Science & News from the Rhode Island Natural History Survey

Rhode Island Naturalist

Volume 17 • Number 2 • Fall 2022

Notes on Some Rhode Island Leafminers

By CHARLEY EISEMAN

Leafminers are moths, flies, beetles, and sawflies that live and feed inside of leaves for at least part of their larval lives. They tend to be highly host-specific, and each species makes a particular pattern as it excavates the leaf tissue, which—together with other idiosyncrasies like egg placement, how frass (excrement) is dealt with, and mode of pupation—often make it possible to determine what species is present just by examining the evidence left behind on (and in) the leaf.

I became fascinated with leafminers while working on my first book (Eiseman and Charney 2010), and I have been studying them intensively for over a decade now. I have traveled all over the US (and a little bit of Canada) with my wife, Julia Blyth, to photograph and collect them. Although I have lived in Massachusetts my whole life, I hadn't gotten around to looking for leafminers in Rhode Island until 2020, when Julia and I were awarded a grant from the Henry & Theresa Godzala Research Fund for this purpose.

The full results of our study are much too long for a regular article in *Rhode Island Naturalist*, so the plan is for a detailed report to appear in a Special Issue at some point. What follows are some notes on additional incidental leafminer observations I made in 2021, when I found myself in Rhode Island periodically for my work as a consulting field botanist. Complete information about the biology, hosts, and geographic distribution of these species can be found in my continually updated e-book, *Leafminers of North America* (Eiseman 2022). All but one of the following are here reported from Rhode Island for the first time from our work—one in 2020 and the rest in 2021.

***Japanagromyza viridula* (Agromyzidae).** This fly, known as the "oak shothole leafminer," has been reared from leaves of several different oak (*Quercus*) species as well as Chinese chestnut (*Castanea mollissima*) (Fagaceae). It occurs only on young, tender leaves in spring. During a BioBlitz in Lincoln, Massachusetts, on 6 July 2019, I found what appeared to be empty mines of this species on black walnut (Juglandaceae: *Juglans nigra*), and on 2 July 2020 at the Carter Preserve in Charlestown, Rhode Island, Julia and I found similar mines on pignut hickory (*Carya glabra*) (Fig. 1). On 2 June 2021, I found mines on mockernut hickory (*C. tomentosa*) at the Rome Point Preserve in North Kingstown, and this time there were larvae inside. I collected several leaves, and two adults emerged on 18 and 20 June (Fig. 2), confirming my suspicion that *J. viridula* was responsible for these previously unreported mines on Juglandaceae. Parasitoid wasps (Braconidae: Opiinae) emerged from nine other *J. viridula* puparia from 24 to 29 June. This high parasitism rate is not unusual for leafminers, and it is one reason that I try to collect a dozen or so examples of each type of miner that I want to rear.

***Marmara* sp. (Gracillariidae).** My study of leafminers also includes insects that mine in other plant parts, which differ from borers in that their feeding trails are externally visible. *Marmara* is a moth genus with a few leaf- and fruit-mining species and numerous stem miners, most of which have never been reared. Based on the number of hosts on which mines have been found, there are likely over 100 undescribed species in North America. Eiseman et al. (2017)

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Figure 1. Leaf mine of *Japanagromyza viridula* on pignut hickory (*Carya glabra*) (all photos in this article are by the author).

Figure 2. Adult *Japanagromyza viridula* reared from mockernut hickory (*Carya tomentosa*).

summarized the known *Marmara* host associations, which included one observation of mines on winterberry (Aquifoliaceae: *Ilex verticillata*) in Windham County, Connecticut: "elongate mine in green bark of lower stems of young plants." In Narragansett on 4 June 2021, I noticed *Marmara* mines in brown bark of winterberry stems at eye level. Although I was unable to photograph these, similar mines were documented in Bristol, Rhode Island, in February 2022: https://www.inaturalist.org/observations/106567261.

***Telamoptilia hibiscivora* (Gracillariidae).** This moth species was first described in 2017, from specimens collected in Mexico, Texas, Louisiana, and Maryland. I found its characteristic blotch mines (Fig. 3) on swamp rose-mallow (Malvaceae: *Hibiscus moscheutos*) on 5 August 2021 in the understory of a phragmites (Poaceae: *Phragmites australis*) stand at Sachem Pond, Block Island. One of the larvae I collected emerged as an adult on 21 August (Fig. 4).

Figure 3. Leaf mine of *Telamoptilia hibiscivora* on swamp rose-mallow (*Hibiscus moscheutos*).

Figure 4. Adult *Telamoptilia hibiscivora.*

***Stigmella* spp. (Nepticulidae).** From the same visit to Sachem Pond, I reared two adults of *S. rosaefoliella* from Virginia rose (Rosaceae: *Rosa virginiana*), which emerged on 24 August (Fig. 5), and one adult of *S. villosella* from blackberry (Rosaceae: *Rubus* sp.), which emerged by 28 August. Both species form narrow, linear leaf mines (Figs. 6 & 7). Nepticulids include the world's smallest moths, with adults typically only 2 mm long.

***Elachista helodella* (Elachistidae).** This moth species was described in 1999 from specimens collected in Ontario, Quebec, and Delaware, some of which were reared from an unidentified "marsh grass." In my decade-long study of leafminers on Nantucket, I have determined that this species is responsible for linear-blotch mines on the lower surface of common reed (*Phragmites australis*) leaves, some of which I found during my visit to Sachem Pond (Fig. 8).

(continued on page 4)

President's Corner: Another Year Half Gone Already

On behalf of the Board of Directors, I would like to extend our gratitude again to the Survey staff. They continue to create and host a portfolio of interesting projects and programs, keeping our organization relevant to you, our members. Their ability to identify project opportunities that align with the Survey's mission, and their willingness to pursue them across a broad array of funding sources, are great assets. I would like to say thank you and farewell to board members Stephen Hale, Kim Gaffett, and Jonathan Scoones. who all stepped down this year. We appreciated all you have done for the Survey and wish you great discoveries wherever you go from here. I hope you'll join me in offering a warm welcome to new board members Caitlin Chaffee, April Alix, and Don DeHayes (see page 25). We look forward to working with them and know they will help take the Survey to the next level.

Lou Perrotti, President,
Board of Directors

We are more than halfway through a year of exciting public programs that started with the increasingly polished and popular Rhode Island Nature Video Festival. Seventeen videos were featured, including dramatic footage of a great blue heron dealing with a largemouth bass, majestic humpback whales in Block Island Sound, and two thoughtful and inspiring videos about local water bodies: Point Judith Pond and the Blackstone River. Almost 200 viewers logged in to the virtual festival. If you weren't one of them, you can still watch the videos on our YouTube channel (https://youtube.com/user/rinaturalhistory). In March, we held our annual Open House and Nature Art Exhibit with works from 11 artists. More than 65 Survey members, friends, staff, and board members gathered in person to view the art and socialize outdoors in our newly accessible courtyard space. In April, we held a virtual Annual Meeting featuring an inspiring talk about community engagement programs for inner city youth by Alicia Lehrer from the Woonasquatucket River Watershed Council. Also in April, we hosted a showing of "Turtles on the Hill," a documentary about Rhode Island's state-endangered diamondback terrapins (see page 16).

June brought our signature event, BioBlitz, which never disappoints and continues to build the Survey's reputation by bringing science to the community. This year's BioBlitz along the East Bay Bike Path had 186 participants including 50 students from all levels. The preliminary tally was 1067 species, which continues to grow with final lists still being submitted. Check out the photo spread on pages 14 and 15 in the center of this issue.

Our Henry & Teresa Godzala Research Fund small-grant program administered funding to 3 projects this spring—supporting the purchase of field cameras to observe predation on saltmarsh sparrow nests, travel funding to enable "Newt the turtle dog" to make a training trip to Rhode Island, and characterization of the wild bee community and their visitation frequency and floral resource use of black gum (*Nyssa sylvatica)* in our area. Godzala funding supported the research in this issue's page 1 article, and also allowed the Survey to bring a display to the Northeast Natural History Conference in Albany in April (see page 20). The Godzala fund grew significantly thanks to earmarked member donations over the year.

In conclusion, I want to thank all of you who continue to support the Survey through memberships and donations, and by attending events. We value each one of you and look forward to many more years of investigating and sharing the wonderful natural history of our great state together.

Figure 5. Adult *Stigmella rosaefoliella*.

Figure 6. Vacated leaf mine of *Stigmella rosaefoliella* on Virginia rose (*Rosa virginiana*).

Figure 7. Larva of *Stigmella villosella* (far right) mining in a leaf of blackberry (*Rubus* sp.).

***Ectoedemia* spp. (Nepticulidae)**. In contrast with the entirely linear mines typical of *Stigmella*, moths in this genus generally make linear-blotch mines, as is the case with two species I found in North Kingstown on 27 August 2021: *E. nyssaefoliella* on tupelo (Nyssaceae: *Nyssa sylvatica*) (Fig. 9), and *E. rubifoliella* on swamp dewberry (Rosaceae: *Rubus hispidus*) (Fig. 10).

Figure 8. Leaf mine of *Elachista helodella* on common reed (*Phragmites australis*).

Figure 9. Larva of *Ectoedemia nyssaefoliella* mining in a leaf of tupelo (*Nyssa sylvatica*). Note that the narrow part of the mine extends all the way to the bottom of the image.

Figure 10. Leaf mine of *Ectoedemia rubifoliella* on swamp dewberry (*Rubus hispidus*), with dead larva at upper right.

***Pachyschelus laevigatus* (Buprestidae).** On 1 October 2021 I surveyed the proposed site of a solar project in Westerly for rare plant species, and I found a sizable population of hairy small-leaved tick-trefoil (Fabaceae: *Desmodium ciliare*). Some leaves had been mined by *P. laevigatus* (Fig. 11). Although this beetle has been collected in Rhode Island previously and this plant is among its known hosts

elsewhere, the occurrence of a leafminer on a state Threatened species seems worth mentioning here.

Figure 11. Larva of *Pachyschelus laevigatus* mining a leaf of hairy small-leaved tick-trefoil (*Desmodium ciliare*).

***Calycomyza artemisiae* species group.** (Agromyzidae). Also in Westerly, I found a fly larva of this group forming a whitish blotch mine on mugwort (Asteraceae: *Artemisia* cf. *vulgaris*) (Fig. 12). It is unfortunate that I failed to rear it to an adult, because this group needs further investigation. The European subspecies *C. artemisiae artemisiae* is known to feed on mugwort, but it is not known to occur in North America, with the exception of two questionably identified adults caught in the mountains of southern California. The native subspecies *C. a. marcida* is only known from Manitoba and California, and its only known host is California mugwort (*A. douglasiana*). The only other North American *Calycomyza* record from *Artemisia* is that of *C. artemisivora*, which Owen Lonsdale and I described from two specimens reared from white sagebrush (*A. ludoviciana*) in Oklahoma.

