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- New York's Most Threatened Mammals
- Fearless in the Face of Wet Feet

Amanda Bevan Zientek



News from Hudsonia

Volume 37, Number 2

Winter 2023–2024

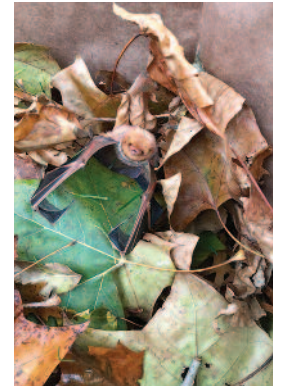


Photo on front cover: Can you spot the bat in the leaf pile? Hoary bats and eastern red bats will often curl up into a ball and roost in leaf piles. Photo © Amanda Bevan Zientek

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Dear Friends of Hudsonia,

Collections of natural history specimens—in jars, pressed in an album’s pages—have become more, not less, important in our digital age. Multifaceted and evolving, they document species, from bacteria to dinosaurs, in time and space, illuminate the interrelations of fungi, insects, and plants, and help us assess climate change. Biologists are now studying extinct plants that could be reestablished using seeds preserved in herbaria. Who knows what ecological history or new products, perhaps pharmaceuticals, could be hiding in billions of specimens around the world?

Declining institutional support for collections, and the misperception that they are outdated, has led to erosion of the collections themselves. Evolutionary biologist Charles Davis warns we are processing new knowledge too slowly, emphasizing the importance of large-scale science to address our ongoing biodiversity crisis. A crucial component is a digital global herbarium—under construction—where biologists can access “unparalleled genetic, genomic, and ecological trait data”. Such a network would allow researchers to locate the physical specimens they need for detailed research, specimens that must remain intact for ongoing study even as digitization progresses.

Small collections are especially under pressure. Ten years ago, Gretchen and Erik, with Paul Harwood formerly of the Brooklyn Botanical Garden’s Herbarium, introduced the Hudsonia-Bard College Field Station Herbarium to our readers in “Irreplaceable Archives,” (hudsonia.org/news-from-hudsonia). Gretchen has curated this small herbarium for thirty years and will help initiate the painstaking process of digitizing thousands of vascular plants and additional mosses, liverworts, lichens and fungi, despite her retirement.

In honor of all that Gretchen has done for our region, we ask you to please make a generous contribution to the Herbarium, irreplaceable archive that it is, so that it can be part of the global herbarium—a gift from all of us, including you, to the scientific community, especially its members in environmental and medical research.

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News from Hudsonia

A journal of natural history and environmental issues

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Volume 37, Number 2

Winter 2023–2024

NEW YORK'S MOST THREATENED MAMMALS

By Amanda Bevan Zientek*

This creature can live for over 40 years, consume up to 50% of its body weight in insects each night, (while producing up to 50% of its body weight in milk), and can weigh as little as a penny.^{1,2}

What is it?

GENERAL BIOLOGY

Fall brings significant changes and challenges for lots of creatures, and bats in the Hudson Valley are no exception. When evening temperatures remain below 50 °F, some bat species are making long distance migrations to Mexico, and Central and South America, whereas other species are en route to their hibernacula which include caves and human structures such as mines, culverts, and buildings.³ For hibernating species, fall is the time for courtship and mating, and outside a hibernaculum you can observe highly active bats performing this “fall swarm.” Typically, by the end of October, bats are deep in torpor where their resting heart rates drop from over 800 beats per minute to five.⁴



The big brown bat (*Eptesicus fuscus*) is a relatively common bat in New York (left) while the Indiana bat (*Myotis sodalis*) is listed as State Endangered (right). Photos © Amanda Bevan Zientek

viously known.⁵ For example, big brown bats (*Eptesicus fuscus*) have been found to be active in mid-winter at temperatures below 30 °F.

In spring, females release stored sperm from a specialized organ within the uterus to impregnate themselves (so to speak). Pregnancy duration is influenced by environmental conditions and food availability, and it is likely that females decide to forgo reproduction altogether during periods of heavy spring rainfall or drought.^{6,7,8z}

Most bat species depart their hibernacula to find summer roost sites which can include trees, talus slopes, leaf piles, beneath large rocks or in rock crevices, clusters of dead leaves in shrubs, mosses, lichens, bridges, culverts, barns, bat houses, and human houses. Large summer colonies of bats are called “maternity colonies” as they comprise reproductive females and their newborn pups which can weigh up to 43% of the mother’s body weight at birth.⁸ Maternity colonies break up after the young can fly, which happens as quickly as four weeks but can take up to 12 weeks depending on the roost’s temperature and quantity and quality of food and water that the mother consumes.⁹ Pups typically begin flying during the latter half of July. Males sometimes form bachelor colonies which can also include nonreproductive females.

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* Amanda Bevan Zientek is Hudsonia’s new Director of the Biodiversity Resources Center.

The winter ecology of bats is a rapidly growing field of study, and evidence suggests that bats are more active in the winter than pre-

Roosting ecology

Males and females have extremely different physiological needs during the spring and summer and this correlates to the sexes having different roost site and habitat requirements. Reproductive females can roost in sites with internal temperatures reaching over 130° F.¹⁰ For tree cavity roosting species, females typically prefer sites that will heat up quickly and remain warm to help reduce energy requirements for thermoregulation for themselves and to speed up pup development.¹¹ Tree roosting species, such as the migratory hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*), and the hibernating tri-colored bat (*Perimyotis subflavus*), roost in leaf clusters in trees and shrubs, leaf piles on the ground, or on the outside of bark (rather than underneath bark). Among this group, silver-haired bats primarily use tree cavities and have (somewhat) often been documented hibernating in caves and mines.⁵



The hoary bat (*Lasiurus cinereus*) is one of New York's migratory tree roosting bats. It is also the largest bat weighing in at 0.1lbs and with wingspans up to 16 inches. Photo © Ellen Whittle

