



# Rhode Island Naturalist

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## Freshwater Mussels in Rhode Island: Part I. Introduction

BY JAY CORDEIRO

The animal Phylum Mollusca (mollusks) includes such organisms as clams, snails, slugs, chitons, octopus, and squid, among others. Only the snails and clams have been successful in colonizing freshwater habitats. This is the first of three

mussels in Rhode Island (C. Raithel, pers. comm.). Guides have been recently produced for neighboring states, including Connecticut (J. Cordeiro, in prep.), Massachusetts (Smith 1995), Maine (Nedeau et al. 2000), New York (Cordeiro 2003; Strayer and Jirka 1997), and Vermont (Fichtel and Smith 1995).

### Life History

Freshwater mussels (Figure 1) are usually separate sexed (dioecious), with some species capable of self-fertilizing (hermaphroditic). Sperm, released directly into the water, fertilizes eggs in modified brood pouches (marsupia) in the gills of the female, where they develop from days to months into larvae called glochidia. Long-term brooders (bradytictic) fertilize in summer or early fall with glochidia released the following spring, while short-term brooders (tachytictic) fertilize in spring with glochidial release later the same summer.

Freshwater mussels have evolved a highly specialized mode of dispersal for the glochidia larvae. In nearly all species, glochidia are obligate parasites on the bodies or gills of fish or some amphibians. Glochidia encyst just beneath the host tissue as ectoparasites, rarely causing permanent harm to the host. When metamorphosis is complete, the juvenile mussel falls from the host to the bottom to begin its life.

Glochidia are host-specific (one or more host species per species of mussel) and unless the proper host is found, they will be sloughed off by the host's natural defenses and die.

Mussels reach sexual maturity at about six years, and life span averages 8 to 20 years, although one species in Rhode Island, *Margaritifera margaritifera* (the Eastern Pearlshell), may live over 100 years. Survival past maturity is dependent on the critical dispersal, settlement, and early growth stages. Once a mussel reaches maturity, its chances of survival increase exponentially.

### Threats

There currently exists a global crisis of freshwater mussel decline and extinction. In the last 25 years, this crisis has developed on a monumental scale. Of the 300 North American taxa, only 25% have stable populations, while 23% are listed under the U.S. Endangered Species Act (62 endangered and 8 threatened), and some 12% are believed to be already extinct (Bogan 1996). NatureServe (a nonprofit conservation organization providing up-to-date information on rare plants, animals, and communities) lists 68% of North American freshwater mussels at risk of extinction (Stein and Flack 1997), a greater percentage than any other animal or plant group tracked by NatureServe. Most endangered mussel species in North America are found in the Southeast, where extensive river systems support a great diversity of native species. Rhode Island supports a few state species at risk (to be discussed

articles on Rhode Island freshwater mussels to appear in *Rhode Island Naturalist*. This article will discuss mussel life history, population declines, and threats to freshwater mussels in the state. Future articles will document a state faunal list, describe habitat and conservation status, review the history of the state's freshwater mussel studies, list eminent local malacologists, and provide insight into Rhode Island mussel collections, among them that at the Roger Williams Park Museum in Providence.

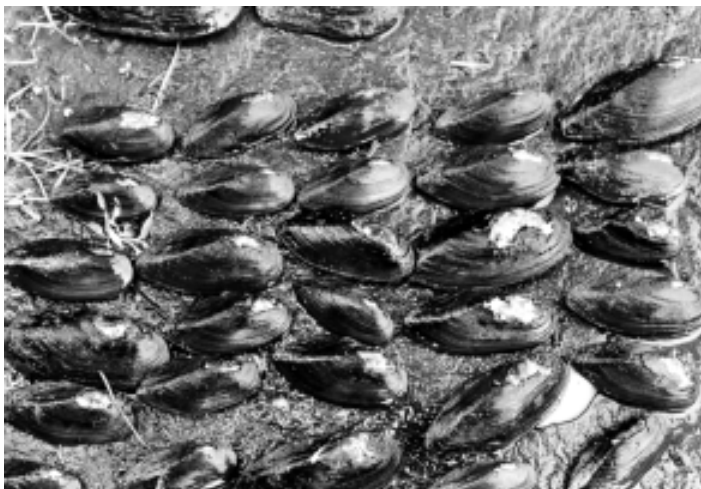
Freshwater mussels (families Margaritiferidae and Unionidae) have attained their greatest diversity in North America, with more than 300 species and subspecies in the United States and Canada (Turgeon et al. 1998; Williams et al. 1993) of about 1000 worldwide. Currently, no comprehensive field guide exists for Rhode Island, although the Rhode Island Division of Fish and Wildlife does maintain a database of freshwater

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**Figure 1.** Specimens of *Ligumia nasuta*, the Creeper (photographed by the author).

in detail in an upcoming article in this series).

Natural threats to freshwater mussel populations are varied. Predation is limited because relatively few animals consume adult freshwater mussels, among them muskrats, raccoons, mink, otters, some waterfowl, some turtles, and a few fishes (freshwater drum, carp, some sturgeon, and certain catfish). Various parasites (mites, leeches, flukes, distomids) are known to infect freshwater mussels, causing death in rare instances.

Pollution has become a severe problem for all freshwater organisms across North America. Point-source pollution includes that from industrial effluent pipes, wastewater release, and chemical spills. Non-point-source pollution includes sediment accumulation, nutrient accumulation, nutrient overloading, acid precipitation, and heavy metals. Effects on mussels include decreases in metabolism, decline in respiration, tissue deterioration, growth rate reduction, and death.

Channelization of a riverbed during dredging to allow boat traffic physically scours sediments (as well as mussels) from the streambed, resulting in a streambed inhospitable to the mussel fauna that formerly occurred in the area. Impoundment, or damming of a river system, reduces flow, increases sediment load upstream of the impoundment, and erodes habitat downstream. Mussels cannot tolerate the sediment accumulation or the deeper, colder water of reservoirs, and they perish. Dams also restrict fish distribution, stranding mussel populations upstream with no hosts and no chance of reproducing.

In recent years, introduced aquatic species have caused significant declines in native mussel populations (Mills et al. 1997; Strayer 1999) and have had serious and costly economic impacts on North American industry, causing billions of dollars in damage, subsequent repair, and removal. The Zebra Mussel, *Dreissena polymorpha*, was accidentally

introduced into Lake Erie in December 1987 (Leach 1993) and into Lake St. Clair in June 1988 (Hebert et al. 1989), most likely as larvae in the ballast water of cargo ships from Europe. Like the marine Blue Mussel, *Mytilus edulis*, Zebra Mussels attach to hard surfaces, with a reported density of over 10,000 individuals on a single native mussel. Fouling on native freshwater mussels decreases fitness, respiration, and water clearance rates; depletes energy stores; and leads to death by smothering. Zebra Mussels can alter entire ecosystems, increasing water transparency, reducing suspended organic matter and phytoplankton production, and physically altering the community (Karatayev et al. 1997). In 1938, Asiatic Clams, *Corbicula fluminea*, were introduced into the Columbia River near Knappton, Washington, possibly as a potential food item (Counts 1986). In addition to fouling power plants and irrigation pipes like Zebra Mussels, this species can alter benthic substrates and compete with native mussels for food, and may inadvertently consume larval freshwater mussels (Leff et al. 1990). Zebra Mussels now have been documented in 22 U.S. states and two Canadian provinces, while Asiatic Clams occur in 40 states and two provinces. Fortunately, Zebra Mussels have not invaded Rhode Island, but they are in Twin Lakes in western Connecticut and in Lake Champlain, Vermont. Despite low water temperatures limiting dispersal (Graney et al. 1980), Asiatic Clams occur at Haddam Neck in the lower Connecticut River (Morgan et al. 1991, 2003) and are spreading to other tributaries (J. Cordeiro, personal research). They were also recorded in Tiogue Lake in Coventry, Rhode Island in July 2000 by Charles Brown of the RIDEM Division of Fish & Wildlife.

### Concluding Remarks

Unfortunately, freshwater mussels are experiencing severe declines across North America, and Rhode Island is no exception. Of the ten species documented historically to occur in Rhode Island, nearly all are in some state of decline in New England. A complete list of Rhode Island species and glochidial hosts, habitat, North American distribution, limited state locality data, and state conservation status will be included in the second article in this series.