Figure 12. Fly larva in the *Calycomyza artemisiae* species group mining in a leaf of mugwort (*Artemisia* cf. *vulgaris*).

***Liriomyza baptisiae* (Agromyzidae)**. Again in Westerly, I found the distinctive blackish linear-blotch mines of this fly on wild indigo (Fabaceae: *Baptisia tinctoria*) (Fig. 13). Published records of this species are from Alaska and California to Manitoba and Pennsylvania.

Figure 13. Leaf mines of *Liriomyza baptisiae* on wild indigo (*Baptisia tinctoria*).

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***Charley Eiseman** is a freelance naturalist, endlessly fascinated by the interconnections of all the living and nonliving things around him and especially drawn to galls, leaf mines, and other plant-insect interactions. His blog can be found at bugtracks.wordpress.com.*

Marine Mammals of Rhode Island: Gray Seal

By ROBERT D. KENNEY

Introduction and Status

*Gray seals (*Halichoerus grypus*) are the second-most likely pinniped to be encountered in Rhode Island, after harbor seals (*Phoca vitulina*). Unlike harbor seals, which are found in both the North Atlantic and North Pacific, gray seals occur only in the North Atlantic. There are three separate populations: a Canadian stock that occurs from Massachusetts to Labrador, a European stock that occurs from France north to Russia and west to Iceland, and a third stock in the Baltic Sea. There are two principal pupping concentrations of the Canadian stock: one in the Gulf of St. Lawrence and the other on Sable Island off the southern coast of Nova Scotia (basically a narrow sandbar about 175 km offshore—43 km long but only 1.2 km across at its widest point).

Gray seals are one of the success stories of the US Marine Mammal Protection Act (MMPA), although not everyone will agree today whether that was a good thing. They were hunted by Native Americans for subsistence, and then by European settlers for oil, meat, and leather. By the mid-19th century, gray seal abundance in the US and Canada had been greatly reduced. In the modern era, commercial hunting has been relatively limited because of low abundance and relatively low pelt value. Most modern hunting has been primarily for population control to protect commercial fisheries—reducing sealworm infestation (see further below for details), minimizing damage to fishing gear, and reducing perceived seal consumption of commercial fish stocks. Bounties paid by state authorities in both Maine and Massachusetts were one factor leading to their near extirpation in the northeastern US by the 1960s. When the MMPA was enacted in 1972, gray seals were effectively absent from southern New England.

The recovery of gray seals in New England has been tracked by monitoring the numbers of pups born each year. One pup was observed in Massachusetts in 1969, and absolutely none were seen during the 1970s. In 1988, 5 pups were counted on Muskeget Island, an uninhabited sandy island off the west end of Nantucket. The seals re-colonizing Massachusetts came from Sable Island, the nearest population center in Canada—nearly 900 km away. Counts increased to 59 in 1994, 883 in 2002, and 2095 in 2008, with pupping expanding to Monomoy Island (a National Wildlife Refuge) off the "elbow" of Cape Cod. An additional 515 pups were counted in 2008 at two sites in Maine. By 2010 pupping had expanded to one more site in Massachusetts and two more in Maine, and the total number of US pupping sites had grown to nine in 2019. The total number of gray seals in southeastern Massachusetts alone in 2015 was estimated at 28,000–40,000 by applying standard correction factors to counts of seals on the beaches from Google Earth images (Fig. 1). Based on pup counts, the number of gray seals in Canada is between 330,000 and 500,000. Needless to say, gray seals are not listed under the US Endangered Species Act or on the Rhode Island state list, and are classified as Least Concern on the IUCN Red List.

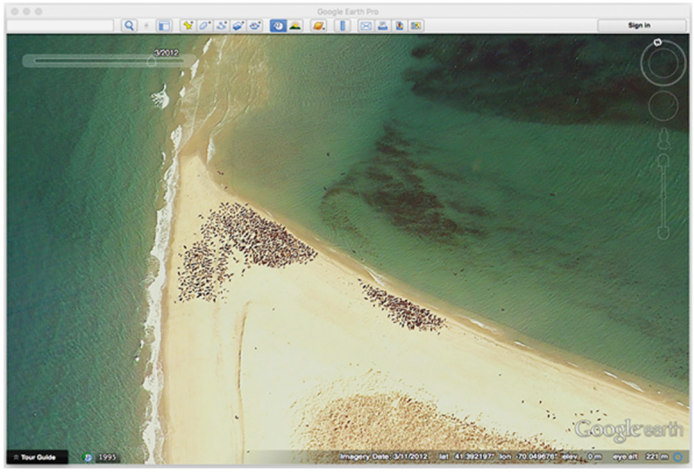

Figure 1. Google Earth screen shot of gray seals hauled out on Great Point, Nantucket, Massachusetts, on 11 March 2012 (from Moxley et al., 2017, *Bioscience* 67:760–768.)

The number of gray seals killed by humans each year averages close to 5,000 for the US and Canada combined, which sounds like a lot but is really not significant relative to the population size. The lion's share is removal of about 3,000 "nuisance" animals in Canada. There is a small commercial hunt in the Gulf of St Lawrence (600–700 per year), and a personal hunting license allows Canadians to take up to six gray seals. The average number of gray seals killed per year

*These articles are simplified and summarized from a technical report that was part of the Rhode Island Ocean Special Area Management Plan ("Ocean SAMP") in 2010. For details and full references to the literature, see that report at http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/10-Kenney-MM&T.pdf.

by incidental take in US commercial fisheries has been approaching 1,000 and increasing as the population grows (and includes an unknown mix of seals from US and Canadian rookeries).

As hinted above, not everyone is pleased with the booming gray seal population. An adult male gray seal can weigh as much as 400 kg (880 lb), substantially more than the biggest harbor seals at 170 kg (350 lb). That means two things. One gray seal can eat a lot more fish (and bigger fish) than a harbor seal. And a gray seal is a much more tempting meal for a large shark. The combination of large numbers of fat seals, warming ocean temperatures, and a ban on commercial fishing for great white sharks (*Carcharodon carcharias*) in US Atlantic waters since 1997 has led to an ever-increasing number of white sharks off the beaches of Cape Cod. The tourism industry is worried that sharks will keep the tourists away, although some tourists are now coming specifically to see sharks and seals. Fishermen are concerned that both seals and sharks are eating "their" fish. There have been calls to ease restrictions in the MMPA to make it much easier to kill "excess" seals, and there have been seals found dead from gunshot wounds (six on the Cape in 2011, although fewer in most years).

Description

Gray seals are sexually dimorphic, with adult males up to 2.7 m long and females up to 2.1 m. The sexes also differ in color—males are mainly dark with irregular light patches and females are light with dark spots. Pups are born with a solid white or yellowish coat (lanugo), and molt to a spotted coat after weaning. Gray seals (including pups) are distinguished from harbor and harp seals by the distinctive shape of the head. Gray seals have an elongate snout with a flat or slightly convex profile, in contrast to the shorter, concave, "puppy-dog" snout of the smaller seals (Fig. 2). The neck and chest of males may be wrinkled, scarred, and often devoid of fur—believed to result from male-male fights over access to females. Females tend to be sleeker and lack scarring. The nostrils are widely separated and from the front look like the letter "M" or "W," while harbor seal noses look more like a "V."

Natural History

Gray seals give birth to single pups in January or February. Pupping can occur in a variety of locations depending on region—rocky ledges (Maine and Nova Scotia), sandy beaches (Sable Island and Massachusetts), and sea ice (Newfoundland). Adult females attend their pups continuously from birth to weaning and do not feed at all during that time, losing up to a third of their body mass. The

Figure 2. Two harbor seals (left) and two gray seals (right) hauled out together at low tide on a ledge at Duck Island, Isles of Shoals, Maine. The larger sizes and longer faces of the gray seals are easily seen. There are other seals behind and one more in the foreground, still in the water and just about to start climbing out onto the ledge (photo by the author).

breeding fast is even longer for adult males, since they arrive first to stake out and defend territories. Pups are weaned and abandoned in about 18 days, then they fast for 10–28 days. Newly weaned pups are so fat and buoyant that they can't really swim well. Ovulation and mating also take place around the time of weaning, which is why the males hang around to guard the females from other males. Implantation of the early-stage embryo is delayed for about 3.4 months, "stretching" the 8-month gestation period into an effectively annual breeding cycle.

After the winter breeding season, there is a post-breeding pelagic feeding period in February–April. This is followed by a haul-out for molting in May or June, then another dispersed feeding period until the next winter's pupping season begins. Tracks of gray seals tagged with satellite-linked radio tags and incidental captures in fishing gear far out at sea both confirm that adult gray seals commonly travel long distances far from their breeding sites on their foraging trips. Juveniles don't range as far offshore, but disperse widely along the coast during feeding phases of the annual cycle. Like harbor seals, but unlike harp and hooded seals, gray seals haul out routinely for resting and not only for breeding or molting.

Gray seals feed on a variety of fish species and cephalopods (squid and octopus), with no evidence for significant dietary differences between first-year juveniles and adults.

The age at sexual maturity differs between the sexes. Most females mature at 4 or 5 years of age. Males mature at 6 years, but do not begin to breed until age 8, when they are large and strong enough to compete with other males. Most

breeding bulls are 12 to 18 years old; older males can no longer compete with the younger bulls. The typical lifespan is 25–35 years in the wild, with females living longer than males. The record was 46 years in one wild female.

Sharks are the major predator of gray seals, with a variety of different shark species having been implicated. Greenland sharks (*Somniosus microcephalus*) are suspected as a principal predator around Sable Island, and we now know that white sharks are their primary predators in Massachusetts. During the molt, adults in Massachusetts probably become more vulnerable to shark predation by spending more time close to shore.

Gray seals are subject to a variety of diseases and parasites, which are better known in harbor seals; it is likely that many of the same organisms affect gray seals. One parasite of particular interest is the sealworm or codworm (*Pseudoterranova decipiens*). The penultimate phase of the parasite's life cycle is as a large late-stage larva (up to 4 cm long) encysted in the muscle tissue of a fish like cod or haddock, greatly reducing the palatability and marketability of the fillets. Piscivorous seals are the final host in the life cycle of the worms, which mature and reproduce in the seal's gut. Sealworms can infect other seal species, but are most commonly found in gray seals in most areas.

Historical Occurrence

Gray seals were largely absent from Rhode Island and nearby waters until recently. In *The Mammals of Rhode Island*, Cronan and Brooks reported that the species was unknown from Rhode Island, but said that there was one record to the south. That referred to a report of a juvenile male taken in a net at Young's Million Dollar Pier in Atlantic City, New Jersey in 1931. Archaeological finds indicate that Native Americans sometimes used gray seals on Block Island and along the Connecticut coast, however, the number of individuals was apparently relatively small. It is quite possible that the Indians simply made opportunistic use of stranded animals at no greater frequency than current stranding rates. There are no other historical reports in the literature of gray seals in southern New England except for the known breeding colony near Nantucket.

