Science & News from the Rhode Island Natural History Survey

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Moths of Block Island: Introduction

By AARON S. HUNT

Block Island is one of most distant offshore islands on the US East Coast, making it one of the region's most ecologically isolated landmasses. It was a remarkable stroke of luck that Block Island was, almost entirely by chance, the place where I began my studies in 2014. More than 1,250 species of moths have been recorded on the island, most of which I have found, and I have complete records of individual sightings since 2018, totaling over 50,000 through 2022. My records, from nightly counts at my home lights and regular surveys with UV lights ("black lights") at locations across Block Island, provide a detailed picture of the phenology, abundance, and local distribution of the island's moths.

This article will serve to introduce my Block Island moth survey in advance of a planned series of articles detailing the results. Each special issue will treat a portion of the island's moth fauna, summarizing and analyzing my results for one or more superfamilies. All species recorded on the island will be listed with phenology summarized. For each sufficiently common species, flight time phenology will be graphed using my nightly home-light data or in some cases my records from one of my best-surveyed black-lighting sites. Following the annotated species list, the fauna of each family will be discussed with comparison to species lists and citizen science data from southern New England and Long Island.

Papers on the Pterophoridae (Hunt and Matthews 2020) and Zygaenoidea (Hunt 2021) have been published elsewhere; most or all of the remainder of the series will be published in *Rhode Island Naturalist* special issues in the coming years. While holistic analysis of the remainder of the fauna remains unpublished (and mostly unwritten), analyses of my results for individual species are mostly complete and available on my website—https://blockislandmoths.org/.

My family has visited Block Island each summer since I was three. I began photographing moths (and many other invertebrates) here in 2013 and began a serious effort to record all the local moth species in 2015. By 2018, I practically abandoned photography and collection of other insects; since then, moths have been nearly my exclusive focus. By coincidence, Nigel Grindley began photographing moths at his home lights on Block Island around the same time I did. He has photographed over 50 species that I have not found, in addition to helping me on some of my nights of surveying since the 2017 season. Fewer than 40 of the species ever recorded on Block Island have not been found in our ongoing survey efforts; they were all taken between 1971 and 1999 by various collectors. A number of these records may be questionable, as we have only second-hand reports of them and have not located the specimens.

Moths, inclusive of butterflies, form the insect order Lepidoptera, named for the scales covering nearly the entire surface of the adults (*lepis* = scale, *ptera* = wing). Moths constitute a major component of nearly all terrestrial ecosystems and are among the most diverse groups of organisms, with over 150,000 described species globally. Adults and especially immatures (caterpillars) of Lepidoptera are a crucial component of the diets of a large portion of bird species and a wide variety of invertebrate predators, scavengers, and parasitoids. (From a taxonomic perspective, butterflies [Papilionoidea] are a day-flying clade of moths nested deeply within the lepidopteran phylogeny. However,

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their day-flying habits require a completely different survey methodology from that used for adults of nearly all other Lepidoptera. Because of that, along with the attention already paid to them, I have not attempted a detailed survey of Block Island's butterflies.)

Block Island's geographical isolation and past clear-cutting for agriculture and fuel has left it with a highly unusual flora. Many of the region's commonest trees, including oaks (*Quercus* spp.), birches (*Betula* spp.), hickories (*Carya* spp.), ash (*Fraxinus* spp.), and white pine (*Pinus strobus*), are nearly completely absent on Block Island. What passes for forest on Block Island is mostly shadbush (*Amelanchier* spp.) and cherry (*Prunus* spp.) woods with the occasional small red maple (*Acer rubrum*). Coastal shrubland covers a large part of the island, with the dominant woody plants typically native bayberry (*Morella caroliniensis*), beach plum (*Prunus maritima*), Virginia-creeper (*Parthenocissus quinquefolia*), and poison-ivy (*Toxicodendron radicans*) along with invasive Asiatic bittersweet (*Celastris orbiculatus*), multiflora rose (*Rosa multiflora*), and Japanese honeysuckle (*Lonicera japonica*). Managed meadows and a variety of lentic habitats cover much of the remainder of the island's conservation and other rewilded lands.

A large number of Block Island's resident moth species likely were extirpated from the island during its period of intensive agriculture and have recolonized it over the last several decades. Some poorly dispersing species common on the mainland have yet failed to return to Block Island despite plentiful host plants. Some of the commonest moths of forests on mainland Rhode Island are conspicuously rare or absent on Block Island, which likely cannot sustain breeding populations of them until their respective host plants return to the island. I doubt the very few oak trees on Block Island support even a single population of an oak specialist moth, though a few stands of nonnative chestnuts (*Castanea* sp.) do appear to support populations of several host specialist moths, most of which can develop on oaks as well. More than two dozen oak specialist moths have been recorded on Block Island one or a few times, presumably as strays that flew (or were blown) to the island from nearby landmasses where they are much more common (Fig. 1).

Figure 1. Four oak-specialist moths that have been recorded on Block Island as strays: top—*Bucculatrix packardella* (Bucculatricidae); left, middle—*Chionodes sevir* (Gelechiidae); right, middle—*Argyrotaenia quercifoliana* (Tortricidae); bottom—*Catocala ilia* (Erebidae) (all photos by the author).

(continued on page 4)

A Message from the Editors

The unplanned theme of this issue of *Rhode Island Naturalist* has turned out to be biodiversity. Stephen wrote an article summarizing the recent COP15 conference (p. 9). Aaron Hunt's article introducing his Block Island moth studies is a terrific example of biodiversity right here at home. During December's Last Wednesday Tea, discussion turned to a new graphic-format edition of E.O. Wilson's *Naturalist*, and Melissa Guillet followed up almost immediately with an unsolicited review of the book (p. 24). The Survey is working closely with the Narragansett Indian Tribe on plans for the 2023 BioBlitz on tribal lands in Charlestown (pp. 3, 28), with hopes for a continuing partnership. And Bob was reading the next edition of the book that he reviewed in the Spring 2022 issue, and the last article there was on the importance of engaging Indigenous peoples and communities in biodiversity conservation (p. 14).

President's Corner: Whales and Bobcats and Critters, Oh My!

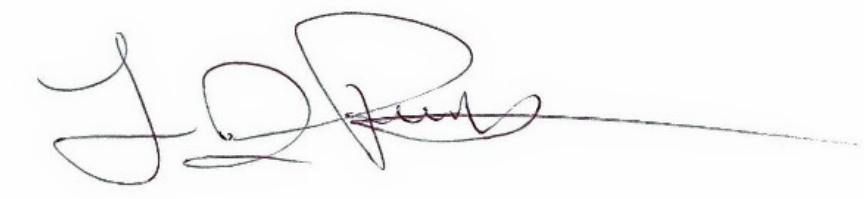
With spring on the way, we are looking forward to another exciting year of events. We kicked off the year in January by hosting our annual Open House and Nature Art Exhibit with works from some of Rhode Island's top nature artists! We saw over 80 folks in attendance with a good time had by all. The annual, ever-popular Rhode Island Nature Video Festival was held in February at Rhode Island College. With a 77-minute reel of fantastic video entries featuring whales to bobcats to microscopic water critters, almost 100 people joined us in person. Viewing of the reel from our YouTube channel has been strong (https://www.youtu.be/jswaL6Y5kHI) and the People's Choice Awards showed some spirited competition! This event just gets better and better every year. Thanks to our event partner Environment Council of Rhode Island; our hosts, the Rhode Island College Film Studies Program and Environ-mental Club; and Roger Williams Park Zoo for their generous funding support.

Lou Perrotti, President,
Board of Directors

I hope you will look forward to June with us as we plan our 24th BioBlitz. This annual event never disappoints! Every year it expands our Survey community, and our understanding of biodiversity across the spectrum of landscapes in Rhode Island. The Narragansett Tribal Office of Environmental Protection and Natural Resources Management and the Narragansett Tribe have invited us to collaborate to conduct the 2023 BioBlitz on approximately 1,200 acres of mostly wooded land within the Narragansett Indian Reservation off Route 2 and Old Mill Road in Charlestown.

The parcel includes rare Atlantic white cedar swamp, two pristine coastal plain ponds, and unusual pitch pine-scrub oak woods, as well as culturally and historically important landmarks and sites. The exciting part is this land is virtually undeveloped and significant biodiversity discoveries are expected. The Survey hopes this event will help build the foundation of a long-lasting relationship with the Narragansett Tribe. Find information on how to participate in BioBlitz 2023 on the back page of this bulletin. Lastly, many thanks to Roger Williams Park Zoo and Largess Forestry—our long-term BioBlitz sponsors, for their support of our signature event.

I would like to thank David Gregg and Kira Stillwell for all they do to keep the Survey the amazing organization that it is. Together they continue to build a portfolio of interesting projects and programs which keep us relevant to our membership. If you aren't already on the mailing list for our News to Use email newsletter, send an email to Kira at admin@rinhs.org and ask to be added to the list so you'll be notified of any programs coming up. I would also like to thank my fellow directors, both past and present, for their dedication and support of our mission. Lastly, all of you who continue to support the survey through memberships, donations, and by attending our events. We value each one of you and look forward to many more years of sharing the wonderful biodiversity and natural history of our great state together.



Moths of Rhode Island (continued from page 2)

A few species presumably have colonized Block Island from the south in the last few decades. At least one species known to longtime lepidopterists in the region as a new arrival, *Glenoides texanaria* (Fig. 2), was not recorded in limited surveying of Block Island in the 1990s but is now quite common locally. At least three adventive species have colonized the island since the present survey began (Fig. 3): *Oligia latruncula* (first recorded on Block Island in 2016), *Calamotropha cf. paludella* (2017), and *Paracorsia repandalis* (2019). The second of these is particularly noteworthy, as Block Island seems to have been its point of introduction to the continent. The earliest North American record I have found of the species outside Block Island is a single photographic sighting in Bristol, Rhode Island, in 2021. The following summer, the species was documented in Hopkinton, in two localities in southeastern Connecticut, and in New York on Fishers Island and near the eastern tip of Long Island.

Figure 2. *Glenoides texanaria* (Geometridae) male (top) and female (bottom).

I expect my series of papers treating the moth fauna of Block Island to take several years to complete, in part because it will take time for me to resolve small numbers of remaining taxonomic problems in many families. However, analyses of individual species are already largely complete and available online. I use a series of spreadsheets to generate abundance, presence/absence, and distribution data for each species. Tables of my sightings since 2018 are used to calculate average abundance at my home lights for each species in each 1/3-month period from late May to early October. Sightings for each area surveyed are also tallied to calculate total relative abundance in each area surveyed; these figures do not account for the uneven distribution of survey nights across the season in each area and should be used with caution. Species presence or absence for each 1/3-month period from March through December is derived from all available data, including my photographs from before 2018, Nigel Grindley's photographs, and survey records from 1996 to 1999. I recorded at least 100 individuals each for over 90 species, and at least 50 individuals each for about 180 species, from 2018 to 2021. Flight time phenology on Block Island can be calculated with high accuracy and detail for a few hundred species using my survey data.

