *Morphological differences between native and introduced Phragmites haplotypes from the east coast (adapted from Blossey 2002, http://www.invasiveplants.net).*

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Adam Lambert *is a graduate student working with Dr. Richard Casagrande in the Department of Plant Science at the University of Rhode Island.*

RINHS Organizational Members: Special News & Events

Announcing the publication of the *Southeastern Naturalist,* a companion journal for the *Northeastern Naturalist*

The *Northeastern Naturalist* is pleased to announce the publication of its companion journal, the *Southeastern Naturalist*! This new journal serves as the southeastern regional counterpart for the Northeastern, Northwestern, and Southwestern Naturalists. These journals, together with the *American Midland Naturalist,* provide broad coverage of scientific research efforts throughout the United States.

Like the *Northeastern Naturalist*, the *Southeastern Naturalist* is a broad-based effort involving many people from many organizations. It is co-sponsored by the Association of Southeastern Biologists and the Humboldt Field Research Institute. Both journals welcome submissions of manuscripts on terrestrial, freshwater, and marine organisms and their habitats.

Subject areas include, but are not limited to: field ecology, biology, behavior, biogeography, taxonomy, evolution, anatomy, physiology, geology, and related fields. Manuscripts on genetics, molecular biology, archaeology, and anthropology, etc., are welcome if they provide natural history insights that are of strategic interest to field scientists.

Regional journals need your subscription support! The broader the subscription base of our country's regional journals, the more articles the journals can publish! This makes the journals more interesting to their readers and more useful as standard research and publishing resources. This is something that is of interest to the scientific community in the entire country as a whole!

Information about the journals is available from the Humboldt Field Research Institute, PO Box 9, Steuben, ME 04680. Phone: 207-546-2821; humboldt@loa.com.

Come join the **South Kingstown Land Trust** as we *Celebrate Open Space* at the foot of the DuVal Trail in Perryville this June 22nd. The trail lies in Susanna's Woods, noted for its stands of oak and Mountain Laurel, so lace up your hiking boots for a fun-filled day with events for all ages.

- Enjoy guided and unguided trail hikes on our celebrated DuVal Trail
- Bird Hike with staff from Birdwatcher's Natureview
- Wild Plant hike with Christopher Nerone, naturalist and botanist from URI
- Challenge yourself on the rock-climbing wall
- Get up-close and personal with an assortment of reptiles and amphibians from the Rhode Island Herpetological Association
- Learn about native birds of prey rehabilitated by the Rhode Island Raptor Center
- Relax to the folk music of South County's own Hatfield McCoy Trio
- Don't miss free pony rides for the kids

Thanks to the generosity of many local businesses, we will also hold a raffle of nature-related items. Please join us on Saturday, June 22nd, 11am-3pm, Post Road, Perryville. The approximate hiking time for the DuVal Trail is 1.5 hours. Shuttle service will be provided from both the trail's midsection and its end back to the main event. Pre-registration is required for the guided hikes due to limited space. Please phone Cynthia Gleason at 789-7628 to register or for more information. Food and refreshments will be available. Rain date: Saturday, June 29th.

Seventh RINHS Conference a Great Success!

Nearly 300 participants filled the conference rooms at the Radisson Airport Hotel in Warwick on March 1st, to hear excellent presentations on geology, hydrology, water quality, vertebrates, invertebrates, plants and forests, and coastal habitats and to view a variety of posters and organizational displays. Keynote speaker Orrin H. Pilkey of Duke University offered a global view of barrier islands, and the 2001 and 2002 Distinguished Naturalist Awards were presented to Doug Rayner, Grace Klein-MacPhee, and Les Sirkin (see separate articles). One hundred and thirty-five high school students and teachers joined the participants to get first-hand exposure to a real scientific conference. To read abstracts of the papers and posters, visit the RINHS website at: http://www.uri.edu/ce/rinhs/pages/abstract2002.html.