Foraging behavior

All bats in New York State are primarily insectivorous. New York's bats have adequate vision and excellent hearing for detecting prey, but these species primarily rely on echolocation to find and capture their food. The unique anatomy and physiology of bat echolocation appears to be a magic

well of incredible discoveries.¹² Bats often appear erratic when in flight and you can find some excellent high-speed footage on Dr. Aaron Corcoran's YouTube Channel (https://www.youtube.com/watch?v=MgRh_Q_xwys) to find out why: bats capture their prey in their wings or tail and not in their mouths while pursuing insects at high speeds (otherwise they'd choke). While in flight, bats transfer their insect prey from their wing or tail membrane to their mouths which results in high-speed somersaults in the sky! If you're sitting outside at night and wondering why bats enjoy foraging around you—it is not because they want to nest in your hair but rather, they enjoy eating the insects attracted to you and your outdoor lights.

In North America, bats consume astonishing amounts of insects including agricultural pests.¹³ Estimates from one study indicate that bats save the US agricultural industry 3.7 – 53 billion dollars every year due to pest suppression and (thus) reduced pesticide applications.¹⁴ Some studies on other culturally important crops (corn, macadamia nuts, grapes) also demonstrate the important roles bats can play in suppressing pest insects.^{15,16,17}

CONSERVATION CONCERNS

Eight of the nine species of bats in NY are listed as Species of Greatest Conservation Need (SGCN) and four are listed as "High Priority" SGCN. Only big brown bat populations seem to be secure here, at least for the time being.

White-nose syndrome

White-nose syndrome (WNS), a disease caused by a fungus native to Europe and Asia, has caused precipitous declines of several hibernating bat species in the US (especially so in the Northeast). While bats are hibernating, it is extremely energetically costly to come out of torpor (a very deep, sleep-like state of hibernation), and WNS infections increase the number of arousals and associated losses of fat and water reserves bats need to survive the winter. Of the 12 species affected by WNS, little brown bats (*Myotis lucifugus*), tri-colored bats, and northern long-eared bats (*M. septentrionalis*) have experienced population declines of more than 90% since the fungus first arrived in New York in 2006.¹⁸ Other hibernating New York species, such as the In-

diana bat (*M. sodalis*), big brown bat, and eastern small-footed myotis (*M. leibii*) have also experienced declines although big brown bats typically have the highest survival rates.¹⁸

Although there are no known cures for white-nose syndrome, federal, state, and non-profit agencies have funded several efforts to develop vaccine and anti-fungal treatments. The efficacy of these treatments is unclear due to concerns about causing further disturbance to the microbiome on both bats and other cave-dwelling biota and disruptions to the rest of the fungal community of the cave. In addition, inoculating individual bats and/or their hibernation sites on a yearly basis would be prohibitively expensive. Instead of developing treatments, some biologists are investigating specific features of hibernacula that have colonies experiencing higher survival rates and others are focused on how to minimize additional threats that bats are facing outside of the hibernation season.^{19,20}



The scientific name for silver-haired bats, *Lasionycteris noctivagans*, means "hairy bat night wanderer" in Greek and Latin. Photo © Amanda Bevan Zientek, taken in Wyoming

By supporting surviving individuals to successfully reproduce, evolutionary rescue (the propagation of disease-resistant genes) could be a possible mechanism to develop WNS-resistant populations over time.²¹ For example, increasing foraging habitat to help surviving individuals regain lost body mass during the critical early spring period or creating "bat buffets" by setting up UV lights to lure insects outside hibernation sites could significantly increase survival rates.²² Additionally, protecting and increasing roost sites for threatened species would further support bat survival.¹⁹

Wind Energy Facilities

Bats flying through arrays of wind turbines are at risk of colliding with turbine blades or experiencing fatal barotrauma (lung damage caused by dramatic changes in air pressure behind the moving turbine blades).²³ Rapid development of wind energy facilities worldwide has led to significant advancements in the renewable energy sector, but expansive facilities are now a leading cause of population declines for bats around the world.²⁴ In the US and Canada, wind energy facilities are estimated to cause hundreds of thousands of deaths per year.²⁵ Wind turbine collisions are a particularly severe extinction threat for species that make seasonal long-distance migrations such as hoary bats, silver-haired bats, and eastern red bats.²⁶ Among these species, hoary bat fatalities number the highest.²³ Population sizes for hoary bats are difficult to estimate which restricts the ability to assess extinction risks, but recent research suggests that severe population-level impacts for the species are already underway.²⁷ Fortunately, some mitigation techniques, such as acoustic deterrents and curtailing wind turbine use during busy migration periods and low wind speeds, may be effective while minimally affecting energy generation.^{28,29}

Very little research has been done on the effects of photovoltaic (PV) solar arrays on bats. PV solar panels have been shown to attract aquatic insects drawn to smooth surfaces that generate polarized light (normally water), and this is expected to influence bat foraging patterns because some species of bats primarily forage above ponds and even around streetlamps.^{30,31} Additionally, these smooth surfaces are “acoustic mirrors” to echolocating bats, which interfere with their innate detection mechanisms of water sources, and this confusion could cause collisions and serious injury.^{32,33}

Bats, like most other species, also experience significant threats from climate change, habitat modification, loss, and degradation, and direct human disturbance.²⁴ The Indiana bat was among the very first group of species to be listed as “Endangered” by the federal government. Indiana bat populations continue to decline due to human disturbance of caves and abandoned mines during the hibernation period and the loss of forested



Amanda Bevan Zientek examining a hoary bat collected during field work in Wyoming. This bat was captured in a mist net and placed in a bag until it could be examined (5-10 minutes).

