



Rhode Island Naturalist

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Native Bees and Plant Pollination

BY HOWARD S. GINSBERG

Steve Buchmann and Gary Nabhan's 1996 book, *The Forgotten Pollinators*, provoked a great deal of concern among ecologists and conservationists about possible declines in populations of pollinating animal species,

fragmentation and loss, excessive pesticide use, and the effects of invasive species.

The debate about possible pollinator declines, and the accompanying activity (including meetings sponsored by government agencies and conservation organizations, and the establishment of the North American Pollinator Protection Campaign) was discussed in a previous *RINHewS* article (Ginsberg 2002). In the present article I want to discuss the most important group of pollinators, the bees, assess the difficulties in determining whether their populations are actually declining, and review the potential implications for flowering plants. After all, we can track populations of domestic Honey Bees because we have records from beekeepers. In contrast, most native bees are cryptic and solitary and very few people can identify them. No one is tracking populations of these species. We can't even document the decline in feral Honey Bees, obvious though it may seem, because there is no monitoring program to track their populations.

Native Bees

The bees, or Superfamily Apoidea of the Order Hymenoptera, include about 25,000 species in seven families worldwide. They are distinguished morphologically by having branched hairs, which is an adaptation for collecting pollen, the major protein source for bees (their closest relatives, the sphecids wasps, are predators). When most people think of bees, they think of Honey Bees and Bumble Bees,

Volume 11 • Number 1 • May 2004

which are far larger and more highly social than most species. The vast majority of bees are solitary and have just one generation per year. They nest in holes in the ground, crevices, or hollow twigs. Nevertheless, social behavior has evolved several times independently in the Apoidea.

Solitary bees can be either generalists or specialists in flower foraging. For example, *Andrena carlini*, a solitary soil-nester that is active in the woods in spring, has been collected from over 30 genera of flowering plants (Mitchell 1960). In contrast, *Andrena erythronii*, another spring-active woodland species, specializes on Trout Lily (*Erythronium americanum*) (Michener and Rettenmeyer 1956), and rarely visits other plant species. Social bees, on the other hand, tend to be generalists in foraging, because their social behavior results in several generations per season and thus long periods of seasonal activity. Their seasonal phenologies are typically too long for them to depend on a single flower species for nectar or pollen.

Assessing Faunal Declines

The diversity of bee lifestyles complicates sampling of bee faunas. Bees are patchily distributed in space because their nesting sites and food sources are

and about potential effects of these declines on plant reproduction (Allen-Wardell et al. 1998). The most dramatic decline has been in populations of Honey Bees (*Apis mellifera*), which were decimated by two invasive acarine species, the tracheal mite and the *Varroa* mite. Honey Bees are the predominant pollinators used for agricultural crop production, so this decline was obvious and costly to many people outside of the scientific community. However, Honey Bees are not native to North America, having been introduced by the early colonists. Some authors have even been concerned that Honey Bees might have negatively affected populations of native bee species, although a contemporary review article (Butz Huryn 1997) found little evidence for this. In any case, Buchmann and Nabhan (1996) were more concerned about declines in native pollinator species resulting from such factors as habitat

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clustered in distribution. Temporal distribution is also complex because some species are active only when their host plants are active, while others are active most of the season. Samples taken at any given time will miss some species that might be common at other times. Therefore, samples must be carefully designed to assess the populations of interest.

Another problem results from natural variability in species abundance—at any given site some species are quite common, others are moderately abundant, and many are quite rare. Two samples from the same site will always capture the same common species and some of the same moderately common species. However, the representation of rare species in the samples is less predictable. Typically, rare species are represented, but usually different ones in different samples since the probability of capturing any particular rare species is quite low. I once did a computer exercise where I created an artificial bee community of 20 species, with species abundances distributed the same way they were distributed in an actual sample I had taken in Maine. The computer then randomly selected 1,000 individuals from the community, and repeated the sample ten times. The average number of species collected in the samples was 9.7, and the percent of species shared in the various samples ranged from 53.3% to 100% (average = 77.2%). In other words, two of the samples shared only 53.3% of species, even though these were completely random samples from the same community! Given this inherent sampling problem, and the diversity of bee natural histories described above, assessing changes in bee faunas is a difficult problem indeed.

Williams et al. (2001) compiled data from dozens of published bee surveys, and found that bees are highly variable in space and time, and that bee faunas are often rich in rare species. Therefore, if a sample of bees from a site differs from a sample taken previously, this does not necessarily indicate that the bee fauna has changed. For one thing, the differences could have resulted from subtle differences in sampling methods (if, for example, the samples were taken by different investigators). Alternately, the differences might reflect normal variation in bee numbers unrelated to faunal change, or the differences might simply have resulted from sampling error rather than from changes in the bee fauna. Marlin and LaBerge (2001) compared samples of bee diversity taken in Carlinville, Illinois from 1970 to 1972 to samples taken around the turn of the century (1884–1916) by Charles Robertson (1929), and concluded that despite substantial landscape changes, the bee fauna had not changed all that much. They ascribed the differences they found to sampling problems of the type outlined above rather than to faunal change (but of course they couldn't be sure). Roubik (2001) conducted an intensive sampling



program of orchid bees (Tribe Euglossini) in Panama for 21 years (1979–2000). He found enormous variation from year to year in bee numbers, but no long-term trends in bee populations. Apparently, samples of this level of intensity are needed to get unambiguous assessments of bee population trends. Unfortunately, Roubik's study is singular. We have no such data for the vast majority of bee species.

The first step in solving this problem is to develop standardized sampling protocols that can be used to collect data that are comparable from site to site and from year to year. A study currently in progress is developing sampling protocols based on standardized sampling methods applied at sites scattered over North America. The next step is to utilize these sampling methods at numerous sites over several years to assess variability in the data and to develop analysis tools to enhance reliability of conclusions drawn from the sampling program.

Native Bees and Plant Pollination

Pollinators and their host plants sometimes form *Keystone Mutualisms* that can have profound effects on community structure. Changes in pollinator populations can influence plant reproduction by increasing or decreasing pollinator visitation (thus influencing seed set), and by modifying the spatial pattern of pollen deposition on plant stigmas (thus changing effective population size). Changes in plant reproduction can result in increases or decreases in plant population density and cover, which can modify the horizontal and vertical structure of a community, microclimate near the ground, patterns of nitrogen deposition (e.g., resulting from increases or decreases of nitrogen-fixing species), and

other community and ecosystem-level parameters. These changes could be subtle and difficult to recognize by a casual observer. We don't know if these types of changes occur, or how important they might be at present, because few studies have assessed these possible effects.

Native bees also play a role in crop pollination. Kremen et al. (2002) showed that in small organic farms near natural areas in California, wild pollinators could provide full pollination services, but that in conventional farms in intensely agricultural areas diversity and abundance of native species declined, so that crop pollination by native bees alone was insufficient. Therefore, managing agricultural landscapes to promote diversity and abundance of wild bees can have clear economic benefits for farmers, because the pollination services provided by wild bees are free. The Xerces Society recently published the *Pollinator Conservation Handbook* (Shepherd et al. 2003), which provides useful information on methods to foster populations of wild pollinators.

The dependence of many plants on bees for pollination means that one plant can potentially influence the reproduction of another plant by virtue of its effect on pollinator behavior. For example, Brown et al. (2002) planted mixed and monospecific plots of the native Winged Loosestrife (*Lythrum alatum*) and the invasive Purple Loosestrife (*Lythrum salicaria*). The invasive reduced pollinator visitation and seed set in the native in these experimental plots. Here, then, is another possible negative effect of invasive plants on native species. In preliminary studies in natural areas in Maine, some invasive plant species apparently lowered bee visitation and fruit set in natives, while others had inconsistent effects, and some even appeared to increase visitation to the native plants (O'Neal et al. 2003). This is a phenomenon that has received little attention to this point, so its overall importance in natural communities is not known.

Obviously, the potential effects of pollinator declines on natural systems will be hard to quantify, mixed in as they are with the effects of landscape change, spread of alien species, pollution effects, and the myriad other factors that currently influence natural communities. This area of research is still in its infancy. Once monitoring programs are established to provide unambiguous evidence about the details of pollinator declines (extent, geographical locations, species, etc.), we will be in a better position to assess the importance of this phenomenon. Nevertheless, the evidence already available makes it clear that effects of management actions on plant pollination, and on populations of bees and other pollinators, need to be addressed in conservation planning.

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Rhode Island Naturalist, the newsletter of the Rhode Island Natural History Survey Inc., is published twice yearly. RINHS, Room 101 Coastal Institute in Kingston, 1 Greenhouse Road, URI, Kingston, RI 02881-0804

Freshwater Mussels in Rhode Island: Part II. Diversity and Distribution

B Y J A Y C O R D E I R O

Introduction

This is the second of three articles on Rhode Island freshwater mussels to appear in *Rhode Island Naturalist*. The first discussed mussel life history, decline, and threats to freshwater mussels in the state (Cordeiro 2003a). This article provides a state faunal list, delineates habitat requirements, and provides a conservation status assessment of Rhode Island freshwater mussels. The final article in this series will provide insight into Rhode Island mussel collections, give a history of scientific studies, and list eminent local malacologists.