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## Two Populations Are Better Than One: Attempting to Introduce a Population of the Endangered Sandplain *Gerardia*

B Y C H R I S R A I T H E L

Gerardias belong to the plant family Scrophulariaceae, familiar to botanists and gardeners alike, which includes such species as foxgloves and snapdragons. This is a large group, containing about 50 native Rhode Island species (Gould et al. 1998). *Gerardia* flowers are slightly irregular in shape (with weak bilateral symmetry), and feature five petals that are fused at their base to form a tube or corolla. Several species are hemiparasites, forming root connections with certain host plants to augment their nutrient intake. This relationship apparently does not harm the host plant.

The Sandplain *Gerardia* (*Agalinis acuta*) is one of the rarest plants in the world. *A. acuta* was not endowed with a large distribution to begin with; its historical range extended only from Maryland to Cape Cod along a narrow region of coastal plain. But *A. acuta* was extremely localized even within that band, with only 49 known historical sites. Its status in Rhode Island mirrors this pattern: there are only five verified historical sites, none more recent than about 1945. By the time *Agalinis acuta* attracted conservation attention in the 1980s, it had declined to about ten populations range-wide, most of which were located on Long Island, New York, and it was believed long gone from Rhode Island. Because of its extreme rarity and the vulnerability of existing populations (most of the known sites were on roadsides), the U.S. Fish and Wildlife Service listed *Agalinis acuta* as an endangered species in 1988 (U.S. Fish and Wildlife Service 1989).

Even though there were no known extant localities for *Agalinis acuta* in Rhode Island, we learned from Caren Caljouw and Bruce Sorrie, then botanists in Massachusetts, that the best chance of finding it in Rhode Island was to search in historical cemeteries. Apparently, cemeteries overlying the proper soil type and managed a certain way (mowed consistently but not too often) mimicked the suspected ancestral habitat of *A. acuta*. For several years I scouted old cemeteries throughout southern New England to look for potential habitats. I made initial trips in the spring to locate patches of plant species that liked the same conditions, such as Birds-foot Violet (*Viola pedata*), and then I followed up with visits during the peak flowering season of *A. acuta* in August and September. Fall visits were always

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problematic because I had no way of knowing the mowing schedule of a particular cemetery. If a site had been recently mowed, I would not be able to find *A. acuta*, even if it were present, and on many occasions a long drive produced no reward. These field trips, often made on weekends and with my young children in tow, gave me an appreciation of how unusual potential *A. acuta* habitat really was. We visited many sites and found many interesting plant species, but not *Agalinis acuta*. Eventually, fate intervened. As I was driving to work one day, I saw an historical cemetery that I had passed many times before but had never visited. I pulled in and had barely left the car when I saw the object of my long search, *Agalinis acuta*—in full flower. That moment remains one of my more memorable field experiences.

Now that we had located an extant Rhode Island site, we began to monitor the plants and to tinker with the mowing regime a bit to try enhancing this population. Also, to hedge the bet against extinction, we collected a small subset of seeds for several years and stored them at the New England Wild Flower Society. This strategy, known as seed banking, seemed prudent, but no one really knew how long these stored seeds would remain viable. Despite giving this population our increased attention in the 14 years since its discovery, *Agalinis acuta* has declined and become much more localized within its habitat, for reasons that are not entirely clear. The situation became so troubling that by 2001 the population consisted of only 12 plants, and we feared that extirpation was imminent.

Although each case of species endangerment is subtly different, there are some general rules that one can apply to nearly every recovery attempt. Conventional wisdom dictates that having more individuals in a population is better, and having more populations is better, too. Ideally, populations should be spread out enough to span the historic range, yet close enough to interact at some temporal scale. Such simple guidelines reduce the chance that a random event will negatively affect all populations. Once we had decided that it was about time to introduce *Agalinis acuta* to another Rhode Island locale, the first step in this process was the selection of a suitable site. We searched for a site that was roughly similar to the existing site—a coarsely mowed field with the same soil and with the host plant Little Bluestem (*Schizachyrium scoparium*) growing in profusion. To fine-tune the selection, we looked for the presence of at least a few plant species that associated with *Agalinis* at the existing site. However, there is another important component of endangered species habitat—its political context. Though

we very rarely hear discussion about the political component of wildlife habitat, it undeniably exists. We all recognize intuitively that not all endangered species are created equal—that certain species are more tolerable than others. People will go out of their way to shepherd Bald Eagles but are less likely to accept Gray Wolves. Therefore, in order to create a new *Agalinis* population that would be viable in the long term, we had to find an area that not only contained protected and suitable habitat, but was far from physical risks and human conflicts, and also owned or managed by a steward that would consider the plants a high priority and care for them (or allow us to do so). After identifying an appropriate old-field habitat on the Eppley Wildlife Sanctuary that contained several associating species, the Audubon Society of Rhode Island graciously gave us permission to proceed with the transplantation experiment.

To extract as much information as possible, even if the introduction failed, we established an experimental design at the Eppley site whereby each of two 9 by 9 meter areas was subdivided into three zones—left, middle, and right. Each of these 3 x 9 meter zones was further separated into 1 x 1 meter plots. We used two sources of seeds in this experiment. We collected about 8% of the fresh mature seed capsules from the existing population during the fall of 2002. We broke apart the capsules and counted the tiny seeds (yellowish and about the size of a period on this page), separating them into lots of about 100 seeds within glassine envelopes. We received the other seeds from the New England Wild Flower Society. These seeds, originally from Rhode Island, had been seed-banked for just such an occasion during the fall of 1995. By using both sources of seeds in the same experiment, we could compare germination rates in the field while controlling for other effects (such as weather and predators) that also influence seed germination. Before introducing the seeds during November of 2002, we prepared the introduction area by mowing down the existing grassy vegetation and scarifying the plots with garden rakes.



Sandplain Gerardia (*Agalinis acuta*) plants are 10–40 cm tall with thin, 1–2.5 cm leaves and 1–1.5 cm tubular flowers. The flowers are pink with two yellow lines and faint purple spots (Illustration from Holmgren, 1988).

We then introduced 100 fresh seeds to each of several randomly selected plots in the left-hand zones and placed 100 1995 seeds in each of several plots in the right-hand zones. We left the middle zones as non-treatment “control” areas to prevent confusion that might arise if some seeds “wandered” from their initial placement site. *Agalinis acuta* seeds need a cold period to spur germination, so while they lay dormant on the ground during the snowy winter of 2002–2003, we wondered, as we shoveled our walks and tried to stay warm, about the result of our effort.

Finally, in August 2003, came the season to search for new *Agalinis acuta* plants; I was actually reluctant to visit the new site for fear that there would be nothing to see. However, it was exciting to see that *Agalinis acuta* was present—33 plants now graced our experimental plots. All but four of these were derived from the fresh seeds; a result that suggests, unfortunately, that seed-banking may not be an effective conservation strategy for this species. Even the germination rate of the fresh seeds was low overall, with about 1% of the seeds producing seedlings. However, that rate is not unexpected for this species, and in fact represented better germination than for the existing “wild” site. We suspect that the plot scarification done during the fall at Eppley enhanced germination relative to the other site. So the next obvious question is, “OK, so now what”? Since there are more old Rhode Island *Agalinis* seeds available, we’ll probably try the same experiment again in an adjacent area and manage the existing *Agalinis* plots to enhance the numbers of plants. A fall 2003 survey of the seed sources revealed that there will be plenty of fresh seeds to transplant again, and the new population also produced nearly 200 seed capsules. Barring unforeseen events, there should be enough seeds to guarantee another generation of *Agalinis acuta* at the Eppley site. This does not mean that this new population will be viable in the long run or that the species



Lawrence Taft sowing seeds of Sandplain Gerardia at the Eppley Wildlife Sanctuary in West Kingston, RI.

is on the road to recovery—neither premise is a given. However, if we can figure out what *Agalinis* likes and better provide it, the probability of its extirpation from Rhode Island will be significantly lowered. That sound you hear when you turn your ear to the wind may be the collective sigh of all those who care about the security of rare plants.

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## Estimating the Hydroperiod of Seasonal Ponds: Assessing Amphibian Breeding Habitat Suitability

BY DENNIS E. SKIDDS

In New England, seasonal ponds (also commonly called vernal pools) provide primary breeding habitat for several amphibian species, including the Wood Frog (*Rana sylvatica*) and the Spotted Salamander (*Ambystoma maculatum*), as well as a host of invertebrate species. These small, depressional wetlands typically fill with water during the winter and spring months and dry in the summer or early fall of each year. The length of time that surface water is continuously present, known as the hydroperiod, may vary from a few weeks to a year or more. The periodic drying of these wetlands generally precludes the presence of predatory fish, which would otherwise decimate the egg masses and larvae of pond-breeding amphibians.