Recent Occurrence

The recovery of the Massachusetts and Canadian populations has led to an increased occurrence of gray seals in southern New England and mid-Atlantic waters. There are gray seal specimens in the Smithsonian collection from strandings in New Jersey in 1973 and 1978. These were the first documented records west of Massachusetts after the 1931 Atlantic City animal. The two earliest strandings recorded in Rhode Island, both from Block Island, were in 1986 and 1988. In 2004, however, I pulled a frozen seal out of the walk-in freezer on the Bay Campus to use as a specimen in a class. It had been hiding in the back of the freezer, wrapped in burlap, for 24 years. Although the tag read "harbor seal, Block Island, March 3, 1980," when it was unwrapped on the necropsy table it turned out to be a gray seal—the earliest known stranding in the state by six years.

Gray seal occurrences in Rhode Island are almost entirely represented by stranding records. Strandings and occasional sightings throughout the region have become much more common. Annual numbers of strandings were nearly negligible during the 1980s (Fig. 3). There was a generally increasing and variable trend through the last decade of the 20th century and first decade of the 21st, reaching a peak in 2011. There was then a steep decline in strandings until 2016, followed by an equally sharp increase to the maximum number of 34 in 2020. The overall increasing trend is essentially following the trend in numbers at the pupping beaches in Massachusetts.

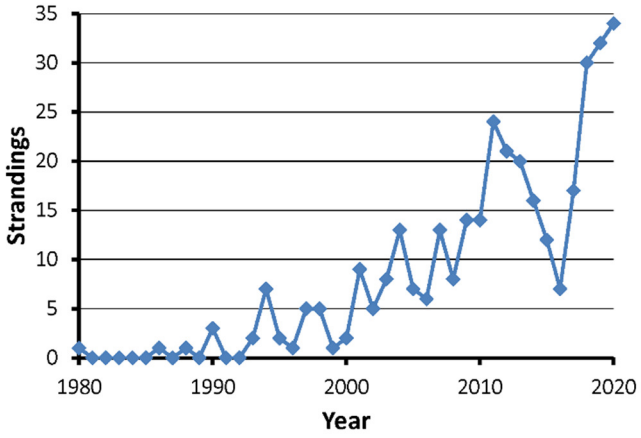

Figure 3. Annual numbers of gray seal strandings in Rhode Island, 1980–2020. (Stranding data are provided by the National Marine Fisheries Service, Greater Atlantic Fisheries Regional Office. Since the early 1990s they have been collected by Mystic Aquarium.)

Gray seal records in the region are primarily from the spring, with a peak from March through June (Fig. 4). That peak seems to be spreading out more into May and June over the last decade and a half. A monthly tabulation of the regional strandings through 2005 completed for the Ocean SAMP showed a very sharp peak in March and April, with 75% of all strandings. In the total 1980–2020 dataset, March–April accounted for only 41% of the strandings. The seasonality observed in gray seal occurrence in our area is related to the timing of pupping in December–February. The majority of individuals in the study area appear to be post-

weaning juveniles, and starved or starving juveniles are the most common stranded individuals encountered. A young gray seal needs to learn how to find and catch fish totally on its own, with absolutely no help or training from its mother. The expected period of feeding dispersal by newly weaned pups that have just completed their post-weaning fast and molt would be in March and April.

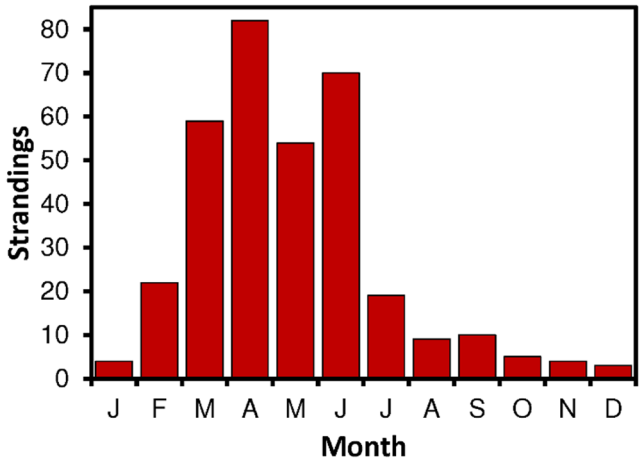

Figure 4. Monthly stranding frequencies for gray seals in Rhode Island, 1980–2020.

As with other seals, habitat use by gray seals in southern New England away from the pupping beaches and haul-outs is poorly known. They are seen only infrequently at sea, and very difficult to identify to species when they are sighted in the water. Gray seals are frequently observed mixed in with groups of harbor seals at haul-out sites in Massachusetts and northward, and occasionally in New York in smaller numbers. Until recently there had been very few observations of gray seals in Rhode Island other than strandings, but that is changing. In recent years small numbers of gray seals, apparently mostly younger animals, have been remaining year-round on Sandy Point at the north end of Block Island. The spreading out of the spring stranding period between 2005 and 2020, from March–April to March–June, is likely a result of the increasing residence of juveniles in our area.

Block Island's Sandy Point is very similar in overall appearance to the pupping beaches in Massachusetts, and does not get a lot of visitors in mid-winter during the gray seal breeding season. As the growing Massachusetts population pushes more and more seals in search of new breeding areas, Sandy Point might be a good place for a new breeding colony to be established. I had been looking forward to that day, but maybe it's already here. Kim Gaffett (Ocean View Foundation and The Nature Conservancy, Block Island, and until recently a Survey board member) reported that several small pups were seen there during the 2022 winter (Fig. 5).

Figure 5. Whitecoat gray seal pup photographed on Block Island in early December 2021 (photo provided by Kim Gaffett, original photographer unknown).

Dr. Bob Kenney *is an Emeritus Marine Research Scientist at the URI Graduate School of Oceanography specializing in marine mammal ecology and conservation, a board member of RINHS, and a co-editor of* Rhode Island Naturalist.

New England Cottontail Conservation in Rhode Island

By NICHOLAS T. ERNST, THOMAS J. MCGREEVY JR., ANDREA PETRULLO, CYNTHIA L. CORSAIR, and DYLAN FERREIRA

Overview

The New England cottontail (*Sylvilagus transitionalis*; NEC) is the only rabbit native to the northeastern United States. NECs require dense thicket habitat found in early successional habitats, regenerating forests, and coastal barrens. Since 1960, the range of the NEC declined by an estimated 86% and is now restricted to five geographically isolated populations located in Maine, New Hampshire, Rhode Island, Connecticut, and New York (Litvaitis and Tash 2006, Tash and Litvaitis 2007). The primary cause of their decline includes habitat loss and fragmentation due to human development and forest succession (Litvaitis et al. 2008, Fuller and Tur 2012). Low genetic diversity threatens

the remaining small populations, making them more susceptible to extinction (Fenderson et al. 2011). NEC also may be imperiled by encroachment into its range by the introduced eastern cottontail (*S. floridanus*; EAC), which may compete with NEC and seems more able to use diverse and fragmented habitats and avoid predators (Fay and Chandler 1955, Litvaitis and Tash 2006, Tash and Litvaitis 2007). NEC habitat selection is impacted by the presence of EAC (Cheeseman et al. 2018); both species have similar diets (T.J. McGreevy, unpublished data), which could cause competition if food is limited.

The New England Cottontail Conservation Strategy, finalized in 2012 (Fuller and Tur 2012), brought together partners from federal and state agencies, nongovernmental organizations, zoos, and universities working to implement conservation actions that address these threats. A major component of the NEC conservation effort is population management, which includes captive breeding, reintroduction, translocation, and monitoring. In this article we highlight the major activities occurring in support of NEC conservation in Rhode Island and the region.

Captive Breeding

In 2010, the NEC captive breeding program was initiated at the Roger Williams Park Zoo in Providence, Rhode Island (Fig. 1), followed by a second captive breeding facility established in 2015 at the Queens Zoo located in Corona Park in Queens, New York. The individuals produced by these facilities are used to augment wild NEC populations and reintroduce NEC to formerly occupied areas throughout their historic range. Founders for the program are wild NECs live-trapped from populations throughout their range, and the first-generation offspring they produce in captivity are then released. Members of the Wildlife Genetics and Ecology Laboratory (WGEL) at the University of Rhode Island use genetic tools to confirm the species brought into the captive breeding programs and to ensure that the founder individuals have not hybridized with EAC. WGEL staff also use genetic tools to determine the gender of the NEC founders and offspring to ensure the correct genders are paired for mating and to avoid the release of opposite gender offspring to the same release location. Breeding pairs are rotated within each zoo to maximize the number of pairing combinations.

The Roger Williams Park Zoo has raised over 334 juvenile rabbits through their captive breeding efforts since 2011 (L. Perrotti, RWP Zoo, pers. comm.), helping to augment and establish populations in Maine, New Hampshire, and Rhode Island. NEC females give birth 28–34 days after mating, and the young are weaned at 28 days. Once weaned, young captive-born rabbits are transported to acclimation pens at Ninigret National Wildlife Refuge in Charlestown or Great Bay National Wildlife Refuge in New Hampshire, where they learn to hide in cover and feed on natural vegetation before their release into the wild.

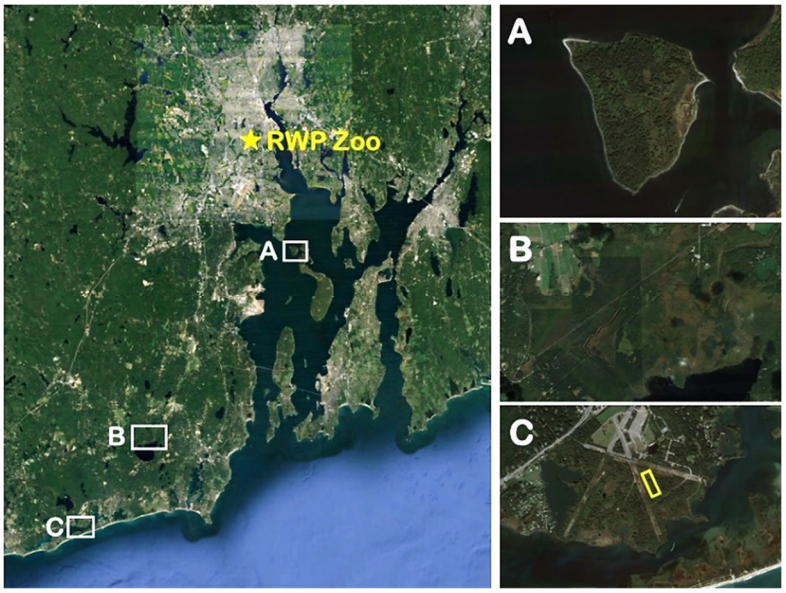

Figure 1. New England Cottontail conservation sites in Rhode Island, showing the captive-breeding facility at Roger Williams Park Zoo in Providence and the three release sites. A. Prudence Island, Portsmouth. B. Great Swamp Wildlife Management Area, South Kingstown. C. Ninigret National Wildlife Refuge, Charlestown, with the yellow rectangle showing the approximate location of the holding pen.