State Fauna

In Rhode Island recent history, ten species of freshwater mussels have been documented to occur in the state (Table 1). The state fauna incorporates species assemblages from streams on the Atlantic slope, the area encompassing river drainages flowing eastward into the Atlantic Ocean between Nova Scotia, Canada and Georgia, U.S.A. (Johnson 1970). Comprehensive field guides for neighboring states (Cordeiro 2003b; Fichtel and Smith 1995; Nedeau et al. 2000; Smith 1995; Strayer and Jirka 1997) provide identification and distributional information for all ten species. National guides for the United States (Burch 1975) and Canada (Clarke 1981) are in need of revision. Turgeon et al. (1998) provide a comprehensive nomenclatural listing for all species in the United States and Canada. The NatureServe Explorer web site (<http://www.natureserve.org/explorer>) provides updated information on taxonomy and distribution, as well as global, national, and regional protection status, while the Rhode Island Natural Heritage Program monitors state status (<http://www.state.ri.us/dem/programs/bpoladm/plandev/heritage/pdf/animals.pdf>). Host lists are limited to species occurring in Rhode Island (Krueger 2001).

The most common species found in most rivers and lakes throughout the state is the Eastern Elliptio (*Elliptio complanata*) (Figure 1). Widespread and abundant, the

Eastern Elliptio is probably the most familiar of Rhode Island's freshwater mussels. Distribution ranges from Nova Scotia to Georgia and west to the northern parts of the Great Lakes basin. It is sub-trapezoidal in shape (up to 125 mm), may be compressed or inflated, and has an angular ridge running across the posterior shell face. Color varies from brownish to blackish with fine green color rays on young individuals. The interior glossy part of the shell (nacre) may be tinted purple and hinge teeth (raised protuberances along the top margin of the shell interior that hold the two opposing valves of the shell together) are well developed. The only verified larval host (mussel larvae are obligate external parasites on certain species of fish or amphibians) is the

Table 1. Rhode Island freshwater mussels.

Common Name	Scientific Name	Conservation Status
Eastern Elliptio	<i>Elliptio complanata</i> (Lightfoot, 1786)	
Eastern Floater	<i>Pyganodon cataracta</i> (Say, 1817)	
Triangle Floater	<i>Alasmidonta undulata</i> (Say, 1817)	
Alewife Floater	<i>Anodonta implicata</i> Say, 1829	
Eastern Lampmussel	<i>Lampsilis radiata</i> (Gmelin, 1791)	special concern
Creeping	<i>Strophitus undulatus</i> (Say, 1817)	special concern
Eastern Pondmussel	<i>Ligumia nasuta</i> (Say, 1817)	special concern
Eastern Pearlshell	<i>Margaritifera margaritifera</i> (Linnaeus, 1758)	special concern
Tidewater Mucket	<i>Leptodea ochracea</i> (Say, 1817)	
Brook Floater	<i>Alasmidonta varicosa</i> (Lamarck, 1819)	extirpated

Yellow Perch, but suspected hosts include Banded Killifish and Largemouth Bass.

Another common Rhode Island freshwater mussel is the Eastern Floater (*Pyganodon cataracta*) (Figure 2). The Eastern Floater is widespread throughout New England in most lakes and in quiet portions of many rivers. North American distribution ranges from the St. Lawrence River in Canada to Georgia and west nearly to Michigan. The shell (to 150 mm) is elongate and sub-elliptical to sub-ovate in outline and is often somewhat inflated. Shell color is often

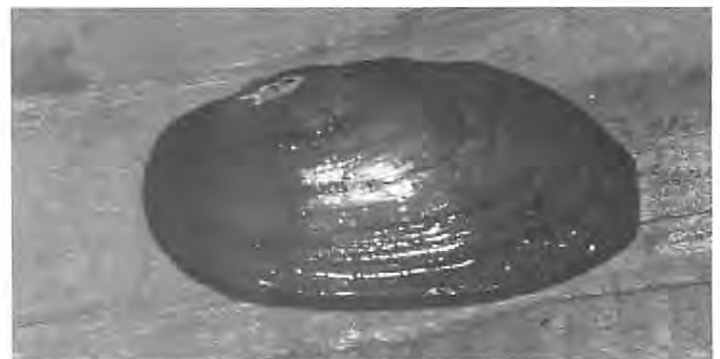


Figure 1. Eastern Elliptio (*Elliptio complanata*)



Figure 2. Eastern Floater (*Pyganodon cataracta*)

greenish-brown with fine green color rays on all but the oldest individuals. The shell of this species is uniformly thin and fragile with a bluish-white interior. Hinge teeth are entirely lacking. Hosts include Rock Bass, White Sucker, Common Carp, Threespine Stickleback, Pumpkinseed, Bluegill, and Yellow Perch.

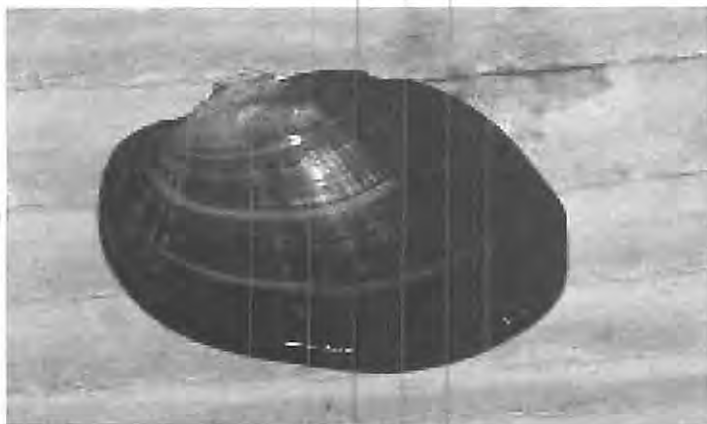


Figure 3. Triangle Floater (*Alasmodonta undulata*)

Less common, though not imperiled, is the Triangle Floater (*Alasmodonta undulata*) (Figure 3). It is regarded as a species of special concern by many malacologists (scientists who study mollusks) but maintains no status as a protected species in Rhode Island or federally. Scattered populations can be found in large creeks and small rivers in both slow and fast-moving water. Distribution ranges from Nova Scotia west to the St. Lawrence River drainage and south to Florida. The smooth, shiny, yellow-brown shell (to 80 mm) is thick but thickness decreases markedly from anterior to posterior (this feature is most noticeable on the interior of the shell). Shell shape is triangular (hence the common name, Triangle Floater) and inflated, and the ventral margin is broadly rounded, not straight or incurved. Wide, bright green color rays adorn the external shell surface. Interior nacre is white, salmon-colored, pink, or red, and hinge teeth are well developed although lateral teeth are vestigial to

absent. The Triangle Floater utilizes a variety of host fish including Pumpkinseed, Common Shiner, Largemouth Bass, Blacknose Dace, Longnose Dace, and Fallfish.

The Alewife Floater (*Anodonta implicata*) (Figure 4) is another of those less commonly encountered mussel species in Rhode Island. It was once much more common than it is today, having experienced significant decline across its range. Currently in Rhode Island it persists in coastal lakes and standing water of slow to medium-flowing rivers that have access to the ocean. North American distribution ranges from Nova Scotia west to Quebec and south to North Carolina. The shell (to 125 mm) is sub-elliptical and elongate, similar to the Eastern Floater, with a straight ventral margin (little or no curvature). The shell is thin and fragile but, unlike the Eastern Floater, exhibits an increase in shell thickness from posterior to anterior visible on the interior along the ventral margin. External color is yellowish-, greenish-, or reddish-brown, occasionally with fine color rays. On the interior, nacre is usually pink or purple but weathered shells are white. Hinge teeth are completely lacking. Host fish include White Sucker, Threespine Stickleback, Pumpkinseed, White Perch, and the anadromous Alewife.



Figure 4. Alewife Floater (*Anodonta implicata*)

Four species are listed of state special concern in Rhode Island. The Eastern Lampmussel (*Lampsilis radiata*) (Figure 5) is the most common of the four. Across its range from Nova Scotia to Georgia, the species is much more common than in Rhode Island, where significant declines have been documented in recent years. Habitat includes creeks, rivers, and lakes under most flow conditions, usually in sand or gravel. Shell shape is sub-ovate elliptical with an evenly rounded margin, and shells (to 100 mm) are very thick and strong. The external shell surface is yellowish (younger

individuals) to brownish-green with numerous dark green color rays across the shell face. Interior nacre is white tinged with pink or salmon-color. Hinge teeth are very long and well developed but not thick and heavy. Hosts include Rock Bass, Pumpkinseed, Bluegill, Smallmouth Bass, Largemouth Bass, White Perch, Yellow Perch, and Black Crappie.



Figure 5. Eastern Lampmussel (*Lampsilis radiata*)



Figure 6. Creeper (*Strophitus undulatus*)

Another species of special concern is the Creeper (*Strophitus undulatus*) (Figure 6). The Creeper maintains common to abundant status throughout most of its range in North America but is declining in New England. It is widespread, ranging in the north from Nova Scotia west to Saskatchewan, and extending south along the Atlantic slope to Georgia and through the Ohio and Mississippi River basins to Texas. It is the only Rhode Island species with a native origin outside the Atlantic slope. Populations are found in slow-flowing rivers of all sizes, as well as in lakes. The shell (to 100 mm) is sub-ovate to sub-elliptical in shape with a blunt posterior end. The shell is yellowish-green to dark brown and may have a few fine green color rays but only on the posterior slope. The interior nacre is white grading to iridescent blue toward the hinge. Shells are of

moderate thickness with hinge teeth almost entirely absent, represented by a slight swelling, or bump, at the hinge attachment in each valve where the teeth would normally occur (more easily felt than seen). The Creeper has more larval hosts than most other species of freshwater mussel, among them the Rock Bass, Yellow Bullhead, Tessellated Darter, Pumpkinseed, Bluegill, Common Shiner, Smallmouth Bass, Largemouth Bass, Golden Shiner, Spottail Shiner, Rainbow Trout, Yellow Perch, Black Crappie, Blacknose Dace, Longnose Dace, Brook Trout, and Fallfish. In addition, the Northern Two-Lined Salamander and Red-Spotted Newt have been documented as host amphibians, and transformation has been documented without a host.