RINHS is grateful to the Virginia Butler Fund of the Rhode Island Foundation, a charitable community trust serving the people of Rhode Island, for its support of the conference.

E. Douglas Rayner, RINHS Distinguished Naturalist, 2001

"...for his tireless efforts to protect the Diamondback Terrapin and Rhode Island's estuaries, and to increase children's awareness of the wonders of the natural world."

Born in Winthrop, Massachusetts, Doug Rayner moved to Barrington in the 1930s. He was in his early teens at the time, and, with his new home on the periphery of Hundred Acre Cove, Doug soon began hunting, fishing, and trapping in this naturally bountiful area.

In his twenties Doug married Helen McCarthy, and together they raised four children—Michael, Douglas, James, and Susan. Doug went into business for himself, selling, installing, and repairing carpets, while always spending as much time as possible in the out-of-doors. Over decades, Doug transitioned from a skilled sportsman to a dedicated and accomplished naturalist/photographer.

Keenly aware of changes in wildlife populations occurring in the estuaries that had become so familiar to him, Doug became active in promoting environmental protection. He was a member of Barrington's first Conservation Commission, and was one of the members who made a statement by resigning in protest of the aerial spraying of chemicals for mosquito control. He subsequently participated in an effort that produced Barrington's Mosquito Abatement Plan, which remains in place to this day.

Doug was also one of the early members of the Barrington Land Conservation Trust, on whose Board of Directors he served for two decades. Throughout his tenure on the board he remained vigilant in rallying members toward the resolution of any conservation issue he felt compromised Barrington's natural integrity.

Doug's extensive knowledge of Barrington's estuaries was a key factor in attempts to preserve those same resources. He was instrumental in organizing the Pokanoket Watershed Alliance in the 1980s, a body formed to improve the quality of water flowing downstream into Barrington's salt rivers. Over the next two decades, Doug spent hundreds of hours spearheading efforts of Barrington and Seekonk conservation organizations, Save The Bay, the Rhode Island Department of Environmental Management, the Environmental Protection Agency, Mobil Oil, and other organizations in pursuing East Bay estuarine water-quality issues. Indeed, Doug earned a far-reaching reputation among those entities for his persistence in putting the quality of our salt rivers before anything else.

Also in the 1980s, Doug recognized the significance of Barrington's population of the Diamondback Terrapin; he began, and continues to participate in, an ongoing study of that population in which scores of nesting females each year are captured and marked in an effort to monitor the health and status of this unique resource. This pioneering work led to the declaration of the terrapin nesting site, Nockum Hill, as a Town Wildlife Preserve, and during the past year the preserve was aptly renamed The Doug Rayner Wildlife Refuge at Nockum Hill.

As a self-educated naturalist and wildlife photographer, Doug has worked tirelessly in teaching citizens of all ages the values of Barrington's natural resources. He was active in Bar-Zap, a local organization dedicated to clearing litter from our natural areas, and was also an advisor to Boy Scout troops for countless fishing and Eagle Scout badges. For more than a decade Doug visited the town's grammar schools to share his extensive knowledge of natural history with children, and these visits often included field trips during which Doug, in his true element, would introduce his young students to the wonders of nature. His easy manner and dry sense of humor especially endeared him to the youngsters.

Doug has been active in Barrington natural resources conservation efforts for over five decades, and there is little doubt that he has contributed more toward securing Barrington's natural heritage than any other single individual. He was, and continues to be, an inspiration to us all.

Written by Steve Reinert, ornithologist.

Grace Klein-MacPhee, RINHS Distinguished Naturalist, 2002

"...for her contributions furthering knowledge of Rhode Island's marine fish and her unique ability to culture marine fish larvae."

Grace Klein-MacPhee has had a career that sounds idyllic for a fish ecologist. She has spent her whole adult life out-of-doors, seining rivers, hauling nets from boats, and raising little fish in the laboratory. Grace specializes in the biology and ecology of flat fishes, especially Winter and Summer Flounder, and in the early life history of Northwest Atlantic fishes.

