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Lea Stickle © 2019



News from Hudsonia

Volume 33, Number 2

Fall 2019

Dear Friends of Hudsonia,

We hope this issue of Hudsonia's journal finds you well and warm!

In the pages that follow, you will read about our major areas of interest and recent project work.

Hudsonia is the scientific arm of conservation and land use planning in the Hudson Valley and beyond. We are this only because you and others use the information we produce, and you help support our efforts. In fact, about a quarter of Hudsonia's revenue is from individual donations, with the rest from small and large grants from foundations and agencies, and technical assistance contracts with other NGOs, citizens' groups, local government, landowners, and consulting firms.

To preserve our objectivity in gathering, analyzing, and disseminating scientific information, Hudsonia does not take sides for or against land use projects. But because of our non-advocacy role and because we function at the interface of research and applications, Hudsonia is not eligible for many kinds of financial support. That's why your donations are crucial to Hudsonia's leading-edge studies of urban and rural habitats, rare biota, and non-native invasive plants and animals that help environmental professionals and informed citizens do your thoughtful environmental work.

Today more than ever, as we witness the abandonment of long-standing federal environmental laws and conservation policy, there is need for accurate, up-to-date, site- and region-specific ecological information to inform our uses and care of land and water. The next time you look at a wetland, stream, forest, or meadow and see, hear, or smell the panoply of wild nature, please remember to write a check or donate to Hudsonia via hudsonia.org. If you can, please make a larger gift than last year, to help Hudsonia do more in 2020!

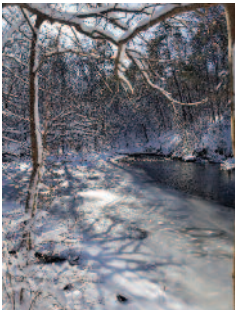
All our best for the holidays and the winter, from all Hudsonia's staff and Board of Directors.

Erik Kiviatt PhD
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Cover photo: The Saw Kill after the Thanksgiving snowstorm.
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BIODIVERSITY STUDIES, SOLAR FARMS, SHRUBLAND, TURTLES, AND SWANS: The Decade in Review

By Erik Kiviat*

At intervals Hudsonia staff stop to reflect on our projects, how they have opened new fields of inquiry, advanced scientific knowledge, and supported biodiversity conservation. This article summarizes some of our most important research, synthesis, and technical assistance work in the larger context – the Northeast and nationwide. Hudsonia biologists started some lines of research before Hudsonia was founded in 1981, among them our studies of non-native weeds, turtle ecology, and the fishes of the Hudson River watershed. Other areas of work are new, including studies of urban biodiversity, solar facility sites, and Natural Resources Inventories for towns and counties.

But our mission and our role in bringing sound science to environmental policy and practice have remained unchanged. We conduct research, synthesize our and others' research findings, develop educational materials, and provide guidance and assistance for people making land use policy and conservation decisions. An increasing deficit of administration and enforcement of environmental laws and regulations greatly increases the importance of private sector studies and local action.



Wood turtle, a Species of Special Concern in New York. Kristen B Travis © 2019

TURTLES

The Hudson Valley is a global hotspot of turtle diversity, which creates a special responsibility for habitat conservation. We have studied the ecology and habitat needs of several of the turtles that occur in our region, namely snapping turtle, painted turtle, wood turtle, bog turtle, and Blanding's turtle. All of these are Species of Greatest Conservation Need in New York except the nearly ubiquitous painted turtle. Using the habitat approach in our research has revealed many important aspects of turtle ecology that can translate into more effective habitat conservation, restoration, and management.

For example, we found that Blanding's turtle females select nest sites with coarser or finer soil texture in wetter or drier nesting seasons, respectively. The soil texture regulates soil drainage and helps maintain the nest at the right moisture level for egg incubation. We found that soils are also key to bog turtle habitats: at a habitat management site the turtles were not using an area where siltation had occurred from upstream land use, despite the apparent suitability of the vegetation and surrounding habitat. These findings allow us to recommend to habitat managers that they provide access to a variety of soils for Blanding's turtle nesting, and examine soils in bog turtle sites prior to designing restoration projects.

We are now studying wood turtles at two large streams that flow through agricultural landscapes. Wood turtles especially are known to be injured and killed by farm equipment, and we hope to learn how this threat can be reduced at these sites and other farms. This is part of a larger agroecology project with the Hawthorne Valley Farmscape Ecology Program. Jason Tesauro is a collaborator in Hudsonia turtle research.