The Eastern Pondmussel (*Ligumia nasuta*) (Figure 7) is a rare species of special concern in Rhode Island and nearby Connecticut. It ranges in North America from Nova Scotia to South Carolina and west into the interior basin states, occurring in quiet standing water of estuaries, lakes and canals, as well as the slower flowing areas of large rivers, often in silt or sand. Shell shape (to 100 mm) is elongate with a distinct posterior ridge and an easily recognizable



Figure 7. Eastern Pondmussel (*Ligumia nasuta*)

point to the posterior end. External color is black to dark brown while interior nacre is bluish-white but may have a purple tinge. Hinge teeth are present and lateral teeth are long and straight. Hosts for the Eastern Pondmussel are not known but the Bluegill is suspected.

The Eastern Pearlshell (*Margaritifera margaritifera*) (Figure 8), the fourth species of special concern in Rhode Island, is the most widely distributed freshwater mussel in the world, occurring in North America from New England and the Canadian Maritimes south to New York, Delaware, and Pennsylvania, as well as in northwestern Russia and northern Europe. Populations in Rhode Island are typically found

in cold, nutrient-poor, soft-water streams with moderate to fast flow on firm sand, gravel, or coarse sand, often amidst boulders. The shell (to 150 mm) is elongate and sub-elliptical with a straight or dorsally incurved ventral margin. Color is dark brown to black with no color rays. Interior color is white and the interior shell nacre exhibits a series of



Figure 8. Eastern Pearlshell (*Margaritifera margaritifera*)

tiny muscle attachment scars across a broad area that resemble weakly scored pits. Hinge teeth are strong but lateral teeth are absent. Hosts include large, cold-water, predatory fish such as Rainbow Trout, Atlantic Salmon, Brown Trout, and Brook Trout.

The Tidewater Mucket (*Leptodea ochracea*) (Figure 9) has documented historical occurrences in Rhode Island based on museum collections, but has not been collected recently and maintains no protective status in the state. Declines in its former habitat of coastal-plains ponds and the slow portions of freshwater tidal rivers have been documented across its range from Nova Scotia to northern Georgia. The thin shell (to 75 mm) is ovate and swollen with a deep beak cavity. Color is yellow to golden-brown with very fine green rays. Interior nacre is pink or salmon-colored. Hinge teeth are thin, delicate and curved. The Tidewater Mucket has a



Figure 9. Tidewater Mucket (*Leptodea ochracea*)

single confirmed fish host, the White Perch.

The Brook Floater (*Alasmodonta varicosa*) (Figure 10) only occurs historically in Rhode Island and was likely extirpated from the state in 1897. It is experiencing declines across its range in North America, from New Brunswick to South Carolina, and is listed as a state endangered species in nearby Connecticut and Massachusetts, as well as federally endangered. Shell shape (to 70 mm) varies from sub-trapezoidal to sub-ovate but its distinguishing features are an abruptly curved anterior margin and the presence of fine corrugated wrinkles on the posterior slope. Color is dark green with continuous color rays and a bluish-white nacre (salmon-colored in the hinge cavity). The soft interior is uniquely bright orange. Hinge teeth are thin with lateral teeth nearly absent. Among the host fish in Rhode Island are Pumpkinseed, Golden Shiner, Yellow Perch, Blacknose Dace, and Longnose Dace.

Concluding Remarks

This fall, I will be concluding a five-year field study of the diversity and distribution of freshwater mussels in Connecticut. Unfortunately, I am finding similar trends in declining diversity and abundance seen in other states (Cordeiro 2003b). Many of the species once widespread in Connecticut were also once common in Rhode Island. The Alewife Floater, Creeper, Eastern Lampmussel, Eastern Pearlmussel, Eastern Pondmussel, and Tidewater Mucket are all in decline in Connecticut and the Brook Floater is nearly extirpated. Two other species not found in Rhode Island, the Yellow Lampmussel (*Lampsilis cariosa*) and Dwarf Wedgemussel (*Alasmodonta heterodon*), have been extirpated or nearly so. I hope to begin compiling field collection data for Rhode Island in the coming years to compare with what little published information and museum collection data exist to determine if similar trends in decline are occurring in Rhode Island (I suspect they are). Recently published faunal studies of Rhode Island freshwater mussels are



Figure 10. Brook Floater (*Alasmodonta varicosa*)

limited, focusing only on a handful of lakes in the state (Kesler 1998; Kesler and Bailey 1993; Kesler and Downing 1997). With specific locality data in hand, the few remaining hot spots of mussel diversity in the state can be targeted for conservation action.

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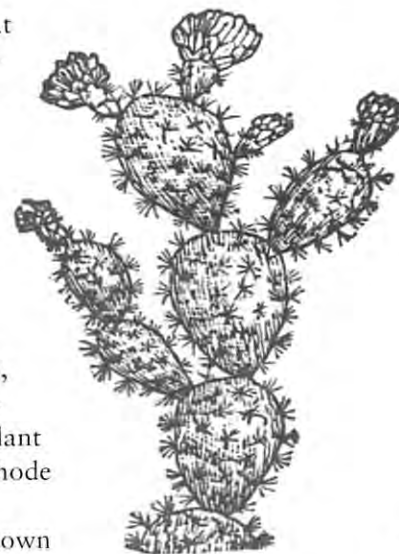
Notes from Field and Study

Cactus in Rhode Island: A Prickly Question Solved

B Y R I C H A R D W. E N S E R

The Eastern Prickly Pear Cactus (*Opuntia humifusa*) is the only member of the Cactaceae found in eastern United States. It is often found in sand-dune communities along the Atlantic and Gulf coasts, as well as on open rocky outcrops within the interior as far west as Minnesota. It has always been considered a rare species in New England—at the northern extent of its native distribution, historically being found in several Connecticut and Massachusetts counties. However, in Massachusetts *Opuntia* is considered to be native only on Nantucket Island and believed to be introduced at other locations in Barnstable and Middlesex counties. Based on this status in Massachusetts, the derivation of Rhode Island populations has always been dubious. *Opuntia humifusa* is sometimes cultivated in Rhode Island gardens because it is winter hardy, and several populations have thrived for many years primarily in the southern part of the state. Until recently, however, no situation had ever been found that would suggest a natural occurrence. There is one known specimen housed at the University of Rhode Island herbarium that was collected by G.W. Burlingame in 1890 from Kingston, but no other information is provided. As such, in his 1955 *Flora of Rhode Island*, Elmer Palmatier included *Opuntia* in the “excluded” category, apparently not convinced that the URI specimen represented a native population.

There are other plants that exhibit a similar distributional pattern to *Opuntia humifusa*. For example, Thread-leaved Sundew (*Drosera filiformis*) is a species of the Atlantic Coastal Plain that reaches its northern limits on Cape Cod, where it is found in small, unique habitats known as interdunal swales. This plant has been found once in Rhode Island—at an abandoned gravel pit in South Kingstown where it thrived for several years



before being overcome by invasive species, but it remains possible that *D. filiformis* may yet appear in a similar moist, sandy habitat. This conclusion may be warranted, given the recent discovery of an apparent native population of *Opuntia humifusa*.

The small population of *Opuntia* was discovered on Prudence Island in 2003 by Kim Botelho and her co-workers at the Narragansett Bay Estuarine Research Reserve. What first lends credence to the conclusion that it is a natural occurrence is the habitat—a back-dune community with typical associates, including Beach Grass (*Ammophila breviligulata*), Jointweed (*Polygonella articulata*), Pinweed (*Lechea maritima*), and scattered Bayberry (*Myrica pensylvanica*). More convincing is the remoteness of the cactus plants from historic or currently occupied sites where they may have been cultivated and potentially spread. Although we may never be able to divine the true origin, it appears that the Prudence Island population represents the first documented natural occurrence of *Opuntia humifusa* in Rhode Island.

Why has it taken so long to find a native population? It is likely that *Opuntia* was never a common species in Rhode Island, near its northern limit. As well, given the history of development along the state's coast, it may be speculated that other former populations have been destroyed following a pattern of similar plant extirpations, including Saltpond Pennywort (*Hydrocotyle verticillata*), Seaside Buttercup (*Ranunculus cymbalaria*), and Silvery Aster (*Aster concolor*). But we should not remain complacent that these species do not still persist somewhere in the state. Another success story involves the estuarine plant *Lilaeopsis* (*Lilaeopsis chinensis*) that was rediscovered three years ago by Frances Underwood along the Seekonk River in Providence, where it had not been recorded for more than 100 years. The lesson from these stories and the theme of this column should always be that for those species that do not blatantly make their presence known to us, our persistence in the field can often lead to important discoveries.

With a new field season approaching, new discoveries are awaiting Rhode Island's intrepid naturalists. To have them reported in this column, contact the author at renser@dem.state.ri.us.

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

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Rhode Island Collections: The Hathaway Library Bird Egg Collection, Audubon Society of Rhode Island

B Y C O N N I E C O S T A

"Maktar Mts., April, 1943." That hand-written inscription, on a piece of surgical tape sealing a U.S. Army rations can, marks the most intriguing collection of birds' eggs held at the Harry Hathaway Library at the Audubon Society of Rhode Island's headquarters in Smithfield.