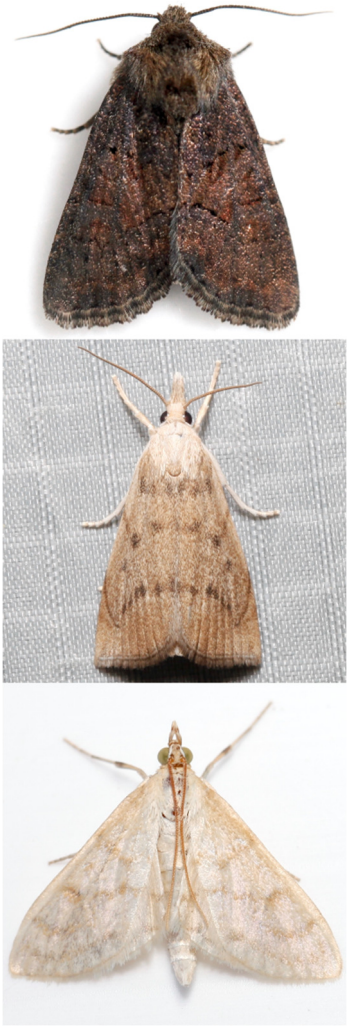


Figure 3. Three moth species established on Block Island since 2015: Top to bottom—*Oligia latrucula* (Noctuidae), *Calamotropha cf. paludella* (Crambidae), and *Paracorsia repandalis* (Crambidae).

Each species recorded on Block Island has its own page on my website (see Fig. 4 for an example) with photographs of live adults, a chart of flight-time phenology, and a map of

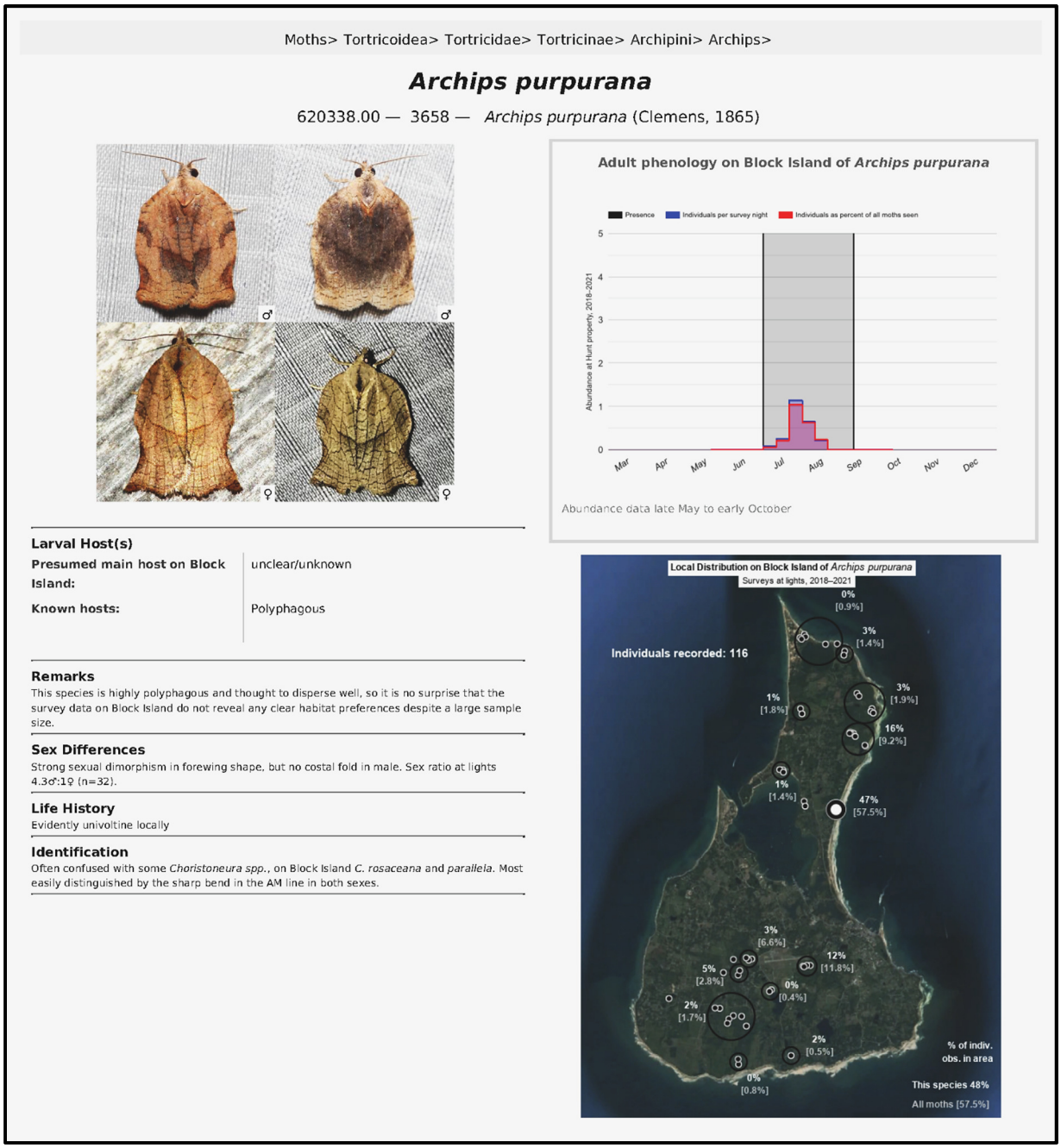


Figure 4. Example species guide page for *Archips purpurana* generated on blockislandmoths.org. Each dot on the distribution map marks the location of at least one sampling night during 2018–2021; the large dot marks the Hunt home. The black rings surrounding clusters of dots denote survey areas. Beside each survey area, the value in white is the percentage of recorded individuals of the species in question that were recorded in that given area; the bracketed value in gray is the equivalent value for all moths combined. The bracketed values provide estimates of relative survey effort to contextualize reported species distributions.

local distribution. Host plant information and often remarks on identification and biology are included as well, as are external links and references. I eventually will add for each species a timeline of years recorded and a list of voucher specimens. Species pages can be converted to PDF form and saved or printed for offline reference.

The website has a dynamic table listing all species known from Block Island; which can be sorted taxonomically, by abundance, or alphabetically by scientific or common names. Another section of the site can be used for easy visual identification of any moth found on Block Island. Over the next year, I plan to add survey-site descriptions for use in conjunction with distribution maps to illustrate habitat associations. Eventually, I will write in detail about the

moth faunae of Block Island particular habitats and common host plants; I have started a few of these already.

In the last few years, I have seen my giant passion project of the last several years generate publishable findings. I look forward to completing family-level analyses of the entire moth fauna of Block Island in the coming years on my way to a detailed analysis of the composition of the entire fauna to serve as the survey capstone.

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Marine Mammals of Rhode Island: Bottlenose Dolphins

By ROBERT D. KENNEY

Introduction

For the previous installment of this *Rhode Island Naturalist* series, I selected the gray seal because there was interesting new information—the likelihood that they were now pupping at Block Island. It's the same thing this time with the bottlenose dolphin. When the Ocean SAMP report that these species accounts are based on was first published (Kenney and Vigness-Raposa 2010) there was only one bottlenose dolphin species included, but now there is published information that we probably have two species in our waters.

The bottlenose dolphin (*Tursiops* spp.) may be the most familiar species of cetacean for many people, for a couple of reasons. Small groups of bottlenose dolphins can be seen from the beach almost anywhere along the East Coast—year-round from Cape Hatteras, North Carolina, to the Gulf of Mexico and during the warmer season from Hatteras to New Jersey. In addition, every one of a certain age remembers the "Flipper" TV series. Nevertheless, this can be one of the most confusing species in terms of understanding their biology, distribution, historical occurrence, etc. One reason is the way that the terms "dolphin" and "porpoise" are often used interchangeably, especially in older publications. At times this seems to have been an apparent attempt to avoid confusion with the dolphin fish (also called mahi mahi or dorado), although dolphins and porpoises are members of separate families of small cetaceans. It also may be unclear when an older publication mentions "common porpoise" whether the subject is bottlenose dolphins or harbor porpoises. A second source of confusion has to do with their taxonomy and with how many species of bottlenose dolphins actually exist.

Taxonomy

There have been at least 20 different scientific names applied to bottlenose dolphins around the world since the currently accepted name was published in 1804. Until recently, two species were recognized—the globally distributed common bottlenose dolphin (*Tursiops truncatus*) and the Indian Ocean bottlenose dolphin (*T. aduncus*). Other names have been proposed and are sometimes used for particular regional populations, although not broadly accepted by the scientific community.

In many areas of the world, including the US East Coast, the taxonomy becomes even more complex. There are often identifiable inshore and offshore populations that differ in body size, DNA profiles, prey species, and typical group sizes, in addition to distribution patterns (Fig. 1). In the US Atlantic, the inshore and offshore populations have been classified and managed as "ecotypes" of a single species, although ecotype has no real taxonomic status. Results of DNA studies showed them to be sufficiently distinct to be considered separate species (Kingston and Rosel 2004), however making that "official" requires a couple of additional steps. There were two previously published scientific names applied to bottlenose dolphins from the US mid-Atlantic coast—*Tursiops erebennus*, published by Edward Drinker Cope in 1865 based on a specimen from southwestern New Jersey across the Delaware River from Philadelphia, and *Tursiops subridens*, published by Sir William Henry Flower in 1884 based on a specimen from Chesapeake Bay. The International Code of Zoological Nomenclature (i.e., the "rules") specifies that the oldest name has priority. Before applying that rule, however, researchers first needed to clearly show, by the combination of genetic and morphological evidence, whether either of the original museum specimens on which the names were based definitely came from the inshore population. Costa et al. (2022) presented the results of a decade of research