*Erik Kiviat is Hudsonia's executive director.

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URBAN BIODIVERSITY

In 1999, a coalition of environmental groups asked Hudsonia to help review the proposal for a development project that would have filled 200 acres of one of the best remaining marshes in the New Jersey Meadowlands. Our analysis contributed to the project being moved out of the marsh and onto the existing fill of the Meadowlands Sports Complex where it is now the just-opened American Dream mall. This introduction to the Meadowlands, a degraded urban-industrial region of 150 km² (60 mi²), inspired us



Box turtle in ephemeral pool, New Jersey Meadowlands. Erik Kiviat © 2019



Least sandpipers in a small pool in common reed marsh, Meadowlands. Chris Graham © 2019



Eastern pond hawk, a common dragonfly on common reed, Meadowlands. Erik Kiviat © 2019

to synthesize biological information into a report, journal article, and book (nearly-completed).

Organisms display variable degrees of urban-tolerance and urban-sensitivity related to their preadaptations to natural habitats such as cliffs or warm areas, and their ability to use altered or artificial soils, vegetation, and surface waters. Some uncommon and rare species actually thrive in urban areas, among them the peregrine falcon, the American snout (butterfly) and its larval host the hackberry tree, and the grainy shadow-crust lichen. Other species do poorly there, including stream-dwelling dragonflies, forest-interior songbirds, and most salamanders. Hudsonia's analyses will aid understanding of the biota of other altered landscapes such as gas drilling areas, as well as the cities that are spreading along coasts. Kristi MacDonald is a longtime partner in the Meadowlands studies.

SOLAR FARMS

Scientific research on the ecology of solar photovoltaic generating facilities in the northeastern states has been scant. Recently Hudsonia has been studying two proposed solar facility sites, a small community solar project site, and a very large utility-scale project site, both on current or former farmlands. We have surveyed rare plants, reptiles, amphibians, and raptors, and are planning experiments in managing vegetation to maintain and improve habitats for species of conservation concern. Hudsonia is now well prepared to provide technical assistance to developers, government agencies, and NGOs involved in solar energy development. David Werier, Patricia Serrentino, and Jason Tesauro collaborated on these projects.

INVASIVE SPECIES

There is a recent boom in research and management of invasive, non-native plants and animals. Starting well before the founding of Hudsonia, our biologists have studied non-native aquatic and estuarine animals, including mitten crab, common carp, weatherfish, and red-eared slider, documenting their distribution and behavior in the Hudson Valley. We recently prepared a critical review of mute swan ecology and impacts. We have conducted more intensive work on non-native plants, especially water-chestnut, purple loosestrife, common reed, and knotweed. Many questions are yet to be addressed, but results to

date indicate that these plants have both detrimental and beneficial effects on habitats and other ecosystem services. Reed, for example, is generally beneficial for carbon sequestration and protection of coastal wetlands, and can provide either adverse or favorable habitat for certain marsh birds. The challenge is to predict the consequences with a particular combination of site ecology and management goals. It takes a blend of natural history observation (where, when, which species) and ecological sampling (how many, how healthy, how functioning) to provide good answers. Currently, with student interns, we are analyzing knotweed relationships with birds, insects, and mosses, and in 2020 we hope to compile and analyze almost 50 years of ecological observations on purple loosestrife.

FRACKING

A few years ago, Hudsonia published two papers and a *News from Hudsonia* piece analyzing known and potential impacts of hydraulic fracturing on biodiversity in the eastern US. Salt, heavy metals, synthetic chemicals, access roads, disturbed soil, habitat fragmentation, water consumption, radioactive and chemically contaminated wastewater, heavy truck traffic, methane leaks, and small earthquakes are all produced by gas fracking operations and this suite of physical and chemical outputs may be eliminating many sensitive species and facilitating colonization by weeds and other pests.

Many other world regions have large shale gas reserves, including South Africa, Europe, and China. Ecologists overseas are looking to the two decades of US research on fracking impacts to guide their studies and decisions. We would like to revisit these questions now that much more information is available.

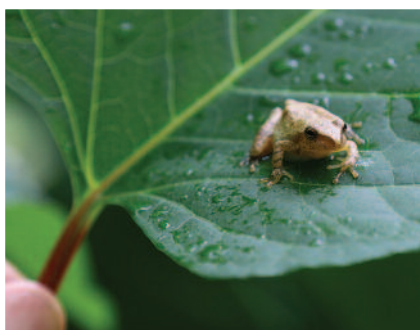
FORESTS, LOGGING, SHRUBLAND, GRASSLAND

Much has been written about the requirements of many birds and other organisms for surprisingly large areas of habitat. It is therefore well known that effective biological conservation in the Northeast needs to preserve large blocks of forest, shrubland, and grassland. If planners and conservationists are to protect 100- or 1000-acre blocks of contiguous habitat that is not shredded by roads or houses, large scale planning is needed within and across municipal boundaries.