Cataloguing the various collections has taken several years. Of the nearly 3,700 eggs, almost 2,500 have been identified thus far. Several collectors left very detailed descriptions of their finds—common and scientific names, dates, locations, and sometimes how far up a tree the nest lay and how fresh the eggs were—while others offered few or no clues.

"The Rations Can Collection" eggs were packed in layers of cotton batting, with common names of birds written on the tape, but no reference to the collector. Despite inquiries through various channels, no identification has been found. I can only speculate that the person, stationed with a World War II army unit in Tunisia, North Africa, collected and carefully preserved the delicate specimens in the "hurry up and wait" times between maneuvers against "The Desert Fox." I used the *African Handbook of Birds* (series one), by Mackworth-Praed and Grant to help in interpreting "stork" and "partridge" on the labels to mean White Stork (*Ciconia ciconia*) and Barbary Partridge (*Alectoris barbara*), birds native to the area.

It has been the accepted practice since the late 1800s to write identification numbers on each egg. However, I discovered that not all collectors used the same identification system. Robert Ridgway devised a method that is in reverse order to the later, more standard American Ornithological Union (AOU) system that is still used today. Some unidentified eggs in the collections are marked with a third system that I have yet to decipher, and still more eggs are unmarked.

Various people have donated eggs to Audubon Society in all sorts of containers—cigar boxes, coffee cans, and candy or cookie tins. The most notable collection, that of Harry S.

Hathaway, the early ornithologist for whom the library is named, contains more than 1,000 specimens that were very well documented and later organized and catalogued by a previous curator. Each set of eggs, collected from the 1880s through the 1920s, had been packed in individual boxes, with detailed descriptions. An organizer's dream—all that had to be done was to arrange the boxes on shelves in taxonomic order and label the outside of each box.

Another collector, William A. Sprague, clearly identified his eggs but over the years the labels were separated from the eggs and it took time to reunite them. Mr. Sprague collected in North Smithfield, Glocester, Burrillville, Cranston, and Warwick from 1887 to 1895. But in 1896 and 1897 he traveled to Magnolia, Colorado, and added several western species such as Williamson's Sapsucker, Mountain Bluebird, "Western" Robin, and "Black Hooded" Goshawk, currently called Northern Goshawk. The label indicates four Goshawk eggs, but thus far none has been found.

A small but well-documented array of eggs came from P. Willard Bridgham, collecting in the 1890s near Seekonk, Massachusetts, and East Providence, Rhode Island. His detailed description included the measurements of every egg to the nearest hundredth of an inch! However, he listed the scientific names only, some of which have changed, leading me on still another search for the current common names.

Another compact but integral part of the ASRI collection is attributed to Harold N. Gibbs [see article on p. 18], former administrator of the RI Division of Fish and Game, and a lifelong observer of wildlife. Born in 1886 near Middleboro, Massachusetts, he moved with his family to West Barrington at age 6. His early interest in collecting is evident in a label which detailed his discovery of three fresh Killdeer eggs "near a pile of seaweed in a plowed field" in Drownville (West Barrington), Rhode Island, on April 15, 1898; he was 12 years old at the time.

No date is given nor donor indicated for a tiny group of eggs collected in England by Hugh Birchhead, Jr., 13th Tank Destroying Battalion, USA. I assume that these eggs were collected during World War II. Included are eggs of Little Grebe, Coot, Ringed Plover, and Lapwing—all birds found near lakes, ponds, marshes, meadows, and moors.

An unknown donor left a large collection of eggs attributed to F.E. Birch, Chatham, New York (west of Pittsfield, Massachusetts), collected from 1887 to 1889. Several of the original labels have survived with the eggs, which include

those of hawks, doves, owls, numerous shorebirds, and passerines. Mr. Birch used the Ridgway numbering system, now easier to decipher since I had worked out a "conversion table" from Ridgway to AOU numbers. A curious entry on some of the labels proved to be prophetic: he wrote that his identification was certain, he had seen the bird on the nest. Several years later I found a quote in *A Laboratory and Field Manual of Ornithology* by Olin S. Pettingill, Jr., about egg identification. He wrote:

"An examination of a collection of ...birds' eggs shows at once the hopelessness of attempting...a classification...based on coloration and shape. Relatively few eggs are as distinct as the species laying them. Usually the similarities and intergradations among species are so great that identification is impossible. The student is advised, therefore, never to attempt positive identification of eggs without direct knowledge of the birds that laid them."

Ignoring his advice, I foolishly persevere. Methods of identified unlabeled eggs include comparison to other eggs in the collection already identified and using a variety of printed resources in the Hathaway Library collection.

The Hathaway Library egg collection may be viewed on site. Please contact Eugenia Marks (emarks@asri.org) for an appointment.

Connie Costa retired from Cranston West High School as a mathematics teacher; she has been trained in natural history curation and volunteers at the Audubon Society of Rhode Island.

Benefits of membership in the Rhode Island Natural History Survey

For Individual, Family, and Student Members

Rhode Island Naturalist, the newsletter

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News Briefs

RINHS logo a winner!

RINHS's new logo has won an award of excellence. Susan Northrop Design and Dawson Communications are the recent recipients of an award for corporate identity excellence. Their logo design for the Rhode Island Natural History Survey has been selected to appear in "American Corporate Identity 2003" — a hardcover, full-color book showcasing "world-class" designs, with distribution around the world. Work selected for this book is a result of a competition in which design firms from all over America submitted their best creative output.

And So Is Our Executive Director!

Lisa Gould, Executive Director of the Rhode Island Natural History Survey, has been chosen to receive the 2004 Exceptional Achievement Award from NonProfit Resources, a support network for non-profit organizations in southern New England. Lisa was nominated for the award by RINHS President Keith Killingbeck. The award was formally presented at the Non-profit Recognition Awards Luncheon at the Providence Marriott on April 26th. This is a statewide award, drawing from a pool of over 4,000 non-profit organizations in Rhode Island. It recognizes "consistently superior performance which significantly exceeds job expectations even in the face of significant challenges." Congratulations, Lisa!

Not to Mention Our Annual Conference!

The RINHS 9th annual conference, *Ecological Research in Rhode Island*, was a rousing success. Held on Friday, March 5th, at Rhodes-on-the-Pawtuxet in Cranston, it was our biggest conference ever. Over 340 attendees were registered, including 140 high school students and their teachers who were able to attend thanks to a generous grant from the Virginia B. Butler Fund of the Rhode Island Foundation. The keynote address, "Ecological Research & Conservation: Is There a Place for Natural History?," was presented by John Wiens, Lead Scientist for The Nature Conservancy. One of the highlights of the conference was the presentation of the 2004 RINHS Distinguished Naturalist Awards to David L. Emerson, Harold N. Gibbs, and C. Robert Shoop (see the articles about them in this issue). There were 26 research talks presented, in sessions with such themes as "Ecological Restoration," "Assessing the Health of Vertebrate Populations," "Geological Habitat and Hydrologic Resources," and "Plants and Ecosystem Functions." There were also 27 research poster presentations on a wide variety of topics, and 13 organizational displays. Initial planning for the 10th conference in 2005 has already started.

In Memoriam: George L. Church (1903–2003)

BY DOUGLASS H. MORSE

George Lyle Church, the Stephen T. Olney Professor Emeritus of Natural History at Brown University, died in Smithfield, Rhode Island on September 8, 2003 at the age of 99. He was born in Dorchester, Massachusetts, on December 19, 1903 and received a B.S. from Massachusetts State College (now University of Massachusetts, Amherst) in 1925. He went on to take his M.S. and Ph.D. from Harvard in 1927 and 1928, respectively. Church was a taxonomist by training and a classmate of the eminent botanist and evolutionary biologist, G. Ledyard Stebbins, at Harvard.

Church joined the Department of Botany at Brown the following autumn as an instructor and rose through the ranks to Professor in 1951 and assumed the Olney Professorship in 1959. He spent his entire academic career at Brown, retiring in 1971. Botany was merged into the new Division of Biology and Medicine in 1968, initially becoming a section within the basic science area of the Division, but then dissolved in 1970, becoming the Plant Sciences Committee, its present interdepartmental form today.

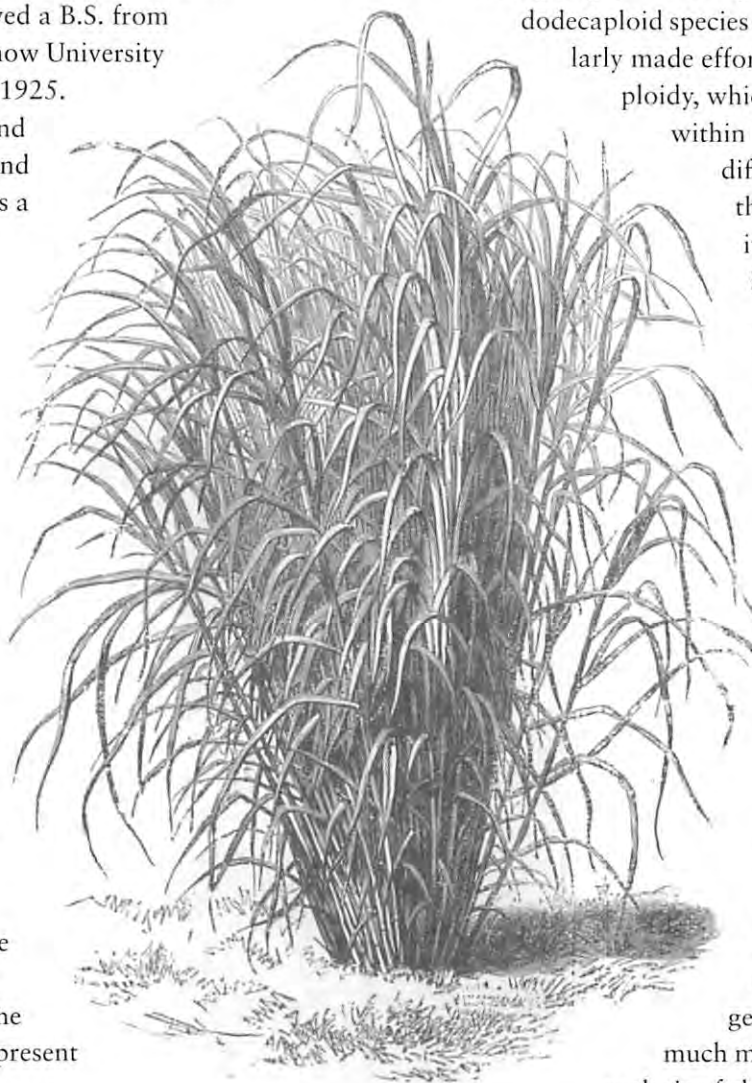
Much of Church's work was performed on the cytology and morphology of grasses, with a primary focus to address taxonomic relationships of species in several genera. His particular interest lay in the genetics of wild populations, particularly in the evolution of ecotypes. This work resulted