Photo © Ellen Whittle

habitats and associated roost sites.³⁴ Forests are essential for supporting diverse bat populations as they provide both food resources and roost sites for all nine of New York’s bat species. While some species may restrict foraging to forest habitats, bats adapted to foraging in open habitats, such as big brown bats, will also readily forage above farmlands and orchards.³⁵ Many biologists agree that the protection of wetland habitats plays an essential role in bat conservation, because many species of bats are known to forage in wetland habitats and drink from small, unobstructed, slow-moving pools of water found along streams.^{3,36} Few studies have investigated the specific characteristics of wetlands that North American bats may utilize and how changes to stream quality may impact foraging behavior of bats that prey on aquatic emergent insects.³⁶

WHAT YOU CAN DO

Bats are difficult animals to observe (and therefore study) given their nocturnal cryptic behavior and small body size (even the largest bat in New York only weighs 20–45 grams or 0.1 pounds). If you are lucky enough to have bats in your backyard, here are a few ways you can help:

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FEARLESS IN THE FACE OF WET FEET

By Chris Graham*

Hudsonia is preparing to enter a new phase in 2024, a territory uncharted since 1990: one without Gretchen Stevens as resolute biologist, educator, and unofficial co-leader of our organization. Gretchen will retire at the end of 2023 after more than 30 years with Hudsonia, but she'll continue to be active with us as a volunteer botanist, archivist, and biodiversity guru.

Gretchen came to Hudsonia with a B.S. in Environmental Conservation from the University of New Hampshire and a decade of work experience, and quickly excelled as Hudsonia's new Biologist and Curator of the Bard College Field Station Herbarium. Early projects included biological surveys, habitat assessments, rare plant and animal surveys, and wetland delineations, covering a broad geographic area from New Rochelle to northern Columbia County and to far-flung locations across New York and western CT. After arriving at Hudsonia already possessed of substantial botany experience, working on so many and varied projects allowed Gretchen's taxonomic skills to really flourish.



Gretchen Stevens with Erik Kiviat on the tidal marsh at Bristol Beach State Park (formerly Eve's Point), soon after joining Hudsonia. Photo © Esther Kiviat

One early, important project on which Gretchen was a lead biologist was the design and construction of Blanding's turtle wetlands at Arlington High School in LaGrange, NY. Here, three wetlands were created to mitigate the destruction of a core Blanding's turtle habitat (a kettle shrub pool), using planted button-bush and blocks of vegetated sediment from the filled wetland, to "seed" the plant communities of the new wetlands. Hudsonia's Executive Director, Erik

Kiviat, relates that "As far as I know, we designed and monitored the first wetland created specifically for a freshwater turtle in the U.S. This project has left a heritage of benefit to a threatened species as well as the...field of habitat creation. Significantly due to Gretchen, we know what worked and what didn't work in the project...."

In the mid-'90s, Gretchen and Kiviat began work on a magnum opus: a comprehensive guide to using existing maps and data to identify, map, and field-check ecologically significant habitats, for use in development reviews and conservation plans. The tome, published in 2001 as the Biodiversity Assessment Manual for the Hudson River Estuary Corridor,¹ also contains hundreds of pages of profiles of habitats, plants, and animals of the Hudson Valley, and has been used widely by municipalities and nonprofits for conservation planning in the region.

Since 2002, Gretchen has been the founding Director of the Biodiversity Resources Center, which houses activities such as Hudsonia's biodiversity education and habitat mapping programs. Gretchen has taught or co-taught more than 70 courses and webinars, ranging from half-day to three-day to 40-hour courses, and over 900 students. These courses are for members of various municipal boards, land trust employees, and other decision-makers, and address the ecology and conservation of our regional plants, animals, ecosystems, and water resources, especially during development review and town-level planning processes. According to Ingrid Haeckel of the DEC's Hudson River Estuary Program, "[Gretchen] is exceptionally skilled at communicating scientific information to non-scientists and conveying land use policy to the public in an understandable way.... Her...expertise as a field biologist and botanist [has] been a great draw in our field-based education programs – so much so that we would often assign someone the task of helping move the group along... when participants would inevitably get absorbed with Gretchen in...questions about plant ID and ecology."

"Gretchen has taught me . . . to listen both compassionately and critically, to think fully before responding . . . to dwell in the details of landscape, habitat, and each plant. . . ."

Building on her years of experience with using remote data sources (e.g., aerial photos, topographic maps) to predict the habitats of a site prior to field study, Gretchen also spearheaded the development of Hudsonia's habitat mapping program, which produced its first town-wide habitat map in 2002.² The project demonstrated how the methods laid out in the Manual could be successfully applied in a GIS (Geographic Information System) to create accurate, high-resolution habitat maps at scales of tens of thousands of acres. Since then, Gretchen has managed and contributed to the mapping of 21 Hudson Valley towns, cities, and riparian corridors, and assisted five conservation advisory

* Chris Graham is Hudsonia's Biologist and Habitat Mapping Coordinator.

councils in the mapping of other towns. Each project includes a lengthy analytical report and educational workshops for municipal board members and the public, on regional biodiversity and habitats, their vulnerabilities and conservation practices, and how to use the habitat map for conservation planning. At the center of each project has been Gretchen, guiding, teaching, editing, and mapping.

In recent years, Gretchen has nearly single-handedly written expansive and information-rich natural resource inventories for seven Hudson Valley towns and counties, and been a coauthor, along with Hawthorne Valley Farmscape Ecology Program staff, of a forthcoming field guide to the habitats of her adopted home region, Columbia County.