In Rhode Island, frogs and salamanders typically migrate to these small wetlands during March and April. There they mate and deposit egg masses. They then return to the surrounding upland forests, where they spend the rest of the year. Each species requires a specific hydroperiod in order to complete development and metamorphose to the terrestrial juvenile stage. For instance, Paton and Crouch (2002) showed that in Rhode Island, ponds must hold water until late June if

50% of the young Wood Frogs are to survive. Spotted Salamanders require surface water until mid-August to achieve the same percentage of survival. Hydroperiod, therefore, is considered one of the most important factors determining habitat suitability for a given species (Snodgrass et al. 2000).

Most New England seasonal ponds are less than a quarter acre in size, and legal protection of these small, isolated wetlands is often weak or lacking (Calhoun et al. 2003). Before protection measures can be applied, regulators and resource managers need to be able to identify those ponds that provide suitable amphibian breeding habitat. Pond hydroperiod is a key factor; unfortunately, historical hydroperiod data are rarely available for individual ponds, and hydroperiod estimation typically requires regular monitoring over the course of several months to years. If there were a way to estimate the hydroperiod of a pond using data gathered during a single site visit, it would greatly facilitate habitat suitability assessments for amphibians.



A vernal pool on the Marchant Farm in South Kingstown.

Site characteristics that might serve as accurate indicators of hydroperiod range widely. Obvious candidates include aspects of pond morphology, such as size and depth. However, researchers in New England and elsewhere in the United States have shown only weak relationships between pond morphology and hydroperiod (e.g., Brooks and Hayashi 2002). The geologic setting of a wetland heavily influences its hydrology, and soil composition both affects, and is affected by, the duration of saturation (Gosselink and Turner 1978). Water chemistry might provide some indica-

tion of the relative influence of groundwater on a pond's hydroperiod (Gay 1996). Finally, the relative abundance of trees growing in or near a seasonal pond might affect pond hydroperiod by influencing water transpiration or evaporation rates (Bosch and Hewlett 1982).

In the fall of 2000, URI Professor Frank Golet and I began research aimed at (1) identifying those features of seasonal ponds that might serve as good predictors of hydroperiod, and (2) developing a model for hydroperiod estimation based on one or more of these features. During 2001 and 2002, we monitored surface water in 65 ponds in the Pawcatuck River watershed and used a combination of field measurements and GIS techniques to assess other site characteristics. Features that we examined included basin depth and surface area, surficial geologic setting, thickness of organic-rich soil horizons and soil texture, percent tree-canopy cover, basal area of trees within and surrounding the pond, and specific conductance and pH of surface water.

Hydroperiods of ponds that dried in 2001 ranged from 19 to 41 weeks, and 13 ponds held water through December. In 2002, which was much drier, hydroperiods of ponds that dried ranged from 2 to 25 weeks, and only three ponds held water through the end of the year. By combining several features in a statistical model, we found that we could explain nearly 60% of the variation observed in the 2-year mean hydroperiod, the highest value reported to date. Tree canopy cover, basin depth, and specific conductance of surface water (a measure of dissolved minerals) were among the most useful site characteristics for estimating hydroperiod, while surficial geology and the texture of soil parent material made smaller contributions to the model. Pond hydroperiods estimated using our method differed from the actual 2-year mean hydroperiods by an average of only 3.3 weeks. Overall, the model correctly predicted whether a given pond's hydroperiod would be long enough to support successful amphibian breeding 95% of the time for Wood Frogs and 75% of the time for Spotted Salamanders.

These results indicate that prolonged and costly hydrologic monitoring is not necessary to estimate the hydroperiod of seasonal ponds. The ability to use predictive models to rapidly assess the potential habitat suitability of these ponds—especially at the watershed scale—should greatly assist federal, state, and local regulatory and resource management agencies in identifying and protecting significant amphibian habitat and in implementing more effective management strategies. Areas with high densities of ponds representing a variety of hydroperiods might be targeted for

special protection because they can provide adequate breeding habitat in at least some ponds regardless of annual precipitation levels (Semlitsch 2000). Nongovernmental conservation organizations and land trusts can use such information to identify tracts of land for open space acquisition. Finally, such information should prove valuable to municipal governments in developing effective resource protection plans, land-use ordinances, and best development practices.

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 Linda Steere, Applied Bio-Systems, Inc.  
 \*Prentice K. Stout, URI Marine Educator Emeritus  
 Everett Stuart, Natural Resources Conservation Service  
 Stephen K. Swallow, URI Department of Environmental & Natural Resource Economics  
 \*Lawrence Taft, Audubon Society of Rhode Island  
 Martine Villalard-Bohnsack, Roger Williams University, Department of Biology  
 Ed Wood, former Director, Rhode Island Department of Environmental Management

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## Ecological Inventory, Monitoring, and Stewardship Program

BY VIRGINIA BROWN

The Ecological Inventory, Monitoring, and Stewardship (EIMS) Program has had a busy and successful first year. While we continued with ongoing projects, including monitoring the condition and status of Nature Conservancy (TNC) preserves, conducting initial site visits for potential TNC acquisitions, and participating in conservation planning activities for TNC, EIMS staff also initiated a number of new inventory and monitoring projects in 2003. Additionally, two important TNC-RINHS initiatives, the John Wald Ecological Research grant program and the Rhode Island Odonata Atlas, produced great results this year.

Much of the inventory and monitoring work requested by TNC this year was conducted on the Francis Carter Preserve in Charlestown. This 840-acre parcel is primarily forested (Pitch Pine/Scrub Oak barren and oak/heath woodland), but it contains a 35-acre grassland that is being restored and managed for nesting birds. Botanical inventory in the grassland yielded over 100 species, including Butterflyweed (*Asclepias tuberosa*), a plant listed as Special Concern by the Rhode Island Natural Heritage Program. To create a baseline for long-term vegetation monitoring associated with ecological management of the grassland, EIMS staff collected data from 125 1-m<sup>2</sup> plots.

Because TNC was interested in use of the grassland and immediate surrounding woodlands by breeding birds, EIMS staff conducted breeding bird surveys in the early morning hours of May, June, and early July. Over 70 species of birds were recorded, most associated with

secondary growth and woodlands surrounding the grassland. Two to four pairs of Grasshopper Sparrows (*Ammodramus savannarum*—State Threatened) and one pair of Eastern Meadowlarks (*Sturnella magna*) nested in the grassland this year, each managing to fledge young.

EIMS staff also conducted several small mammal-trapping sessions at the Carter Preserve. Trap-lines were set in four different natural community types on the preserve, and over 100 individuals of 4 species were trapped. Preliminary results indicate that species diversity was greatest in the Pitch Pine/Scrub Oak barren and lowest in the oak/heath woodland, while abundance was greatest near the wetland and lowest in the grassland.

The Rhode Island Odonata Atlas completed its sixth and final field season in 2003. Volunteers and staff pushed hard to close remaining data gaps, generating 17 new county records and 224 new township records. Two dragonfly species never before reported for Rhode Island were recorded this year: the Umber Shadowdragon (*Neurocordulia obsoleta*) and the Arrow Clubtail (*Stylurus spiniceps*). These two additions to the state's odonate fauna bring the total to 135 species of dragonflies and damselflies.

Other notable results of the 2003 Atlas season include the first ever discovery of Zebra Clubtails (*Stylurus scudderi*) outside of the Pawcatuck River watershed, this time in the Blackstone River watershed. This beautiful dragonfly inhabits clean, cold, forested streams with riffles. It is considered globally imperiled and has been selected by TNC as an ecoregional conservation target. We know of only four populations in Rhode Island. Also of interest was the discovery of three new populations of the Ringed Boghaunter

(*Williamsonia lintneri*), bringing the total to 27 known populations for the state. This bog and fen-dwelling dragonfly is also considered globally imperiled and is a conservation target for TNC.

EIMS staff initiated and/or completed a number of projects for government agencies and local land trusts. A large multi-year contract has been secured with the National Park Service to conduct Odonata inventories at New York City area national parks, including Fire Island National Seashore, Gateway National Recreation Area, and Sagamore Hill National Historic Site. The Rhode Island Army National Guard has contracted the Survey to inventory, map, and monitor invasive species at its Camp Fogarty training site in East Greenwich. This work will begin in 2004 and continue through 2005. EIMS staff also conducted a botanical inventory in South Kingstown and natural community mapping at Quonochontaug Beach. Future inventory and monitoring work is planned in Lincoln, Scituate, and Cumberland.

The numerous projects that have been completed this year could not have been done without the assistance of hard-working volunteers. We would like to acknowledge and thank the contributions of all of our volunteers.