As a scientist, Grace always has several difficult tasks to accomplish at once. Currently she has three major projects. She is conducting an ichthyoplankton survey with the Rhode Island Department of Environmental Management in Narragansett Bay. This survey will characterize larval fish species composition, abundance, and distribution, focusing particularly on commercially important species. She is also performing a fish seine survey in the Blackstone River for Ocean State Power, to see if the Blackstone River can once again become prime habitat for fish (last year she and her seine were almost washed away in the spring freshet). Finally, she has a study of the interactions between gelatinous zooplankton and early life stages of fishes in Narragansett Bay with Dr. Barbara Sullivan for Rhode Island Sea Grant, a project that will perhaps explain if the recent large abundances of jellyfish in early summer are causing the decline in larval fish.

For scholarship Grace has been working with Bruce B. Collette from the NOAA/NMFS Systematics Laboratory in Washington D.C. to revise the latest edition of the famous Bigelow and Schroeder's *Fishes of the Gulf of Maine*. This book will be published in June 2002. For teaching, she offers a Human Anatomy course at the Community College of Rhode Island. For any day in her life, "rest" is not part of the vocabulary!

Aspiring students and impressed colleagues may wonder how anyone could get in the position to be involved in so much. Grace grew up in Andover, Massachusetts. She received her Bachelors and Masters of Art in Biology from Boston University in 1961 and 1966, respectively. For many years, during her employment at the Environmental Protection Agency in the Narragansett, Rhode Island laboratory, she attracted the attention of scientists for her outstanding ability to raise larval Winter Flounder. Still not satisfied with her credentials, she went on to receive her Ph.D. from the University of Rhode Island in Biological Sciences in 1978. At the University she studied with the well-known fish population ecologist, Dr. Saul B. Saila. A couple of years after graduation she worked at the University of Alaska-Juneau fisheries department, where she spent an enjoyable two years trawling the waters of Auke Bay, Alaska. Since the mid-1980s she has worked at the Graduate School of Oceanography of the University of Rhode Island as a Marine Research Scientist. She also serves as an Adjunct Professor in the Fisheries, Aquaculture and Veterinary Sciences Department of the University of Rhode Island.

Grace's life is her work, as her professional affiliations demonstrate. She is a member of the American Fisheries Society, the Fisheries Society of the British Isles, the Estuarine Research Federation, and the Rhode Island Natural History Survey. Grace loves the out-of-doors. She loves to go to sea, whether on Narragansett Bay or offshore to Georges Bank or the Gulf of Maine. She enjoys canoeing the Blackstone River. She always has a student intern with her in her work and enjoys student interactions on many levels. She works with high school students and college undergraduates, and serves on numerous graduate student committees. Grace has worked very hard to have a life doing what she loves. She is our heroine scientist.

Written by Candace Oviatt, Professor at URI's Graduate School of Oceanography.

Les Sirkin, 1933–2002, RINHS Distinguished Naturalist, 2002 (Posthumous Award)

"...for his many contributions toward understanding the geology of Block Island and adjacent areas, and for bringing that understanding to all citizens and visitors to the Island."

Born in Dover, Delaware, Leslie Arthur Sirkin, or Les as he wished to be called, grew up in Watertown, New York, and retained close ties to the Adirondacks while establishing first his summer home and then his permanent residence on Block Island. Les was educated in New York State, receiving his B.A. from Hamilton College in 1954 (Geology), his M.S. from Cornell University in 1957 (Stratigraphy, Sedimentation, and Paleontology), and his Ph.D. from New York University in 1965 (Micropaleontology and Palynology). Along the way, Les taught high school science for 3 years before joining the faculty at Adelphi University in 1962, where he remained for 38 years. He founded undergraduate and graduate Earth Science programs and then the Department of Earth Science, serving as its first Chairperson from 1967–1975. He served two additional terms as Chair from 1984–1987 and 1990–1993. He retired from teaching in 1996, but remained active as a Research Professor.