Along her 30-year arc at Hudsonia, Gretchen has profoundly influenced and, without trying to, endeared herself to her many colleagues. Qualities that stand out most include her critical thinking, ecological acumen, and ability to listen, observe, and soak in details: "Gretchen has taught me . . . to listen both compassionately and critically, to think fully before responding, and to make [my] response both insightful and concise . . . to dwell in the details of landscape, habitat, and each plant in its variability . . ." says former Hudsonia Biologist Kristen Bell Travis. Hudsonia's long-time illustrator, Kathy Schmidt, marvels that "Gretchen has an unusual combination of traits: she is a stickler for details, yet she also sees the big picture." According to Schmidt, this makes her "an editor par excellence. In the several small articles I have written for News from Hudsonia, I read and re-read them to make sure there were no mistakes. I took it as a challenge to outsmart Gretchen. She ALWAYS found some!"



Gretchen Stevens with attendees of the *Small Streams and Wetlands* workshop in Coeymans NY this past fall. Photo © Ingrid Haeckel

Despite her knowledge and accomplishments, Gretchen's humility and work ethic imbue all she does. Haeckel observes, "Gretchen's work is always of the highest quality and integrity, yet she is one of the most understated people I know." Longtime collaborators Claudia and Conrad Vispo agree: "through it all, she remains her soft-spoken self, with a shy smile always ready to grace some natural history observation." Kathy Schmidt: Gretchen "puts in the hours. She is extremely disciplined and . . . does a prodigious amount of work." Kiviatt remarks, "I learned quickly to leave her alone most of the time to manage her

own work effectively." Adds Outreach and Development Coordinator Philippa Dunne "[Gretchen] is committed to making sure everyone's efforts and contributions are acknowledged and valued. . . ."

Many consider her both friend and mentor, and have fond memories of working with her: "Gretchen is a mentor, an inspiration and a dear friend," effuse the Vispos. "She always seems happiest when nosing about in some forest, field or wetland. Somehow, our fondest memories of Gretchen all involve water and/or muck: dragging our canoes across the railroad tracks and then through a thick belt of cattails on the shore of the Hudson River . . . ; crossing the moat of a long-searched-for bog on a fallen tree, to marvel at a 'field' of flowering cranberries and *Rose Pogonia* . . . ; or mucking through a . . . wet beaver meadow . . . to document its vegetation. It is safe to say that she is fearless in the face of wet feet." Schmidt recalls: she "uses the word 'depauperate' in everyday speech, yet isn't showing off. 'Oh, that's a depauperate specimen of a Hellebore,' she once told me hesitantly. A flicker of wonder flashed across her face. How could it be here? How could it be so frugal yet still say Hellebore?"

Travis reminisces, "I looked forward to seeing her at work every morning so we could exchange natural history observations (I still miss this . . . after fifteen years away). . . . A good mentor teaches one how to live by example, and Gretchen has taught me so much." Hudsonia's Administrative Director, Lea Stickle, echoes this: "Her mentorship to me has been one full of generosity and encouragement, thoughtfully instructing me over the years on wide-ranging topics such as the right way to press a plant, format a table for a report, or even make a good cup of coffee. . . ."

Former Hudsonia Biologist Nava Tabak recounts an event that illustrates Gretchen's kindness and thoughtfulness, and not just toward humans: A coworker "got his puppy Willow. She came to work with [him] and was adored by all, but especially Gretchen. Willow was still being housebroken, but was doing pretty well. . . . As a joke, I brought in some fake puppy poop . . . and put it out of the way in a [storage] room. . . . The next day the poop was gone but no one said anything. . . . I asked everyone [about it]. It turned out that Gretchen had found it, and because it was very realistic she picked it up with paper, threw it out, cleaned the carpet, and never said anything to [the coworker] because she didn't want to get Willow in trouble."

Gretchen always appreciates a good joke, quip, or game. I recall how, a few years ago, I brought a small, plush, blue grosbeak toy into the field station and positioned it neatly on Gretchen's desk when she wasn't around. I next returned to work to find the bird in a cleverly unassuming position on my own desk. Over the next few months ensued a game in which we took turns, once or twice a week, smartly positioning, sometimes hiding, the bird on, in, and around each other's desks. Eventually, having run out of creative places to lodge the bird, I silently declared Gretchen the winner.

"Oh, that's a depauperate specimen of a Hellebore,' she once told me hesitantly. A flicker of wonder flashed across her face. . . . How could it be so frugal yet still say Hellebore?"

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- Think of your pollinator garden moonlighting as a bat buffet.
 - Turn off outdoor lights to keep insects active in areas where bats can forage easily.
 - Eliminate or reduce pesticide use.
- Keep your dead limbs! Trees with dead limbs provide important roost sites for bats. Many species of conservation concern will roost under loose bark and in crevices found where the dead branch meets the bole.
- Leave leaf piles— you might find a bat roosting in them!
 - Tree roosting bats, such as hoary bats and eastern red bats, are known to use leaf piles. This behavior has been recorded year-round but is most common during the spring and fall. Leave leaf piles in areas of your yard that would be minimally disturbed.
- Keep cats indoors or equip them with bells to alert wildlife to their presence. Outdoor cats are a significant threat to many kinds of wildlife including bats.
- Avoid using sticky insect traps outdoors. Bats, attracted to nocturnal insects, can easily get caught on these traps and perish.
- Share your discovery if you find a large colony of bats!
 - You can use the New York Natural Heritage Program’s “Report a Rare Species” tool to contribute important information on locations of maternity colonies or hibernation sites. Reports can be made here: <https://www.nynhp.org/contribute-data/>
 - Bats in the belfry? It is illegal to kill or harm bats roosting inside a home (or anywhere) unless an individual specimen is requested for rabies testing by your local Health Department. There are several humane ways to safely exclude unwanted bats from roosting in your attic or interior parts of the house (e.g. the walls).
 - To ensure that the pups are not trapped inside, humane bat exclusions should occur only after pups are able to fly. Pups are typically flying after August 1st.
 - If you are looking to patch up possible entryways for bats, look for openings near the roof edge and valleys, eaves, top of gables, chimneys (areas touching the house), attic or roof vents, dormers, and siding.³⁷
 - Rabies is a deadly disease and should be taken seriously. Never attempt to capture or touch wild mammals. Rabies is rare among bats, but if you think you may have encountered a rabid bat, seek medical attention even if you do not think you’ve been bitten or scratched. Bats have very small teeth and claws, and bites and scratches do not necessarily leave noticeable marks. Also, rabid bats are hard to detect by their behavior. It is not uncommon to see bats flying during the day, and all bats look

erratic in flight to the untrained eye—but a bat on the ground should be suspected of being rabid. Never attempt to move or handle individuals. Questions may be directed to the local Department of Health Rabies Hotline.