An oldfield at a proposed solar facility site in Greene County. Erik Kiviat © 2019

Forests are the most ecologically “expensive” vegetation. Good forest habitat for many area-sensitive species, including wood thrush, barred owl, red-shouldered hawk, and some wildflowers, takes 75 years or more to develop, and is vulnerable to pests and diseases like hemlock woolly adelgid and beech bark disease. Shrubland, on the other hand, can establish in several years. It can develop from forest after clearcutting or from fields after cessation of mowing. Shrubland patches of 6-10 ha (15-25 ac) may be large enough for some of the uncommon shrubland endemics, such as New England cottontail or prairie warbler. Meadows (grasslands) are even simpler to create from abandoned or poor quality agricultural fields. Meadows only



Spring peeper on a knotweed leaf. Erik Kiviat © 2019

have to be mowed once every 1-3 years to maintain the habitat, but a block of 40 ha (100 ac) or larger may be needed for some of the grassland breeding songbirds.

Although we recognize the value of maintaining and expanding shrubland and young forest

to support certain components of native biodiversity, we question the advisability of forest-clearing for this purpose, an approach central to the “Young Forest Initiative” at the state and federal levels. Other methods of creating and maintaining shrubland are readily available that do not harm mature forests, such as allowing abandoned farmland to develop into shrubland, and periodic cutting of existing shrubland to prevent transition to forest.

DAMS AND EELS

Sometimes an important line of research begins from a personal fascination and turns into a special opportunity. Hudsonia has studied the ecology of fishes in the Hudson River marshes, tributary streams, and lakes since our beginning. The Hudson River watershed hosts well over 200 fish species. One is the American eel. Tiny eels in the “glass eel” stage (5-7.5 cm [2-3 in] long) swim from the Gulf Stream up the tidal Hudson River and into many tributaries where they grow up before journeying a thousand miles back to the Sargasso Sea to spawn. Juvenile eels in the roughly 10-15 cm (4-6 inch) length range can ascend or wriggle around waterfalls and dams, even for short distances on land, but eel densities decline rapidly past each such barrier.

Hudsonia has studied eels, other fishes, bottom invertebrates, herpetofauna, higher plants, and mosses along the Saw Kill (a Hudson River tributary) from Tivoli South Bay upstream to Route 9G. Two old milldams that straddle the

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Hudsonia is an institute for research, education, and technical assistance in the environmental sciences. We conduct pure and applied research in the natural sciences, offer technical assistance to public and private agencies and individuals, and produce educational publications on natural history and conservation topics. Hudsonia is a 501(c)(3) tax exempt, non-advocacy, not-for-profit, public interest organization. Contributions to Hudsonia are fully tax deductible, and are used solely in support of our nonprofit work.

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eels' migration route in this reach are under consideration either for removal or for a demonstration micro-hydropower project. Retaining the dams would protect pieces of the illustrious human history of the Saw Kill and the neighboring Montgomery Place historic site; retention might also benefit the rare winged monkeyflower and a rare moss at the lower dam, and a cattail-shrub marsh above the Annandale dam. A proposed hydropower project at one of the dams would also offer opportunities for education and research at Bard. The other option, dam removal, would restore the free-flowing stream and benefit upstream-migrating juvenile eels and other strictly aquatic organisms. Recent interest in dam removal along Hudson River tributaries raises similar questions about the potential benefits and harms associated with removing dams. Each dam site is unique and each dam has its own potential benefits and detriments to the ecosystem services provided by the stream. As for other nature management situations, careful assessment of conditions at each site will help to clarify goals and predict outcomes before decisions are made for large interventions.

WETLAND ECOLOGY AND CONSERVATION

American society at large has come to value wetlands for their many ecosystem services that include carbon storage, water conservation, biological diversity, food, fiber, scenery, and recreational resources. Wetland ecology and management have long been major concerns of Hudsonia. Our work has addressed rare wildlife and plants, soil-nutrient-microbe relationships, mosquitoes, clam shrimps, vegetation, wetland habitat management and restoration, how people use and are affected by wetlands, and wetland imagery in



A frost-covered meadow at the Greenport Conservation Area.
Chris Graham © 2019

fiction. Now that wetland and stream regulations at the federal level are being weakened, local protection of wetlands and watercourses is that much more essential. Some of our biodiversity education programs (see below) are designed to educate municipal officials considering stronger protection of these important resources through local policy, environmental review procedures, and local legislation.