Patience Island

In 2012, a breeding colony of NEC was established on Patience Island, an 85-hectare island with dense shrublands, in Rhode Island's upper Narragansett Bay (Fig. 1a).

In all, 84 NECs (40 males, 43 females, 1 unknown) were released on Patience Island from 2012 to 2018. Rabbits were fitted with VHF collars upon release to track their survival, and in 2014 a pilot trail-camera study was conducted by Brian Tefft, which detected an uncollared NEC that was born on the island. In 2015, 2017, 2019, and 2021, RIDEM Division of Fish and Wildlife staff and the URI WGEL lab conducted pellet surveys on Patience Island to estimate the NEC population size, and to ensure that the genetic diversity of rabbits on the island is maintained. Despite removing more than the number of individuals added to the island (128 from 2016 to 2022), the population size has remained stable; the last estimate was about one NEC per hectare in 2021. Their genetic diversity also has remained stable over time and their level of inbreeding has been negligible. In addition to pellet samples, RIDEM and URI WGEL began

an intensive trail-camera study on Patience Island in the fall of 2021 to see if trail cameras can reliably estimate changes in population size. This project may provide an alternative method for monitoring the relative abundance of the population and documenting the presence of predators.

While most rabbits removed from Patience Island are released in Rhode Island, from 2017 to 2022, 31 Patience Island rabbits were released in New Hampshire and 3 were released in Maine to support regional NEC conservation efforts.

Great Swamp

Since 2006, the RIDEM Division of Fish and Wildlife has restored 125 acres (50 ha) of regenerating young forest on three wildlife management areas (WMAs) including Great Swamp WMA, Arcadia WMA, and Nicholas Farm WMA. From 2016 to 2022, 94 New England cottontails born on Patience Island (54 males, 40 females) were trapped and translocated by RIDEM to Great Swamp WMA (Fig. 1b). Intensive pellet surveys in Great Swamp have detected offspring of released NECs at this site beginning in 2017 (Table 1).

Table 1. New England cottontail translocations at mainland release sites in Rhode Island, and the first year that offspring of translocated individuals were detected at each site.

Release Site	Release Dates	Number Released	First Year Offspring	Max Offspring Detected
Great Swamp	2016-2021	94	2017	15
Ninigret NWR	2019-2021	31	2020	8

Ninigret National Wildlife Refuge

The Ninigret National Wildlife Refuge (NWR) protects 121 hectares of contiguous maritime forest and shrubland habitat in Charlestown, Rhode Island (Fig. 1c). Refuge staff confirmed the presence of two NECs here in 2006. Surveys over the next decade failed to detect additional individuals, indicating that the population was either too small to detect, or no longer present. The Refuge released 31 rabbits (17 males and 14 females) from the zoo-based breeding program between 2019 and 2021 (Table 1) in an effort to re-establish a viable population at Ninigret NWR. Prior to release, some of the rabbits were fitted with Global Positioning System radio collars (Fig. 2), allowing biologists to track their movements and monitor survival. Despite a high mortality rate (52%; n = 21), analysis of fecal pellets collected from the release site indicates that translocated rabbits are producing offspring (Table 1).

Figure 2. Captive-reared New England cottontail released at Ninigret NWR with a radio collar (photo by Robert Michelson).

Future Directions

Establishing an island colony and two mainland populations are positive steps toward the NEC conservation goals, however, additional work is needed to restore a network of viable populations in Rhode Island. Monitoring population size and genetic diversity through more intensive fecal-pellet surveys is needed at Great Swamp WMA and Ninigret NWR to determine their current status. Management measures are needed that create or improve habitat, including forest thinning, prescribed burning, and invasive plant control. Another high priority is identifying additional island sites that could support NEC populations and help bolster the number of rabbits available for mainland translocations. Identifying new mainland release sites within dispersal range of existing populations also is necessary to ensure gene flow between populations and promote genetic diversity. Rabbit Hemorrhagic Disease Virus 2 (RHDV2), an introduced and highly infectious disease that is killing rabbits and hares in the western US, is an emerging threat to NEC and has the potential to decimate already dwindling populations here. The recent discovery that NEC and EAC can hybridize also presents additional challenges and questions for conservationists. Research is needed to determine how often species hybridize in the wild to better assess how widespread this issue may be for NEC conservation efforts. The NEC conservation effort is a rare example of the coordinated efforts of state, federal, academic, and zoo professionals all leveraging their assets—which could be employed as a strategy to conserve other rare and threatened species.

Acknowledgements

Funding for this work was provided by National Fish and Wildlife Foundation, Wildlife Restoration and State Wildlife Grants, Rhode Island Department of Environmental Management Division of Fish and Wildlife, Pittman-Robertson Federal Aid in Wildlife Restoration Act, Wildlife Management Institute, and the US Fish and Wildlife Service's Division of Natural Resources and Conservation Planning. Special thanks to Lou Perrotti, Scott Silver, Brian Tefft, Thomas P. Husband, Suzanne Paton, and Gary Casabona for their work supporting NEC research and NEC conservation at Roger Williams Park Zoo, Great Swamp, Patience Island, and Ninigret NWR, and on private lands.

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Science News: BioTIME—A Global Database of Biodiversity Time Series

By STEPHEN S. HALE

Global biodiversity loss and extinctions threaten the resilience of natural ecosystems and human society (Almond et al. 2020, Arneth et al. 2020). The BioTIME database (https://biotime.st-andrews.ac.uk/) plays a unique role in our learning about these changes in natural ecosystems, and in supporting conservation efforts to protect biodiversity. BioTIME data span the globe and encompass terrestrial, marine, and freshwater systems.

BioTIME is a database of species-assemblage time series in which the abundances of the species that comprise ecological communities have been monitored over several years. BioTIME currently contains over 12 million records of almost 50 thousand species and over 600 thousand distinct geographic locations—from 30 biomes occurring over 6 different climatic zones. It includes data from 361 studies beginning in 1874 from 374 contributors. BioTIME is an open-access resource, free to use for education, research, or conservation.

The BioTIME database was compiled by researchers located at the University of St Andrews in Scotland. The database is supported by an open-access data paper (Dornelas et al. 2018), in which all data contributors were invited to be co-authors. These contributions established BioTIME as the standard database for biodiversity time-series analysis. The data paper has been cited by hundreds of scientific publications, showing the value of species databases in helping us understand the biodiversity changes we are seeing.

Many parts of the world, including many rich in biodiversity, are underrepresented in BioTIME and many taxa have uneven temporal and spatial coverage. BioTIME invites contributions of biodiversity time-series data to help fill these data gaps and increase understanding of how biodiversity has changed worldwide. Science benefits from people sharing data.

I contributed coastal ecological data from the Virginian Biogeographic Province study, 1990–1993 (Hale et al. 2002). The Dornelas et al. (2018) data paper listed the 5 main authors first and then all the data contributors alphabetically—putting me as the 80th out of 270 co-authors, a personal record for my lowest spot on the authorial totem pole. But the leaders of BioTIME strongly believe in giving credit to data collectors, as without the efforts of many people contributing data it is impossible for synthesis work to take place.

Because of biodiversity change, the distinctiveness of natural ecosystems is being lost (Magurran et al. 2015). BioTIME is helping ecologists to understand and predict biodiversity change. For example, Blowes et al. (2020) analyzed the global patterns in temporal change in biodiversity from different regions and showed clear spatial patterns in richness and composition change. Marine taxa had the highest rates of change and the marine tropics emerged as hotspots of species richness losses. As the world is on track for further warming, substantial challenges remain in maintaining local biodiversity amongst the inflow and outflow of "climate migrants" (Antão et al. 2020).

More locally, the Rhode Island Natural History Survey is doing its part by working to compile a database of Rhode Island flora and fauna called BORIIS 2.0 (Biota of Rhode Island Information System). Like BioTIME, this database gathers data from many different contributors and covers many different taxa. There are about 600 Natural Heritage species in Rhode Island out of approximately 15,000 distinguishable plants and animals.

BORIIS 2.0 is designed to provide a data facility for management of rare and invasive species, to support inventories and surveys, and to provide information on Rhode Island species in hard-to-access collections. It will also compile biographical information on naturalists who have worked in Rhode Island and develop a bibliography of the state's natural history publications. Intended users, in addition to RINHS staff, are the Rhode Island Natural Heritage Program, government agencies, non-profit organizations, and the general public. One possible use of BORIIS 2.0 would be to track what species used to be in Rhode Island but are no longer because of local extirpation or northward range shifts in response to a warming climate. BORIIS could show what species move into Rhode Island including invasive species or climate migrants from the south that are here now and were not here before.

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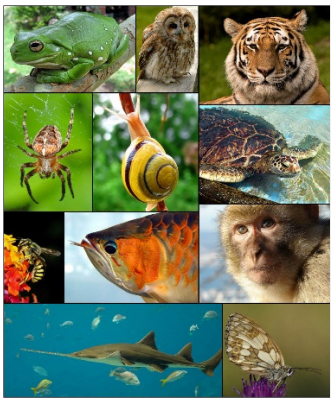
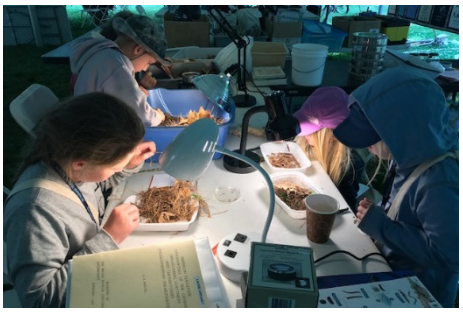


RINHS BioBlitz 2022 — June 10 & 11












East Bay Bike Path — Bristol–Warren–Barrington

(Photos by Nick Dentamaro, David Gregg, Josh Clements, Katie Burns, Pat Verdier, the Ant Team, and Bob Kenney.)

Notes from the Field: Making a Short Film about Terrapin Conservation

By CAROLYN DECKER

In 2022, filmmaker Jason Jaacks and I completed a short documentary film depicting one of Rhode Island's great wildlife conservation success stories: the Barrington Terrapin Conservation Project (BTCP). The BTCP is a community-led volunteer group based in Barrington, Rhode Island, dedicated to conserving diamondback terrapins *(Malaclemys terrapin)*, a State Endangered turtle. Terrapins are the only estuarine turtle in North America, living primarily in salt marshes and using sandy coastal areas as nesting habitat. Historic overharvesting and habitat loss led to sharp declines in terrapin populations, but diligent conservation efforts like the BTCP have helped terrapins persist in Rhode Island.