- Histoplasmosis is an infection, usually of the lungs, caused by the common fungus *Histoplasma capsulatum* which is found in soils. Severe infections are generally contracted when individuals are repeatedly exposed to large amounts of bat or bird droppings over long periods of time (e.g., restorers of very old houses, poultry farmers, cavers). Large amounts of bat guano should be removed by professionals.

HUDSONIA AND BATS

Over the next few years, Hudsonia plans to apply our knowledge of northeastern habitats to address questions regarding bat ecology and conservation. We encourage full consideration of foraging and roosting habitats at the landscape, tree, and microhabitat scale (with special attention to nursery colonies) in land use planning and the management of habitats and potential roost sites (live and dead trees, human structures, etc.). We are prepared to conduct bat habitat assessments and surveys to document which species are present, their activity patterns, specific habitat features that bats might be using, and potential threats to the bats and their habitats.

REFERENCES CITED

1. Kunz, T.H. and M.B. Fenton, eds. 2003. Bat ecology. University of Chicago Press, Chicago.
2. Wilkinson, G.S. and D.M. Adams. 2019. Recurrent evolution of extreme longevity in bats. *Biology Letters* 15(4):e20180860.
3. Lacki, M.J., S.K. Amelon, and B.D. Baker. 2007. Foraging ecology of bats in forests. P. 83–127 in M.J. Lacki, J.P. Hayes, and A. Kurta, eds., *Bats in Forests: Conservation and Management*. Johns Hopkins University Press, Baltimore, MD.
4. Currie, S.E., G. Körtner, and F. Geiser. 2014. Heart rate as a predictor of metabolic rate in heterothermic bats. *Journal of Experimental Biology* 217(9):1519–1524.
5. Cryan, P.M. and J.P. Veilleux. 2007. Migration and use of autumn, winter, and spring roosts by tree bats. P. 153–175 in M.J. Lacki, J.P. Hayes, and A. Kurta, eds., *Bats in Forests: Conservation and Management*. Johns Hopkins University Press, Baltimore, MD.
6. Racey, P.A. and A.C. Entwistle. 2000. Life-history and reproductive strategies of bats. P. 363–414 in E.G. Crichton and P.H. Krutzsch, eds., *Reproductive Biology of Bats*. Academic Press, San Diego, CA.
7. Adams, R.A. 2010. Bat reproduction declines when conditions mimic climate change projections for western North America. *Ecology* 91(8):2437–2445.
8. Stapelfeldt, B., A. Scheuerlein., C. Tress, R. Koch, J. Tires, and G. Kerth. 2022. Precipitation during two weeks in spring influences reproductive success of first-year females in the long-lived Natterer’s bat. *Royal Society Open Science* 9(2):e211881.
9. Hoying, K.M. and T.H. Kunz. 1998. Variation in size at birth and post-natal growth in the insectivorous bat *Pipistrellus subflavus* (Chiroptera: Vespertilionidae). *Journal of Zoology* 245(1):15–27.
10. Williams, L.M. and M.C. Brittingham. 1997. Selection of maternity roosts by big brown bats. *The Journal of Wildlife Management* 61:359–368.
11. Barclay, R.M. and K.A. Kurta. 2007. Ecology and behavior of bats roosting in tree cavities and under bark. P. 17–59 in M.J. Lacki, J.P. Hayes, and A. Kurta, eds., *Bats in Forests: Conservation and Management*. Johns Hopkins University Press, Baltimore, MD.