BIODIVERSITY RESOURCES CENTER

Biological Assessments

Hudsonia biologists recently collaborated with other scientists on biological surveys of two public conservation areas (PCAs) owned and managed by the Columbia Land Conservancy—the Greenport PCA and the Overmountain PCA. We variously studied plants, butterflies, dragonflies, damselflies, moths, reptiles, amphibians, and bats and their habitats and made incidental observations of other mammals and birds, and ants, hoverflies, and ground beetles at strategic locations. We found large, intact, mature deciduous forests, “wild hay” meadows, intermittent woodland pools, hardwood swamps, clay bluffs and ravines, patches of spring ephemeral wildflowers, unusually diverse communities of dragonflies, damselflies, and skippers, and several state-listed rare species of plants and animals.

Working with seven other scientists, we studied the natural resources at the Mountain Top Arboretum (MTA) in Greene County. The investigators looked at the bedrock and glacial geology, reptiles and amphibians, butterflies, moths, bees, bats, plants, habitats, and land use history. We found sandstones formed in ancient river deltas, glacial etchings on exposed bedrock, farms of two families from the early 1800s into the 1920s and 1930s, some unusual present-day plant communities including that of one of the oldest known bogs in the Catskills and a large fen-like peatland, at least 40 species of sedges and 20 species of ferns, at least five bat species, and many invertebrate species that are more typical of northern latitudes, including a state-listed rare bumble bee. With other biologists we also surveyed habitats, plants, reptiles, amphibians, and breeding birds at a 136-ha (335-acre) site in Dutchess County for the Winnakee Land Trust, and found turtle and bird species of conservation concern. These projects will contribute to the public



Four-toed salamander (a High Priority Species of Greatest Conservation Need) near a woodland pool at the Overmountain Conservation Area.
Chris Graham © 2019

TRIBUTE TO INGRID HAECKEL

The Coeymans Heritage Society greatly appreciates Ingrid Haeckel's exemplary mentoring of the Coeymans Conservation Advisory Council in their preparation of a Natural Resources Inventory for the town. (Ingrid is a Conservation and Land Use Specialist with the NYSDEC Hudson River Estuary Program, and a regular collaborator with Hudsonia.)



As personable as she is professional, the Council feels privileged to have had Ingrid's guidance over the past three years. Her work with many small towns in the Hudson Valley has done much to document the region's rich and diverse landscapes and to enliven the conservation conversation.

education programs of the MTA and the land trusts, and will help with planning for land management, conservation, and public uses of the sites.

Natural Resource Inventories

We recently completed Natural Resource Inventories (NRIs) for Columbia County and for Greene County. These are county-wide documents that illustrate and describe the natural resources including minerals, water, plants, animals, habitats, farmland, scenic areas, and recreational resources, and explain their importance to local ecosystems and the human community. We are just completing a similar document for the Town of Dover (Dutchess County). We also completed the identification and mapping of significant habitats throughout the City of Poughkeepsie (Dutchess County) and in selected areas of the Town of Pound Ridge (Westchester County), and those maps and reports were subsequently incorporated into the Natural Resources Inventories for the two municipalities. These NRI projects are intended for use by landowners, developers, municipal agencies, and land trusts to help them better understand the natural resources of special importance to ecosystems and people, how to identify the places of greatest importance, and how to protect the areas of greatest concern.

Conservation Priorities

We recently finished projects for the Woodstock Land Conservancy (Ulster County) and the Greene Land Trust (Greene County) in which we analyzed natural resource information throughout the landscape to identify conservation priorities. These projects will help the land trusts focus their efforts on the places where conservation may provide the greatest benefits for biodiversity, water, farmland, scenic resources, carbon storage, and response to climate change.

Conservation Education

Over the last two decades we have collaborated with the Hudson River Estuary Program on education and training programs for municipal planning boards, town boards, conservation commissions, and the staff of land trusts on topics related to conservation of water resources and native biodiversity. The programs have reached over 750 participants in the ten-county Hudson Valley region and topics have ranged from recognizing and protecting im-

portant habitats; the importance and conservation of small streams that are omitted from federal or state protections; habitat and water resource assessment for land use planners; and how to use a Natural Resource Inventory or Open Space Inventory for local conservation action. We have also provided many kinds of technical assistance to municipalities and NGOs to advance their conservation work, and this year we produced a webinar on Biodiversity Conservation, now available at <https://www.dec.ny.gov/lands/5094.html>.