Since 1990, members of the BTCP have monitored and protected Rhode Island's largest terrapin population. Each summer, the group monitors nesting female terrapins via a mark-recapture study that has identified over 600 individuals. The group also protects nests and hatchlings using wire-mesh cages and electric fencing that deter predators like coyotes, raccoons, skunks, and crows. In both our film and most publications about the BTCP, the exact location of the terrapin nesting site is kept secret to protect the population from poachers, a serious contemporary threat to turtles, including diamondback terrapins. The site and the terrapins are beloved hidden gems, championed by BTCP original leaders Charlotte Sornborger, Peter McCalmont, and Doug Rayner, and presently continued by McCalmont, Kathryn Beauchamp, and Madeleine Linck alongside their team of dedicated volunteers.

My film, titled *Turtles on the Hill,* aims to celebrate the BTCP, weaving together themes of natural history and people engaging with nature and wildlife. The story centers around the ecology of the diamondback terrapin, illustrated across the four seasons with turtles of various age classes. On a deeper level, however, the film shows the human story of people working for decades to conserve this rare salt marsh turtle and its habitats. In this article, I offer some insights as writer and director of this short documentary film and go behind-the-scenes on natural history storytelling.

Where did the idea for the film come from? It all began when Professor Nancy Karraker from URI introduced me to Jason Jaacks, a professor of journalism at URI and an independent filmmaker passionate about science communication. As a master's student in Nancy's lab, I was collaborating with the BTCP to research the movements and habitat use by diamondback terrapin hatchlings. Our research sought to understand where hatchlings went after emerging from their nests in late summer. In particular, where did these hatchlings spend their first winter?

A love story about a population of rare turtles, a dedicated community conservation group, and the changing coastal landscapes that they share. Over one year in a suburban Rhode Island wildlife refuge, a young woman scientist joins this community to reveal how—despite the existential threats of coastal development, predation, and sea level rise—the lives of the people, the diamondback terrapins, and the estuary are inextricably intertwined.

After I connected with Jason, we realized we could combine my research and writing skills with his expertise in photography and scientific documentary work. The story offered a chance to show "nature in your backyard" because the BTCP made conservation action accessible and exciting for children, youth, and adults. We were also inspired because hatchling terrapins are intensely cute and charming subjects for film. Yet, authentically and beautifully filming these small secretive turtles in their natural habitat requires specialized macro lenses and other professional equipment. We relished the technical challenge in addition to the storytelling potential.

What was our goal in making this short nature documentary? My goal was to share my passion for terrapins and the BTCP. At first, our vision for the film was vague: a short video about the history of the BTCP and my hatchling research—a good learning experience for me as a graduate student in biology and science communication. Yet, as I spent more time with the terrapins and the members of the BTCP, I became increasingly impressed by the longevity and legacy of this long-term community-science project, as well as the humility and pragmatism of its leaders.

In a time when I felt so much existential dread about environmental issues, I met people who were unceasingly showing up—for over thirty years—to help an imperiled turtle. I was inspired, and wanted others to know about it. Because film as an artistic medium allows a depth of emotion inappropriate for a scientific manuscript, I used it to express the level of care and affection I felt about the BTCP. Thus, the film transformed from a strictly informative nature documentary to a conservation love story. I hope this film motivates others to combine science and art to tell stories about their passions.

A hatchling diamondback terrapin with a miniature radio tracker glued to the top of its shell (photo by the author).

What was the process and timeline for making the film? Soup to nuts, the film production took approximately two years, beginning in February 2020 and ending in January 2022. We wanted to capture footage of the terrapins and their habitats in all four seasons to fully depict terrapin life history under all the different seasonal conditions. Because we were filming wild subjects, we were at the whims of the wildlife, meaning we gleaned several hours of usable footage from several days of field shoots, edited down to a 21-minute film. Our storytelling decisions largely depended on the content of the footage whether planned or unexpected.

The first 18 months primarily involved collecting footage of the terrapins, the habitats, and the members of the BTCP in action. The pandemic seriously impacted our production plans, but the BTCP adapted and carried on, so we did the same. Toward the end of the production phase, I conducted interviews with the BTCP leaders. We then prepared multiple versions of film scripts based on our footage, the quotes from the interviews, and the narration I wrote. Once all footage was in-hand and the script was finalized, we shifted into post-production. This final stage involved assembling and editing all the component pieces until arriving at the finished film, a time-consuming but rewarding process. We then submitted the film to various environmental film festivals for showings throughout 2022.

What was the biggest challenge or lesson? Originally, I intended to stay largely behind the camera. This was partially out of deference to the leaders of the BTCP and partially to stay more consistent with my perceptions of the nature documentary genre. Over time, however, we realized we could tell a more personal, more impactful story by including me as a character on screen. After considerable thought and writing and editing, we chose to include more imagery of me, presenting me honestly as a newcomer to the BTCP and the world of terrapins. For tone, we relied heavily on my narration in each of the seasons, leaning on my background as a poet to convey the emotional connection to the science and the natural imagery within the story.

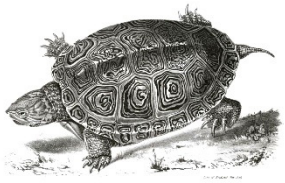
This lesson meant more fully embracing my own role in the conservation story. The idea is illustrated best in one particular shot during the opening spring sequence. Like Caspar David Freidrich's *Wanderer above the Sea of Fog*, my back is to the viewer. I am looking over the salt marsh through my binoculars. In that moment, I hope the viewer sees me, but feels that they are looking over my shoulder, beyond me to the landscape in front of us both. In my view, that layered focus on both the people and nature is present throughout the film and captures the down-to-earth attitude and power of the Barrington Terrapin Conservation Project; I'm proud we were able to film it.

Where can you watch *Turtles on the Hill*? *Turtles on the Hill* premiered at the Environmental Film Festival in the Nation's Capital in March 2022. We held local screenings at the Barrington Public Library and the Rhode Island Natural History Survey in April 2022. We showed it in August at the 40th Rhode Island International Film Festival, where it won the Green Planet Award. Additional showings are coming up at the following film festivals:

- Wildlife Conservation Film Festival, New York City: 13–23 October
- Green Film Festival of San Francisco: 6–16 October

We'll eventually be making the film available for on-line viewing. Watch the Survey's *News to Use* emails for an announcement and a link.

Carolyn Decker *completed an MS in the URI Department of Natural Resources Science on the overwintering ecology of hatchling diamondback terrapins. A video of her thesis presentation can be seen at* https://www.youtube.com/watch?v=V3y5qi540aM.



Science News Brief:
Monarch Butterfly Now Endangered

By ROBERT D. KENNEY

On 21 July 2022, the International Union for the Conservation of Nature (IUCN) announced that they had added the migratory monarch butterfly (*Danaus plexippus plexippus*) to their Red List of Threatened Species as Endangered. The IUCN Red List now classifies 147,517 species, with 41,459 threatened with extinction. The future survival of the migratory monarch is threatened by habitat destruction and climate change. Logging and deforestation have already destroyed large areas of their wintering habitats. Agricultural pesticides and herbicides across their range kill both the butterflies and milkweeds (*Asclepias* spp.), the host plants that the monarch caterpillars feed upon. Climate change is a growing threat—drought limits the growth of milkweed and increases wildfires, warming temperatures can trigger migration too early, and severe weather may kill millions of butterflies.

The migratory monarch is the subspecies that is native to North America, traveling 1000s of km annually between summer feeding grounds in the US and Canada and wintering areas in California and Mexico. The western population is estimated to have declined by 99.9% since the 1980s, with fewer than 2,000 butterflies surviving. The eastern population is larger, but also declined by 84% between 1996 and 2014 and is likely continuing to decline.

(Photo from Wikimedia Commons)

At the species level monarchs are classified as Least Concern on the Red List. Another subspecies, *D. p. megalippe*, is found in the Neotropics—Florida, the Caribbean, southern Mexico, Central America, and northern South America. Four other monarch subspecies have been named but are not accepted by all authors—one farther south in South America and others restricted to Puerto Rico, the Virgin Islands, and Tobago. They are year-round breeders and not long-distance migrators. There are also monarch populations now established in many locations around the world. Those populations are excluded from any Red List assessment because they are non-native, and they depend on host plant species that are also non-native.

Essay:
Wheat from Rye

By JOHN KENNY

It may seem hopelessly sentimental to lament that 21st-century American adults, much less children, can no longer distinguish tufts of wheat from rye. It would have been lamented perhaps more appropriately in the 19th century, when millions of men and women left the "plow in the field" to make their livings in the industrializing cities. Even though the masses being unable to tell these two staple grains one from another must have left naturalists and agriculturalists alike with a sense of alarm, even dread, I think it would have been unimaginable to them that someday children would not be able to tell the difference between a maple tree and an oak, recognize an acorn, or distinguish a field mouse from a shrew. Such an imposing presence as an oak, one would imagine, could never go unnoticed or unnamed. Yet I have worked with adults, college graduates, who didn't understand that butterflies come from caterpillars. Most people who visit our farm cannot identify the simplest bird calls, point out poison ivy, or confidently identify common trees.

When our son Josiah was born, my friends gave us a book called *the lost words* (see the review on page 23). I'll let it describe itself: "When the most recent edition of the Oxford Junior Dictionary—widely used in schools around the

world—was published, a sharp-eyed reader soon noticed that 40 common words concerning nature had been dropped. These words were no longer being used enough by children to merit their place in the dictionary. The list of these 'lost words' included *acorn, bluebell, dandelion, fern, heron, kingfisher, newt, otter*, and *willow*. Among the words taking their place were *attachment, blog, broadband, bullet-point, cut-and-paste*, and *voice-mail*. The news of these substitutions—the outdoor and natural being displaced by the indoor and virtual—became seen by many as a powerful sign of the growing gulf between childhood and the natural world."

To the outdoor person of the 19th century wringing their hands over the blurring of wheat and rye this degree of displacement (a child not recognizing a dandelion) would be simply unbelievable. As we look toward the future being designed for us in Silicon Valley, I'm afraid we are set to move this bar even farther afield from the sad place it hangs now. Children who cannot tell, or have no interest in telling, a kingfisher from a mourning dove may be living in a world where not only natural *things* cannot be distinguished from one another, but where *natural* and *virtual* themselves cannot be teased apart.