in a number of publications in several botanical journals, including the *American Journal of Botany*, *Botanical Gazette*, and *Rhodora*. These papers are still cited today on issues related to ecotypes and populations of the grasses. Some of Church's work involved reclassification, and he even erected a new genus [*Torreyochloa*, from certain species formerly placed in *Glyceria* (Manna-Grass)], as well as a new section of *Glyceria*. The descriptions of these taxa are initially presented in Latin, followed by an English translation, a task that would no doubt extend most modern taxonomists! Much of this work dealt with issues of polyploidy, an apparently important means of speciation in these groups, with everything from diploid to dodecaploid species represented. Church regularly made efforts to relate differences in ploidy, which often occurred even

within forms of a species, to differences in the habitats that the forms occupied. However, it is not clear that differences in ploidy of these grasses are systematically associated with particular ecological conditions. It might thus be best to envision ploidy as a force that facilitates diversity, creating reproductively distinct lines, although hybridization is by no means unknown among these forms.

The genus *Torreyochloa* was not universally accepted—in fact no more than three years after its publication the taxonomist Clausen recommended that it be merged into the related genus *Puccinellia*, though a much more recent phylogenetic

analysis of chloroplast DNA recognized its distinctness. Ploidy differences between long- and short-form *Spartina alterniflora* (Saltmarsh Cordgrass) reported by Church were not found by later workers, though a subsequent common-garden experiment suggested the presence of some genetic control of growth form.



Church focused much of his later work on the genus *Elymus* (Wild Rye), in the process making collecting trips over much of the country. This research included exhaustive efforts, including crossing and backcrossing closely related species, to work out the probable genetic basis for the ubiquitous variation found in areas of apparent overlap. Much of this work dealt with variation in reduction of the glumes (modified leaves at the base of the flowering spike), thought to be a consequence of hybridization of closely related species.

For many years, well into retirement, he was the Rhode Island representative of the group compiling the Catalog of Rare and Endangered Plant Species in New England, eventually published in *Rhodora* in 1981 as a multi-authored report, the last paper I find in his bibliography. The Rhode Island contributions to this document apparently come from an unpublished report produced with Richard L. Champlin [see *Rhode Island Naturalist* 10 (2), 2003.]

Church taught courses in plant systematics, morphology, and anatomy. My colleague, Jon Waage, described him as a professor of the old school. According to Jon, he talked and dressed like a professor, complete to the tweed coat worn out in the field on field trips. He could take dry taxonomic nomenclature and make it live, enthusiastically telling the students what they had previously believed they most certainly didn't want to know and holding them in rapt attention while doing so! Students were totally engaged with him on a field trip and were awed by how much he knew. Jon tells me that on arriving at Brown 30 years ago, he had the opportunity to invite Church to join his field biology classes, well after Church's retirement. On one particularly memorable visit to the Palmer River salt marsh, Church started at the edge of the road and proceeded to work in, identifying the plants, producing their Latin names, telling the students what the Latin meant (the learning of Classics had already degenerated by then!), and showing them how the plants in question fit their names.

Church was the director of the herbarium at Brown from 1938 until retirement and unofficially for some period after that. He was proud of its state and regional representation, as well as his own contributions to it. He built up an excellent collection of the genera of grasses upon which he worked, as well as related genera, from many parts of North America. Most of his materials are in fact voucher specimens upon which he had done cytogenetic work and

thus are of considerable interest. In a description of his work and the role of the herbarium, he wrote, "To the already vital place that the herbarium occupies in botanical study, there can be added its function as a collection of plants that have been studied from the standpoint of heredity."

Church was a frequent public speaker at garden clubs, horticultural societies, and conservation groups, and appeared to be in considerable demand. Usually he presented lectures on his travels, illustrated with color slides. Press clippings of these talks indicate that he presented excellent, well-received programs. A clipping from the *Westerly Sun* notes that "Prof. Church is a speaker of much charm and ability, well able to hold the interest of his audience," and in another clipping he was described as "a witty and engaging speaker."

The Churches summered in Annisquam, Massachusetts, and greatly enjoyed the extended seasons made possible by retirement. Church's wife, Margaret, headed the music department at the Wheeler School in Providence and for many years was also its assistant headmistress. His wife and a son, Robert (Brown '59), predeceased him.

Douglass H. Morse is a professor in the Department of Ecology and Evolutionary Biology at Brown University.

Selected publications of George L. Church:

- Church, G. L. 1928a. Meiotic phenomena in certain grasses. I. Festuceae, Aveneae, Agrostideae, and Phalarideae. *Botanical Gazette* 87:608–629.
- Church, G. L. 1928b. Meiotic phenomena in certain grasses. II. Paniceae and Andropogoneae. *Botanical Gazette* 88:63–84.
- Church, G. L. 1940. Cytotaxonomic studies in the Graminae *Spartina*, *Andropogon* and *Panicum*. *American Journal of Botany* 27:263–271.
- Church, G. L. 1949. A cytotaxonomic study of *Glyceria* and *Puccinellia*. *American Journal of Botany* 36:155–165.
- Church, G. L. 1954. Interspecific hybridization in eastern *Elymus*. *Rhodora* 56:185–197.
- Church, G. L. 1958. Artificial hybrids of *Elymus virginicus* with *E. canadensis*, *interruptus*, *riparius*, and *wiegandii*. *American Journal of Botany* 45:410–417.
- Church, G. L. 1967a. Taxonomic and genetic relationships of eastern North American species of *Elymus* with setaceous glumes. *Rhodora* 69:121–162.
- Church, G. L. 1967b. Pine Hills *Elymus*. *Rhodora* 69:330–351.
- Church, G. L. 1980. Plant conservation concerns in Rhode Island. *Rhodora* 82:145–149.
- Crow, G. E., W. D. Countryman, G. L. Church, L. M. Eastman, C. B. Hellquist, L. L. Mehrhoff and I. M. Storks. 1981. Rare and endangered vascular plant species in New England. *Rhodora* 83:259–299.

President's Message



Saturday, 11:45 am. Musty classroom. Splitting headache. The SAT exam you are barely enduring is nearly finished. Then it strikes... the dreaded "pattern recognition" questions. They saved the worst for last. Devious rascals those Princeton Educational Testing folks. Hurry. Question #99. Which of the following doesn't belong with the others? a) A-Rod b) fly rod c) tie-rod d) I-Rod. Finally, last one. Question #100. Which of the following doesn't belong with the others? a) RIDOT b) RIDEM c) RINHS d) RIDE. Done! Exhausted.

Well, I have to admit that my answer to question # 100 would have been marked wrong. The Princeton exam writers surely would have judged "d" to be the correct answer, given that the acronyms provided in "a" through "c" all had five letters, and "d" had only four. My protests would undoubtedly fall on deaf ears. How in the world would the test makers in New Jersey know that the Rhode Island Departments of Transportation, Environmental Management, and Education were all state-mandated, state-funded Departments, while the Rhode Island Natural History Survey is neither state-mandated, nor state-funded? How would they know that the Survey is, by contrast, a nonprofit 501(c)(3) organization devoted to providing ecosystem science and information vital to our state?

As with most organizations whose acronym begins with "RI," the Survey is often assumed to be a part of state government. For the quintessential example of this category of assumption, just drift back to the dark days of Joe Mollicone and the Rhode Island Share and Deposit Indemnity Corporation (RISDIC). The Survey will never fund itself as RISDIC did (I don't look good in stripes), but it is the responsibility of the Board of Directors to frequently reexamine the sources of our funding. The University of Rhode Island College of the Environment and Life Sciences does contribute some space and funds, but the question that has emerged repeatedly at Survey Board meetings is: should the Survey be fully funded by the state?

State monies sustain Biological, Geological, or Natural History Surveys in all states in which they exist except Pennsylvania and Rhode Island. Should Rhode Island follow suit? The state already funds the RIDEM, but this Department has only a weak mandate, and an even weaker funding base to support the collection, synthesis, and public dissemination of detailed data on the biological, geological, and ecological resources of the state. Two non-game biologists, as talented as they are, do not a state Survey make.