**Virginia Brown** is Coordinator of the RINHS Ecological Inventory, Monitoring, and Stewardship Program





## President's Message



Impressive ignorance. An oxymoron? Probably. But the essence of this binomial was used half a century ago by Marston Bates to suggest that natural history is “an area in which our ignorance is more impressive than our knowledge.” Has that changed in 50 years? Perhaps—but I would argue only by degree. We still know only a fraction of what there is to know about dung beetles and beetle dung, river otters and otters’ rivers, pitch pine and pine pitch. In fact, we probably know more about the *Mayflower* than the Mayflower.

This realization is a major driving force behind the emerging strategic plan of the Rhode Island Natural History Survey. A new facet of this plan is our Ecological Inventory, Monitoring, and Stewardship (EIMS) program. Less than a year old, EIMS has already accelerated the documentation and understanding of the biota and natural systems of our state. Rapid assessments of properties considered for acquisition, descriptions and mapping of natural communities, detailed taxonomic inventories, long-term monitoring programs, development of management and stewardship plans, environmental hazards assessments, and information procurement from databases are all functions of EIMS.

While the Survey is committed to becoming an ever-increasing light in the darkness of biotic ignorance, there are many other lights as well. One of them walked through my office door in 1979. The polite, almost inaudible knock that announced a visitor produced a gentle man I had never seen before, and did not know by reputation. His quest? To talk about plants, nothing more.

As was clear from the outset, this man knew the plants of Rhode Island. Having myself just arrived in the Ocean State from the Land of Oz, or as the public relations gurus used to write, “Kansas—The Land of Ah’s,” I feared I had little to offer this soft-spoken naturalist. I was right of course, not yet knowing much about the specifics of the Rhode Island flora, but I was also wrong. We sat in the University of Rhode Island KIRI Herbarium next to my office for an hour, exchanging information about plant locations, taxonomy, and adaptations. I learned fifty times what he learned, but it became clear that what I could provide, and what this most welcome visitor needed, was a sounding board. I could do that. My larval botanical skills were a poor trade for his considerable knowledge and wit, but we both reveled in the conversation during that unexpected hour.

Quite fittingly, this distinguished naturalist became a Distinguished Naturalist. In 1996, Richard Champlin, the gentleman’s gentle man, was the recipient of the RINHS Distinguished Naturalist Award. Richard died this past summer. I mention him here because, just as it is the mission of the RINHS to make the unknown known, so it is to recognize, encourage, and honor individuals who do the same. It is not only institutional programs and elaborate sampling strategies that are eroding ignorance, but also dedicated, independent naturalists like Richard Champlin. Cheers to both for making our biotic ignorance less impressive.

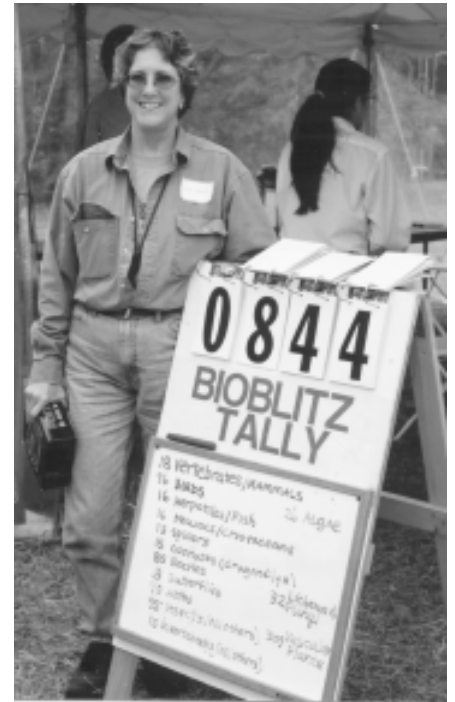
Keith

# BioBlitz 2003 Tackles Tiverton!

Over 140 scientists and volunteers gathered in Tiverton, Rhode Island on June 20 and 21 to participate in the Rhode Island Natural History Survey's 4th BioBlitz, the best attended ever. Combing the Pardon Gray Preserve, Weetamoo Woods, Ruecker Wildlife Refuge, Sapowet Marsh, and Babbitt Memorial Wildlife Area, bioblitzers counted 844 taxa. The count included 309 vascular plants, 26 marine algae, 32 fungi, lichens, and mosses, 18 mammals, 96 birds, 10 herptiles, 6 fishes, 16 mollusks and crustaceans, 85 beetles, 108 butterflies and moths, 15 dragonflies and damselflies, 95 other insects, 13 spiders, and 15 other invertebrates. A full listing of all taxa will be posted on the RINHS website at [www.rinhs.org](http://www.rinhs.org).

The planning and organization of BioBlitz 2003 was co-sponsored with The Nature Conservancy of Rhode Island, Tiverton Land Trust, and the Audubon Society of Rhode Island. We are also grateful to the corporate sponsors, which included Bank of Newport, Birdwatcher's Nature View, Humphrey's Building Supply Center, Largess Forestry, Leary & Holland, New England Property Holding LLC, and Sakonnet Boathouse.

BioBlitz 2004 is in the planning stages: set your calendar for June 18-19, 2004 and come to West Greenwich to help us explore the ecologically rich 2,300 acres at URI's W. Alton Jones Campus.



Lisa Gould with the final species count



Above, Joe Metzen and Danice Whitaker with a Turkeytail Fungus; below, Howard Ginsberg dressed for entomological action

Eli Mitchell examining an Eastern Ribbon Snake



Sheila Hughes and Eugenia Marks admiring a fungus



Children examining skulls at the Education Booth



## Notes from Field and Study

BY RICHARD W. ENSER

During early summer of 2002, local botanist Frances Underwood was in the midst of his favorite activity—prowling the little known corners of Rhode Island looking for rare plants. On this day he had selected a bottomland pine stand in West Greenwich where there was little evidence of past logging, and an open sphagnum-carpeted understory that suggested areas where unusual orchids might be found. Instead, within scattered moist depressions Frances found clumps of an unfamiliar sedge. It was a member of the genus *Carex* that includes over 200 species in Rhode Island, but this one with its distinctive prostrate stems and widely spaced, starburst fruits was clearly one he had not seen before. But he suspected the plant's identity and by the next day, after his digital photographs had been e-mailed for confirmation, the word was out that Collin's Sedge (*Carex collinsii*) had been rediscovered in Rhode Island.

What's that you say? You hadn't heard this news before? Not surprising. Many of the discoveries made in Rhode Island natural history go unrecognized. Sometimes the discoverer or a colleague may submit a note for a peer-reviewed journal, but these publications tend to be seen by only a few. More often the defining specimen or photograph languishes in a desk drawer awaiting an appropriate repository. But first-time discoveries of new species, or ones that significantly alter the current understanding of distributions and status of species, are important bits of information for the scientific and conservation community.

Therefore, it is the objective of this column to provide a forum in each issue of *Rhode Island Naturalist* for

getting the word out on new discoveries in Rhode Island. Maybe you've made an important find or know someone who has, or you have ideas about the kinds of things that should be included in this column. Email your thoughts to the Survey office, or to me at [renser@dem.state.ri.us](mailto:renser@dem.state.ri.us). As an introduction, allow me to suggest a couple of ground rules.

First, *significance*. New state records are always worthy of note, but more importantly today the find might be of a new potentially invasive plant species, or a previously unknown forest insect pest. Other items could be significant range extensions, or the appearance of a species in an unusual habitat or location. What makes Frances Underwood's discovery of *C. collinsii* significant? The last record for this species was in South Kingstown in 1979, at a site that has been searched many times since then without success. Thought to be extirpated, the new West Greenwich occurrence is the only known population of *Carex collinsii* in Rhode Island, and in all of New England.

Second is *documentation*. All significant records should be documented with appropriately collected and prepared specimens, or with photographs. Most naturalists, amateur and professional, understand the basis for this guideline. In support, I can only reflect on the numerous observations of "rattlesnakes" that have been reported to us in the past twenty years, all unsupported by either physical or photographic evidence. More about this debate in the future, but for now, let us serve as your conduit for getting news out about your exciting discoveries.

Editor's note: One of the reasons the RINHS Board selected *Rhode Island Naturalist* as the new name for our journal and newsletter was to maintain a sense of historical continuity with *Narragansett Naturalist*, published by the Audubon Society of Rhode Island

from 1958 to 1971. "Notes from Field and Study" follows in that same tradition—a column with the same title was a regular feature in *Narragansett Naturalist*.