I don't believe we are at this point . . . yet. It may seem that young people's worlds revolve around their smart devices, but in the end they seem to function more as coping mechanisms then actual stand-ins for reality. Even if they don't understand it, I think kids are still yearning for reality. For instance, if I am looking at a post of someone doing something exciting, I am jealous or insecure because *I want to be doing* that thing or something equivalently cool. I want to be known as someone interested *in reality*. It's the difference between going to a concert and watching a recording. One is an event; the other is an interpretation. The places that my generation would inhabit in their daydreams, hobbies, or books—or on an impulsive walk—have been occupied by an army of virtual distracters. The feeding frenzy of virtual impulsiveness is being exposed for what we all could have (should have) seen: a greed-driven social experiment that is washing the color from adult life and crushing our kids.

Kids don't need smart phones. Despite what they might believe, they can live without them. According to the current data on anxiety disorders in kids, they may have a better chance of surviving without them. A kid may need a way to get in touch with a parent. This does not mean they need a device that has access to all the information that humanity has ever generated and is dominated by platforms designed to addict them. I had an 18-year-old man working for me several years back who had no cellphone and grew up without a personal computer. I asked him how he got his work done for school. He told me he went to the library.

What I am getting at—linking the world of virtual distractions to the point that many people today do not know the most basic things about the natural world around them, is *not* that we can simply get some apps, or even guidebooks, together and solve this problem. Sending kids to camp doesn't solve it in many cases either. In truth, it's not so much the *identifying* of a maple leaf from an oak leaf that I'm concerned about. It's the reverence for damp leaves falling on your neck. Telling a frog from a toad is less important than having tadpoles tickle your toes. Knowing a bluebird from a blue jay is not valuable, perhaps at all, compared to peering into a nest of splotched eggs, feeling the joy of watching barn swallow juveniles take their first flights, or experiencing the sorrow of a fledgling robin found dead in the yard. The compartmentalizing left brain follows the life-embracing right.

Wheat (left) and Rye (right). Illustrations from *Manual of the Grasses of the United States*, by A.S. Hitchcock, second edition revised by Agnes Chase (1951, U.S. Dept. of Agriculture Miscellaneous Publication No. 200), digitized and made available by Google Books.

Children do not fall in love with nature by way of guidebooks, placing names to things, distilling nature into Latin and taxa. They, we, fall in love when we fall down and scrape our knees. I came to love nature by sitting in a sanctuary of forest—an undeveloped, quiet woodlot on a small private road by the Glen in Portsmouth. Watching as it was bulldozed was one of the most important developmental moments of my life. A common place of alchemy was made into an exclusive place of entropy. Let a child fall in love with a woodlot and mourn its loss to development. You can't grieve what you never loved. As children we shouldn't be shielded from the heartbreak of knowing a well-explored patch of forest torn asunder to make way for a gas station. A child has to understand the difference between a natural system whose functional purpose, or dharma if you like, is

to promote life and growth, and an artificial system whose side effects are diabetes, heart disease, foul air, and poisoned water.

If our culture raised children in this way then we would already be celebrating what we all know we need: beauty in our surroundings. It is seen as a disgrace that any child should grow up without adequate food, water, or access to health care and education. I think it is equally disgraceful that any child, *any child*, should grow up without access to *at least* twenty acres of woods, meadow, marsh, open desert, etc. within a walk or a short bike ride of where they live. I'm sorry but parks are not good enough. Mown grass, pruned shrubs, invasive bird species, and hybrid trees do not foster imagination like stinging nettle, foxes, and red maple in the marsh.

I'm a dreamer. That this is a dream is maybe a sad truth, but truths can change. Dreams can become realities. It may be hard to imagine a society arranged around the priority of providing nature as a staple for a humane life. Clearly it was difficult for our ancestors to accept that someday people might not tell wheat from rye. It is troubling that our young people's natural literacy is at such a frightening low, but even more frightening is what may be coming if we continue to prioritize the synthetic over the photosynthetic. Eventually what we once called the natural world could be so bled out, so un-wilded, that it will have no appeal to our imaginations. This is the world that the metaverse of Mr. Zuckerberg first requires. After all a healthy, inspiring, and fulfilling *real world* is the primary competitor to any virtual one. Stripping nature down to a caricature, a world where one can't tell grass from tree or bird from mouse is fertile soil for a private virtual world to spring forth.

Human beings are notorious for looking for the greener grass over the hill. The metaverse, or virtual reality, will supposedly offer that grass: the hike more majestic, the concert more historical, etc., etc., etc. But think of the octopus or the star-nosed mole. Human beings will search the galaxies for other, strange worlds, but they will never find anything stranger than a crab spider inside an aster or a skunk cabbage melting the snow. What we have is more than just worth celebrating. It's our salvation and our redemption all in one.

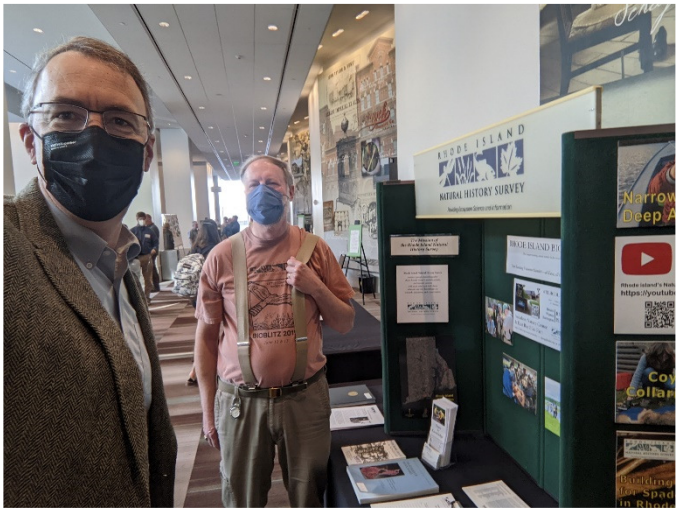
Start early. If you didn't, then just start now.

John Kenny *is the owner and manager of Big Train Farm, a certified organic vegetable farm in North Scituate, Rhode Island (https://bigtrainfarm.com/). This essay is adapted from a blog posted on the farm's web page in November 2021.*

Executive Director's Journal: Northeast Natural History Conference

By DAVID W. GREGG

This year's Northeast Natural History Conference was held April 22–24, in Albany, New York, and I was able to attend thanks to support from the Survey's own Henry and Theresa Godzala Research Fund, part of which is allocated specifically for that purpose. For many years, the Survey has been represented at the conference by member Norm Dudziak, who brings up our display and participates on conference committees with our affiliation. This was my second attendance, the first being in 2019 in Burlington, Vermont.



David Gregg (left) and Norm Dudziak next to the RINHS display at the 2022 Northeast Natural History Conference in Albany.

The conference is organized annually by the Eagle Hill Institute of Steuben, Maine, the same folks behind the *Northeastern Naturalist* and 10 other academic journals, as well as an amazing calendar of natural history residential seminars, workshops, and community programs that runs throughout the summer. (For more information on these, visit eaglehill.us.) Like any academic conference, the schedule includes 20-minute oral presentations grouped into sessions by theme—e.g., subject, region, or methodology; posters—printed, illustrated summaries of research; and a plenary session where all the attendees gather to hear some luminary present a perspective on a theme that overarches the whole conference scope. There is a hall full of displays by commercial interests flogging books or field equipment,

and natural historical organizations trying to raise their regional profile . . . like the Rhode Island Natural History Survey. Our display features a section on Rhode Island BioBlitz, in hopes of attracting additional, skilled participants, and this year a section promoting our YouTube channel to try to broaden the audience beyond Rhode Island.

I attended one session that lumped together four papers on insects including bees, midges, and burying beetles. The first paper was very interesting to me: "How to study bees without killing them" by Nicholas Dorian and Elizabeth Crone from Tufts. In it they critique the dominant methodology in bee ecology, which they describe as "pattern-oriented research" that uses usually lethal sampling to document how bee communities vary across space and time. At the same time, we have no more than rudimentary information on the full life cycle of most bees. They argued that in North America 72 species of bees can be identified "on-the-wing" and there should be more data-rich, detailed studies of individual species. They pointed out that anyone, amateur naturalists included, could make great contributions by moving away from general surveys of species richness or abundance.

One session was on amphibian ecology; another was on community engagement in conservation and restoration projects. One was focused on urban wildlife and was dominated by papers on gray squirrels. Another with great natural historical interest was called "A multi-organism perspective on wild flower meadows" that explored things that go into a healthy wildflower meadow that *aren't* wildflowers, including bees and wasps, soil microbes, and leaf microbes.

To me, one of the most interesting papers was presented by Harper Loeb from Oregon State University, written with six co-authors: "Using Hudson River School Paintings to Explore Historic Forest Dynamics in Eastern US Forests." The paper's authors were interested in long-term trends in forest landscapes that might be attributed to climate change. When one is observing species and natural communities, by the time you notice something that is possibly changing, one of the hardest things to get data on is the period from before the putative change occurred. By the time a change is noticeable, it is probably already too late to collect the "before" data. This is one reason why on-going, open-ended monitoring, such as the Survey's BioBlitz or rare species database, or major periodic efforts, such as the Breeding Bird Atlas or Wildlife Action Plan, are so important. If no one has supported regular monitoring, or a trend goes back too far into the past, you have to use statistical tools to infer prior conditions or use creativity to find sources of relevant information even though considerable adjustments or compensations may be necessary.

Landscape paintings of the mid-19th century Hudson River School, by painters such as Thomas Cole, Frederic Edwin Church, or John Frederick Kensett, feature forested landscapes (often from the eponymous Hudson River valley) rendered in apparently meticulous, almost photographic detail. Could these be used as evidence of the forest's contemporary extent and character at the time? The Hudson River School, however, is also associated with the Romantic Movement, and elements of paintings are added or exaggerated to depict the landscape as of epic scale and wildness (and hence enhance the achievements of the American society in settling it). The authors went back to artists' field sketches, traced their travels in the Catskills, and relocated the precise sites depicted. They considered other evidence for the artists' training or knowledge in natural history. Using special techniques, they documented the composition of the paintings themselves. In the end, they found "clear support for the veracity of . . . certain details of forest community composition, microhabitat features, and structural complexity . . . in these images, but also identify important caveats when making ecological interpretations from these images." The paper was a tour de force of reasoning; historical, art historical, and ecological research; and interdisciplinary collaboration.

There was one particularly noteworthy poster (in fact it won first prize for student posters) entitled, "Abundance, Morphometrics, and Diet Diversity of Invasive Praying Mantids in Southeastern Massachusetts," by a group of students from Wheaton College in Massachusetts. There are no native praying mantises in our area; these generalist predators are entirely novel in our ecosystems and increasingly abundant. How can their impact be assessed? These students dissected the stomach contents of 300 *Tenodera sinensis* (Chinese mantis) and *Mantis religiosa* (European mantis) and used DNA barcoding to determine prey taxa. It turns out they eat a wide variety of arthropods: the main groups being Hemiptera, Lepidoptera, Orthoptera, Araneae, Diptera, Coleoptera, and Hymenoptera, including many important native pollinators and predators.