Given that the RINHS already houses, maintains, and updates the Natural Heritage Program database, implements biological inventories, publishes the Biota of Rhode Island series, organizes conferences and public lectures to disseminate data and encourage the exchange of ideas, and represents the state as its only member of NatureServe, public funding appears to be entirely appropriate. We are not so naïve as to ignore the fact that the current state budgetary shortfalls will be a deterrent to our ability to secure state funding, yet we are convinced that funding our programs and services would be a low-cost, high-benefit investment by the state of Rhode Island.

This reasoning has convinced us to launch a vigorous exploration of the state funding landscape, a landscape that might be described as bleak and desolate by some. While the search may not be simple, the collective expertise of the RINHS will undoubtedly boost our odds of finding a beetle in a haystack.

Keith

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Natural History Opportunities for Volunteers & Students

Roger Williams Park Zoo is always looking for outgoing, friendly people who share a passion for animals and wildlife preservation to join the zoo's Docent Program. Docents are volunteer teachers who increase the public's appreciation of wildlife through education about animals, conservation, and the role of the modern zoo. Docent training is a 13-week course, which is offered periodically. For more information or an application, interested persons, 18 years of age or older, can visit the zoo's website at <http://www.rogerwilliamsparkzoo.org> or contact Wayne Wohlschlegel, Coordinator of Volunteer Resources, at (401) 785-3510 x 356.

Roger Williams Park Zoo also needs volunteers for special events. Special event volunteering is a great way to help teach valuable lessons about the environment, give back to the community, and spend a fun day at the zoo. Volunteering at signature events such as Conservation Week, Earth Day, Spooky Zoo, or Thanksgiving for the Animals may involve greeting visitors, staffing craft or game stations, and helping to facilitate event activities. Interested individuals or groups may contact Bonnie Davis, Special Events Manager, at (401) 785-3510 x378 or bdavis@rwpzoo.org for more information.

The South Kingstown Land Trust invites volunteers to assist in various land management activities. SKLT seeks a volunteer to prepare baseline documentation, which entails photographing the protected property, and making careful notation of locations photographed, to document the land's natural condition. Experience with GPS equipment and GIS software would be a plus, but not necessary. A volunteer is also needed to prepare management plans, working from existing samples in-house. In addition, volunteers able to perform habitat assessments, in particular conducting an inventory of rare species or invasive species, would be most welcome. SKLT could also use volunteer help in ongoing land management activities, including posting of property boundaries, trail maintenance, and brush clearing. Time commitment required varies by activity. Contact Joanne Riccitelli, Director of Land Protection, at sklt@ids.net or (401) 789-0962.

The Ocean View Foundation is pleased to announce the posting of their 2004 Intern Program. They are searching for a "environmentally oriented enthusiast" from mid-June through August or September for outdoor natural history and environmental education on Block Island. Housing and a stipend will be provided. The full job description and a downloadable application are available at: http://www.oceanviewfoundation.org/intern_2004.html.



Writers Wanted

Last fall I volunteered to step in as editor of *Rhode Island Naturalist*. I would like to take this opportunity to encourage our readers to submit articles for future issues. Beginning in 2003, we've modified the format to increase its visibility and perhaps bring it one step closer to a scientific journal. We now lead off with Scientific Reports, and are especially interested in your contributions there. This is the perfect time to dust off that half-finished note in the back of your desk drawer. We are also looking for your contributions in these other areas:

- Reviews of recent books related to natural history (plants, animals, habitats, geology, hydrology, soils, etc.);
- Articles on Rhode Island natural history collections;
- "Focus On" pieces featuring one of the RINHS member organizations;
- Upcoming conferences, seminars, lectures, workshops, field trips, etc. that have natural history themes or components. Be sure to include: title of event, date, time, location, and contact information (phone, email, and/or web).
- Interesting web sites related to any aspect of natural history. Please include a brief summary and the complete URL.
- Opportunities for volunteers and students. Do you need volunteers for special projects? Offer internships? Have other natural history opportunities you'd like people to know about?
- Any other information you think would be pertinent to the Rhode Island ecological/natural history community.

We publish two issues per year, in spring and fall. The Fall 2004 issue is planned for distribution in November, and our working deadline for submissions is September 1st. Copies of recent issues can be viewed or downloaded at our web page — <http://www.rinhs.org> (go to "Web Publications," then "RI Naturalist"). For a copy of our author's guidelines, contact me at rkenney@gso.uri.edu or the RINHS office at info@rinhs.org. Or feel free to contact me if you have any other questions about submitting an article.

— Robert D. Kenney, editor

David L. Emerson (1924–2004), RINHS Distinguished Naturalist, 2004

COMPILED BY RICHARD FERREN

“...for deepening our understanding of Rhode Island’s avifauna and generously sharing his knowledge with a new generation of ornithologists.”

No one since Harry Hathaway has been more central to the Rhode Island birding community than David L. Emerson. He was among the charter members and the nearly permanent secretary of the Rhode Island Ornithological Club (RIOC), organized their activities for many decades, and served as the



organization’s President for more than 30 years. He became the compiler of the Newport/Westport Christmas Bird Count in the 1950s and continued in that capacity for more than 50 years. One of his most important contributions was the periodic update of the Audubon Society of Rhode Island/RIOC Checklist of Rhode Island Birds, including the latest revision published by ASRI in 2003. Most importantly, he became the one-man compiler, editor, and commentator for the *Field Notes of Rhode Island Birds* between 1980 and 1995. Trained in meteorology at Harvard, he continued to write the “Weather Commentary” for the *Field Notes* up to within a few months of his death.

Born in 1924, David was a graduate of Moses Brown School in Providence and received his bachelor’s degree in Physics, magna cum laude, from Harvard College in 1945. He served as an engineering officer in the US Navy and saw duty in the Pacific at the end of World War II. After the War, he worked for 28 years in the family-owned Rhode Island

Cardboard Company in Pawtucket, a specialty paperboard manufacturing company established by his grandfather and continued by his father. Ultimately David served as its general manager and treasurer. After the business was sold in 1976, he worked as a sales manager for Boise Cascade Corporation and later for Baird and Bartlett Company of Brockton, Massachusetts until his retirement in 1990.

David was a careful compiler and analyzer of Rhode Island bird records. He maintained a long fascination with bird migration and the vagaries of weather, carefully tracking daily patterns in wind, precipitation, and temperature. At the same time he sifted through the mountains of ornithological field data submitted by the state’s birding community to prepare a clear and concise monthly compilation of bird records along with a summation of the weather during the period. Well in advance of the appearance of personal computers he analyzed Christmas Bird Count data for all of southern New England, drawing graphs by hand of increasing or decreasing trends.

In addition, David was a former member of the Board of Directors of the Audubon Society of Rhode Island, and helped to organize several of their annual birder’s conferences. He was also a member of the Rhode Island Avian Rarities Committee, and was a longtime member of Cambridge’s Nuttall Ornithological Club, one of the most distinguished groups of its kind in the country.

Unfortunately, David contracted cancer in the fall of 2003 and died in January before he could receive the RINHS 2004 Distinguished Naturalist Award. But the Rhode Island birding community will long remember him as a supportive member, ever willing to discuss an ornithological mystery, ponder a tough identification problem, and share his skills with up-and-coming birders.



Harold Nelson Gibbs (1886–1970), RINHS Distinguished Naturalist, 2004 (Posthumous Award)

BY CHARLOTTE SORNBORGER

“...for pioneering work in shellfish aquaculture in Narragansett Bay and promotion of Rhode Island’s first anti-pollution legislation.”

Harold Nelson Gibbs (1886–1970) was known and respected as a self-taught scientist, marine biologist, ornithologist, conservationist, crusader against pollution, artist, inventor, and sportsman.

He spent most of his life in Barrington—from his youth, an outdoorsman. He writes in his diaries in 1904–1906 of his hunting, trapping, and fishing whenever school was

not in session (and sometimes when it was). He knew the brooks, rivers, and ponds well, leaving us a legacy in writing of what birds and mammals could be found in Barrington in those early days of the 20th century. He and his brother, Frank, often camped out at Nockum Hill prior to a morning of hunting in Hundred Acre Cove (before the 1916 Migratory Bird Act).

Although he never went beyond Barrington High School in formal education, he became a widely acknowledged expert on the ecology of Narragansett Bay. After some years as a mink trapper and commercial fisherman, he went to work for the Warren Oyster Company as a watchman on the beds off the Nayatt and Warwick shores. He got all the books he could find on the life of the oyster, bought a microscope and equipment for measuring temperature and salinity, and began his own studies, including drawing and identifying plankton that the oyster fed on. He soon became an authority on the oyster; that research ended with the 1938 hurricane, which ruined the Bay bottom for oyster culture.



Harold Nelson Gibbs (1886–1970)

Harold then began a study of quahogs, teaming up with Dr. Thurlow Nelson, a shellfish expert from Rutgers University. He spent summers doing research, first on Chesapeake Bay and the Connecticut River, and then building his own laboratory on the Palmer River behind his house in Barrington. There he bred and raised quahogs, then transferred the tiny-shelled creatures to containers in the river, to find if they could thrive, as oysters had. This was not successful; drills soon found the quahogs and destroyed them. The research, however, was later perfected in laboratories on Cape Cod. Dr. Nelson once wrote to Harold; “Nature has given you gifts so far above most of us that any absence of formal training is insignificant by comparison.”

Harold’s interests were many; his days in the field and on the water led to an intense interest in birds. He assembled a sizable collection of bird eggs, now to be found at the headquarters of the Audubon Society of Rhode Island. With many spare hours on his fishing boat, he taught himself to whittle miniature birds, soon becoming an accomplished artist. He mounted the birds on the silvery-gray swamp cedar found in Hundred Acre Cove, remnants of the submerged forest. Many hundreds of the handsome painted birds can now be found in the hands of collectors throughout the country and abroad.