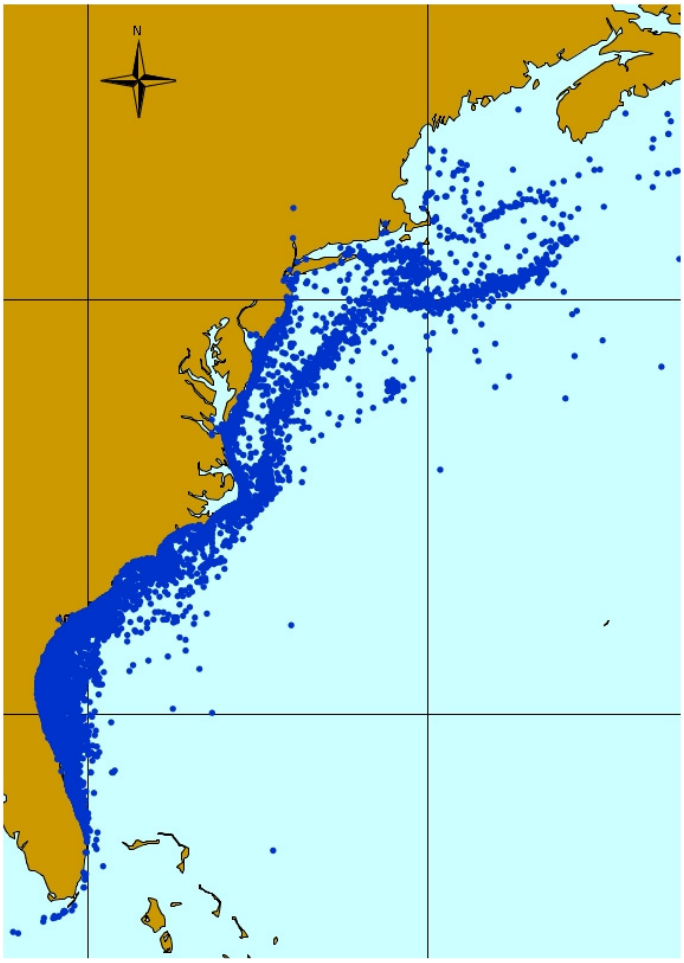

Figure 1. Distribution of all sightings of bottlenose dolphins (*Tursiops* spp.) along the eastern coast of the U.S., showing the clear separation north of Cape Hatteras between the inshore (*T. erebennus*) and offshore (*T. truncatus*) species. South of there, the inshore and offshore species overlap much more.

showing that the coastal dolphins along the U.S. Atlantic are very clearly a different species than offshore animals, having separated about 80,000 years ago. Both original specimens matched the inshore species, therefore the valid name is the older of the two—*Tursiops erebennus* (Cope). As a new common name in English, they proposed "Tamanend's bottlenose dolphin" in honor of Chief Tamanend (1628–1701) of the Turtle Clan of the Nanticoke Lenni-Lenape Tribal Nation—the original people who lived in what is today New Jersey and eastern Pennsylvania. The new name applies to coastal bottlenose as far south as the tip of Florida, but the taxonomic status of coastal dolphins in the Gulf of Mexico and Caribbean needs additional study.

Status and Abundance

If that wasn't complicated enough, management gets even more tangled. Within the Tamanend's bottlenose dolphins along the East Coast, there are multiple stocks or sub-populations that mix very little, if at all. Some of them migrate north and south along the coast with the seasons—such as the "northern migratory stock" that moves north as far as New Jersey in summer and south to North Carolina in winter. Some are more resident within specific coastal areas—e.g., the "South Carolina/Georgia stock." Others are resident within bays, sounds, or estuaries—11 separate bay/sound/estuary stocks are recognized between southern Florida and North Carolina.

Federal law mandates abundance estimates for each stock, which has proven to be very difficult for some, and it will take some time before the annual stock assessment reports (Hayes et al. 2022) catch up with the revisions in taxonomy. The offshore (*T. truncatus*) population was estimated at 54,739 in 2004, 77,532 in 2011, and 62,851 in 2016, however the high degree of statistical uncertainty in these estimates makes it difficult to say whether there are real differences in the number, or if any differences are caused by actual changes in abundance or simply changes in spatial distribution associated with environmental variability. A survey along the entire East Coast in 2016 generated abundance estimates for all five coastal (*T. erebennus*) stocks, with the combined total of 18,512 (Hayes et al. 2022). For the 11 Atlantic bay, sound, and estuary stocks, few have current abundance estimates because of old data, or incomplete or biased estimates. The total of what data are available suggests at least another 6,000 animals.

Common bottlenose dolphins (still using the old taxonomy) 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. Coastal bottlenose dolphins along the U.S. Atlantic coast were designated as "depleted" under the Marine Mammal Protection Act in 1993 because of a significant mortality event in 1987, which killed at least 740 animals over several months. However, the impact of that event was seriously overestimated—the mortality occurred from Florida to New Jersey, but it was compared to the only available abundance estimate at the time, for Cape Hatteras to Delaware Bay, New Jersey (i.e., only the northern migratory stock). "Undoing" that sort of federal designation is a lot harder and more complicated than doing it in the first place.

Bottlenose dolphins have been hunted in several areas of the world, including the Black Sea, Peru, Sri Lanka, and Japan. There was a bottlenose dolphin fishery in operation at Cape Hatteras, North Carolina, at least sporadically from 1797 to 1929, hunting dolphins for meat, oil, and leather. A similar fishery occurred at Cape May, New Jersey, in 1884–1885. James E. De Kay and earlier writers described "porpoise" fisheries in the 18th Century or earlier in Long Island, New

York. De Kay believed that harbor porpoises had been the targets, but it was much more likely (based on reported oil yields) to have been bottlenose dolphins. Bottlenose dolphins are taken incidentally as bycatch in a number of different commercial fisheries around the world. Average bycatch mortality in U.S. mid-Atlantic gillnet fisheries dropped from a couple hundred per year to a few tens per year with the establishment of a Take Reduction Plan in 2001. Bottlenose dolphins are also the most frequently stranded cetacean on the US Atlantic coast, with a few hundred dead dolphins every year from New England to Texas, although assessing stranding patterns will be another task complicated by the change in taxonomy.

Description

Bottlenose dolphins are the "plainest" and least distinctively marked of all of the beaked dolphins in the North Atlantic (Fig. 2). Body size is extremely variable between the two East Coast species. Adults may be 2–3.8 m long, with offshore animals averaging about 15% larger than inshore animals. The body is relatively thick and robust (especially in offshore animals), with a tall, falcate dorsal fin. The beak is well-defined and prominent, of medium length, and stout.

Figure 2. A Tamanend's bottlenose dolphin, part of a small group photographed in estuarine waters of North Carolina in July 1991 (photo by the author).

The body is basically gray to brownish, darkest on the back and lightest on the belly. There may be a clearly visible darker cape, or the color may simply fade gradually from the back to the belly. In addition to consistent genetic and biochemical differences, Tamanend's bottlenose dolphins are significantly smaller than common bottlenose from nearby regions; are usually lighter-colored; have flippers and beaks that are larger relative to body length, as well as narrower skulls and rostrums; feed on different types of prey; and carry different types of parasites.

Natural History

Bottlenose dolphins are gregarious, usually occurring in small groups of around 2–15 animals, but groups larger than 1,000 have been reported. They generally are seen in smaller groups in bays, sounds, and nearshore waters than offshore. Off the northeastern US, the average group is around 15, ranging from 1 to 350 (combining inshore and offshore sightings). Group membership is dynamic, with sex, age, reproductive status, kinship, and affiliation history all involved. The social structure has been called a "fission-fusion" society. Some subgroups are stable for long terms, some may be repeated over periods of years, and others are more ephemeral. The basic social units are nursery schools of adult females and their calves, mixed-sex juvenile schools, and adult males, either solitary or in strongly bonded pairs and trios. Long-term group cohesion of social units likely underlies the subtle but consistent genetic differences between stocks. Dominance hierarchies are observed in captivity—maintained by aggressive behaviors, including posturing, loud jaw claps, and physical contact.

There are many reports on the prey of bottlenose dolphins, mostly dealing with inshore animals. The dominant prey are fishes, primarily from three families—sciaenids (weakfish, croaker, spot, etc.), scombrids (mackerels), and mugilids (mullets). They also feed on many other kinds of bony fishes, plus skates, rays, sharks, squid, shrimp, and isopods. Stomach contents of offshore dolphins are dominated by lantern-fishes and squid.

Female bottlenose dolphins give birth after a 1-year gestation to a single calf that is 84–140 cm long, with substantial differences between populations. Calving seasonality varies between populations; births probably peak in the spring in Atlantic populations. Mothers and calves rarely separate during the first few months. A calf may nurse for several years, but begins foraging independently during its first or second year, maybe as young as four months. A calf is usually weaned completely at around the time the mother gives birth to the next calf, after an interval of 3–6 years.

Historical Occurrence

There are very few historical records of bottlenose dolphin from Rhode Island or nearby. The oldest record is a specimen in the Smithsonian, collected in Newport by Major E. A. Mearns on 13 December 1899. Remington Kellogg mentioned a sighting in 1936 "off Block Island" in a 1940 *National Geographic* article. Cronan and Brooks reported a 315-cm male stranded at Sand Hill Cove in Narragansett in September 1967. Nearby, there was a stranding in Plymouth, Massachusetts, in December 1947. In New York, a specimen was collected from Woods Hole's

research vessel *Atlantis* in May 1939 "100 miles south of Montauk," and sightings and strandings around southern and eastern Long Island were relatively common through the first half of the 20th Century.

Recent Occurrence

The distribution of bottlenose dolphins off Rhode Island is consistent with what we know from broader studies in the western Atlantic (Fig. 3). Summer is the peak season (53%), followed by spring (24%), fall (17%), and winter (6%). The summer data are somewhat biased by data from a whale-watching boat operating from Montauk at the eastern end of Long Island throughout much of the 1980s and 1990s. It seems likely that the offshore species predominates in our area. There were more inshore sightings in summer, but they were still mostly in waters deeper than 40–50 m except in the immediately vicinity of Montauk Point. Especially in that location, we cannot rule out the occurrence of some Tamanend's bottlenose dolphins in our area.

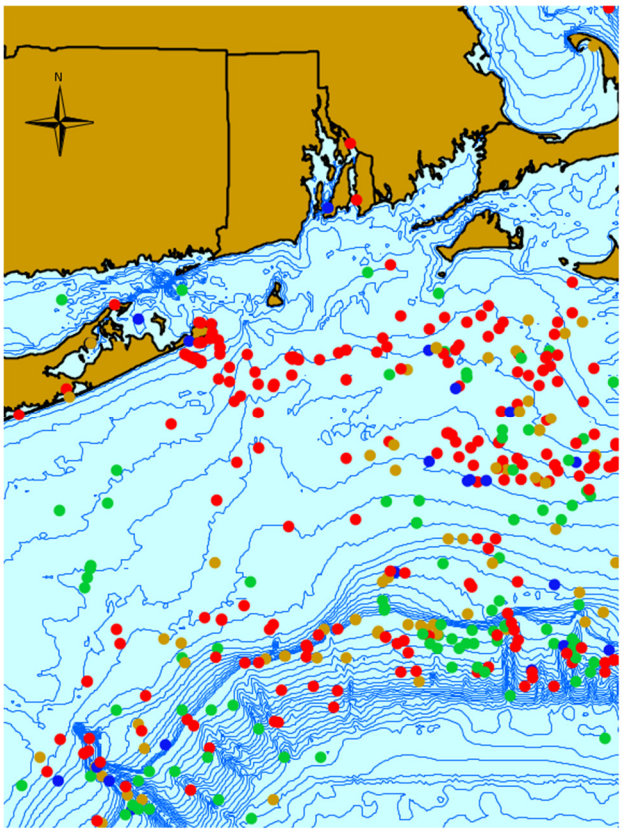

Figure 3. Bottlenose dolphins (*Tursiops* spp.) in the waters of the Rhode Island region, 1899–2022, color-coded by season (winter = blue; spring = green; summer = red; fall = brown).