12. Adams, R.A. and S.C. Pedersen. 2000. *Ontogeny, functional ecology, and evolution of bats*. Cambridge University Press, Cambridge, UK.
13. Maslo, B., R.L. Mau, K. Kerwin, R. McDonough, E. McHale, and J.T. Foster. 2022. Bats provide a critical ecosystem service by consuming a large diversity of agricultural pest insects. *Agriculture, Ecosystems & Environment* 324:e107722.
14. Boyles, J.G., P.M. Cryan, G.F. McCracken, and T.H. Kunz. 2011. Economic importance of bats in agriculture. *Science* 332(6025):41–42.
15. Maine, J.J. and J.G. Boyles. 2015. Bats initiate vital agroecological interactions in corn. *Proceedings of the National Academy of Sciences* 112(40):12438–12443.
16. Taylor, P.J., I. Grass, A.J. Alberts, E. Joubert, and T. Tschamtk. 2018. Economic value of bat predation services – A review and new estimates from macadamia orchards. *Ecosystem Services* 30:372–381.
17. Rodríguez-San Pedro, A., J.L. Allendes, C.A. Beltran, P.N. Chaperon, M.M. Saldarriaga-Cordoba, A.X. Silvia, and A.A. Grez. 2020. Quantifying ecological and economic value of pest control services provided by bats in a vineyard landscape of central Chile. *Agriculture, Ecosystems & Environment* 302:e107063.
18. Cheng, T.L. et al. 2021. The scope and severity of white-nose syndrome on hibernating bats in North America. *Conservation Biology* 35:1586–1597.
19. Coleman, J., A. Ballmann, L. Benedict, E. Britzke, K. Castle, W. Cottrell, P.M. Cryan, T. DeLiberto, A. Elliot, and R. Ewing. 2014. A national plan for assisting states, federal agencies, and tribes in managing white-nose syndrome in bats. United States Fish and Wildlife Service. US Fish & Wildlife Publications. 454. <https://digitalcommons.unl.edu/usfwspubs/454>
20. White-Nose Syndrome. White-nose Syndrome Response Team <https://www.whitenose-syndrome.org/static-page/helping-bats-survive>.
21. Maslo, B., O.C. Stringham, A.J. Bevan, A. Brumbaugh, C. Sanders, M. Mackenzie, and N.H. Fefferman. 2017. High annual survival in infected wildlife populations may veil a persistent extinction risk from disease. *Ecosphere* 8:e02001.
22. Frick, W.F., Y.A. Dzal, K.A. Jonasson, M.D. Whitby, A.M. Adams, C. Long, J.E. Depue, C.M. Newmann, C.K.R. Willis, and T.L. Cheng. 2023. Bats increased foraging activity at experimental prey patches near hibernacula. *Ecological Solutions and Evidence* 4:e12217.
23. Arnett, E. and E. Baerwald. 2013. Impacts of wind energy development on bats: Implications for conservation. P. 435–456 in R.A. Adams and S.C. Pedersen, eds., *Bat Evolution, Ecology, and Conservation*. Springer, New York.
24. Frick, W., T. Kingston, and J.A. Flanders. 2019. Review of the major threats and challenges to global bat conservation. *Annals of the New York Academy of Sciences* 1469:5–25.
25. Hayes, M.A. 2013. Bats killed in large numbers at United States wind energy facilities. *BioScience* 63(12):975–979.
26. Thompson, M., J.A. Beston, M. Etterson, J.E. Diffendorfer, and S.R. Loss. 2017. Factors associated with bat mortality at wind energy facilities in the United States. *Biological Conservation* 215:241–245.
27. Rodhouse, T.J., R.M. Rodriguez, K.M. Banner, P.C. Ormsbee, J. Barnett, and K.M. Irvine. 2019. Evidence of region-wide bat population decline from long-term monitoring and Bayesian occupancy models with empirically informed priors. *Ecology and Evolution* 9(19):11078–11088.
28. Hayes, M.A., L.A. Hooton, K.L. Gillan, C. Grandgent, R.L. Smith, S.R. Lindsay, J.D. Collins, S.M. Schumacher, P.A. Rabie, J.C. Gruver, and J. Mahoney-Goodrich. 2019. A smart curtailment approach for reducing bat fatalities and curtailment time at wind energy facilities. *Ecological Applications* 29:e01881.
29. Weaver, S.P., C.D. Hein, T.R. Simpson, J.W. Evans, and I. Castro-Arellano. 2020. Ultrasonic acoustic deterrents significantly reduce bat fatalities at wind turbines. *Global Ecology and Conservation* 24:e01099.
30. Horváth, G., G. Kriska, P. Malik, and B. Robertson. 2009. Polarized light pollution: A new kind of ecological photopollution. *Frontiers in Ecology and the Environment* 7(6):317–325.
31. Szabadi, K.L., A. Kurali, N.A.A. Rahman, J.S.P. Froidevaux, E. Tinsely, G. Jones, T. Gorgol, P. Estok, and S. Zsebők. 2023. The use of solar farms by bats in mosaic landscapes: Implications for conservation. *Global Ecology and Conservation* 44:e02481.
32. Greif, S. and B.M. Siemers. 2010. Innate recognition of water bodies in echolocating bats. *Nature Communications* 1(107):1–6.
33. Greif, S., S. Zsebők, D. Schmieder, and B.M. Siemers. 2017. Acoustic mirrors as sensory traps for bats. *Science* 357:1045–1047.
34. US Fish and Wildlife Service. 2007. Indiana bat (*Myotis sodalis*) draft recovery plan: First revision. Department of the Interior, US Fish and Wildlife Service, Great Lakes-Big Rivers Region, Region 3. Fort Snelling, MN. 258 p.
35. Maslo, B., R. Valentin, K. Leu, K. Kerwin, G.C. Hamilton, A. Bevan, N.H. Fefferman, and D.M. Fonseca. 2017. Chiro surveillance: The use of native bats to detect invasive agricultural pests. *PLoS one* 12:e0173321.
36. Mas, M., C. Flaquer, H. Rebelo, and A. López Baucells. 2021. Bats and wetlands: Synthesising gaps in current knowledge and future opportunities for conservation. *Mammal Review* 51:369–384.
37. Greenhall, A.M. and S.C. Frantz. 1994. Bats (*Myotis lucifugus*). P. 5–24 in S.E. Hygnstrom, R.M. Timm, and G.E. Larson, eds., *The Handbook: Prevention and Control of Wildlife Damage*. Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln. ■

WELCOME TO AMANDA BEVAN ZIENTEK

This fall, Dr. Amanda Bevan Zientek joined Hudsonia, stepping into Gretchen’s role as the Director of the Biodiversity Resources Center. Amanda has a background in developing and leading outreach and education programs that incorporate engaging urban, suburban, and rural communities in scientific monitoring of bats and amphibians. Some of her projects will include completing a Natural Resources Inventory for the City of Newburgh, conducting biodiversity assessments, leading the Biodiversity Education Program, as well as developing research projects to study bat ecology in the Hudson Valley.



HUDSONIA PROJECT UPDATES, 2023

Special Species and Habitats

Temporary pools. In 2021-2022 we sampled macroinvertebrates and water chemistry in temporary pools in Ulster and Dutchess counties. The first of two papers, about the invertebrates, has been submitted to a journal. We are currently analyzing the relationship of the invertebrates to water chemistry and other environmental conditions. Temporary pools, which hold water for several weeks or months each year, are rich invertebrate habitats and support some species not found elsewhere. (With Bob Schmidt and Emily White. Supported by Will Nixon.)