The 2023 Northeast Natural History Conference is scheduled for April 21 to 23 in Burlington. Thanks to Norm and the Godzala Fund, the Survey will be there as usual and I hope to attend. It would be great to have better representation from Rhode Island, including the strong academic departments here, but especially from avocational naturalists and other people based outside the Academy. There will be relevant papers and posters no matter what your topic of interest is, but I particularly value it as an emporium displaying a full variety of subjects, methodological approaches, and practitioners that constitutes that most eclectic of pursuits—natural history.

Focus On RINHS Organizational Members: Friends of Canonchet Farm

By TOM HOAGLAND

Canonchet Farm has been referred to as the hidden gem of the town of Narragansett because of its central location and its vast natural resources. Located near the southern end of Narrow River along the shore of Pettaquamscutt Cove, the property consists of 174 acres of forest, meadows, vernal ponds, and fresh- and saltwater marshes. Crooked Brook meanders through its western half. Two freshwater ponds, Lake Canonchet and Little Neck Pond, lie to the east across Route 1A from Narragansett Beach. The 275-million-year-old granite that underlies Narragansett was exposed in many places by the glaciers, and long-abandoned colonial-era quarries are now vernal ponds that are home to diverse amphibian, mammalian, and reptile life. The glaciers also deposited a rich and fertile layer of till that resulted in some of the best farmland in New England. Boulders from that glacial till have been used to erect the lichen-covered stone walls that run throughout the property. Coyotes, owls, deer, fox, raccoons, snapping turtles, and many songbirds are some of the wildlife that populate the property.

Canonchet Farm has a rich history. The land was home to the Narragansett Tribe for thousands of years. It was a small part of the Pettaquamscutt Purchase in 1658, negotiated in part by Roger Williams, when the Narragansett tribe ceded a large tract of land to white settlers, including most of modern South Kingstown and parts of Narragansett, North Kingstown, and Exeter. Thomas Mumford (1615–1692) and later William Robinson (1693–1751) and his descendants farmed this property until it was sold to the A & W Sprague Company in the 1850s.

William Sprague IV was Governor of Rhode Island (1860–1863), one of our US Senators (1863–1875), and the first president of the Narragansett Town Council in 1900. He and his first wife, Kate Chase Sprague, built a magnificent 64-room summer mansion on the property in 1863. In 1909 the mansion burned in a spectacular fire. Avice Colvert Sprague Wheaton Borda, the widow of Sprague's son, continued to farm the land. Eventually, in 1974 after a long legal battle, the Town of Narragansett bought the property from a developer to prevent a housing tract from being built.

Over the next decades, there was no shortage of development ideas proposed to the Town Council—new municipal buildings, a new school, expansion of Sprague Park, a municipal golf course, a bike path, an exercise trail, nature trails, a firefighters' museum, a children's passenger train, paddleboats, a bandshell, and a pedestrian bridge to the beach—but all were rejected by the Council. The Town Council finally created a committee to develop a Master Plan in 1993.

In 2006 the Narragansett Polo Club proposed creating a polo field on twenty acres in the interior forest area of the Canonchet property. Many trees would have had to have been cut down and the landscape substantially altered. Paved roads, support structures, and parking areas would need to be built. The proposal generated many meetings and studies to examine and debate it. It also became the catalyst for the development of the Friends of Canonchet Farm.

Friends of Canonchet Farm (FOCF) was formed in 2007 by a group of more than 50 concerned citizens who loved the property and were opposed to its further development as a polo field. After informational nature walks open to the public and much publicity, the group quickly grew to more than 100 people who wanted to see the property remain undeveloped and restored to its natural state. They were successful in generating sufficient opposition to defeat the polo field proposal.

After this victory FOCF evolved into an entirely volunteer environmental organization devoted to restoring the natural ecosystem of the property. The mission of the group is to improve, manage, and preserve Canonchet Farm as a natural area in partnership with the town of Narragansett and the public.

In 2010 FOCF provided input to the town for final revision of the Canonchet Farm Master Plan. In 2016, the group signed a 5-year stewardship agreement with the town of

Narragansett to preserve and restore Canonchet Farm. The agreement was renewed for an additional 10 years in 2021.

FOCF's activities have been focused on the removal of invasive plants, first on the eastern edge of Lake Canonchet and then beginning in 2014 on the overgrown 1.3-mile Nature Trail that runs from the beach to the Narragansett Community Center and elementary school. FOCF also has deepened its community focus by engaging with other non-profits who have contributed many volunteer hours to our work. FOCF has partnered with the Narragansett Tree Society, the URI Master Gardeners program, Narragansett Troop 2 Boy Scouts, the South County Museum, and the URI Women's Rowing Team. RINHS held its 2013 BioBlitz there.

FOCF is dedicated to educating the community about the natural history of the property and our mission of eradicating invasive plants and restoring the native environment. We have created two educational loop trails; one describing the geology of Narragansett and one detailing the long human history of the property. Colorful brochures for both are available to the public at the kiosks on either end of the trail. Three artistic and informational signs have been installed along the trail describing its natural features and the ongoing invasives work conducted by our volunteers. In 2020 FOCF created a full color, 16-page booklet illustrating the most common invasive plants in South County and have distributed well over 1000 copies to the public. It is also available online on our website and those of the Narragansett Chamber of Commerce and the Narrow River Preservation Association.

For over a decade, FOCF has organized and conducted a series of educational walks in the spring and fall that feature a range of topics and guest lecturers. Many have proven so popular that we repeat them in multiple years. Some of the most popular walks have been led by Tom Fortier, arborist and past FOCF President; Robert Thorson, author and expert on New England's stone walls; the late Jon Boothroyd, URI geologist; Scott Turner, nature writer; Nancy Karraker, URI herpetologist; Jim Crothers, past director of the South County Museum; and Tim Cranston, local historian.

Ongoing environmental projects include the eradication of invasive phragmites reeds and Japanese knotweed that for years obscured the view of the ponds from the road and beach. Lake Canonchet has been treated and native wildflowers have returned in profusion. This summer we will begin treating the northern pond. This fall, in cooperation with Save The Bay, we will begin restoring the Canonchet high marsh, which has been degraded by ponding that has killed much of the native vegetation. Finally, we have presented the town with a vision plan for a long-discussed Linear Park along the lakes that would beautify this area and enhance recreational facilities adjacent to the town beach. The plan entails open space where residents can use walking paths along the lakes, with structures for shade and relaxation, and where they can enjoy the beauty of the natural environment that FOCF has worked hard to preserve and protect.

For more information visit our webpage Canonchet.org or our Facebook page: https://www.facebook.com/friendsofcanonchetfarm

***Tom Hoagland** is the President of the FOCF Board of Trustees.*

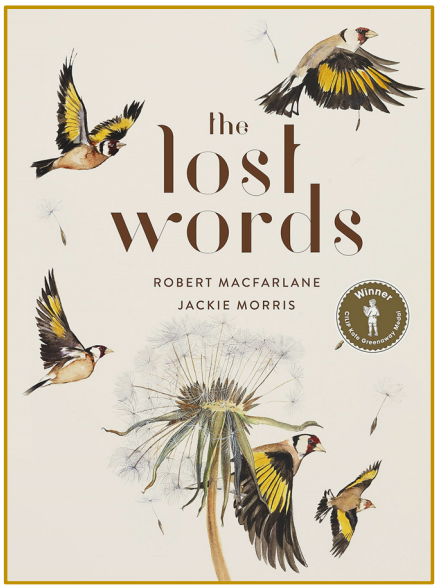
Rendering of one proposed alternative for the Canonchet Farm Linear Park between Lake Canonchet and Boston Neck Road (from a presentation by landscape architect Randy Collins, The Beta Group, Lincoln, RI).

Book Review: Lost Words, Lost Nature?

By KEITH KILLINGBECK

the lost words: A Spell Book
By Robert Macfarlane and Jackie Morris
Penguin Books Ltd., United Kingdom, 2017; Anansi International, Toronto, 2018.
ISBN: 978-1-4870-0538-2 (hardcover)

Before you admonish me for forgetting some capital letters in the book's title, the eccentric capitalization is just the first



unusual feature you will notice in this recent, large-format (11 x 15-inch) gem of a book. It won't be the last.

My first introduction to *the lost words* was in a masterfully crafted essay sent to me last year by my good friend, John Kenny, and featured in this issue of *Rhode Island Naturalist* (p. 18). *Wheat From Rye,* John's thought-provoking lament on nature lost, was in many ways the product of a gift presented to his newly born son, Josiah. That gift: *the lost words*.

Inspired by the disappearance of words associated with nature that were summarily jettisoned from a recent edition of the *Oxford Junior Dictionary*, Robert Macfarlane and Jackie Morris joined forces to shed light on this misguided editorial heist and showcase 20 of the discarded words in poetry and art. The *Junior*, by the way, in the dictionary's name pertains to kids, not the heft or length of the dictionary. Kids were the target of the word theft, but *the lost words* is meant for all of us.

So why banish innocent words? Unlike the intent of the head-scratching book banishments creeping into some schools and libraries today, the 20 words in *the lost words*, and 20-some more that weren't covered in the book, were apparently thought to have no relevance anymore. Why would 8-year-olds ever need to know what the strange looking nut-like thing on the ground under an oak tree is called if they never wander far enough beyond a computer screen to even see an acorn? Or even if they did, know what in the world it really was? Kids don't often head off to the back-40 just to explore these days. Do they?

Apparently the editors of the *Oxford Junior Dictionary* decided that they don't. Whether the editors were right or not, Macfarlane and Morris clearly disdained the notion that nature has become less relevant. Their emotive retort was Macfarlane's poetry and Morris' paintings, both designed to conjure spells of nature's call. "You hold in your hands a spellbook for conjuring back these lost words. To read it you will need to seek, find and speak. It deals in things that are missing and things that are hidden, in absences and in appearances . . . it holds not poems but spells."

The physical anatomy of these spells is this. One hundred and thirty-two unnumbered 11 x 15-inch pages printed and bound in Italy on thick, high-quality paper. One page of text introducing the authors' inspiration and intent. Twenty pages of poems, one for each of the 20 lost words. Glorious paintings on every page except those holding the poems.

The poems. Every Macfarlane poem is built around one or more lines headed by each letter of a lost word. Alone, each poem succeeds in casting a spell, but only if the mood and creativity of the reader matches that of the poet himself. In combination with the paintings, they form a magical tapestry. One of my favorites is "bluebell."

> Blue flowers at the blue hour –
> Late-day light in a bluebell wood.
> Under branch, below leaf,
> billows blue so deep, sea-deep,
> Each step is taken in an ocean.
> Blue flows at the blue hour:
> Colour is current, undertow.
> Enter the wood with care, my love,
> Lest you are pulled down by the hue,
> Lost in the depths, drowned in the blue.