It is interesting to speculate about what might happen in the future as ocean temperatures in our region continue to warm. We now know that migratory coastal bottlenose dolphins between Virginia and New Jersey reach the northernmost point of their migration at the warmest part of the summer, and range farthest north in the warmest years.

We also know that coastal dolphins must have occurred along Long Island historically if they were hunted at Montauk in the 18th Century, although they are scarce there today. With a little more warming, it is possible that we could see bottlenose dolphins swimming along our beaches from Napatree to Point Judith within the 21st Century.

Bottlenose dolphins are the eighth most frequently stranded cetaceans in the Rhode Island study area, which is much lower than their ranking in New York (third) or in New Jersey and states to the south (first). This is certainly due to the northern extent of the range of the inshore species. There seems to be an increasing frequency of bottlenose strandings in Rhode Island since the one in 1967, although some of that could be due to increase stranding response efforts: Mount Hope Bay, Warren, August 1983 (265 cm); Sakonnet River, Little Compton, August 1992 (310 cm); Navy base, Newport, March 2004; Block Island, July 2004; Mackerel Cove, Jamestown, July 2008; Buttonwoods Beach, Warwick, March 2012 (228 cm); Coggeshall Point, west side of Portsmouth, March 2014 (274 cm); Roger Wheeler State Beach, Narragansett, August 2014 (269 cm); Smith Cove, west side of Adams Point, Barrington, May 2019 (303 cm); east side of Warrens Point, Little Compton, March 2019 (225 cm); east side of Point Judith, Narragansett, July 2019 (294 cm). We could be seeing more inshore animals ranging this far north as the Atlantic Ocean gets warmer, although the largest individuals are most likely to be from the offshore species

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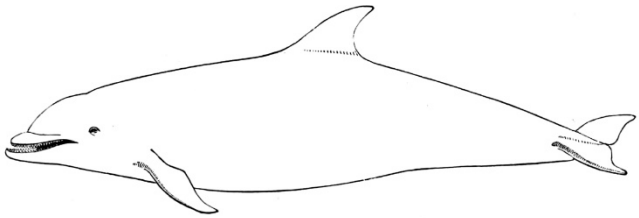

Common bottlenose dolphin (from Frederick W. True, 1884, Suggestions to the keepers of the U.S. life-saving stations, light-houses, and light-ships; and to other observers, relative to the best means of collecting and preserving specimens of whales and porpoises, Govt. Printing Office, Washington (public domain).

Saving Biodiversity: From the Planet to Rhode Island

By STEPHEN S. HALE

This past December, over 190 countries met at the UN Biodiversity Conference in Montreal, Canada, and adopted a breakthrough agreement aimed at halting global loss of biodiversity. In a signature achievement, delegates pledged to protect at least 30% of Earth's lands and waters by the year 2030 ("30x30").

What commitments has the US made to this goal and how is Rhode Island doing?

What brought the delegates to Montreal is the ongoing precipitous and widespread decline of biodiversity resulting from human activity. The planet is experiencing a human-induced sixth mass extinction event, the largest loss of species since the demise of the dinosaurs. The global rate of species extinction is at least tens to hundreds of times higher than it has averaged over the past 10 million years (Wilson 2017, Brondizio et al. 2019). One million species are threatened with extinction; more than half of those lack sufficient habitat for long-term survival (Brondizio et al. 2019).

Worldwide, populations of reptiles, amphibians, fish, birds, mammals, insects, and other taxa have experienced declines unprecedented in human history (IBPES 2019, Sánchez-Bayo and Wyckhuys 2019, WWF 2020). Meanwhile, the human population reached 8 billion last fall and is still climbing. A World Bank report found that biodiversity loss harms human well-being and the global economy to the extent that weakened ecosystems could trigger a drop of $2.7 trillion in global Gross Domestic Product by 2030 (Johnson et al. 2021). The top five drivers of global biodiversity loss are: (1) changes in land and sea use (the global food system is the primary driver), (2) climate change, (3) pollution, (4) direct exploitation of natural resources, and (5) invasive species (Brondizio et al. 2019).

The 2022 Montreal meeting was the 15th Conference of the Parties of the Convention on Biological Diversity, presided over by Huang Runqiu, the minister of ecology and environment for China, which co-hosted with Canada. The UN Convention on Biological Diversity (CBD) was established at the 1992 Earth Summit in Rio de Janeiro, Brazil. Primary goals are: (1) to conserve biodiversity, which includes species, ecosystems, and genetic diversity; (2) to use species in a sustainable way; and (3) to share the benefits of genetic resources fairly.

The 2022 conference had been planned for 2020 in Kunming, China, but was postponed and moved to Montreal

because of the coronavirus pandemic. Canadian Prime Minister Justin Trudeau attended in person and Chinese leader Xi Jinping opened the high-level negotiations remotely. Around 12,000 people attended. They hoped for a major agreement like the 2015 Paris Agreement, when nations pledged to try to limit Earth's warming to 1.5ºC (2.7ºF).

The 2022 Global Biodiversity Framework

Each UN biodiversity conference (now held every two years) builds on the previous ones. The 2022 Montreal agreement extended a previous biodiversity framework, the 2010 Aichi (Japan) targets from COP10, which called for preventing extinction of threatened species by 2020. Despite progress, this goal was not met. The 2010 framework lacked a workable financial plan and accountability mechanism. The 2022 framework is viewed as a major breakthrough as it has clear goals, financial commitment, and a mechanism for accountability.

After much debate that extended into overtime, delegates at the 2022 Montreal conference, adopted the Kumming-Montreal Global Biodiversity Framework (GBF), which aims to reduce biodiversity loss, restore ecosystems, and protect indigenous rights. The plan includes measures to halt and reverse loss of natural areas, including an agreement to put 30 percent of each nation under protection by 2030. Currently, depending on how it's calculated, 11–17% of the world's terrestrial area and 8–10% of the marine area are under protection (CBD 2022, Protected Planet 2022).

What counts as protected for nature? According to the CBD, it is "A geographically defined area which is designated or regulated and managed to achieve specific conservation objectives." The International Union for Conservation of Nature defines it as "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." The IUCN recognizes and defines guidelines for six protected area management categories (Dudley 2013). Dudley and Stoltz (2022) discuss guidelines for achieving 30x30.

The 2022 GBF has four goals and 23 targets (see boxes) (CBD 2022). It includes: (1) a comprehensive framework matched by resources for implementation; (2) clear targets to address overexploitation, pollution, fragmentation, and unsustainable agricultural practices; (3) a plan that safeguards the rights of indigenous peoples; and (4) financial mechanisms to drive finances toward sustainable development.

Four goals of the 2022 Global Biodiversity Framework.

- Halting human-induced extinction of threatened species and reducing the rate of extinction of all species tenfold by 2050; maintaining genetic diversity within populations.
- Sustainable use and management of biodiversity to ensure ecosystem functions and services are maintained and enhanced.
- Fair sharing of the benefits from the use of genetic resources and digital sequence information.
- Adequate means of implementation are accessible to all parties, especially least developed and small island countries.

While a great step forward, the 2022 framework—like the 2015 UN Climate Change Paris agreement—is still not fully adequate to do the job without ratcheting up the ambition in the future. Goal A of the current framework calls for reducing extinction tenfold by 2050, which does not keep up with the current rate of extinction. Also, because less-developed and indigenous communities harbor some of the planet's richest biodiversity, adequate finances to help them are essential. Countries in South America and Africa need financial help to protect landscapes and police against poachers and illegal loggers. The agreed-upon commitment of $30 billion a year to developing countries and the $200 million to be provided for all conservation work, while a

Highlights from the 23 targets of the 2022 Global Biodiversity Framework.

- Effective conservation and management of at least 30% of the world's lands, inland waters, coastal areas, and oceans, with emphasis on areas of particular importance for biodiversity and ecosystem functions and services.
- Have restoration completed or underway on at least 30% of degraded ecosystems.
- Reduce to near zero the loss of areas of high biodiversity importance.
- Phase out subsidies that harm biodiversity and use those funds to enhance biodiversity.
- Reduce by half both excess nutrients and the risk posed by pesticides and highly hazardous chemicals.
- Mobilize by 2030 at least $200 billion per year to help meet the goals.
- Prevent the introduction of priority invasive species and reduce by half the establishment of other known invasive species.

promising start, is short of the $598–824 billion estimated by Deutz et al. (2020) to be needed annually to reverse the loss of species worldwide.

United States

Almost every country in the world is a party to the CBD (the US being a notable exception). President Clinton signed the pact in the 1990s but it was never ratified by the required two-thirds majority of the Senate. Still, the American delegation at COP15 was able to play a significant role in the negotiations and support the final agreement.

On the positive side, President Biden issued an Executive Order in January 2021 that made an American commitment for a national 30x30 plan (The White House 2021). Four federal agencies prepared a report to implement the executive order (US Department of the Interior et al. 2021). This recognizes that, in addition to protecting biodiversity and the planet's life-support system, natural areas sequester carbon, so achieving the 30x30 goal would be a critical milestone in the US effort to address climate change.

Late-breaking News:

On Saturday, March 4th, at United Nations headquarters in New York, more than 190 countries reached a landmark deal on the text of a treaty aimed at protecting the biodiversity of the world's oceans. After nearly 20 years of stalled negotiations, the assembled diplomats agreed on a framework for safeguarding the high seas and establishing new protected areas in international waters. Only 1.2% of the high seas—two-thirds of the Earth's oceans beyond the 200-mile limits of national jurisdiction—are currently protected.

Before going into effect, the treaty first needs to be ratified by the United Nations, and then formally adopted by the individual member nations. That process is expected to take many years. Once it takes effect, nations can begin proposing the establishment of new marine protected areas in international waters. Without the ability to extend protections to the high seas, it would be impossible to reach the 30x30 goal set at last year's COP15 U.N. biodiversity summit, since that goal includes both land and oceans. Ocean biodiversity hotspots that are already on priority lists for protection by marine conservationists include the Sargasso Sea in the central North Atlantic and the Costa Rica Dome in the eastern tropical Pacific.

In 2019, the US Congress passed a law that permanently reauthorized the Land and Water Conservation Fund. Another bill in 2020 fully and permanently provided money for that fund—$900 million per year to invest in conservation and recreation opportunities. Biden has taken executive actions such as restoring three large national monuments created by Presidents Clinton and Obama. But reaching the 30x30 goal will require even more. Only about 13% of America's lands and inland waters and about 19% of its oceans currently are protected (https://www.protectedplanet.net/country/USA).