During his long career at Adelphi, Les taught 20 different Earth Science courses and thoroughly enjoyed sharing his knowledge with others, particularly during field excursions. He was known by his students as the "Dean of Geology."

His research focused on the timing of geologic events and the nature of resulting materials deposited during the Quaternary Period (the last million years of earth history) using micropaleontology and palynology (the study of microfossils and pollen grains) as a tool to unravel the geologic history of an area. His work took him to glaciated regions and coastal plains in the northeastern United States, southeastern Alaska, and coastal regions of western Mexico. Much of his later work concentrated on understanding the glacial history of the southern margin of the last great ice sheet in the northeastern United States. That margin included present-day Long Island and, of course, Block Island. Besides a stream of papers in journals, Les found the time to write *Block Island Geology, Eastern Long Island Geology,* and *Western Long Island Geology,* books for the educated layperson that summarized his long years of study of each of these areas. Particularly important are the self-guiding field trip logs provided at the end of each book.

Les was a fellow of the Geological Society of America and a staunch supporter of that great non-organization, the Friends of the Pleistocene. The "Friends," as they are known, gather each spring for two days of lively discussion in the field. Les co-led two trips and was the leader of the 1998 trip to eastern Long Island. Les also supported the fall field meetings of the New England Intercollegiate Geology Conference (NEIGC) that are specifically designed for geology students. Les was a leader in 1981 and a co-leader in 1998 when the conference was held in Rhode Island. His dry, whimsical humor was always much in evidence, particularly when the trip leaders carried on too long at the outcrop.

Les spent his summers on Block Island at Sheep's Meadow learning geology, leading field trips, and enjoying sailing his catboat, the *Loon*. He endeavored to give back to the people of Block Island part of what the Island had given to him.

Written by Jon Boothroyd, Professor in the URI Department of Geosciences.

Focus on RINHS Organizational Members

Rhode Island Association of Wetland Scientists

The Rhode Island Association of Wetland Scientists (RIAWS) is a non-profit organization of professionals involved in various aspects of wetland science. RIAWS members include regulators, consultants, researchers, teachers, and others interested in promoting the advancement of wetland science in Rhode Island. RIAWS was formed in 1992 to promote the profession and understanding of wetland science in Rhode Island and to protect the public interest by:

- Maintaining high professional standards in accordance with a code of ethics.
- Participating in programs designed to educate the public in the study of wetlands and the profession of wetland science.
- Sponsoring educational seminars for the Association membership and the public.
- Providing a forum for the full exchange of ideas and open discussion of issues between professionals involved in wetland science.
- Supporting and contributing to the expansion of the wetland science research base.
- Establishing professional qualifications and certifying those qualifications to the public.
- Promoting policies that contribute to the sound stewardship of wetland resources.

RIAWS has been a long-standing organizational member of the Rhode Island Natural History Survey (RINHS), in recognition of the important contributions made by the Survey to the scientific community in Rhode Island. The RINHS publications, presentations, and conferences have consistently provided RIAWS members with valuable information relevant to the profession.

Education and Technical Assistance

RIAWS sponsors various wetland education and information activities for the general public and for wetland professionals. The organization actively supports programs that bring wetland science activities to Rhode Island schools. Wetland information is also provided to RIAWS through its quarterly newsletter and special events. The newsletter provides updated information on current scientific and regulatory issues in Rhode Island. RIAWS special events range from interpretive wetland walks to meetings with prominent wetland scientists and regulators. For example, the 2001 RIAWS annual meeting featured a presentation by Ralph W. Tiner of the US Fish and Wildlife Service on geographic information system applications in wetland management, and presentation of the first annual RIAWS Award for Excellence in Wetland Science to Dr. Francis C. Golet of the University of Rhode Island.