In 1939 Harold was appointed R. I. Administrator of Fish and Game by Governor William Vanderbilt. He stayed on under Governors McGrath and Pastore until 1946, but then resigned because of little support from a General Assembly that was indifferent to conservation. During his tenure he promoted sport fishing, which attracted anglers from all over the country to try the waters of southern New England. Harold was one of the first to fish with hand-tied flies for Striped Bass; the Gibbs Striper Fly is still used by fisherman today.

Sunday mornings the Gibbs living room or porch was a meeting place for fishermen and anti-pollution advocates. Concerned about the growing pollution of Rhode Island’s rivers and the Bay after World War II, Harold joined the Pollution Information Committee to hammer away at the problem. He helped to formulate laws which required that sewage disposal plants be built in communities that had been dumping raw sewage. Later, Governor Pastore appointed him to the New England Interstate Water Pollution Control Commission. Harold was also an original member of the Barrington Conservation Commission. Rhode Island College recognized Harold’s gifts for educating the local

populace, granting him a Master's degree in 1947 for his conservation work.

In the words of Mark Sosin (1970), "Harold Gibbs was a beacon in the darkness fighting for conservation and preservation of our resources at a time when most of us were youngsters at our mother's knee...Today, the world is waging the conservation war of survival, but try to imagine those days when Harold Gibbs stood alone and tall fighting to prevent what he knew would happen..."

C. Robert Shoop (1935–2003), RINHS Distinguished Naturalist, 2004 (Posthumous Award)

BY KEITH KILLINGBECK

"...for pioneering research on the biology and ecology of a diverse array of vertebrate species, and for inspiring students to understand and appreciate the natural world."

So what does a hair-challenged young man growing up on the outskirts of Chicago in Cicero, Illinois keep in his basement to impress friends and family alike? Shoe boxes overflowing with baseball cards? Pilfered Burma Shave signs? An extensive collection of toupees for the Al Capone look? Not if you were Bob Shoop. Decorating the walls of the basement in the Shoop home were jars and jars of preserves. Not pickles and jellies mind you, but snakes and lizards. Even better yet were the live snakes he sold to, and traded with, the Director of the Lincoln Park Zoo. That Director just happened to be none other than Marlin Perkins. What a start to a career in herpetology!

Bob took his penchant for biology to Southern Illinois

University where he earned a B.A. in 1957. Perhaps deciding that there were just too few herps in Illinois, Bob headed south to the bayou country of Louisiana and took M.S. and Ph.D. degrees from Tulane University. Three years before finishing his Ph.D., Bob received national recognition as the recipient of the 1960 Stoye Award in Herpetology from the American Society of Ichthyologists and Herpetologists. That award is bestowed on the student presenting the oral herpetological research seminar judged to be the best that year.

Wellesley College became his professional academic home in the 1960s where, as former student and internationally known marine biologist Tundi Agardy recalls, Bob "was able to make the sometimes far too serious and self-absorbed Wellesley women realize that the best way to learn is to enjoy oneself and let one's own curiosity create a thirst for knowledge." As much fun as it was for Bob to challenge coeds of the rich and famous, the hole in his Wellesley donut was the complete lack of a graduate program. That hole was filled in 1969 when Bob joined the University of Rhode Island (URI) as an Associate Professor in the Department of Zoology.

What followed was a career at URI that spanned 29 years, 24 graduate students (some who earned both M.S. and Ph.D. degrees under Bob's tutelage), more than 60 professional publications, innumerable hours of field work, 11 different courses taught, countless research seminars, and enough

Friday afternoon Shoop Sessions to make an indelible impression on scores of students and faculty alike. To those of you lucky enough to have attended even one of the legendary Shoop Sessions, what is the first recollection that comes to mind? Right ... Mystery Meat. Science was certainly digested at these gatherings in Bob's lab, but it was digesting, and identifying, the Mystery Meat that was the people magnet. Road kill was often a staple. Opossum. Owl. Anything to goad the weak-at-heart.



C. Robert Shoop (1935–2003)

Even after retiring in 1998, Bob continued to write and pursue research with Carol Ruckdeschel, the talented biologist with whom he had shared his life since the early 1980s. Together they lived on the offshore slice of southern landscape they adopted as home: Cumberland Island, Georgia. It is here that they founded, and literally built, the Cumberland Island Museum. Preserved herps reminiscent of

a long-ago Cicero basement grace the shelves, as do one of the best collections of sea turtle skeletons in the world. Even on Cumberland Island the long-standing tradition of serving Mystery Meat continued. My favorite entry in the guest cabin logbook on Cumberland rejoiced over the hospitality shown the visitor but concluded with an apology; "sorry, I just couldn't eat the porpoise tongue."

Biological research was at once vocation and avocation for Bob. The tremendous breadth and depth of his life's work reflected that fact. Taxa that were the focus of his research papers and books included an amazing array of vertebrates: snakes, salamanders, eels, sunfish, shrews, wood storks, pelicans, opossums, gray fox, alligators, and both freshwater and sea turtles. Processes that were at the heart of his research included reproduction, migration, homing behavior, home range size, nesting, predation, and physiological responses to anoxia. The research on annual migratory patterns and population dynamics of salamanders Bob pioneered at the URI Alton Jones Campus was among his best.

To say that Bob distinguished himself as a naturalist is only part of his story. He had a special way of engaging students in the life of natural history. His URI class field trips to the southeastern United States are the topic of countless stories. His love of, and penchant for, a good gag or a sharp barb endeared him to all who had the good fortune to know him. Former student Jeff May, an undergraduate in the Introductory Ecology class Bob and I used to team-teach, recently concluded that Bob "seemed to have a joie-de-vivre beyond the usual allotment." Way beyond.

When Bob died this past November, he left a legacy of good science, good teaching, and good humor. He was a scientist of substance and a person of substance who never took himself, or the world, too seriously. His life, well-lived, made him an unforgettable friend, mentor, colleague, and now, 2004 RINHS Distinguished Naturalist.



Focus on: Block Island Banding Station

B Y S T E V E R E I N E R T

Four decades ago, Elise Lapham was introduced to bird banding by Elise Dickerson at the north end of Block Island, Rhode Island. In 1967, after a brief but intense apprenticeship, Ms. Lapham set up mist nets on her own property in the north end, and 37 years and nearly 100,000 birds later the *Block Island Banding Station* (BIBS) is still going strong. Based at the Lapham's Block Island home in the midst of the Clay Head nature preserve (most of which is land was donated by the Lapham family), BIBS has run for the duration, uninterrupted, with just a handful of principal staff working with Elise. Her daughter, Helen Lapham, an ornithologist, shared in all phases of the operation until her untimely death from cancer in 1997. Kim Gaffet joined the program in 1981 and is now the station manager; along the way, countless other volunteers have helped with the banding operation.



Elise Lapham holds a banded bird on Block Island

The targets of all this attention are migratory landbirds. Many of these birds, including warblers, vireos, thrushes, orioles, and tanagers, fly at night, and each year a small proportion of them—due to a combination of faulty navigational abilities and west winds—find themselves aloft over the western Atlantic when day breaks. These birds, mostly in their first year of life, make landfall on coastal points and islands where their numbers become concentrated. Block Island is one such point of concentration, and the abundance of migrating birds there prompted Ms. Dickerson, and later Ms. Lapham, to establish their banding stations. Choosing the north end was logical, as the landbirds which stop on Block Island tend to travel northerly across the island prior to crossing Block Island Sound to regain the mainland. As the birds become concentrated in the narrow habitat corridor that comprises the north end, they become vulnerable to capture.

The birds are captured in 12-meter long by 3-meter tall, fine-meshed mist nets. Each day during spring (last week of April through May) and fall (September and October), weather permitting, 10–12 nets are set in the shrubby habitats surrounding the Lapham home. Birds moving through the vegetation are captured when they fly into the nets. Banding staff check the nets hourly. Each captured bird is carefully removed from the net and placed in a soft mesh pull-string bag, one bird per bag. After all nets are checked, the birds are brought to the banding laboratory that is attached to the Lapham house. Each bird is then identified, banded, aged, sexed, weighed and measured—and released—all within a few minutes after being removed from its bag. Nets are kept open 24 hours per day, every day (again, weather permitting). The last check is one hour after dark; the first a half-hour after sunrise.

Through the 2003 banding season, over 90,000 birds have been banded at BIBS, averaging 602 individuals (of a mean of 55 species) annually in spring and 2,111 individuals (of a mean of 71 species) in fall; 113 species have been banded in all. These numbers do not include the thousands of birds banded at BIBS that were recaptured in later years or seasons.

The primary objective in running this long-term monitoring program is to promote research on migratory birds, towards their conservation. To this end, all banding data have been computerized and are available to migratory bird researchers. Parties interested in using BIBS data should send

a one-page proposal to the station manager, Kim Gaffett, at Block Island Banding Station, P. O. Box 640, Block Island, RI 02807.

The first employment of this recently compiled database was by Jason Osenkowski, a graduate student of Dr. Peter Paton in the URI Dept. of Natural Resources Science. In 2002 Jay completed his master's thesis, entitled *Validating the use of banding data to monitor avian population trends: a comparison of two adjacent banding stations*.

A second important function of BIBS has been education. Visiting birders and the general public are welcome at BIBS where birds-in-hand are used to facilitate lessons in the marvels of bird migration. Additionally, in cooperation with The Nature Conservancy, scores of school groups from on and off the island have been educated at BIBS over the years. Parties interested in visiting BIBS should contact Kim Gaffett at (401)-466-2224.