**Richard Enser** is Coordinator of the RIDEM Natural Heritage Program and serves on the RINHS Board of Directors.

## Accessing RINHS Data

One of the greatest challenges RINHS faces is the handling of biotic and community data. From its inception, RINHS has spearheaded local efforts to catalogue biodiversity and to date, along with a sizeable list of contributors, has collected data on plants, animals (including a specimen collection of the Odonata in the region), fungi, and rare and endangered species. Although the collective breadth of this information is possibly the most complete for the region, access to the data has been problematic, because different database management programs were used to manage each database and safe storage was not ensured.

To integrate and secure the databases, RINHS has hired Jeff Hollister, a PhD candidate in landscape ecology at URI's Environmental Data Center. Jeff has combined the Biota of Rhode Island databases (Animalia, Plantae, and Fungi), the Rhode Island Natural Heritage database, and the Rhode Island Odonata Atlas into a single, seamless database using MS Access. In addition, he is working with RINHS staff to standardize the storage of all taxonomy information, add Taxonomic Serial Numbers from the Integrated Taxonomic Information System, create data entry forms, and work on data exchange processes. Jeff has also moved the database to a secure server housed by the Environmental Data Center.

## In Memoriam: Richard L. Champlin (1927–2003)

BY PETER LOCKWOOD

The RI Natural History Survey lost one of its most venerable colleagues with the death of Richard Champlin this past summer. Mr. Champlin was the recipient of the 1996 RINHS Distinguished Naturalist Award and co-author of *Vascular Flora of Rhode Island*. He was instrumental in the development of Rhode Island's first lists of rare and endangered species and was arguably the premier natural historian in Rhode Island during the latter half of the twentieth century.

Richard Lawrence Champlin was born in Newport on 8 June 1926 and was a lifelong resident of Newport and Jamestown. He attended Mount Herman Preparatory School and Middlebury College, where he majored in Russian. Between 1944 and 1946 he served in the Navy, providing instruction to the Russian military in the Aleutian Islands. He retired as the head librarian of the Redwood Library in Newport in 1991, where he was highly regarded for his scholarship and literary capabilities.

Beyond his lifelong "avocational" interest in the natural sciences, he educated himself in diverse academic areas of local history, and authored numerous articles for such periodicals as *Newport History*, *The Newport Review*, *Yankee*, *Verbatim*, and the *Rhode Island Yearbook*. He researched and acquired extensive information and local knowledge on such topics as antique clocks and clockmakers, Newport architecture and historical land use, ferries, lighthouses, stone walls, and weather events. A highly literate individual, he was fascinated with word study and read

classical Greek for pleasure. His own artwork included highly refined and precise pen and ink line drawings of botanical specimens and impressive pastel drawings of local landscapes.

The breadth and diversity of his knowledge embodied a classical definition of natural history. Richard was the author of more than 20 published articles or books on the subject of Rhode Island's flora and fauna, and was a contributor to *Narragansett Naturalist*, *Rhodora*, and *American Fern Journal*. His interests ranged across the biological realm (botany, ornithology, mycology, entomology, malacology, ecology) to geology and hand-sample mineralogy, and predated what we today have named "landscape ecology."

Richard had an intuitive appreciation and understanding of the historical processes by which human culture affects our flora and fauna, and maintained a lifelong interest in



Richard L. Champlin  
(1927–2003)

colloquial history. He was a very good storyteller and was a companion to most of the old Yankees from northwestern Rhode Island. For many years, his day off from the Redwood Library (Thursday) was spent exploring and visiting in the Towns of Burrillville, Glocester, Foster, Coventry, and West Greenwich. Accordingly, he came to learn a great deal about local lore and cultural history including the locations of springs, Native American mortar stones, threshing rocks, charcoal mounds, and other colonial industry.

Richard's special skills related to field botany and he had particular knowledge of orchids, ferns, mosses, and trees. One of his more significant botanical accomplishments included the discovery and published description of a red-flowered form of Spicebush, which has been accepted as *Lindera benzoin* forma *rubra* R.L. Champlin. He maintained records of notable trees for many years and was the discoverer of the national champion Pussy Willow in Rhode Island. In Newport and Jamestown he was considered the expert on the flora of the various estates and exhibited an authoritative knowledge of their woody horticultural taxa. In addition, he was an exceptionally astute and persistent observer of all types of wildlife, providing ongoing contributions regarding, for example, birds, turtles, and butterflies. A diligent keeper of written records, his daily journals amounted to over 35 volumes over the years, and will provide an invaluable record of his explorations and observations.

Most of all, Richard was a true gentleman. He was a reverent, modest, and private man. His manner easily impressed those who had just met him and, without exception, he was deeply respected by those who knew him well. Among professionals in the field, Richard Champlin's report of a plant

occurrence or wildlife sighting was accepted verbatim and as fact—a level of credibility not to be exceeded in the scientific community. Nevertheless, he humbly referred to himself as “only an amateur, with little or no formal training in the natural sciences.”

Perhaps it should be said that Richard spent his last day doing what he loved most. It was during the dog days of August when he returned to one of his favorite places in Foster to glean some peaches from an abandoned orchard. He came to rest alongside a stone wall, with his hand atop a sapling and a full box of peaches at his side. Rhode Island may never again know such a remarkable man.

The day before he died, Richard stopped by our house for a brief visit. It was a hot day and we sat in the shade discussing various plants and other natural phenomena. We shared some of the last blueberries of the season from our bushes in the yard. I commented that the wild blueberries were generally superior. After a lengthy but relaxed pause he reflected, “Yes, I know.”

**Peter Lockwood** is a Director of the RI Natural History Survey and an Associate and Senior Environmental Scientist with Mason & Associates, Inc.

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## Rhode Island Collections: “Just for the Record...”

BY MARILYN R. MASSARO

Many of us are affiliated with an organization of one kind or another. Whether public, private, governmental, academic, not-for-profit, etc., all of them have one thing in common: they all amass vast quantities of records. These records may be in the form of paper documents such as manuscripts, publications and correspondence; photographs; and contemporary communications media. Those records which contribute to the institutional history of an organization, or which document the regular activity of an individual or organization, constitute an archive. Archives, then, are collections of primary records or primary source material generated by an individual or agency. In natural history collections management, field notes, collectors' catalogues, original specimen labels, and all other ancillary materials are considered to be archives.

So why focus on archives? My reasons writing this column are twofold. This column presents an ideal opportunity to raise a general awareness about an important and often neglected kind of collection, i.e., archives. Further, it offers an opportunity to share information about available resources, many of them free of charge, to assist you and your institution to better manage your archives.

Both you, and your organization, possess a unique history. This history can only be documented in the future by the records that are preserved for others to examine and research. In today's world of electronic communication, it is vitally important to remember, that, unless you have saved a hard-copy record of that communication, no one in fact can know about it in the future. Historical reconstruction of any

kind is impossible without record retention and preservation.

Whether you are a scientist, educator, or amateur naturalist, if you produce records in the course of your day, you are assembling your archives. Do not underrate their importance! Not only are they irreplaceable as documentation of your life's work, their value is further enhanced if they also contribute to the history of an organization with which you are affiliated.

To whom might these records matter? They may be of immediate importance to current staff members needing to research an organizational matter. They may be needed by your immediate successor or by one a hundred years from now. These records may be vitally important to your biographer if you have made noteworthy contributions to a cause or discipline. Or, they may be of great importance to a colleague working in your interest area. An organization's archives are the historical backbone of the agency and vital to its chronological documentation. As we have seen in recent times, they may also serve as evidence in legal issues.

If you are an independent or freelance worker, either professional or amateur in your pursuits, do not underrate the importance of your archives. It is equally important to retain the records that document your life's work, be they in the form of manuscripts, field notes, correspondence, photographic media, etc. If you maintain a collection of natural history materials, never discard your original notes and journals, and keep all associated labels (including field tags) with your specimens. These primary documents constitute the archives associated with your collection.

Institutions bear an ethical responsibility to steward their records and those of their affiliates appropriately. They bear this responsibility to professional successors, to colleagues and clientele, and to society at large. A gap in an institution's history from the loss of

primary records, or those generated by its affiliates, cannot be reconstructed due to the nature of those records. Which brings us to the question: How does one know what is worth saving? And how does one maintain order for all these retained records? How can we arrange them to facilitate and expedite their accessibility?

Amazingly, there is plenty of help out there. In the best of all possible worlds a professional archivist would be hired as a permanent staff member or even as a short-term consultant to organize and "arrange" these records. Arrangement is a technical term for organizing records in the world of archives, and follows a suite of standards and protocols. A directory of professional archivists in our area is published by the New England Archivists (NEA). Their website ([www.newenglandarchivists.org](http://www.newenglandarchivists.org)) is extremely user-friendly and a great resource. It currently has a dozen Frequently Asked Questions (FAQs), with succinct, pithy answers—questions such as: How can I preserve my organization's records or my family papers? How do I donate my records to a repository? How can I find out about archives education in New England?