Rhode Island

For the state of Rhode Island as a whole, about 20% of our lands are protected for nature by national wildlife refuges, state parks and management areas, preserves of The Nature Conservancy and Audubon Society of Rhode Island, town parks and conservation areas, local land trusts, and conservation easements. This includes smaller freshwater bodies and most salt marshes (thanks to Kevin Ruddock of The Nature Conservancy for providing the current figure). These protected areas are where RINHS centers its annual BioBlitzes to identify and celebrate the state's biodiversity. A recent update to the 2021 Rhode Island Act on Climate, which has goals for reducing greenhouse gas emissions by 2030, set a goal of "no net forest loss."

With regard to Rhode Island's freshwater and marine systems, there are several designated areas that provide some level of protection. For example, seven rivers in the Wood-Pawcatuck watershed are designated as National Wild & Scenic Rivers. These 110 river miles (177 km) are less than 8% of the state's total river miles.

Examples of protective actions can also be found in Rhode Island marine areas. Several barrier beaches and coastal waters in the state are designated under the 1982 federal Coastal Barrier Resources Act administered by the US Fish & Wildlife Service (USFWS 2022). The five refuges in the Rhode Island National Wildlife Refuge Complex protect salt marshes, salt and brackish ponds, a tidal river, dunes, and barrier beaches. Boundaries of the Prudence Island National Estuarine Research Reserve extend out into subtidal waters to a depth of 5.4 m (18 ft) and include salt marshes, eelgrass beds, and rocky intertidal habitats. The Nature Conservancy preserves at Fogland Marsh in Tiverton and Goosewing Beach in Little Compton include salt marshes and salt ponds.

Rhode Island's Coastal Resources Management Council has several regulations that provide some protection for coastal and marine areas, including Water Use Categories. The

Ocean Special Area Management Plan has designated areas where large offshore developments, mining, and sand and gravel extraction are prohibited. And the plan has areas designated for protection for such things as sea duck feeding.

E. O. Wilson's Half-Earth Project (Wilson 2016, Half-Earth Project 2022) has promoted the idea that we need to go beyond 30% for nature and protect half of Earth's natural environments to ensure a healthy level of biodiversity. One place that is approaching that goal is right here in Rhode Island—Block Island, where about 44% of the land is preserved as open space. The town's comprehensive plan set a goal to preserve 50%.

Beetles (Order Coleoptera) are the most diverse group of insects, and comprise about a quarter of all the animal species on the planet (from Wikimedia Commons; Source = Collections of Staatliches Museum für Naturkunde Karlsruhe, Germany; licensed under the Creative Commons Attribution-Share Alike 3.0 Unported license).

Conclusions

Natural areas and the biodiversity they support are essential both for their intrinsic value and if we are to meet the UN Sustainable Development Goals, limit global warming to 1.5° C, and protect ecosystem services that are crucial for our own health and well-being. Under the 2022 Global Biodiversity Framework, nations agreed to use the next eight years to achieve their 2030 targets for protecting natural areas and biodiversity. This is a historic global recognition that, for our own good and that of other species, we must do a better job of preserving our natural life support system. It offers hope that we have reached a turning point in our rocky relationship with the natural world.

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Commentary: Biodiversity & Indigenous Communities

By ROBERT D. KENNEY

In our Spring 2022 issue, I reviewed *The Best American Science and Nature Writing 2021*. As we were just starting on this issue, I happened to be reading the next edition in the series. The last piece in the book was a short article (just over 5 pages) entitled "There's a Global Plan to Conserve Nature. Indigenous People Could Lead the Way." It was written by Somini Sengupta, Catrin Einhorn, and Manuela Andreoni, and originally appeared in the *New York Time*s. The timing could not have been better.

In a short discussion of the UN COP15 biodiversity conference, the authors point out that "Indigenous communities are not recognized as parties to the international agreement. They can come as observers to the talks, but can't vote on the outcome. Practically though, success is impossible without their support. They already protect much of the world's land and water, as David Cooper, deputy executive secretary of the United Nations agency for biodiversity, pointed out: 'People live in these places. They need to be engaged and their rights respected.'"

The article highlights just a few examples of Indigenous communities working to conserve their lands and resources. In the Brazilian Amazon, the Uru-Eu-Wau-Wau have legal right to over 18,000 square kilometers of forest and savannah, but must patrol their lands with drones, video cameras, and sometimes poison-tipped arrows to defend them from illegal loggers. In the middle of the last century the Łutsël K'é' Dene in northern Canada opposed creation of a national park in their homeland. Steven Nitah, a former tribal chief, remarked: "At that time, Canada's national parks were very negative to Indigenous people's ways of life. They used to create national parks—fortress parks, I call it—and they kicked people out." But when their land was threatened by possible diamond mining in the 1990s, they went back to the Canadian government with a plan for a park that would insure their rights to manage the land, to hunt, and to fish. The new park, Thaidene Nëné (Land of the Ancestors) opened in 2019.

The lessons of these examples—as well as the others described in the article, and surely many, many more—are clear. "Nature is healthier on the more than quarter of the world's lands that Indigenous people manage or own." A coalition of Indigenous groups and local communities agrees with the Half-Earth Project that 30% is not enough, and we should be aiming to protect 50%.

Uncontacted Indigenous tribe in the Brazilian state of Acre in July 2009. In the Amazon rain forest, both the habitat and the Indigenous residents can be threatened by development. (Photo by Gleilson Miranda, government of Acre; originally posted to Flicker; https://www.flickr.com/photos/fotosdoacre/3793143031; from Wikimedia Commons; licensed under the Creative Commons Attribution 2.0 Generic license)

Conservation News: Putting the Natural Heritage Data to Use

By SARAH GAINES

In January, the Rhode Island Department of Environmental Management announced the permanent conservation of 125 acres of forested land (the D'Ambra property; see the accompanying map from the RIDEM press release) in the Upper Pettaquamscutt Estuary Watershed on the western shores of Silver Spring Lake in North Kingstown. This land will be protected for public recreational use: for fishing, hunting, hiking, bird watching, and appreciating the healthy natural habitat. This parcel joins two abutting conservation areas owned and managed by the Town of North Kingstown. The site consists of upland forest, including the headwaters of the Mattatuxet River with associated perennial streams and wetland habitat.

The Survey was pleased to be able to contribute scientific information to the decision process that led to prioritization by the State to purchase this land through the State Land Conservation Program, which purchases ecologically valuable land. Many other partners and citizens are involved in that process, including the Rhode Island Woodland Partnership. Some species of turtles will benefit from this designation.

In addition, the Survey has been providing analyses of a range of data, including natural heritage data, to help the Town of North Kingstown prioritize the conservation of the Cruickshank property, 355 acres of woods and wetlands along Shermantown Road, providing critical habitat for native trout in the upper tributaries of the Saugatucket watershed. On the request of local residents, the Survey provided maps showing the polygons of critical habitat for priority heritage species for the State, a large portion of which is included in this new parcel.

RINHS maintains a database of species—both plants and animals—which RIDEM considers rare or endangered. This "natural heritage" list includes information about known occurrences. RIDEM responds to data requests for regulatory, permitting, and commercial purposes while the Survey can respond to requests for non-profit conservation, educational, and research purposes. The Survey welcomes observation reports of heritage species to improve the accuracy of the database. These Observation Reports can be submitted through our website (see the links toward the bottom of the

RIDEM map of the D'Ambra property (outlined in orange). Silver Spring Lake is the horseshoe-shaped pond to its northeast; Pendar Pond is to the southeast.

page at https://rinhs.org/species/rare-species/). Maps of Natural Heritage Areas are available to the public through the RIGIS website (also linked on our rare species page), but to protect these vulnerable species, only on generalized maps without specific location details.

Sarah Gaines *is an earth scientist and Research Associate with the URI Coastal Resources Center, and serves on the RINHS Board of Directors and as President Elect.*

Eastern box turtle (*Terrepene carolina*) in Central Park, New York City. Box turtles are very popular in the black-market pet trade and protected by state regulations in Rhode Island, so they are one of the species where locations are not made public. (Photo by 37an7, from Wikimedia Commons, licensed under the Creative Commons Attribution-Share Alike 4.0 International license)

RINHS 2023 Awards

As part of its mission to advance public understanding of natural history and the role of naturalists in environmental conservation and management, the Rhode Island Natural History Survey has instituted three awards recognizing accomplishments of individuals from, or working in, Rhode Island. To see more about all our awards and find complete lists of past awardees, go to https://rinhs.org/events/awards/.

The RINHS **Distinguished Naturalist Award** is presented by the Survey to an individual who has made significant contributions to scientific knowledge of Rhode Island's organisms, geology, and ecosystems; is recognized as an outstanding teacher and educator about the natural world; and/or has significantly enhanced public awareness of the importance of understanding Rhode Island's ecosystems.

The RINHS **Founders' Award for Exceptional Service** celebrates the organization's heroes: individuals, groups, or organizations that have made extraordinary contributions—time, things, money, expertise, all of the above—that substantially advanced the Survey's longevity and mission. Recipients of both the Distinguished Naturalist and Founders' Awards can be living or deceased, and are selected by the RINHS Board of Directors from lists of nominations made from people both within and outside of the Survey.

The **Golden Eye Award** recognizes a naturalist for reporting an extraordinary field find—a "good catch." It could be a new species for Rhode Island, a rare or otherwise unusual species, an invasive species, or some other natural historical phenomenon. RINHS staff makes the nomination, and the winner is voted on by the Board of Directors.

On November 1st, 2022, the Survey held an awards presentation at the Barrington Public Library. We presented Distinguished Naturalist Awards to Charlie Brown and Ginger Brown, and want to be absolutely clear that these were two separate awards to equally deserving, though not completely unconnected, individuals. A video of the presentations is on the Survey's YouTube channel at https://www.youtu.be/qzBqziM7q_A. We also presented a Founders' Award to Helen Lusi, and that video is at https://www.youtu.be/1-hso3uareM. More about all three winners is in the following articles.

Call for Nominations: The 2023 nomination period is open for both the Distinguished Naturalist Award and the Founders' Award for Exceptional Service. Nominees can be living or deceased. Current members of the Board of Directors are not eligible, nor are members of the RINHS staff. To nominate someone, send a letter or email to the Survey office marked "Attention: Awards" or contact any member of the Board of Directors. In your correspondence please describe the ways in which your nominee excelled in the sort of contributions summarized above or provided in more detail on our website. Please include as much specific detail as possible, as we may not be personally familiar with your nominee's work. Past nominations are kept and reconsidered for up to five years, so if you've nominated someone unsuccessfully in the past, you are not required to re-nominate them. You may, however, wish to provide additional information on your nominee if you feel it would strengthen the nomination.