RIAWS has provided technical support to various public interest projects related to wetlands. With US Environmental Protection Agency (EPA) funding, RIAWS partnered with the Audubon Society of Rhode Island to provide a series of training workshops for local officials in wetland identification and assessment. RIAWS has assisted several municipalities in their land-preservation efforts by conducting site evaluations and assisting in open-space grant applications. RIAWS has provided training to high school students in preparation for the RI Envirothon, and has assisted RIDEM in training for loggers who work in regulated wetlands. RIAWS has contributed to grant writing, technical analysis, and educational outreach to the Town of Coventry in its Sandy Bottom Road Wetland Restoration Project. This EPA/RIDEM-funded project has included technical analysis of restoration alternatives and a public outreach program involving area residents, businesses, high school students, and organizations. This project won the Environment Council of Rhode Island's Senator John H. Chafee Conservation Award for 2002.

Legislation and Regulation

As an organization composed of professional wetland scientists, RIAWS is actively involved in technical review and dissemination of information concerning proposed wetland legislation and regulations. RIAWS has provided technical review comments to RIDEM on major regulatory changes pursuant to the Rhode Island Freshwater Wetlands Act. The RIAWS quarterly newsletter updates members on the progress of proposed legislation, legal decisions, regulatory changes, and RIDEM guidance regarding freshwater wetlands.

Federal regulation of wetlands is also of interest to RIAWS. Many activities requiring state wetland permits also require federal wetland permits pursuant to the Clean Water Act. Also, state wetland delineation now follows the federal method, providing further need for wetland professionals to keep up to date with changing federal techniques and guidelines. Wetland professionals engaged in permit activities stay abreast of evolving federal issues through RIAWS. For example, RIAWS sponsors lectures and discussion groups with federal wetland

regulators and scientists on topical issues of interest to professionals.

Professional Registration

As a service to its members and the public, RIAWS has developed guidelines for evaluating the education and experience of professional wetland scientists working in this State. A professional wetland scientist is an individual involved in the occupation of delineating, classifying, managing, evaluating, assessing impact to, or studying wetlands. The RIAWS Professional Registry identifies those individuals who meet the requirements established by the membership of RIAWS in 1994. Registration by RIAWS indicates that, to the best of its knowledge, an individual meets the required standards of education and experience. It does not constitute a guarantee that an individual will perform at a certain level of competence; however, all registrants must abide by the RIAWS Code of Ethics and Standards of Professional Conduct. Registration is limited to RIAWS members.

RIAWS Membership

Individuals, groups, and businesses are encouraged to become RIAWS members. RIAWS has several different categories of membership:

- Charter Members are those who participated in the formation of RIAWS
- Active Members are professionals engaged in wetland science who have a minimum of two years of experience and a related degree or five years of experience
- Associate Members are professionals in wetland science with at least two years of experience or a related degree
- Affiliate Members do not meet the qualifications for Active or Associate Membership, but have an interest in wetlands
- Student Members are actively pursuing an academic degree related to wetland science

Members must pay an annual membership fee. RIAWS publications such as the quarterly newsletter and special announcements are mailed to all members. Voting privileges are available only to Active or Charter Members.

For more information on activities and membership, contact RIAWS at:

Rhode Island Association of Wetland Scientists
P.O. Box 1514
Providence, Rhode Island 02901-1514

Visit RIAWS online at: http://www.RIAWS.org

Upcoming Events

June 1. RI Wild Plant Society's Spring Plant Sale. 9:30 a.m. to 12 noon. URI Greenhouses, Flagg Road, Kingston, RI. For more information call (401) 783-5895; office@riwps.org

June 8, 15, 22, 29. Wood-Pawcatuck Source to Sea. For four consecutive Saturdays in June, Wood-Pawcatuck Watershed Association will be conducting canoe trips starting at the headwaters of the Wood River in Exeter and ending at Little Narragansett Bay in Westerly. Pre-register by contacting the WPWA office. http://www.wpwa.org; (401) 539-9017; deniseburgess@wpwa.org

June 15 & 23. Botanical Illustration class with RISD illustration instructor (and RINHS member) Gretchen Halpert. Session one will focus on describing form accurately using perspective and tone in pencil or pen and ink. Session two will introduce the use of color. All levels of experience welcome. Register with RI Wild Plant Society, $100/RIWPS member, $120/nonmember. (401) 783-5895.