We are working with the Hawthorne Valley Farmscape Ecology Program to prepare the *Ecological and Cultural Field Guide to the Habitats of Columbia County*, to be published in 2021, which describes many aspects of the natural landscape in the county, past and present human uses of the land, and present-day interactions with the natural world.

Hudsonia's work serves many purposes. It advances scientific knowledge of wildlife, weeds, and wetlands. It synthesizes and interprets scientific information about energy impacts, rare species, and habitat conservation to guide environmental decision-makers. It trains students in museum and field techniques, and environmental professionals in identifying, mapping, and assessing biodiversity. It shows how human life and livelihoods depend on wild organisms. Above all, Hudsonia helps solve environmental problems where people live, work, and play in the Hudson Valley and northeastern states. In this time of argument about the validity of science and the importance of protecting the environment, it's ever more crucial to observe, analyze, and report what's actually there, and how our society can meet our needs more efficiently and leave habitats and biota in better condition for those who follow.

SELECTED HUDSONIA REPORTS

Graham, C., E. Heffernan, and G. Stevens. 2018. Significant habitats in the Town of Pound Ridge, Westchester County, New York. Report to the Town of Pound Ridge, the Hudson River Estuary Program, and the Westchester Community Foundation. Hudsonia Ltd., Annandale, NY. 142 p.

Graham, C., N. Tabak, and G. Stevens. In prep. Significant habitats in the Town of Dover, Dutchess County, New York. Report to the Town of Dover and the Dutchess Land Conservancy. Hudsonia Ltd., Annandale, NY.

Graham, C., C. Vispo, C. Knab-Vispo, D. Cipkowski, and G. Stevens. 2018. Overmountain Conservation Area biological assessment: Phase 2. Report to the Columbia Land Conservancy. Hudsonia Ltd., Annandale, NY, and Hawthorne Valley Farmscape Ecology Program, Ghent, NY. 77 p. + appendices.

Heffernan, E. and G. Stevens. 2018. Significant habitats in the City of Poughkeepsie, Dutchess County, New York. Report to the Environmental Cooperative at the Vassar Barns and the City of Poughkeepsie. Hudsonia Ltd., Annandale, NY. 117 p.

Stevens, G., ed. 2019. Natural resources inventory for the Mountain Top Arboretum. Report to the Mountain Top Arboretum. Hudsonia Ltd., Annandale, NY. 154 p. + appendices.

Stevens, G. and C. Graham. 2019. Natural resources inventory for Greene County, New York. Prepared by Hudsonia Ltd. for the Greene Land Trust, Coxsackie, NY. 272 p. + appendices.

Stevens, G., C. Graham, C. Knab-Vispo, C. Vispo, and D. Cipkowski. 2017. Scotland Farm biological assessment: Phase 1. Report to the Columbia Land

Continued on page 6

Conservancy. Hudsonia Ltd., Annandale, NY, and Hawthorne Valley Farm-
scape Ecology Program, Ghent, NY. 98 p.

Stevens, G. and K.B. Travis. 2018. Natural resources inventory, Columbia
County, New York. Prepared by Hudsonia Ltd. for the Columbia Land Con-
servancy, Chatham, NY. 291 p.

Stevens, G., C. Vispo, D. Cipkowski, C. Knab-Vispo, and C. Graham. 2015.
Natural resources and land use history at the Greenport Conservation Area.
Report to the Columbia Land Conservancy. Hudsonia Ltd., Annandale, NY,
and Hawthorne Valley Farmscape Ecology Program, Ghent, NY. 137 p.

Travis, K.B. and E. Kiviat. 2017. Assessing potential ecological effects of mute
swan (*Cygnus olor*) expansion in northeastern North America. Report to Grant
& Lyons LLP. Hudsonia Ltd, Annandale, NY. 28 p.

SELECTED SCIENTIFIC PAPERS

Caponera, V. and E. Kiviat. In press. Painted turtle ecology in a freshwater
tidal marsh: Concluding survey. Final Reports of the Polgar Fellowship Pro-
gram, Hudson River Foundation.

Dowling, Z., T. Hartwig, E. Kiviat, and F. Keesing. 2010. Experimental man-
agement of nesting habitat for the Blanding's turtle (*Emydoidea blandingii*).
Ecological Restoration 28(2):154-159.