The artwork. I have already given away my impressions of the paintings by Jackie Morris. Some of her brush-stroked images seem to have a dreamlike character, but perhaps that is just the poems speaking to me. Merge the paintings with the poems they accompany and the sum is infinitely greater than the parts. If I could only have one, I'd grab the artwork—a minimalist, whimsical 2-page introductory sketch underneath the lost word (see below for the literal illustration of one "lost word"), a full-page painting opposite the poem, and another large painting following, spread across two big pages. It's really hard to pick a favorite, or even to pick the same favorite each time you look through them all. (We obtained permission to reproduce a gorgeous illustration that went with "bluebell" from the publisher in Canada, but were then informed that an on-line publication also needed permission from the original publisher in the United Kingdom, which would take at least 16 more weeks. Unfortunately, we had to pull the illustration.)

So, what were the lost words beyond "acorn" and "bluebell"? "Fern," "wren," "heather" to name three, but all 20 were individually "lost" in a scramble of letters on the page that preceded each poem. "Newt" had to be gleaned from **dpxhnruceyoawfijmsvgbzltqk**, the scattered hodge-podge of golden letters hiding each word and existing as

cryptic symbols of goldfinch charms according to the authors. The realistically illustrated goldfinches that flit through some of the pages and across the cover are European, just like the authors.

The message of *the lost words* is that our collective understanding of, and need for, nature is being lost, just like the words. But rather than attack the issue with strident admonitions, Macfarlane and Morris gently pull us back to nature with words and luxurious images that invoke an aura of tranquility that technology alone will never, can never, achieve. The hope is that the lost will be found

Keith Killingbeck *is a retired URI botany professor and graduate school dean, and a founding member and Past President of the RINHS Board of Directors.*

Meet Our New Board Members

By HUGH MARKEY

Three new members joined the RINHS Board of Directors at the Annual Meeting of the Natural History Survey in April. We hope this will help you get to know them better.

April Alix

April Alix can trace her love for bugs to her earliest childhood. "My mom was the one that put me in tutus but then would find me sitting in the mud, picking bugs and worms out of it to collect. I wasn't quite the girl she hoped for."

As part of a childhood camp experience, she once visited the Wood Pawcatuck Watershed Association for a kayak outing. She sat down to change from sneakers to water shoes, and suddenly she found that a seriously large insect was just inches away from her face. "I freaked out because they're, let's say, they're not the most glamorous, right?" she said. Luckily, a counselor had the perfect reaction. "He ran over to me, and he said, 'Oh my gosh, this is a Dobson fly! These guys can only be in places with super clean water!' He turned that moment into a very positive experience. He put it in a jar and let me walk around with it, and I felt like the coolest kid at camp." That experience had a lasting influence on April, who has since devoted much of her career to entomology and kids.

April graduated from North Carolina State University in 2010 with a degree in zoology and a minor in graphic design. She struggled to find a job in her field, so she returned to Rhode Island, where she joined AmeriCorps. That brought her to the Audubon Society of Rhode Island. "I absolutely fell in love with environmental education, particularly in urban settings."

"I think I am happiest outdoors when I can share the experience with someone, particularly with somebody that might be having their first time outdoors. That's an opportunity: I can change a person's perspective." That's when April bears in mind that early encounter with the Dobson fly. "That's really what I take out of working, even with kids from the city. But I have to be very clear: kids in the city love nature. And I don't think that there's a deficit there. I think sometimes it's just a matter of answering a question or getting excited about it."

April is currently the Conservation Program Coordinator for the Providence Parks Urban Wildlife Refuge Partnership, a collaboration among the U.S. Fish and Wildlife Service, the Rhode Island National Wildlife Refuge Complex, the City of Providence Parks Department, and the Partnership for Providence.

Caitlin Chaffee

It's probably fair to say that most people would think working on an island would be amazing. Solitude, a commute by ferry rather than highway, being surrounded by the Atlantic. For Caitlin Chaffee, Reserve Manager at Narragansett Bay National Estuarine Research Reserve, that fantasy has been a reality for the past two years.

"I have a fantastic team who are all extremely motivated," Chaffee says. "We do a wide variety of things related to estuarine and coastal science. We have an education program; we steward our 2,300 acres on Prudence, Hope, Dyer, and Patience Islands. We do research, we do monitoring. It's just an amazing variety of activities we're engaged in. I'm really privileged to be able to support them."

Chaffee's experience with RINHS goes back to her work in the Natural Resources Science department at URI, where she earned a master's degree. "I have always been aware of the Natural History Survey. I worked with Hope Leeson on an invasive plant management program when I was at CRMC. I've always just appreciated the survey's important work of cataloging species and advocating for biodiversity."

"When I was at CRMC, DEM became involved in creating a partnership with the Survey to work on wetlands planning. That work included some freshwater wetlands. It was really like program-development work that would support the freshwater and coastal wetlands programs at DEM and CRMC. And so that was just a great opportunity to work directly with David and Kira. We created a position, and it's been fantastic. It's just really increased our ability to develop these kinds of strategies to decide what we need to do to protect coastal wetlands. The work that I was doing at CRMC has kind of carried over and it's been a wonderful partnership. I would say I've always really appreciated the survey, worked closely with them. I was really delighted to be asked to be on the board because I was familiar with the good work that they do."

When she's not hard at work on the islands, Chaffee can be found running with her dog Bear. "I love running with my dog. I've always been a runner, but we got a dog during COVID, and that's become one of my favorite things to do. He makes sure that I do it on a regular basis, because he looks very sad if I don't take him out for a run."

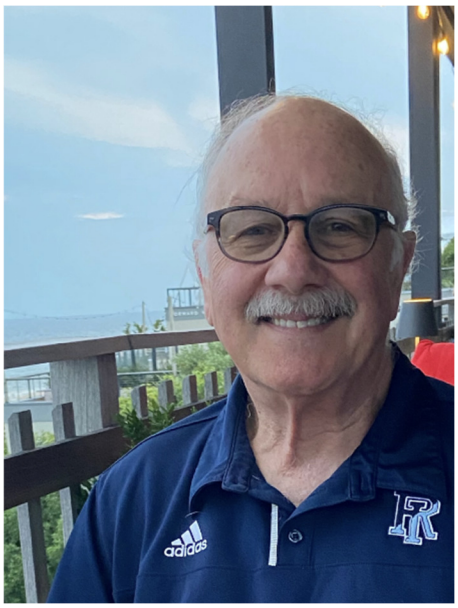
Don DeHayes

What does a man with a background in forest biology, physics, and plant genetics, and as dean of the environmental school at University of Vermont do when he takes a sabbatical? He writes a book about . . . leadership, of course.

Yet there's much more to the story. Don DeHayes started out in various environmental positions, but he's spent the past 14 years as Provost and Vice President for Academic Affairs at URI. It was during his tenure in that position, publishing papers and garnering millions of dollars in grants, that he realized that there was a need for some sort of instructional manual for those in need of a bit of coaching.

"I'm calling it *A Field Guide to Leadership in Higher Education*. The field guide concept is sort of blending a little bit of my field biology background, along with my leadership background, and I do make reference to guides in multiple places in the book. I draw some parallels between being an ecologist and being a leader."

"I'm hoping this book is a how-to guide to leadership in academic environments. They're pretty complicated environments to lead in, because of shared governance of public institutions. You don't have entire control over your own funding, because you rely on state governments and all the politics that comes with that. So we'll see. I hope it's useful. I'm having a blast writing it."



DeHayes brings his experience running complex organizations to the RINHS board and is interested in finding creative ways for the Survey to identify new funding so that the organization is always evolving. At the same time, he is looking forward to reviving those early days that he spent working with conservation and the environment.

"It's also reconnecting to my roots. I never 100% abandoned my interest in the natural world. I have an interest in what I would call an ecosystem approach to understanding conservation. Not just a species-by-species approach, but really understanding how these complex ecosystems work. This is a chance for me to get back and relearn some of what I had forgotten."

Hugh Markey *teaches English at Pilgrim High School in Warwick, is a free-lance journalist and writer, and serves on the RINHS Board of Directors. His blog can be found at http://scienceandnatureforapie.com/.*

There are as many ways to build our knowledge of Rhode Island's animals, plants, and natural systems as there are people willing to help.

ANNUAL MEMBERSHIP in the Rhode Island Natural History Survey funds public events, helps conservationists and managers, and gives you a stake in the success!

Yes! I Want to Join the Survey.

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The bulletin of the Rhode Island Natural History Survey, Inc. is published twice yearly

Our Mission

The Rhode Island Natural History Survey is an independent, member-supported non-profit, founded in 1994, that connects people knowledgeable about Rhode Island's animals, plants, and natural systems with each other and with those who can use that knowledge for research, education, and conservation.

For environmental conservation there are fewer resources than ever . . . but with zoonotic diseases, climate change, invasive species, and habitat loss all accelerating, the natural world isn't getting any less complicated. We need good science and we need everybody to work together to make the most of our combined knowledge and experience.

The Natural History Survey manages data documenting the state's species and natural communities, publishes books and articles, facilitates science projects that have diverse partners or complex funding, and hosts events bringing people together, including conferences and the annual Rhode Island BioBlitz. The Survey is not a state agency or university department: it is embodied in members and friends who make generous gifts of time, money, and expertise to do this important work.

Notices

Pollinator lecture: With Samantha Alger, Research Assistant Professor at the University of Vermont. Wednesday, October 5, 7:00 pm (doors at 6:30 for mingling and sweets), Doody Auditorium, Swan Hall, URI Kingston campus.

Dragonflies & Damselflies: The newest publication from the Survey is the Checklist of Rhode Island Odonata by Ginger Brown. Download it from https://rinhs.org/resource-library (search keyword "checklist), or get a free printed copy (thanks to RIDEM Fish & Wildlife) by stopping in at our office at East Farm, calling us at 401-874-5800, or emailing info@rinhs.org with "odes" in the subject line.

Natural History Week: October 29–November 6. A plan for programs is in development, watch our *News to Use* e-newsletter for updates.

BioBlitz 2023: We've been scouting an exciting site for our next BioBlitz in June. Stay tuned for an announcement coming up soon.

Save the Date: Our annual Open House and Nature Art Exhibit will be on Tuesday, January 24, 2023, from 5:00 to 7:30 pm (weather date Wednesday the 25th) at our offices in Building 14 on the URI East Farm campus.

Next issue: Spotted lanternfly was recently discovered in the state—watch for the Spring 2023 issue of *Rhode Island Naturalist* for details. Other articles planned are an introduction to Block Island moths, the next round of Distinguished Naturalists and Founders' Awards, the next installment of Marine Mammals of Rhode Island (which could be readers' choice), and more.

To Contact Us. . .

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