Another excellent resource is the National Historical Publications and Records Commission (NHPRC). Affiliated with the National Archives and Records Administration, it promotes the nationwide preservation of documentary records. A major way it does this is through its grant program, funded each year by Congressional appropriation. More information on NHPRC and its grants can be obtained from its website: [www.archives.gov/grants/about\\_nhprc/about\\_nhprc.html](http://www.archives.gov/grants/about_nhprc/about_nhprc.html).

In our state we have yet another resource, the Rhode Island Historical Records Advisory Board (RIHRAB), established by Executive Order in 1976. It is the in-state entity that helps local agencies apply for grants, and also the body that reviews grant

requests submitted to NHPRC. Its mission is to "serve the people of the state by advocating, developing, and supporting programs that defend and provide access to its documentary heritage." It serves as the central advisory body for all historical records issues in our state and promotes programs that identify historical records. RIHRAB consists of a Board of at least ten members having records management backgrounds and is chaired by the State Archivist. It publishes a directory of records-holding repositories within our state, accessible via its website at: [www.state.ri.us/RIHRAB](http://www.state.ri.us/RIHRAB). You can enter or correct your agency's information at this website.

In closing, I would like to add that we at the Museum of Natural History have completed a formal "arrangement" of our photographic archives complete with the publication of a finding aid and a manual for their ongoing management. These documents are available at our website: [www.osfn.org/museum/](http://www.osfn.org/museum/). This project was implemented in 1998–99 with grant funds provided by the Rhode Island Council for the Humanities (RICH). Our documentary archives, though chronologically arranged and quite accessible, have not yet been inventoried or catalogued and therefore do not have a published finding aid.

If this article helps encourage even a few people to generate and save hard copies of their work output, I will have achieved my goal in writing it. Your archives and your institution's archives are important and irreplaceable. They are part of our collective historical legacy. They warrant engaged and informed stewardship for today's access and that of tomorrow. They deserve our attention...just for the record.

*Marilyn Massaro is Curator of Collections at the Museum of Natural History, Roger Williams Park, Providence; Chair of the RINHS Collections Committee; and a member of the RI Historical Records Advisory Board.*

## Focus on RINHS Organizational Members: The Rhode Island Wild Plant Society

TEXT BY ERIN FOURNIER

Sometime in the early spring of 1986, a congenial group gathered at the Eppley Wildlife Sanctuary for a workshop in wild plant gardening offered by Lisa Gould and Doris Anthony. In the course of the day, Lisa described the wild-flower garden club to which her mother belonged. That group had three primary interests: growing wild plants, working toward conservation, and taking walks and trips to see wild plants in their native habitats. This was an inspiring idea to the group gathered at Eppley, and they began to discuss starting a similar organization in Rhode Island. As support grew, several ideas emerged. Instead of a garden club, the wild plant group should have a strong conservation component; it should have a broad base to interest many people, from highly qualified professionals to those that simply liked to walk; and it should be fun for its members.

This concept eventually grew into the Rhode Island Wild Plant Society, which was officially incorporated in 1987. Many of the original founders are still our most active volunteers, and our mission today remains the same. We are a nonprofit organization dedicated to the conservation of Rhode Island's native plants and habitats through preservation, education, propagation, and recreational programs.

Today our preservation efforts encompass several programs. In 1991 we sponsored legislation to protect Sea Lavender under the Christmas Greens Act, and we continue to educate and

spread the word about protecting native species. Like the RINHS, we offer plant inventories and surveys to members, individuals, and organizations. These lists become part of the statewide plant inventory compiled in conjunction with the RINHS and the RI Natural Heritage Program. As RIWPS members hone their botanical skills they are encouraged to participate as Plant Conservation Interns for the New England Plant Conservation Program and help monitor rare plant populations, as well as search for new populations.

Each year we educate the public on the scientific and aesthetic values of wild plants through a variety of outreach activities. Our annual display at the Rhode Island Spring Flower and Garden Show reaches thousands of Rhode Islanders each year. Our Educa-

tion Committee provides lectures and slide talks on native species for adult groups and schools. They also manage our *plant discovery boxes*, which provide materials and curriculum for Rhode Island teachers and are placed in local libraries throughout the state. We have recently embarked on

a new service that offers consultation to groups wanting to develop interpretive nature trails. Each year garden clubs use our speaker list to schedule talks on a variety of botanical and conservation topics including invasive species identification and control and using natives in a garden setting.

To encourage and offer guidance in the cultivation and propagation of wild plants, we have several active Seed Starters groups. They meet monthly to learn how to propagate native plants and supply hundreds of plants each year for the RIWPS plant sales. We also offer courses and publish detailed cultivation notes in each issue of our newsletter, *RIWildflora*.

Probably the most popular part of our mission is the opportunities we provide

for Rhode Islanders to study and enjoy native plants in their natural habitats. People of all ages and interests have the opportunity to learn about native plants through our courses, programs, tours, lectures, and field trips at sites throughout Rhode Island and New England. The Certificate in Native Plant Studies offered through the RIWPS and the New England Wildflower Society offers committed students a comprehensive series of programs on the identification, ecology, cultivation, and conservation of northeastern plants.

Over the last sixteen years our programs have grown and improved, and continue to spread the word about using native plants and protecting habitat. We look forward to continuing to partner with the Rhode Island Natural History Survey to offer programs, publications and services, as we all work to use education as a means to conserve Rhode Island's native plants and habitats.

*Erin Fournier is the Director of the Rhode Island Wild Plant Society. Memberships and publications can be purchased through the RIWPS's office at (401) 783-5895 or by email, office@riwps.org.*



### Benefits of membership in the Rhode Island Natural History Survey

#### *For Individual, Family, and Student Members*

*Rhode Island Naturalist*, the newsletter  
Participation in the RINHS List-Serve  
Free membership list  
10% discount on all publications  
Discount on annual conference fee  
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## Book Review

REVIEW BY GRACE KLEIN-MACPHEE

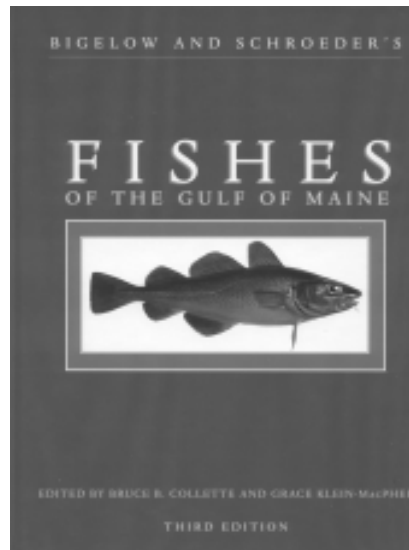
### *Bigelow and Schroeder's Fishes of the Gulf of Maine, 3rd ed.*

The first edition of *Fishes of the Gulf of Maine* was published in 1925 by Henry B. Bigelow, professor at the Museum of Comparative Zoology (MCZ) at Harvard University, and later the first director of the Woods Hole Oceanographic Institution, and William W. Welsh. It was published by the U.S. Bureau of Fisheries, the predecessor agency of today's National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), and resulted from field work conducted during the early part of the 20th Century by Bigelow and colleagues from the Bureau of Fisheries and the MCZ. The first edition included what was then known about the biology and ecology of 178 fish species in 83 families. The book was revised by Bigelow and William C. Schroeder in 1953, describing 219 species and 108 families. This second edition served as the standard reference for nearly a half century.

An updated revision of *Bigelow and Schroeder's Fishes of the Gulf of Maine* was originally suggested by Charles Sheldon, a fisheries consultant, to Allen Peterson, the director of the NMFS Northeast Fisheries Science Center at Woods Hole in the 1980s. Dr. Peterson was very enthusiastic about this and contacted Bruce Collette, at that time the director of the NOAA Systematics Laboratory in Washington, D.C. Bruce also felt that a revision was long overdue and agreed to take on the task. He subsequently contacted me because I had done work on a number of the commercial species in the Gulf of Maine, particularly the flatfishes. I was very excited about the project and began a collaboration with Bruce that was to last 15 years until the book was published in 2002 by Smithsonian

Institution Press. Thirty-eight additional authors contributed to the book, and much biological, fisheries, and habitat data were contributed by the Northeast Fisheries Science Center. We also conducted a cruise in the Gulf of Maine to ground-truth earlier descriptions of the more common fishes.