[Editor's note: RINHS has published a book, The Ecology of Block Island, which contains a chapter describing in detail the spring and fall land-bird migrations using data from BIBS. See the publications page of our web site to learn more about the book, and/or to purchase a copy.]

Steve Reinert is a Rhode Island ornithologist who has served as the volunteer Data Manager for the Block Island Banding Station since 1996.

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RINHS is a nonprofit 501(c)(3) organization. Dues in excess of \$4 (for annual subscription to the newsletter) and contributions are tax deductible to the full extent allowed by law.

Weaving the Web: Electronic Resources

The Narragansett Bay National Estuarine Research Reserve recently launched a Narragansett Bay Watershed Coastal Training Program (NBWCTP) website. NBWCTP is designed to provide coastal decision-makers with the science-based information and skills that are necessary to make informed decisions about how to use and manage Narragansett Bay and its watershed. It will also serve as a forum to enhance coordination and communication among trainers and educators who will provide coastal decision-makers with technical support on issues relating to the Bay and its watershed. Based on a market analysis and needs assessment, the range of issues for focus will include: wetlands ecology, invasive species, endangered species, suburban sprawl and urban decay, tourism and recreation development, water quality and quantity, planning town-wide greenways, and other watershed issues that may become vital to the successful management of the Bay and its resources. The goal for this interactive web is to provide coastal decision-makers and educational institutions with relevant information to help ensure a healthy future for Narragansett Bay and its watershed. <http://www.nbwctp.org>

The Royal Botanical Gardens and the Canadian Museum of Nature in Hamilton, Ontario began the "Green Legacy" project in 2002—a traveling museum exhibit on the importance of rare and endangered plants, and plant diversity generally, in Canada. Scheduled to continue into 2006, the exhibit has been traveling now for 18 months,

and is presently in Quebec. A companion Green Legacy web site was also established to make the exhibit's resources more broadly available. Feedback on the web site is invited—What do you like about the site? Is it helpful or useful? Would you recommend it as a general introduction to the issues? Any comments should be sent to Dr. David A. Galbraith, Manager of Biodiversity Projects, Royal Botanical Gardens at dgalbraith@rbg.ca. <http://www.rbg.ca/greenlegacy>

The Monterey Bay National Marine Sanctuary recently launched a new state-of-the-art web site that provides users fast, easy access to the latest high-quality scientific research and monitoring information on the Sanctuary's major habitats, species, and management issues. The web portal for Sanctuary Integrated Monitoring Network (SIMoN) can be found at <http://mbnms-simon.org>.

Connecticut Amphibians. John Himmelman is a Connecticut-based naturalist and author/illustrator. His web site provides species accounts for all of the salamanders, frogs, and toads found in the state, with his own photographs of most of them. Clicking on the frog pictures will play recordings of their calls. There are also links to many other amphibian web pages, and ordering information about John's children's books. Where else could you find the real truth about the famous "Windham Frog Fight of 1754"—a little-known incident during the French and Indian Wars. <http://www.ctamphibians.com>

The Southern New England Forest Consortium, Inc. and the URI Cooperative Extension Home*A*Syst Program have developed a program called "Today's Forest, Tomorrow's Legacy: A Guide for Small

Acreage Woodland Owners." A series of fact sheets provides the small acreage woodland owner with planning guidance, project ideas, basic and technical information, and a list of several specific contacts and resources for more detailed information and technical assistance. <http://www.uri.edu/ce/wq>—click on the "RI Home*A*Syst Program."

URI Cooperative Extension also has a "Healthy Landscapes" education program that focuses on "smart" home landscaping practices that enhance the environment and protect water quality and quantity. The program includes local demonstration sites, printed materials, tours and other events. <http://www.healthylandscapes.org>.

The Northern RI Conservation District has completed an on-line, downloadable "Tool Kit for Urban Rivers: Public Outreach & Education Strategies and Programs." The Tool Kit is based on the Woonasquatucket River "Do's and Don'ts" Education Program, which was six years in development and implementation. Users will have to register, but only for tracking purposes. NRICD wants to follow and celebrate the tool kit's use across the United States; several other states have already downloaded it. <http://www.nricd.org>—on the home page, click on "tool kit."

The Farmland Information Center (FIC) announced on March 1st that their substantially expanded and improved FIC web site was up and running. FIC is a partnership of the American Farmland Trust and the U.S. Dept. of Agriculture's Natural Resources Conservation Service. Since 1994, they have hosted an ever-growing on-line collection of state laws, statistics, literature, and technical resources related to farm and ranch land protec-

tion and stewardship. The improved FIC site offers more resources, direct access to full text, and a more robust search feature, all designed to make it easier for users to find the information that they need. <http://www.farmlandinfo.org>

AGRICOLA catalog, which replaces AGRICOLA98, is one of several modules implemented in NAL's migration to Endeavor's Voyager library system. In addition to a search and retrieval engine for AGRICOLA, the new Voyager system supports NAL's

fully electronic request and delivery management system linked to the AGRICOLA bibliographic and holdings records. NAL plans to implement the document delivery system in late spring 2004. <http://agricola.nal.usda.gov> for the AGRICOLA catalog; <http://www.nal.usda.gov/spevents/relais.html> for the document delivery system.



The National Agricultural Library (NAL) has released a significant upgrade to its Web-based AGRICOLA catalog of records for the materials in its collection. NAL, located in Beltsville, Maryland, is part of the Agricultural Research Service, the U.S. Department of Agriculture's chief scientific research agency. NAL is one of four U.S. national libraries, and is known for an expert staff, extensive AGRICOLA bibliographic database, leadership in information services and technology applications, and strong collections in agriculture and related sciences. The new version of AGRICOLA provides improved access—many new search and retrieval capabilities, with daily updates—to over 4 million bibliographic records, the world's largest compilation of agricultural information. The new

acquisitions, serials control, cataloging, indexing, and circulation operations. Other features of NAL's new AGRICOLA catalog include:

- Users may search the catalog of books, journals and non-print items; search the catalog of article records for the journals indexed; or search the two catalog databases combined.
- Users may choose either to display results of searches, or to e-mail the search-results to themselves.
- Hotlinks enable users to obtain the full text of resources, where available electronically.

Future enhancements to the new AGRICOLA will include user-initiated requests for patrons who have document delivery and borrowing privileges. NAL and Endeavor are working with Relais International to develop a

The Organization of Fish and Wildlife Information Managers (OFWIM) announced that the winter 2003 edition of their newsletter, "OFWIM News," is now available on-line. This issue includes a message from the new OFWIM President, links to products from the OFWIM 2003 Annual Meeting, a welcome to the new Executive Committee, "Databases and Science-based Management"—an article by Falk Huettmann, University of Calgary, and much more. <http://www.ofwim.org>

The U.S. Environmental Protection Agency, National Center for Environmental Assessment has issued a new report entitled "Generic Ecological Assessment Endpoints (GEAEs) for Ecological Risk Assessment," downloadable as a 67-page PDF. The report was prepared by the agency's Risk Assessment Forum, a collection of experts from throughout EPA. Ecological risk assessment is the "process for evaluating the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors." The objective of the report is to help in determining which aspects to select in order to evaluate impacts. It supplements the 1998 report "Guidelines for Ecological Risk Assessment," which can also be down-loaded. <http://cfpub.epa.gov/ncea/raf/recordisplay.cfm?deid=55131> (Endpoints) <http://cfpub.epa.gov/ncea/raf/recordisplay.cfm?deid=12460> (Guidelines)

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.

To Contact Us...

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Providing Ecosystem Science and Information

Room 101, Coastal Institute in Kingston
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Join us for BioBlitz 2004!

Come one, come all—scientists, naturalists, volunteers, and everyone in-between—to the Rhode Island Natural History Survey's 5th Annual BioBlitz! BioBlitz 2004 will be held at URI's beautiful, 2,300-acre W. Alton Jones Campus in West Greenwich, Rhode Island, from 3:00 p.m. Friday, June 18 to 3:00 p.m. Saturday, June 19.

Alton Jones offers a wonderful variety of habitats, including ponds and streams, Red Maple swamp, White Pine forest, Sugar Maple forest, oak-beech woodland, wet meadow, and open fields. It has a rich diversity of flora and fauna and is home to a number of rare species, so it will provide a perfect venue for bioblitzing!

Just what is a bioblitz? A bioblitz is a tally done by volunteer scientists and naturalists, to count as many species of plants, animals, and other organisms as they can in 24 hours. This public event is designed to increase awareness of the variety of life that surrounds us and of the important services these species provide to improve the quality of our lives.

With their taxonomic expertise, the scientists form the core of a bioblitz, but volunteers of all sorts are needed to help out in the field, lead field walks, do data entry, greet the public, and help in myriad other ways. What better way can you think of to celebrate the summer solstice than to spend a few hours in one of the most beautiful corners of Rhode Island, helping to highlight the state's amazing biological diversity?

BioBlitz 2004 will be headquartered at the Alton Jones Environmental Education Center. Overnight facilities and meals will be available for scientists/naturalists and volunteers. Nature walks, activities for children, and other events will be available for the public on Saturday, June 19, from 10:00 a.m. to 3:00 p.m. The full schedule of events is posted on the RINHS website.

Cosponsors of BioBlitz 2004 include the University of Rhode Island W. Alton Jones Campus, The Nature Conservancy of Rhode Island, Largess Forestry, and the West Greenwich Land Trust.

Come for one hour, or for all 24, and join us for our most fun event of the year! For registration information, go to the RINHS website at www.rinhs.org.

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