Wood turtle. The fifth season of radiotracking at an organic farm has drawn to a close as the turtles now spend their time in their aquatic overwintering habitat. Our goal in this project is to devise recommendations for reducing the injuries and deaths caused by farm equipment. Our manuscript covering the first four years of tracking is under review for a special turtle issue of a scientific journal and are discussing potential mitigative measures with farm managers. (Radiotracking conducted by Hudsonia staff and Jason Tesauro Consulting. The Applied Farmscape Ecology Research Collaborative [AFERC] is co-coordinated by Hawthorne Valley Farmscape Ecology Program and the Hudson Valley Farm Hub.)

Common Gallinule and Other Biota

Originally published in the *Birds of North America* accounts in 2002 by Brett Bannor and Erik Kiviat, the life history synthesis of the common gallinule has

been considerably updated with the help of Bard student intern William Mennerick and SUNY ESF graduate Hannah Kowalsky. The revised manuscript will be published in the expanded, online *Birds of the World* series of the Cornell Laboratory of Ornithology.

Papers about Atlantic Coast leopard frog, Blanding's turtle, common reed (*Phragmites*), and knotweed are in scientific journal review or in preparation.

Special Places

Our biodiversity assessment at the **Jesse and Gayle Bontecou Wildlife Conservation Preserve**, a recent acquisition of the Dutchess Land Conservancy, has turned up numerous bird and bat species listed as NYS Species of Greatest Conservation Need, rare and uncommon species of dragonflies, and several regionally-rare plants. A camera trap found an ear-tagged black bear that had been recently reported from Columbia County. Surveys will continue through the winter and next spring, and in the meantime we are developing recommendations for land management to protect and improve habitats for wildlife while accommodating ongoing agriculture and planning for public uses. Collaborators include the Hawthorne Valley Farmscape Ecology Program, Larry Federman, Jason Tesauro, and Emily White. (Funded by the Dutchess Land Conservancy.)



Meg Rumplick radiotracking wood turtles at the research site. Photo © Amanda Bevan Zientek



An intermittent stream and pipewort, a plant of low-nutrient waters, at the Jesse and Gayle Bontecou Wildlife Conservation Preserve. Photos © Gretchen Stevens (top) and Erik Kiviat (bottom)



Blue ground cedar, *Diphasiastrum tristachyum*, a possibly regionally rare clubmoss found during field work in Dutchess County. Photo © Erik Kiviat

Biodiversity Assessments and Biological Surveys

We performed **biodiversity assessments, reviewed environmental documents,** and provided **conservation recommendations** for proposed developments, future parks, energy projects, lakes, and private estates from Long Island to Sullivan County to Columbia County in the New York towns of Clinton, Copake, Huntington, Marbletown, Mount Pleasant, Pine Plains, Pleasant Valley, Rhinebeck, Rochester, Saugerties, Thompson, Woodstock, and Wright, and a *Phragmites* assessment in Jersey City, New Jersey. Among our findings were rare sedges, the State-Threatened pied-billed grebe, and extensive acidic bogs.

Biodiversity Education

In collaboration with the Hudson River Estuary Program, we held field workshops on **Identification and Protection of Small Streams and Wetlands** at locations in New Paltz (Ulster County) and Coeymans (Albany County). Topics discussed included how to identify small wetlands and small streams even when they are dry; ecological attributes and sensitivities; the changing federal and state regulatory programs; and the importance of local legislation to protect the many small streams and wetlands that are unprotected by the state and federal governments. (Funded by the NYS Environmental Protection Fund through the NYSDEC Hudson River Estuary Program.)

Assistance to Municipalities

Natural Resource Inventories. Since early 2022 we have been assisting working groups in the **Town of Kent** (Putnam County) and the **Town of Milan** (Dutchess County) with preparation of Natural Resource Inventories for those towns. The two NRIs were finally published this fall and are available for viewing or downloading from links on the town websites. We hope that landowners, developers, town agencies, conservation organizations, and others will find many uses of the NRI information for land use planning, environmental reviews, and conservation initiatives.

In collaboration with GREENPLAN, we have begun work on a Natural Resources Inventory for the **City of Newburgh** (Orange County), working closely with the Newburgh Conservation Advisory Council and Department of Planning. In addition to describing the natural resources, the NRI will examine how those

resources serve the city, how the people of Newburgh interact with local green-spaces, and how the connections might be improved.

As contributors to the Natural Resources Inventory for the **Town of Stanford** (Dutchess County), we are undertaking an update of the town-wide map and report on ecologically significant habitats that we completed in 2005.

Our work on the NRIs and the Stanford habitat mapping has been funded by grants to the municipalities from the NYS Environmental Protection Fund through the NYSDEC Hudson River Estuary Program.

Critical Environmental Areas. In partnership with the Hudson River Estuary Program, we assisted a working group in the **Town of Olive** with their successful effort to establish two Critical Environmental Areas (CEAs) in the town, one in the vicinity of an unusual wetland, and the other along two high-quality trout streams. The purpose of the CEA designations is to educate people about exceptional natural or cultural features that deserve special attention during environmental reviews and decisions related to land uses. (Conducted through a partnership with Cornell University and the NYSDEC Hudson River Estuary Program with funding from the NYS Environmental Protection Fund.)

Urban Biodiversity

Urban Biodiversity: The Natural History of the New Jersey Meadowlands by Erik Kiviat and Kristi MacDonald is available in hardcover and ebook. Favorable reviews have appeared in *Quest*, *Natural Areas Journal*, and *Wetland Science & Practice*. We hope you will ask your library to order it. The comprehensive flora and bird lists from the book, as well as a discount flyer for personal orders, are at hudsonia.org. A companion book on urban biodiversity is in preparation.