Gillen, J. and E. Kiviat. 2012. Hydraulic fracturing threats to species with restricted
ranges in the eastern United States. Environmental Practice 14(4):320-331.

Kiviat, E. 2013. Risks to biodiversity from hydraulic fracturing for natural gas
in the Marcellus and Utica shales. Annals of the New York Academy of Sci-
ences 1286:1-14.

Kiviat, E. 2014. Adaptation of human cultures to wetland environments. P.
404-415 in P. Gâştescu, W. Marszelewski and P. Bretcan, eds. 2nd Interna-
tional Conference "Water Resources and Wetlands" Proceedings 11-13 Sep-
tember, 2014 Tulcea (Romania). Romanian Limnogeographical Association.

Kiviat, E. 2019. Organisms using *Phragmites australis* are diverse and similar
on three continents. Journal of Natural History 53(31-32):1975-2010.

Kiviat, E., L.A. Meyerson, T.J. Mozdzer, et al. 2019. Evidence does not support
the targeting of cryptic invaders at the subspecies level using classical bio-
logical control: The example of *Phragmites*. Biological Invasions 21(8):2529-
2541.

Kiviat, E., L. Stickle, and E. Heffernan. 2019. Flora re-survey after four
decades in a New York bog lake. Castanea 84(2): 290-310.

Schmidt, R.E. and A.J. Schmidt. 2014. Observations on oriental weatherfish
(*Misgurnus anguillicaudatus*), an exotic species in the Hudson River Valley,
New York. Northeastern Naturalist 21(1):134-146.

Schmidt, R.E., E. Kiviat, N. Trigoboff, and J. Vanek. 2018. New records of clam
shrimp (Laevicaudata, Spinicaudata) from New York. Northeastern Naturalist
25(2):N7-N10.

Travis, K.B., E. Kiviat, J. Tesauro, L. Stickle, M. Fadden, V. Steckler, and L. Lukas.
2018. Grazing for bog turtle (*Glyptemys muhlenbergii*) habitat management:
Case study of a New York fen. Herpetological Conservation and Biology
13(3):726-742.

We are grateful to the numerous public agencies, private foundations,
businesses, conservation NGOs, and individuals that have funded these
projects over the years and thus contributed to the science, education, and
conservation outcomes of Hudsonia's work. ■



A biodiversity assessment workshop at the Buttercup Farm Audubon Sanctuary, Dutchess County. Laura T Heady © 2019

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UPCOMING EDUCATIONAL EVENTS

The tentative list of 2020 programs includes these workshops:

Small Wetlands: Values, Threats, and Protection

Small Streams: Values, Threats, and Protection

Environmental Reviews of Land Development Projects

Recognizing Habitats

Join the email list at <https://hudsonia.org/maillinglist/> or check back at <https://hudsonia.org/events/> to learn more about 2020 events as soon as they are scheduled.

OUTSTANDING EDUCATOR

This year the Hudson River Environmental Society honored Hudsonia's Gretchen Stevens with their Outstanding Educator award for her nearly two decades of work bringing conservation science to municipal agencies, land trusts, and others engaged in policy-making, environmental reviews, design of conservation easements, land management, and other actions that affect native biodiversity.



The Hudson River Environmental Society is a nonprofit organization of academics, governmental officials, nonprofit scientists, private consultants, teachers, and others that fosters research, communication, and cooperation among researchers and practitioners, and disseminates ideas and information on environmental sciences.

SPECIAL THANKS

Julianna Zdunich, for designing our fundraising appeals.

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Original artwork by Ralph Della-Volpe,
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HUDSONIA MEMBERS, 2019

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(Listed here are donations received between 1 December 2018 and 16 December 2019.)

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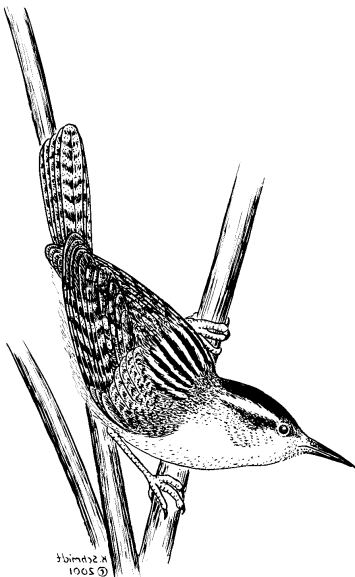


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