Charlie Brown
2022 Distinguished Naturalist

Ever observant of Rhode Island's biota—mammals, insects, plants, and much more; a thoughtful mentor to students and volunteers.

The first of our two 2022 Distinguished Naturalists is Charles F. "Charlie" Brown (the order here is simply alphabetical). Charlie retired in February 2022 from the RIDEM Division of Fish and Wildlife, where he was the expert on all things mammalian. If you Google his name, even adding "Rhode Island" and "mammals" to cut down on the Peanuts cartoons, you will still get over 4 million hits. Many are links to news stories from the papers or TV stations where he was quoted as the expert on coyotes, bats, fishers, bears, foxes, bobcats, pumas . . . and that's only from the first page.

Charlie grew up in Barrington, where he still lives today. He credits his family and the local environment for instilling his love for the natural world. He recollected during his remarks accepting the award that every boyhood hour not spent in school or the dinner table was spent outside—fishing, trapping, and exploring. He fondly remembers fishing with his dad, trips with Uncle Frank to Thomas Delsanto's

taxidermy shop in downtown Warren, his parents driving him up to the old Audubon office in Providence, or his mother driving him and his friends to Echo Lake or Bicknell Pond to catch turtles (and re-paying her with a bag filled with 18 garter snakes).

Charlie graduated from URI in 1985 with a bachelor's degree in Natural Resources, although he claims that he "just barely got through." He worked as a Forestry Technician with the US Forest Service and at a variety of other jobs, including landscaping, before being hired by the

Coastal Resources Management Council as a wildlife biologist in 1990. He moved over to the Division of Fish and Wildlife as a wildlife biologist in 1998, where he served as the principal furbearer biologist for the next 24 years. He also worked on other programs, including bat research, wildlife rehabilitation, and nuisance wildlife control.

During his comments while presenting the award, Todd McLeish recalled meeting Charlie at the first volunteer meeting for the dragonfly atlas in the late 1990s. Although Todd wasn't sure whether Charlie was just a regular volunteer or if he and Ginger were already together, but it was very soon clear that he knew a lot more than the rest of the volunteers, and about a lot more than dragonflies. Todd later volunteered on Charlie's mammal projects, like counting and mist-netting bats, and often turned to him for his expertise when writing stories about mammals. He especially loved visiting Charlie at his office, because Charlie had the most amazing collection of Rhode Island mammal skulls—like being in an especially dusty museum.

During the award ceremony, Survey Board member Don DeHayes read a letter of support written by Mike Thomas from the Connecticut Agricultural Experiment Station. He called Charlie and Ginger "two of the best naturalists I know and terrific field companions." That was typical of the remarks heard that evening—Charlie and Ginger have been married and working together long enough that it can be difficult to talk about only one of them. (In her acceptance remarks, Ginger said that Charlie was the best naturalist she knew.) Mike's letter recounted how Charlie and Ginger started collaborating over 20 years ago on a study of the diversity, distribution, and abundance of robber flies in southern New England. Despite his expertise in mammals and hers in dragonflies, they took on a very poorly known insect family at a time when field guides and on-line identification resources did not exist. In that time they have collected over 2,000 voucher specimens from Rhode Island, comprising 63 species, 27 genera, and 8 sub-families.

In accepting the award, Charlie was typically humble, saying that the credit really belonged to everyone who had helped him along the way—family, friends, teachers, co-workers, friends, Mike Thomas, George Seavey (original staff member at the Coastal Resources Center), and Chris Raithel (former RIDEM rare species biologist and 2019 RINHS Distinguished Naturalist). He especially appreciated what an honor it was to come back to URI and work on collaborative research with his former professors and their students.

Ginger Brown
2022 Distinguished Naturalist

A meticulous field scientist and a conservationist; when the little things count, you can count on her.

Virginia A. "Ginger" Brown is our second Distinguished Naturalist for 2022. Ginger is the state's leading expert on

the Odonata—the order of insects comprised of the dragonflies and damselflies—and the author of two authoritative books on the group.

Early in her career, Ginger worked for the Cape Cod Museum of Natural History. It was during her time at the Museum that she published her first book in 1991: *Dragonflies and Damselflies of Cape Cod* (Cape Cod Mus. Nat. Hist. Natural History Series no. 4). A revised edition was published in 1997.

Ginger moved from the Cape Cod Museum to The Nature Conservancy, Rhode Island chapter. At TNC she had a major role in their Natural Heritage program, working on evaluation of land for protection and collaborating with RIDEM on rare species. When TNC passed their role in the Natural Heritage program to the Rhode Island Natural History Survey, Ginger became a Survey biologist. Currently, she teaches about environmental science and nature for Living In Fulfilling Environments, Inc. and for the Audubon Society of Rhode Island. And she hasn't given up her passion for odonate conservation, and gets out to chase dragonflies, robber flies, and other insects as often as possible.

It was at TNC that she began the Rhode Island Odonata Atlas project—a statewide inventory of dragonflies and damselflies—which continued after the transition to the Survey. She trained a corps of about 70 volunteers who collected specimens around the state, visiting more than 1,100 ponds, lakes, streams, rivers, and other sites in every community. More than 13,000 specimens were collected and identified. Overall, more than 100 species were recorded in five communities, and at least 90 species were found in an additional seven communities. The formal Atlas project collections were mainly between 1998 and 2004, but she has been studying the group for over 40 years in all—before the Atlas collections began and more or less continuously ever since.

All those years of work resulted in her second book, *Dragonflies and Damselflies of Rhode Island*, which was published in 2021 by the RIDEM Division of Fish and Wildlife. The book includes detailed accounts of all 139 odonate species found in the state, with illustrations by Nina Briggs. Of course, that is not the end of it. Ginger is now overseeing an update of the Odonate Atlas that began in 2022, to look for any changes in the state's dragonfly and damselfly fauna in the two decades since the first atlas sampling was completed.

Todd McLeish was one of the volunteers on the original Atlas, and spoke at the award ceremony last fall. He remarked that what impressed him first about Ginger was that she was a great teacher. She served as an educator and mentor for an entire group of beginners who knew little about dragonflies—providing the right level of encouragement and the right amount of natural history information about plants, insects, and other groups so everyone would feel comfortable and like they were making a valuable contribution. When Todd was writing his first book—about rare species in New England and the scientists studying them—he turned to Ginger as his primary source for the chapter on the ringed boghaunter (more below). She took him to some of her super-secret locations to see the breeding ponds of some of the state's rarest dragonflies, answered question after question about the Atlas, and happily (seemingly) put up with being repeatedly referred to in print as the dragon lady.

In accepting the award, Ginger pointed out the urgency for land protection to conserve biodiversity in the face of a changing climate, and the importance of documenting and disseminating information. She spoke about how field work has gotten easier in some ways since she first started. Insect nets are still the same, and sinking to your knees in the mud in some swamp hasn't changed, but being able to take good photos and record field notes in a smart phone is much more convenient than carrying a heavy camera and writing field notes in a notebook.

She also emphasized the continuing need for voucher specimens. Rhode Island's only State Endangered insect is a dragonfly called the ringed boghaunter. The species was described based on a specimen collected near Albany, New York, in 1874 and deposited in the New York State Museum (the "type" specimen). The type location no longer exists because of development, and the species has never been found again in New York State. Without that type specimen, it would be much harder to confirm the identification of any new ones. Voucher specimens are also important for other reasons, and they need to be physical specimens and not just photographs. After the first Atlas was completed, researchers concluded that a damselfly called the northern spreadwing was actually two different species. Voucher specimens allowed checking (with a microscope) to see which species had been collected in Rhode Island.

Ginger also emphasized how much we need to get students inspired and involved. We are going to need new scientists coming up through the educational system to fix the mess that the "grown-ups" have made of our environment.

"Sorry Charlie, but you cannot catch bats with an insect net." Our two 2023 Distinguished Naturalists in their natural habitat—chasing dragonflies in a White Mountain stream in Errol, New Hampshire (courtesy of Mike Thomas).

Helen Lusi
2022 Founders' Award for Exceptional Service

By KIRA STILLWELL

I am honored to introduce Helen Lusi, and to share some stories from her life that help explain the notable role she has long played in Survey events and her contributions in helping shape our future. Last summer, after the Survey Board named Helen the recipient of the 2022 Founders' Award for Exceptional Service, I was tasked with delivering the news. After several years of COVID distancing, I was going to visit Helen! Awesome! Over the years, I have had the good fortune to visit her several times—always a delight. Her home and surrounds are like stepping into a calm sanctuary—insulated from the chaos of the everyday world.

During our visit, I shared the news of the award with Helen. She was predictably humble and thanked me, but put it off like it was no big deal. From there, our conversations wandered broadly. Hearing stories from Helen's childhood, and of her formative connection with the natural world, was *gold*!

Helen grew up in Latrobe, Pennsylvania, southeast of Pittsburgh. Her *favorite* times as a child were visits to her Uncle John's farm, where the farm's plants and animals were surrounded by nature. She remembers that the most frequently uttered phrases during those visits were: "Where's Helen?" "Where *is* Helen?!" "*Helen!!*" Helen of course was "*out there,*" she told me with a dancing gleam in her eyes. To this day Helen remains deeply connected to

that place and time at Uncle John's farm, becoming misty with a somewhat faraway look as she spoke of it.

Helen grew up to be an elementary school teacher and a flower designer. Teaching children and working with plants have been constants throughout her life. She found her way to Rhode Island and met the love of her life, Armando Lusi, known to all as "Gus." They married in 1958 and shortly thereafter acquired a 5-acre wooded dell in Johnston where they built their home. Over the next 60+ years, Helen accentuated the natural features of the wooded property with extensive cultivation of native plants and trees, creating a literal oasis. It was the perfect place to raise their five children, in the middle of urban, mostly treeless Johnston, and to instill in them her abiding love of the natural world and native plants in particular.

Years went by; the kids grew up and plants were still a thing. Helen was part of the creation of the Rhode Island Wild Plant Society in 1987, serving on their board and in various support roles for *many* years. She was one of the cornerstones of the native plant "brat pack"—including dear friends Fran Underwood, Kathy Barton, Norm Boyer, Gil George, Ethel Halsey, Anne Wagner, and of course, the Survey's founding director, Lisa Gould. I can imagine that Helen was the social director for this bunch!

Helen is curious, enthusiastic, warm, genuine, and interested. When she asks a question, she "leans in" to listen, like the elementary school teacher she is, with her full attention. She became a Survey member in 2004, the same year that David Gregg and I started at the Survey. I'm not sure what inspired her to become a member, but am eternally grateful that she did, and that she took to loving and supporting the Survey in her distinct way!