June 15. South County Rivers Day 2002. Join a consortium of South County organizations to celebrate the area's beautiful waters! The day will feature a canoe trip on the Wood River, a Saugatucket River Cleanup, a Rowing Clinic with URI Women's Varsity Rowing Team, kayak races, and much more, with a grand finale block party. For information contact Dorothy Devine at the Saugatucket River Heritage Corridor Coalition, (401) 782-0149.

June 21. Canoeing through John H. Chafee National Wildlife Refuge at Pettaquamscutt Cove, 7:30-10 a.m. This program, jointly sponsored by the Friends of the NWR of Rhode Island and Save the Bay, will let us explore the Cove the only way there is, by water. Canoes, paddles, and personal floatation devices will be provided. Bring your binoculars and camera! Cost: Member Price: $20; nonmember price: $25. Minimum age: 10 (children under 16 must be in canoe with adult). Registration required: e-mail reservations@savebay.org or call 1-800-627-7229.

June 21-22. BIOBLITZ 2002! 3:00 p.m. Friday, June 21 to 3:00 p.m. Saturday, June 22. Marion Eppley Wildlife Refuge, West Kingston, RI. Co-sponsored by the Rhode Island Natural History Survey (RINHS) and the Audubon Society of Rhode Island. Explore and celebrate Rhode Island's biodiversity by participating in the third annual Bioblitz. Experts in all taxonomic specialties are welcome, as are all others who wish to help out and enjoy the summer solstice in a unique way. For more information go to: http://www.uri.edu/ce/rinhs/pages/events.html The event is free, but registration is required; call the RINHS office at (401) 874-5800 or e-mail rinhs@etal.uri.edu

June 22. *Celebrate Open Space* with the South Kingstown Land Trust at the foot of the DuVal Trail in Perryville, RI. Take guided and unguided trail hikes (including a wildplant hike and a bird hike), try out the rock climbing wall, see reptiles and amphibians, learn about native birds of prey, enjoy folk music, pony rides, food & refreshments, and much more. For more information and to register contact Cynthia Gleason, (401) 789-7628. Rain date June 29.

June 28. Rome Point Walk, North Kingstown, RI, 6-8 p.m. Spend the evening exploring the John H. Chafee Nature Preserve. Investigate cobble beaches, salt marshes, and cedar forests. Check out the panoramic vistas from the most pristine point on the West Passage and learn about issues of interest to Save The Bay. Cost: Members: Adults $8; Children $6; Non-Members: Adults $10; Children $8. Registration required: e-mail reservations@savebay.org or call 1-800-627-7229.

July 10, 17, 24, 31. Arachnifest! Roger Williams Park Zoo, Providence, RI. Every Wednesday, 11 a.m. - 3 p.m., visitors can "bug out" and have fun with special activities devoted to learning about superstars of the Itsy Bitsy Empire, such as "The Beetles" (the American Burying Beetle, that is), and of course, the scary, hairy wonders of the arachnid world—tarantulas and spiders. Free with regular zoo admission.

July 20. Exploring the Bay's Fringes. Explore the rocky intertidal area of Fort Getty on Conanicut Island with Prentice Stout, one of the state's pre-eminent marine educators. We will discuss adaptations to that harsh environment and the many ways marine organisms cope in their daily lives. Bring shoes you don't mind getting wet. Check the weather and dress accordingly. Ages 6 and older, maximum number 15. For reservations call the Rhode Island Natural History Survey at (401) 874-5800 or email rinhs@etal.uri.edu to make reservations. Location, Fort Getty, Jamestown, 10:00 am until noon.