How many species of fish live in the Gulf of Maine? The grand total documented in the new edition is 252 species in 111 families—33 more species and 10 more families than in the 1953 edition. Nine of these species are newly described since 1953—the Deepwater Skate (*Bathyraja richardsoni*), Slope Hatcherfish



(*Polyipnus clarus*), a lightfish without an official common name (*Polymetme thaeocoryla*), Black Spinyfin (*Diretmichthys parini*), Silver Roughy (*Hoplostethus mediterraneus*), Western Roughy (*H. occidentalis*), Gulf Snailfish (*Liparis coheni*), Inquiline Snailfish (*L. inquilinus*), and Atlantic Softpout (*Melanostigma atlanticum*). Most of these are strays from relatively deep water, but the two snailfishes are small, secretive species that occupy shallow to moderate depths. The Inquiline Snailfish can be fairly abundant and is often found inside sea scallops in a commensal relationship at certain times of the year, but the Gulf Snailfish is relatively rare.

Other species that have been found to inhabit the Gulf of Maine since the 1953 edition was published are also mostly deeper-water species. Some of these might be more abundant than believed because fewer collections are made in deeper water. For example, the Glacier Lanternfish, *Benthosema glaciale*, is the most frequently collected lanternfish in the Gulf of Maine, but was not reported until the 1970s. The Striped Cusk Eel, *Ophidion marginatum*, is a shallow-water species, first reported only in 1997, that might be more common than previously believed. This species burrows in the bottom and may go unnoticed, but it is very vocal; its sounds have been recorded in Barnstable Harbor. There are also species that represent range extensions. The Smallmouth Flounder (*Etropus microstomus*) is common from Cape Hatteras to Long Island. Early life stages occur regularly off southern New England and Cape Cod. Adults were first collected in Cape Cod Bay in the 1980s, and have since been collected regularly in the Massachusetts Department of Marine Fisheries trawl surveys north of the Cape. They have been increasing in numbers in southern New England since the 1980s, with eggs and larvae collected in estuaries from Long Island to Narragansett Bay. The Bigeye Soldierfish (*Ostichthys trachypoma*) is represented by a single individual collected at a power plant intake in Seabrook, New Hampshire. This species is known from deep reefs from Brazil to Cape Hatteras, and was probably carried up by the Gulf Stream. The Bullet Tuna (*Auxis rochei*) is also represented by a single specimen, but also has been reported off Nova Scotia and Martha's Vineyard.

A particularly interesting addition is the Rainbow Trout, *Oncorhynchus mykiss*, which has been utilized in mariculture since 1978 in the Gulf of Maine. Escapees from cages are collected occasionally, although there



is little evidence of long-term survival or reproduction to date. This species, native to Asia and the Pacific northwest, has been widely stocked throughout the world and naturalized populations are common, but its presence in the Gulf of Maine illustrates the potential danger of culturing species that are not native to the region.

Some new additions, like the Offshore Hake, *Merluccius albidus*, and White Mullet, *Mugil curema*, are easily confused with similar species (Silver Hake and Striped Mullet). They might have been present earlier but were misidentified. Meek's Halfbeak, *Hyporhamphus meeki*, was reported as *H. unifasciatus*, its southern relative, in the 1953 edition, but was not described as a separate species until 1993.

We are pleased to have added to the species list and biological information given in the two previous editions of *Fishes of the Gulf of Maine*, and hope that people who find additional species will keep us informed so that we can further expand the knowledge for the next edition. In a review of our book earlier this year in *Bioscience*, Ione Hunt von Herbing, Associate Professor at the University of Maine School of Marine Sciences, wrote that the new edition is "a standard for the next 50 years." If so, can you imagine how many more species might be added when the fourth edition comes out?

*Bigelow and Schroeder's Fishes of the Gulf of Maine*, 3rd Edition, edited by Bruce B. Collette and Grace Klein-MacPhee (2002, ISBN 1-56098-951-3, 882 pp., hardcover, \$75.00), is published by Smithsonian Institution Press, Washington, DC ([www.sipress.si.edu](http://www.sipress.si.edu), 800.233.4830). A reprint of the 1953 edition is available from Blackburn Press ([www.blackburnpress.com](http://www.blackburnpress.com)).

*Grace Klein-MacPhee is an Assistant Marine Research Scientist at the URI Graduate School of Oceanography, and winner of the RINHS Distinguished Naturalist Award in 2002.*

## Rhode Island's Natural Heritage under Siege: Meeting the Challenge of Invasive Species

*Rhode Island's Natural Heritage Under Siege: Meeting the Challenge of Invasive Species* is the title of two new outreach items just released by RINHS. A 25" x 17" full-color poster, shown below, highlights the impacts of invasive plants on native plant and animal populations, and a full-color brochure describes impacts, facts about invasive species, how to take action, and resources for further information.

Production of these materials was made possible by the support of the U.S. Fish & Wildlife Service, The Nature Conservancy of Rhode Island, URI Coastal Institute, Rhode Island Agricultural Experiment Station, and the Rhode Island Wild Plant Society. Anderson Pop Design provided the graphic design. The items are available without charge if picked up at the RINHS office.



## Thanks and Credits

Volunteer Joyce Valentine-Kenney, CPA deserves a huge thanks for working with the RINHS to change our accounting system from a cash to an accrual system. We also thank the following people for their contributions to the RINHS library: Alex Frost, for *The Guide to Pressing Seaweed*; the estate of George Church, for *Picocola Flora delle Dolomiti* and *Mountain Flowers of Scandinavia*; and Chris Modisette for *Rare and Endangered Plant Species Field Guide for Southern New England*.

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## Weaving the Web: Electronic Resources

**Ferns of New England:** Don Lubin is a fern enthusiast from Allston, Massachusetts with a broad interest both in wild-growing ferns and in their garden cultivation. He maintains a personal website with a wealth of information on ferns and fern allies (clubmosses, quillworts, horsetails, etc.). There he says that he “thinks there are more fern species in his garden than any other in Massachusetts, but he’s not sure.” Resources available on the website include extensive photos, species lists, site surveys, and information on available classes. Particularly worth noting is a table of 112 fern species and their status (extant, watch list, special concern, threatened, endangered, historic, extirpated, or never present) in each of the six New England states — select “MORE,” then “FERNs,” then “New England endangered and extant taxa by state.” <http://theworld.com/~donlubin/>

**Kluwer Academic Publishing**, headquartered in Dordrecht, The Netherlands,

recently made available free on-line access to all of the articles published in the *Journal of Landscape Ecology* between 1987 and 1997, at either of the web addresses given. Free access to more recent articles is available for a limited time, until the end of December 31, 2003, only at the Kluwer website. <http://www.kluweronline.com/issn/0921-2973>  
<http://landscape.forest.wisc.edu/landscapeecology/>

**U.S. Forest Service:** This site has downloadable images and maps for 135 tree species that have at least a portion of their range in the eastern United States. You can use the data in a GIS to display both ranges (according to Elbert Little’s maps) and importance values by 20-km cell (according to U.S. Forest Service Forest Inventory Analysis data) from their most recent surveys. Click on the “New” button on lower right corner of the start page to get to the tree information. At the same website, you can also access a climate change atlas, a database on 3200 species from the Illinois flora, a documentation of biological trends in the United States, and information on prescribed fire studies. <http://www.fs.fed.us/ne/delaware/4153/4153.html>

**U.S. Geological Survey (USGS)** announced on-line availability of data on fish communities for 960 stream sites in more than 50 major river basins across the nation. More than 1,900 fish community samples, collected from 1993 through 2002 by the National Water-Quality Assessment (NAWQA) Program, can be downloaded. USGS fish community samples document the presence of all fish species and their relative abundances within designated stream reaches. Online access to macroinvertebrate and algae data were anticipated to follow in succession. These data are part of the NAWQA Data Warehouse, which also provides online access to 8 million records of water-quality information, enabling water-resource managers, scientists, and the public to find data about the quality of water or chemical concentrations in aquatic tissue at 4,100 stream sites and 6,500 wells across the United States. For questions regarding online data retrievals, please contact [gs.nawqa.data@usgs.gov](mailto:gs.nawqa.data@usgs.gov) or Mr. Sandy Williamson at (253) 428-3600, ext. 2683. For technical questions, such as regarding biological collection methods and taxonomy, please contact Dr. Steve Moulton at [smoulto@usgs.gov](mailto:smoulto@usgs.gov) or (703) 648-6874. <http://water.usgs.gov/nawqa/data>.