Helen *shows up*—in mind, body, and spirit. Helen shows up, so much so that (in botanist Hope Leeson's words) it often didn't feel like things really started until Helen arrived. Since 2004, Helen has attended more Survey events—lectures, conferences, walks, award ceremonies, fund-raisers—than anyone other than me and David and perhaps a few board members. She is the first one to buy raffle tickets and bid on auction items (and continue bidding to drive up the proceeds); she is the first one to get in line to buy a book by the author who just gave a talk. She brings acorn-flour cookies or some other gathered delicacy for the refreshment table, or a potful of wild mushrooms, cooked to perfection!

With the exception of a few years (2007–2009), Helen has attended *every* BioBlitz since 2004, participating on the vascular plant and fungi teams. During lulls in her activities at Science Central, I often saw Helen observing with great pleasure and interest the school kids buzzing about—taking it all in and appreciating the magic that happens when kids have, as David says, "minimally predictable encounters with nature."

Helen suggested many times over the years that we conduct a BioBlitz at Dame Farm in her home town. So, when we announced that our 2017 BioBlitz was going to be held at Snake Den Farm (which encompasses part of Dame Farm) she was thrilled. Out of the blue, Helen called the Survey office to inform us that A.F. Lusi Construction, Inc. (under Helen's direction in memory of Gus, who had recently passed) wanted to sponsor the evening meal at BioBlitz. Stepping in and *showing up* in such a way made a notable contribution to our work and helped fill the financial short-fall we always struggle with. Helen and I made a field trip to a local deli (which she chose) and created the dinner menu. Those of you who were there might remember the Italian feast served in the barn. The highlight of dinner was Helen's eldest son and family, including teen daughters, joining us for the meal and Helen touring them around—telling them all about BioBlitz and sharing an important part of her world with them.

A year or two prior to COVID, Helen invited David and me to her home for a visit. We sat around the dining table with her and family members, enjoying tea and cookies, and she challenged us with one of her perennial questions. How can you engage more kids in BioBlitz? She challenged us to make student participation in BioBlitz part of our routine planning. We talked at length about what that could look like, how we could do it and stick to our real science chops without just making it into a field day for busloads of kids. My head was spinning imagining the challenges and the possibilities!

As tea was finished, Helen modestly stated that she had a financial gift planned for the Survey, which would be earmarked for helping us to expand our efforts and hone our vision for what "student" participation in BioBlitz could be in practical application. Since that day she has held our feet to the fire—literally, by showing up and continuing to ask us about kids at BioBlitz, and conceptually, by tasking the Survey with creating a new framework for how we approach our most notable annual event. As a result of Helen's generosity, our way forward includes efforts to incorporate more family-friendly events into our programs, and to engage more with faculty who participate and have students in tow.

As she receives this Founders' Award for Exceptional Service we thank Helen for challenging us to do the work to insure our on-going existence, to inspire kids to be interested in the natural world and in taxonomy, and to provide them with skills. We thank Helen for providing the financial means for us to embark on the task.

A short statement from Lisa Gould sums it up perfectly: "In everything that Helen did or does, her infectious enthusiasm permeates. She loves being with other people and sharing her knowledge (which is considerable, although she is very modest about it) and enthusiasm (which has no bounds). She loves being out among wild plants (her property speaks for itself!) and her passion is education."

Kira Stillwell *is the RINHS Program Administrator.*

Executive Director's Journal: What Is Natural History?

By DAVID W. GREGG

The Natural History Survey gives awards to people for being especially good at natural history; it hosts an annual BioBlitz to encourage more people to learn natural history; it holds conferences where people share natural historical information. Heck, "natural history" is right in our name. So, we should be able to define natural history and explain what people think they're doing when they're doing it so hard they win an award.

When you ask people on the street what natural history is, the most common answer usually involves dinosaurs. There is often also something in the answer involving biology and the past. "Isn't natural history what biology was called in the old days?" "It's putting names to animals and plants." "It's biology when you put it in a museum . . . you know, like taxidermied wildebeests." Countless rows of insects on pins or stuffed birds on dowels? Something that happened on sailing ships? If you ask 10 people what natural history is, you're likely to get 12 different answers. To paraphrase Justice Potter Stewart talking about pornography, "It's hard to describe, but I know it when I see it."

A taxidermied wildebeest.

Natural history is, of course, the world's oldest profession. Yes, even older than *that* one. Genesis (2:19) says, "And out of the ground the LORD God formed every animal of the field and every bird of the sky, and brought them to the man to see what he would call them; and whatever the man called a living creature, that was its name." This was before Eve was even on the scene.

Many people have undertaken to define or describe natural history, in fact, to articulate an opinion on this question is practically required, at one point or another, of scientists in any of the natural history-adjacent fields from anatomy and zoology. But it is also a real challenge outside the context of academic papers and talks. Many just plain working naturalists need a way to answer the inevitable questions we get when we're running around in a field with binoculars or worse a butterfly net: "What are you doing?" (or more penetratingly, "Why are you doing *that*?").

One could start with a dictionary definition such as, "the natural development of something such as an organism or disease over a period of time, the study of such natural objects and their development especially in the field from an amateur or popular point of view, or a treatise relating such a study" (adapted from www.merriam-webster.com). This describes an activity—amateurs studying natural objects in the field. This is roughly what I have called "natural history values"— we study living organisms and functioning systems, we study locally to learn about the world, and we believe any curious person, suitably supported, can make a contribution. For our larger understanding of natural history as a phenomenon or occupation, unfortunately, this is something of a least-common-denominator definition. Natural history would be whatever is left after you take out pursuits that have a narrower definition: field ecology or biology, zoology, or ornithology, or perhaps the general umbrella that such diverse things are categorized under.

Another lowest-common-denominator way to define natural history is as those activities that produce a certain kind of output. Gilbert White's *The Natural History and Antiquities of Selborne* (1789) is the most frequently cited archetype. White's compilation of years of observations and inquiries in his rural English county is quotidian in subject and deliberately simple in style, but it was admired at the time and ever since for showing how profound insights could be reached by practically any curious person in their immediate surroundings.

One problem with narrowing the definition down in this way is that it remains merely descriptive, not explanatory. An observation without an inquiry as to the practitioners' motivations, for human activities at least, is a pretty limited definition. So, what motivates practitioners of natural history and their supporters, be they individuals, academic or government institutions, or society in general? Explanations for natural history have been made using paradigms from spirituality to economics.

There are even psychological motivations to activities of natural history, for example a psychological condition called *ataxophobia*, which is the irrational fear of disorderliness. For sufferers, anxiety may set in just from thinking about being in a messy, disordered situation, and it can lead to or arise from obsessive-compulsive disorder. When we look at many natural history collections, with serried rows of bird skins or insects on pins, it's hard to imagine it wasn't the work of someone who couldn't stop organizing. A good example, perhaps, is the British Museum paleontologist Leslie Bairstow who, in addition to an important but pedantic study of belemnite fossils, saved scraps of string organized into boxes by length, the smallest of which was labeled, "Pieces too small to be of use." At the larger scale, in retrospect the frenzy of natural historical system-making in the 18th century has a manic aspect to it, a sense that the classes engaged in thinking about the nature of the world simply had to discover a rational order behind it. It has been said that museum curators all suffer to some degree from ataxophobia.

Probably the most common natural history rationales are economic, being about gaining knowledge to control and manage natural resources. In fact, this too could be traced back to Genesis (1:26–28): "And God blessed Man, and said . . . subdue it [the Earth] and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth." A bit later, at the end of the 19th century, Alexis Caswell, 6th president of Brown University, said of natural history, "Without knowing something of the forms and laws of animal life which everywhere surround us . . . we seem to be walking blindfold in the midst of nature's richest treasures." The value-proposition for natural history is embedded in the treasure-house metaphor itself: if you know natural history, you can take the treasure.

Appreciation for natural history's economic value grew through colonialism. It was important to ascertain the value of a place once it was "discovered." Control of valuable natural resources could help one compete with other world powers directly and indirectly, gain the personal favor of one's monarch, pay for more voyages of discovery, or fund colonial experiments. With natural historical knowledge, explorers such as Bartholomew Gosnold and John Smith favored colonies in New England because, compared with locations tried in lower latitudes, they had more timber and fish and the area's climate better comported with English comfort and would potentially support agriculture much like England's.

This "taking from the treasure-house" mode does not exactly embrace conservation ethics commonly associated with natural history today. It is, nonetheless, a mode I often find myself in, as the director of the Natural History Survey, when I am trying to justify a grant request, or jollying a dean or a legislator into some support, or encouraging people who aren't already won over by the Survey's intangible benefits to make donations. Would it sound better if we rephrase it as, "gathering resources with wisdom"?

Believe it or not, some people are motivated to pursue natural history because it's fashionable. There are times in recent history when that would have been highly improbable, but now, with COVID driving outdoor pursuits, we're near a high point in that respect—hipster beards and expedition gear signal authenticity conferred by being close to nature. Natural history's fashionability goes way back, though. The early growth of botany was at one point being fueled by sycophants and social climbers pursuing favors in the court of King George III, whose queen, Charlotte of Mecklenberg, was genuinely interested in plants and natural (or at least faux natural) landscapes. Increasing numbers of the not-quite-so-rich emulated these elites, amplifying the competition for "curiosities," as well as for books about natural history and for the attention of scholars.

Survey Executive Director David Gregg attended a BioBlitz in Concord, Massachusetts, in July 2018 organized in honor of E.O. Wilson.

The intellectual and emotional stimulation of the social elite drove the creation of cabinets and museums that collected and juxtaposed diverse natural (and often man-made) objects, and collecting as an activity is full of relevance to the history of natural history. Steven Lubar, in *Inside the Lost Museum; Curating, Past and Present*, notes that specimen collecting, or modern virtual counterparts such as identifying, listing, and photo-vouchering, consists of things selected with reference to certain variable features to provide evidence or tell a story. It follows that a collection is bounded by an internally consistent system for describing the variability of certain features among its specimens, and without such a system, a gathering of objects is just an accumulation. To collectors, therefore, natural history was important because it provided systems for distinguishing among and organizing the animals, plants, rocks, and other impedimenta which elites and aspirant elites gathered at an increasing pace from around the world.

With respect to natural history and its value, no less august a naturalist than E.O. Wilson, in *Creation*, defines two kinds of natural history, both to be valued, but differently. One is a "scientific" kind of natural history that connects to the economic rationale, while the other is a practice that amounts simply to messing about in nature and has spiritual and secondary economic value. The latter instills interest in and an ethical response to the natural world and is central to much of Wilson's philosophy, indeed to his very biography. The former makes substantial contributions towards all the material and societal benefits that come from science. Wilson says, "*scientific* [my emphasis] natural history is one of the few endeavors in which almost any interested person can make original contributions to science."