July 20 and August 24. Rose Island: Explore the Marine Biology and History, 1 p.m. to 3:30 p.m., Newport, RI. Join Rose Island Lighthouse Foundation and Save The Bay as we explore the Rose Island Lighthouse and the rocky shores and eelgrass beds that surround it. Through hands-on experience, examine marine life up close and do some beach combing. You can expect to get wet, if you wish. This program is open to all age levels, with families especially invited. Cost: Members: Adults $15, Children 5 to 12 $5; Non-members: Adults $20, Children 5 to 12 $10. Registration required: e-mail reservations@savebay.org or call 1-800-627-7229. *Cost includes round trip boat ride aboard Save The Bay's M/V Alletta Morris.*

July 25. Canoeing the Bay: Hundred Acre Cove Canoe Exploration, 5:30 to 7:30 p.m., Barrington, RI. Canoe and discover the natural beauty of Hundred Acre Cove in Barrington. Minimum Age: 10. Member price: $20; Non-member price: $25. Registration required: e-mail reservations@savebay.org or call 1-800-627-7229.

August 10. URI Vegetable Demonstration Garden Open House. Saturday Aug. 10, 10 a.m. to 3 p.m. Demonstrations, tours, informational talks, and cooking demonstrations. Next to Cooperative Extension Education Center, East Alumni Ave., URI Main Campus, Kingston. Free.

August 16. Fort Wetherill Snorkeling Adventure, 1 p.m. to 2:30 p.m., Forth Wetherill State Park, Jamestown, RI. Swim and snorkel in the coves off Fort Wetherill State Park. We'll provide snorkel, fins, and mask. The ocean can be chilly: bring a wetsuit if you have one. Minimum age: 10; must be capable of treading water for 5 minutes. Member price: $15; Non-member price: $20 Registration required: e-mail reservations@savebay.org or call 1-800-627-7229.

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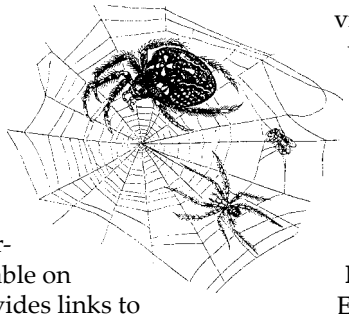
Website: http://www.uri.edu/ce/rinhs

Weaving the Web: Electronic Resources



The UNESCO Water Portal is intended to enhance access to information related to freshwater available on the World Wide Web. The site provides links to the current UNESCO and UNESCO-led programs on freshwater and will serve as an interactive point for sharing, browsing, and searching websites of water-related organizations, government bodies, and NGOs, including a range of categories such as water links, water events, learning modules, and other online resources. Websurfers can also add or modify links to help maintain an accurate online resource. All water managers are invited to participate by providing information on activities, useful links, news, and content that they wish to share with others and generally make more widely available.
http://www.unesco.org/water/

invasiveplants.net For more information on the native and naturalized forms of Common Reed, *Phragmites australis,* go to this site from Cornell University's site.
http://www.invasiveplants.net

EPA's Office of Water Online Reference Library contains lists of online Office of Water documents organized by subject. By clicking on "Water Quality Standards" on this web page, you will reach http://www.epa.gov/ost/library/wqstandards/ which provides a large number of PDF memos, guidance documents, and policy directives related to water quality. For example, the entire "Water Quality Standards Handbook: Second Edition," EPA 823/B-94-005a, August 1, 1994, is available off this page.
http://www.epa.gov/ow/library/

EPA's Office of Water, Office of Science and Technology, Water Quality Standards web page provides additional online information related to water quality, including links to various water quality-related criteria and guidance documents, State and Tribal standards, rulemaking and other Federal Register notices, training information, and other documents and web pages.
http://www.epa.gov/ost/standards/