Bard College

Hudsonia staff provided assistance to Bard College students, faculty, staff, and graduates, trained interns and volunteers, spoke to classes, and discussed vegetation and water management on the campus in Annandale. We also assisted folks at other Hudson Valley colleges. ■



Bard College student and Field Station intern Mari Thompson with moss collection. Photo © Lea Stickle

From the ancient-looking huaraches she wears around the field station and tattered cotton-duck field pants, to her whimsical, hand-sewn masks of the Covid-19 era and colorful tops heavy on shades of purple, Gretchen's style also shines. She "effortlessly blends nerdiness and cool, [and] wears old timey red Converse sneakers," remarks Schmidt. Indeed, the Chuck Taylors are quintessential Gretchen: "While [she] seems most at home. . . in the field wearing rubber boots, she has put on her clean Converse sneakers to attend myriad. . . meetings, often far from home and late into the night, to provide education and support for local conservation. . . ." muses Haeckel.

Above all else, perhaps, is the lasting imprint Gretchen has made on the communities, both natural and human, of our region. Travis writes, "What a huge practical impact Gretchen has made on fostering responsible and democratic land stewardship, via her work as an educator, town committee member, poll worker, and especially through Hudsonia's many projects and collaborations. . . . Her steadfast. . . commitment [has] helped so many communities [adopt] critical environmental areas . . . and other policies to protect biodiversity. . . ." Haeckel points out. "The result [of her efforts] is an empowered, active cadre of well-informed citizens and decision-makers who are leading efforts to protect biodiversity in their communities, on a scale unequaled elsewhere in New York State."



Gretchen poking about in Thompson Pond, undaunted by a lack of rubber boots.
Photo © Lea Stickle

Schmidt, who considers Gretchen "the total package" and a "good friend," says that she "cares deeply about the things . . . we all depend on—the environment, land use, protecting critters and biodiversity. Gretchen has dedi-

cated her life and career to protecting wild spaces by doing original research, . . . mapping, and report-writing, then teaching what she finds to local communities."

The result of her efforts "is an empowered, active cadre of well-informed citizens . . . who are leading efforts to protect biodiversity in their communities."

Perhaps the Vispos sum it up best: "We have come to appreciate Gretchen's patient and competent work style, her deep love and care for all creation, and her companionship and expertise in the field." All of us at Hudsonia have, too, and we will count on her continued presence in our lives and the lives of the Hudson Valley's wild creatures.

1. Kiviat, E. and G. Stevens. 2001. Biodiversity assessment manual for the Hudson River estuary corridor. New York State Department of Environmental Conservation, Albany. 508 p.
2. Stevens, G. and E. Broadbent. 2002. Significant habitats of the Town of East Fishkill, Dutchess County, New York. Report to the Marilyn Milton Simpson Charitable Trusts and the Town of East Fishkill. Hudsonia Ltd., Annandale, NY. 56 p. ■

NYFA PLANT CONSERVATIONIST AWARD



Gretchen Stevens was honored to be the recipient of the 2023 Plant Conservationist Award from the New York Flora Association. This is an annual award to recognize a person who has worked towards the conservation of the native flora of New York. Gretchen has directed Hudsonia's Biodiversity Resources Center for over twenty years, overseeing habitat mapping and natural resource inventories covering over 2,000 square miles in the Hudson River estuary corridor, Catskill Mountains, and beyond, all the while training members of municipal agencies and land trust staff in ways to recognize and protect important habitats and water resources throughout the region.

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Julianna Zdunich, for designing our fundraising appeals.

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Binoculars (lightweight, good quality)

Natural history and conservation science books, periodicals, maps

(For technical equipment, we are interested only in items less than 5 years old and in good working condition.)

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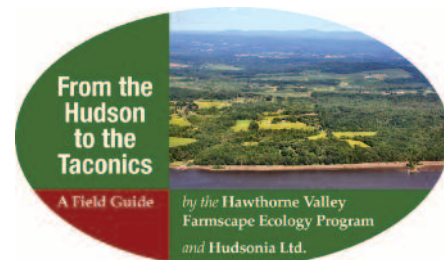
WELCOME TO CARLA RHODES

We are delighted that Carla Rhodes has joined our advisory board. Carla first pursued a career as a comedian and ventriloquist, in her words lending her voice to inanimate objects. Now dedicating her life to wildlife conservation photography, she uses her camera to elevate wild subjects, including species that are often overlooked, and conservationists working to help them survive. You can find her work in the New York Times, The Guardian, and the Wall Street Journal, among many other publications. Welcome, Carla.



COLUMBIA COUNTY FIELD GUIDE

Co-authored with the Hawthorne Valley Farmscape Ecology Program, the **From the Hudson to the Taconics: An Ecological and Cultural Field Guide to the Habitats of Columbia County, New York** is available for a **discounted pre-order this winter!** This generously illustrated book describes many of the ecological communities in the county, past and present uses of the land, and aspects of people's interactions with the natural world. Visit our website at hudsonia.org to access a pre-order form and the discount. Save on shipping by selecting the option to pick up from Hudsonia's office at the Field Station after the field guide is printed in April 2024.



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(Listed here are donations received between 10 February 2022 and 30 June 2023.)

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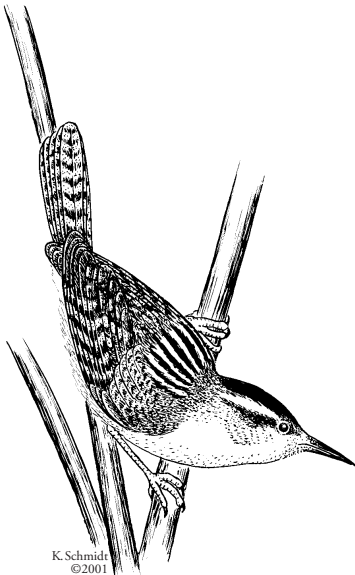


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