## Natural History Opportunities for Volunteers and Students

**The Audubon Society of Rhode Island** is looking for volunteers for two natural history-related projects. One volunteer is needed who can help in confirming the identification of birds eggs. A 10–12 hour commitment is required. A volunteer is also needed for waterfowl monitoring on Wesquage Pond in Narragansett (Bonnet Shores). The project will run from December through March, with weekly monitoring ideal but bi-weekly or monthly acceptable. This project requires someone with good bird identification skills; reports can be submitted by email or regular mail. Hot chocolate certificates provided! Please contact Eugenia Marks at (401) 949-5454 or [emarks@asri.org](mailto:emarks@asri.org).

**The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)** is offering *Wildlife Habitat Restoration Internships*. Internship periods are negotiable and hours are flexible at 10–35 hours/week. Interns will conduct field work in Rhode Island coastal and inland habitats and also

work in the NRCS office in Warwick. Duties may include: participation in pre-restoration and post-restoration field-work (monitoring vegetation, hydrology, birds, nekton, and herptiles in an array of upland, freshwater and coastal habitats, GIS mapping (ARCVIEW 3.3), general database management (MS EXCEL), reporting and analyzing monitoring data, and working with private landowners to develop conservation plans. You will have the opportunity to participate in multi-partner projects with other federal, state, and non-governmental agencies. The goal of Conservation Programs implemented by NRCS is to enhance and restore native wildlife habitats that have been degraded, altered, or eliminated as a result of agriculture, urban and residential development, and other changes in land use. In Rhode Island, NRCS focuses on the restoration of coastal habitats (salt marshes, eelgrass beds, and diadromous fisheries); freshwater wetlands and riparian habitats, and early successional upland habitats (grasslands). Interns will

earn Experiential Learning Credits, and a stipend may be possible. This position is ideal for individuals interested in a getting real-world experience and conducting an independent study for academic credit or personal satisfaction. Qualifications include: a genuine interest in ecological restoration techniques, ecological monitoring, and database management; effective organizational and time-budgeting skills; completion of some coursework in natural sciences (ecology, natural resources science, soil science, hydrology, biology, geology, etc.); a demonstrated ability to work independently and perform a range of job tasks; the ability to be comfortable getting mucky in the field or in an office at a computer; and the ability to work hard and maintain a sense of humor. To apply, submit a resume and availability to Andy Lipsky, Natural Resources Conservation Service, 60 Quaker Lane, Warwick, RI 02886. For more information contact: Andy Lipsky at (401) 822-8842 or [Andrew.Lipsky@ri.usda.gov](mailto:Andrew.Lipsky@ri.usda.gov)

## Events Calendar

**October 19<sup>th</sup> – February 23<sup>rd</sup> 10:00 AM – 5:00 PM daily.** Museum of Natural History and Planetarium exhibit: *The Nature of Holography*. This exciting new exhibit produced by Holophile, Inc. features dramatic 3-D laser-generated imagery of natural history subjects augmented by specimens from the Museum's own collections. Roger Williams Park, Providence. For information call (401) 785-9457.

**January 2<sup>nd</sup>.** Southern New England Chapter of the American Fisheries Society winter meeting, Connecticut Department of Environmental Management, Old Lyme CT. There will be papers on many aspects of fishery biology, systematics, ecology, and aquaculture, with students competing for the Saul B. Sailer best student paper award. Registration, which includes lunch, is \$35 for non-AFS members, \$25 for members, and \$10 for students. Registration for non-SNEC members and students confers a one-year affiliate membership to SNEC, including the discount rate at the summer meeting to be held in Rhode Island. For information contact Lesa Meng at (401)782-9618 or meng.lesa@epa.gov.

**January 21<sup>st</sup> 7:00 PM.** Roger Williams Park Zoo Conservation Lecture Series presents *Search for the Golden Moon Bear* at the Feinstein IMAX Theatre at Providence Place. Seating is limited and

lecture schedule is subject to change. Pre-registration is required. For more information/updates, call (401) 785-3510 or visit rogerwilliamsarkzoo.org. To register, e-mail lectureseries@rwpzoo.org or call (401) 785-3510 x378.

**January 29 – 30.** National Council for Science and the Environment: *4th National Conference on Science, Policy and the Environment: Water for a Sustainable and Secure Future*. Ronald Reagan Building and International Trade Center in Washington, DC. Visit www.NCSEonline.org to register online, read pre-conference materials, obtain the latest program updates, and view links to travel and lodging options. For general conference questions, contact conference@NCSEonline.org.

**February 4<sup>th</sup> 7:30 PM.** RINHS Mark D. Gould Memorial Lecture Series. Suzanne Paton, Senior Biologist, Rhode Island National Wildlife Complex, US Fish & Wildlife Service, presents *Piping Plover Management in Rhode Island 1992–2003: The Road to Recovery* at the Westerly Public Library, Westerly, RI. For more information, contact the RINHS at (401) 874-5800 or info@rinhs.org.

**February 26<sup>th</sup> 7:00 PM.** Journalist John Frederick Walker presents *A Certain Curve of Horn: The Hundred-Year Quest for the Giant Sable Antelope of Angola*. Roger Williams Park Zoo Meller-Danforth Education Center. See January 21<sup>st</sup> listing for more information.

**March 5<sup>th</sup>.** Rhode Island Natural History Survey **9th Annual Conference, Ecological Research in Rhode Island**. Rhodeston-the-Pawtuxet, Cranston, RI. For meeting details, see the separate announcement on the back cover. For more information, contact the RINHS office at (401) 874-5800 or info@rinhs.org.

**March 20<sup>th</sup>.** Audubon Society of RI: *Annual Birders' Conference*, held at the ASRI Environmental Education Center, Bristol. Mark your calendar now for day-long activities; program details will be announced in February. For more information contact Eugenia Marks at (401) 949-5454 or emarks@asri.org.

**April 1<sup>st</sup> 7:30 PM.** RINHS Mark D. Gould Memorial Lecture Series. O. Don Hermes, Professor, URI Department of Geosciences, presents *Virtual Reality Geologic Field Trips: Examples from National Parks and Rhode Island* at Weaver Auditorium, Coastal Institute in Kingston, URI. For more information, contact the RINHS at (401) 874-5800 or info@rinhs.org.

**April 14<sup>th</sup> 7:00 PM.** Dr. Alison Jolly presents *Lords and Lemurs: People and Conservation in the South of Madagascar*. Roger Williams Park Zoo Meller-Danforth Education Center. See January 21<sup>st</sup> listing for more information.

**June 18<sup>th</sup> 3:00 PM – June 19<sup>th</sup> 3 PM.** Rhode Island Natural History Survey's **BioBlitz 2004**. URI W. Alton Jones Campus, West Greenwich. Watch for details in the Spring 2004 *Rhode Island Naturalist*.

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

Annual dues (check one) (see page 15 for membership benefits):

Individual (\$25)  Family (\$40)  Student/Senior Citizen (\$15)  Organizational (\$100)

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*RINHS is a nonprofit 501(c)(3) organization. Dues and contributions are tax deductible to the full extent allowed by law.*

## Our Mission

- \* To facilitate and coordinate the gathering and dissemination of information on RI's biota, ecological communities, and geological systems;
- \* To enhance communication among RI's natural scientists, educators, and decision makers;
- \* To provide sound scientific data that can be used to help make informed management decisions;
- \* To foster the preservation of RI's natural history collections; and
- \* To provide educational outreach.

## 2004 RINHS Conference: Ecological Research in Rhode Island

The Rhode Island Natural History Survey's 9th annual conference will be held on Friday, March 5, 2004 at Rhodes-on-the-Pawtuxet in Cranston, RI. The theme will be *Ecological Research in Rhode Island*, featuring oral and poster presentations on research and projects on geology, hydrology, ecosystems, organism biology, population biology, and conservation/management. The call for abstracts can be found on the RINHS website at [www.rinhs.org](http://www.rinhs.org); the deadline is December 15th.

The keynote speaker at the conference will be John Wiens, Lead Scientist for The Nature Conservancy's Mid-Americas Conservation Region. Wiens is widely known for his work in landscape ecology and the ecology of birds and insects in arid environments. Wiens left a distinguished academic career in 2002 and joined the staff at The Nature Conservancy, where he focuses on developing and helping to implement science-based conservation.

In addition to the scientific sessions, there will be organizational displays and presentation of the 2004 Distinguished Naturalist Awards. We will once more be hosting secondary school teachers and high school students at the conference, thanks to a generous grant from the Virginia B. Butler Fund of The Rhode Island Foundation, a charitable community trust serving the people of Rhode Island.

## To Contact Us...

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