In this part of Wilson's vision, citizen or community scientists are a sort of biodiversity national guard. The need to document the earth's biodiversity for conservation and its concomitant human societal benefits, Wilson argues, is urgent because biodiversity is so rapidly disappearing. Yet, as of a 2006 estimate that he cites, there were only 6,000 "overworked" professional and semi-professional scientists addressing identification and classification of organisms worldwide, half of whom are based in the United States. Community scientists are urgently needed to provide, "more eyes, more boots on the ground, and more fresh ideas." Besides being a force multiplier in the core tasks that need doing, in Wilson's picture, community scientists make it feasible for science to have data and pursue questions that would be impossible without numerous, simultaneous observations: "Consider: one observer may witness a population of butterflies using one kind of larval food plant in Sweden, at the northern limit of the species range, and a second finds the same species on an entirely different food plant in the southern most population, in Italy. Or, a species of frog may be increasing in Kansas but declining toward extinction in Colorado."

Survey Executive Director David Gregg in the field practicing "natural history"—taking video of ants that discovered a crumb dropped on the floor during the annual Open House and "Artists on Expeditions" art show at the Survey offices on East Farm in January.

Wilson observes that new information technology tools help the biodiversity national guard make its contributions to science and help bring us what I have dubbed "the new golden age of natural history." In the age of film cameras, really good pictures of insects alive, in the field, were extremely rare, being technically hard and consequently expensive. Now anyone with a cell phone can easily best all but a handful of pre-digital photographers in an afternoon. The internet allows you to share those pictures, allowing for IDs as well as contributing distribution information. Wilson also singles out online species profiles, plus cites DNA barcoding, online DNA catalogs, and engagement of people across borders and up and down the ladder of expertise. This last is, perhaps, particularly important: the internet turbocharges a very important social dynamic that is as old as humanity itself: the desire to be someone, to be recognized as accomplished, to sense that your efforts are contributing, to belong to a group, to be famous—social dynamics that help recruit and retain vastly more participation in natural history.

The urgency in Wilson's thesis that science is overwhelmed by biodiversity and needs help probably comes from his background in a field of natural history that deals with the small and easily overlooked—the ants! For the ants, nematodes, centipedes, tardigrades, et al., natural history has to become both broader and more penetrating, or else it will not give suitable consideration to "these little creatures." More consideration of the small but numerous is urgently needed because a) their cumulative mass and activity are huge; b) certain of them—but we don't know which—directly control manifestly important ecological phenomena; and c) their sheer diversity is useful for adapting to climate change and gives us many models to understand evolution, ecology, or even our own biology.

One important insight of Wilson's is that naturalists are, by and large, fans of science. We either agree with the importance of science, as either a project or a methodology, for whatever we believe its greater benefit to be (human welfare, resources and economics, existential conservation, etc.), and we want to contribute to this, to be or to help scientists. This is a predominant explanation for our practice of natural history.

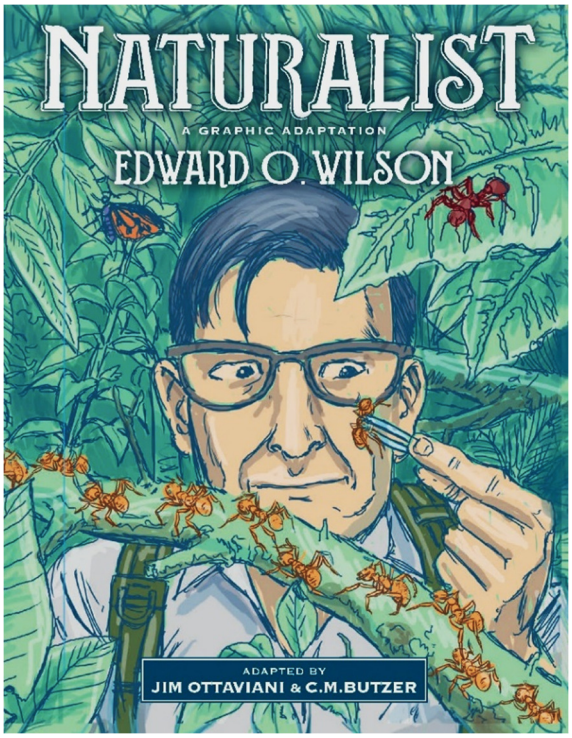
Explanations, be they personal, social, or spiritual, are not mutually exclusive. We aren't always content to simply contribute but we want to be known as someone who makes contributions or to be associated by others with those who share natural history values. Or perhaps we want to gain economic resources or political influence. Maybe we are viscerally compelled by the diversity, complexity, and mystery of the world, or seek through the study of God's works to get closer to the divine. Of course, many of us do what we do in natural history because we want to pass on our natural history values to the next generation.

Book Review: Naturalist: A Graphic Adaptation

By MELISSA GUILLET

Naturalist: A Graphic Adaptation
By Edward O. Wilson; adapted by Jim Ottaviani; illustrated by C.M. Butzer
Island Press, Washington, D.C.; 2020. 240 pp.
ISBN: 978-1610919586.

Admit it: you can get a lot out of a graphic novel. This graphic adaptation of *Naturalist* does not disappoint! Despite the foggy-brained days that occur between the



winter holiday of your choice and New Year's Day, I was able to devour this title in two days. Based on the 1994 book by E.O. Wilson, *New York Times* best-selling author Jim Ottaviani takes us through Wilson's childhood in Alabama, Florida, Virginia, and Maryland; 14 different schools in 11 years; and the formative experiences of his youth that led him to become the naturalist he was. As a child and teen, he avidly explored woods, marshes, and shores. A fish spine injury while fishing left him blind in one eye, making close examination of small objects easier for him and ants a natural choice. His experiences with the Scouts, religion, and the military opened his eyes to the structure of rules he sought, but also led to more questions as he found contradictions and disparities. (Could these analyses have contributed to his explorations of sociobiology later that were not well received?)

Finding a fellow naturalist friend while exploring the National Zoo led to an increased interest in insects as they were readily available on the friends' butterfly-collecting expeditions. Later, in partnerships with other biologists and entomologists, most notably William L. Brown, he delved further into evolutionary biology.

Environmental biology at Harvard soon took second seat to the much sexier studies of DNA and molecular biology, causing academic rifts. Still, Wilson was drawn to the effects of the environment on biodiversity as a whole and continued his research. By studying biodiversity of ant species on islands, he theorized that larger islands and islands closer to the mainland would be more biodiverse. With the assistance of Robert MacArthur and his rigorous mathematical background, they set out to test this theory. They first looked at the impact of the Krakatoa eruption in 1883 that wiped all life off the island. Ecologists at the time had kept records of the return of species. Wilson wanted to know when equilibrium would be reached; that is, when the area would reach the maximum number of species that it could support. They created a controlled experiment at tiny mangrove islands in the Florida Keys, employing pest-control experts and careful tenting to kill all insects (after removing larger animals such as lizards), then monitoring the return of species. *The Theory of Island Biogeography* was published in 1967.

Wilson, now famous for his studies of ants and how they use pheromones to communicate, was the only natural scientist on a Harvard panel in 1980 asking what the most important problem facing the world will be in the next decade. While others listed economic, political, and social issues, Wilson stated "mass extinction." This became the beginning of his role as an environmental activist. Following the equilibrium theory of island biogeography, smaller natural areas and fragmented forests will have fewer species, which is the case when habitat is broken up by, say, shopping and commercial centers. Conversely, reconnecting wildlife corridors through wildlife bridges over highways or planting native trees, shrubs, and flowers in yards, schools, and urban green areas can expand the "islands" that humankind has created.

In his 2016 book *Half-Earth: Our Planet's Fight for Life*, Wilson concluded that, to protect 95% of our species, we must "rewild" and protect at least 50% of Earth's lands and waters. At the recent United Nations Biodiversity Conference (COP15) in Montreal, more than 190 countries, not including the United States or the Vatican, adopted a plan to protect 30% of the planet by 2030 (see the article on page 10).

How will *you* help protect land where you are? Here are just a few starting points. Douglas W. Tallamy's *Bringing Nature Home: How You Can Sustain Wildlife and Native Plants* (2nd ed., Timber Press, 2009) shows ways to support nature in your own backyard. Japanese botanist Akira Miyawaki pioneered a method for planting mini-forests of native species that grow to climax size in one-third the time of natural succession (decades vs. centuries); the first Miyawaki Forest in the northeastern US was created in Massachusetts in 2021 (https://www.ecolandscaping.org/12/designing-ecological-landscapes/public-gardens-and-parks/miyawaki-forests/). Land can be bought through land trusts and other non-profits. We can extend wildlife corridors a few hundred feet every year. Now is the time to plan and act.

Melissa Guillet *is a URI Master Gardener, 2012 Rhode Island Environmental Educator of the Year, and Creative Director of 15 Minute Field Trips, a non-profit that "offers hands-on education programs at the intersection of art, community action, and the natural world."*

Artist Thea Ernest (left) with the subject of one of her drawings, entomologist Raul Ferreira. On January 24, they got together at the Survey's Open House and the opening of the "Artists on Expeditions" exhibit. When Thea found Raul at the 2022 East Bay Bike Path BioBlitz, late at night, Raul was hard at work under the lights of Science Central recording beetles. Raul captains the beetle team, which identified 94 species in just those 24 hours.

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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Our Mission

The Rhode Island Natural History Survey is an independent, member-supported non-profit, founded in 1994, that engages 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

LECTURE and SURVEY ANNUAL MEETING: Thursday March 30th, 6:30 pm, Doody Auditorium, Swann Hall, URI Kingston campus. Herpetologist and teacher Brian Bastarache will speak about his turtle conservation projects bringing diamondback terrapins back to the Taunton River and Mt. Hope Bay. FREE and OPEN TO THE PUBLIC. A short annual meeting will precede the lecture.

Special Lecture: "Pathogen Spillover in Managed & Native Pollinators," by Dr. Samantha Alger, Research Assistant Professor, University of Vermont. Saturday, April 15th, 2:00 pm, LIVE ONLINE (postponed from last October). RSVP to the office (address at the bottom of this page) to receive the Zoom link.

BioBlitz 2023: The Narragansett Indian Tribe and their Office of Environmental Protection and Natural Resources Management will be hosting our 24th BioBlitz on 1,200 acres of Tribal land in Charlestown on Friday and Saturday, June 9th and 10th. Science Central will be at the Tribal Meeting Grounds, and a wide variety of habitats will be accessible for "blitzing" (see Lou's letter on page 3 for more about the site). In addition to the usual orientation session at Roger Williams Park Zoo, we expect to have a second orientation at the USFWS Kettle Pond Visitor Center in Charlestown. Registration will open on May 2nd; watch the *News to Use* email newsletter for updates and announcements.

Next issue: We are already thinking about the Fall 2023 issue of *Rhode Island Naturalist*. Watch for a summary of some of the wetland work being done by the Survey's Tom Kutcher and his team and collaborators, the next installment of Marine Mammals of Rhode Island, introductions to new members of our Board of Directors, photos from the upcoming BioBlitz, and more. Let us know if there is something you'd like to hear more about, or have read a recent book that you'd be willing to review.

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