Internet Newsbrief is a weekly service from the EPA Headquarters Library that provides a sampling of new and/or useful Internet resources for EPA staff and other environmental professionals.
http://www.epa.gov/natlibra/hqirc/inb.htm

Freshwater Spills Information Clearinghouse. While there is a wealth of information on the Internet about oil spills in the marine environment, the same is not true of oil spills to freshwater bodies, such as the Great Lakes. The Freshwater Spills Information Clearinghouse is trying to change that. FSIC is a comprehensive source of information with sections dedicated to oil spill planning and response, mapping, laws and regulations, education, science, and a public e-mail list. You'll also find numerous links to organizations that offer information regarding spills and Area Contingency Plans, which are available to download.
http://www.freshwaterspills.net/

The American Society of International Law—Wildlife Interest Group has a searchable bibliography on the impacts of climate change on flora and fauna species, ecosystems, and agricultural resources. The bibliography now has more than 3300 citations, encompassing peer-reviewed and gray literature.
http://eelink.net/~asilwildlife/bib.shtml

The Lobster Conservation Web Site has been constructed by Richard Allen, to help citizens learn about the US Atlantic lobster fishery; funding for the site provided by the Pew Charitable Trusts.
http://www.LobsterConservation.com

Please include me as a member of the
Rhode Island Natural History Survey, Inc.

Annual dues (check one) *(see over for membership benefits)*:
_____Individual ($25) _____Family ($40) _____Student/Senior Citizen ($15) _____Organizational ($100)

Name _____ Telephone _____
Affiliation _____ Fax _____
Address _____
E-mail _____

Make checks payable to: ***RINHS*** and send to:

Benefits of membership in the Rhode Island Natural History Survey

For Individual, Family, and Student Members

RINHewS, the newsletter
Participation in the RINHS List-Serve
Free membership list
10% discount on all publications
Discount on annual conference fee
20% discount on subscription to the journal *Northeastern Naturalist*

For Institutional Members

RINHewS, the newsletter
Participation in the RINHS List -Serve
2 free membership lists
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*

Thanks!

RINHS is grateful for the following additions to our library:

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 Fleniken.

Illustrations credits: pages 4 and 19: line drawings from *Animals: 1491 Copyright-free Illustrations*, by Jim Harter, 1979, New York: Dover Publications, Inc.

Bioblitz 2002!

The Rhode Island Natural History Survey will hold the third annual Bioblitz on June 21-22, 2002, and you are invited to help achieve a new state record for number of species tallied in 24 hours! In June 2000, our first Bioblitz conducted at Roger Williams Park in Providence resulted in a compilation of 665 species. 2001 saw us inventorying at the Norman Bird Sanctuary, Oakland Forest, Sachuest Point National Wildlife Refuge, Raytheon Corporation, and places in between, where we tallied over 774 species.

This year we will be at the guests of the Audubon Society of Rhode Island at the Eppley Wildlife Sanctuary, one of ASRI's largest sanctuaries (~1200 acres), nestled in the heart of the Wood-Pawcatuck watershed system, in West Kingston, Rhode Island. With the Queens River flowing through the center, this beautiful property is home to riverine habitat, bogs, ponds, Red Maple swamp, Atlantic White Cedar swamp, rhododendron tangles, White Pine forest, meadows, and oak forest. The diversity of habitats here should make Bioblitz 2002 a very rich experience.

Anyone can participate! Scientists from all fields are needed to fill out the biodiversity roster: vertebrates, plants, insects, soil arthropods, fungi, diatoms, spiders, crustaceans, mollusks, lichens, bacteria, algae, and more—we need all taxonomic specialties—we need YOU! We also welcome volunteers to help greet the public, assist scientists in the field, and lend a hand wherever help is needed.

If you are interested in participating, contact the RINHS office at (401) 874-5800 or e-mail RINHS@etal.uri.edu. Registration is required; you can also download a form from our website at http://www.uri.edu/ce/rinhs/pages/events.html

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