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Julianna Zdunich © 2012

Studying urban biodiversity will help us learn how to better conserve those species that survive or thrive in cities, and avoid replicating in rural areas the urban mistakes of the past.



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SCIENCE FOR LOCAL CONSERVATION: Dispatches from the Education Program

By Gretchen Stevens*

"My view of the landscape is forever changed.... As I hike through the woods, watching for springs and seeps, I hope to come across the life-breeding gem I would have previously ignored—an intermittent woodland pool.... I was so inspired [by the Short Course] that I got the Town of Rosendale to create a multi-commission team to participate in the 10-month Biodiversity Assessment Training to map the central corridor of the town..."

Manna Jo Greene, Rosendale Environmental Commission,
November 2003

If there were a typical student of Hudsonia's Biodiversity Education program, it might be Manna Jo Greene—a town official who in a single breath can capture the poetry and science of biodiversity protection. Since 2001, participants like Greene—who now sits on the Rosendale Town Board—have given up their weekdays, weekends and evenings to take part in Hudsonia courses. Here they learn about calcareous ledges, kettle wetlands, and oak-heath barrens; how to tell a marsh from a fen; and where a spotted turtle might like to make its nest or spend the winter. They learn to analyze soils maps and topographic maps to locate some of the rare and hard-to-find habitats in the region; they learn how constructing a poorly-planned residential development here can adversely affect a songbird population or a trout stream over there. And they learn how to identify the areas most appropriate for land development.

The courses are designed not just to deepen knowledge and appreciation for the natural environment. Their purpose is more practical: to ensure that town agencies, land trusts, and others are well-equipped to protect native biological diversity. We want environmental reviews of new land use proposals and the design of conservation easements, for example, to consider not just the usual property line setbacks, soil per-

colation tests, scenic issues, traffic flow questions, and the ins and outs of driveway design, but also the potential impacts on wildlife corridors, rare species of plants and animals, streams, groundwater, and other sensitive resources important to ecosystems and to the public welfare.

GATHERING BETTER INFORMATION

Dismayed by the poor quality of natural resource information typically submitted to the town in support of new development proposals, Sheila Buff, Frank Margiotta, and Lauren Kingman set about to improve the situation in the Town of Milan. Buff is a writer, Margiotta a retired biology teacher, and both are bird-watching and outdoor enthusiasts. They joined with an intermunicipal group back in 2002 to undertake Hudsonia's ten-month Biodiversity Assessment Training and then persuaded the Milan Town Board to establish a Conservation Advisory Council for the town. Lauren Kingman, retired from IBM and former chair of the Milan Planning Board, took the Biodiversity Assessment Short Course in 2004. The three were concerned that important natural areas were often overlooked in the design and review of new development projects, and then damaged or destroyed before anyone knew what was being lost. So they put their heads together and, with the assistance of Karen Schneller-MacDonald at Hickory Creek Consulting, created *Habitat Assessment Guidelines* to help developers and consultants gather the

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* Gretchen Stevens is director of Hudsonia's Biodiversity Resources Center.

kind of information that would actually help the Planning Board understand potential impacts of a proposed project on biological resources on and near a development site. They believed that information gathered early in the planning stages of a new project would help an applicant arrive at a better design that would reduce harm to sensitive wildlife, natural areas, and water resources important to the town. Moreover, they believed that understanding the environmental issues right from the start could save the applicant significant time and money, avoiding costly delays, restoration measures, and even state-imposed fines in some cases. The intent of the *Guidelines* was to replace the (often) adversarial review process with a collaborative one to achieve the common goal of a "negative declaration," and to ensure that sensitive areas are well protected. Since publication of the Town of Milan *Habitat Assessment Guidelines* in 2005, several other towns in the region have used the document as a model for developing their own such guidelines and recommendations for applicants.

This is just one of many direct and indirect outcomes of Hudsonia's Biodiversity Education program, formally instituted in 2001 and conducted ever since in partnership with the Hudson River Estuary Program of the New York State Department of Environmental Conservation (NYSDEC). Now a major arm of Hudsonia's work, the program offers long and short courses in biodiversity assessment, and one-day, half-day, and evening workshops on various conservation-related topics.

An important resource for the program is the *Biodiversity Assessment Manual for the Hudson River Estuary Corridor* (Kiviat and Stevens 2001) which profiles many of the ecologically significant habitats in the ten Hudson Valley counties. The *Manual*, created by Hudsonia and published by NYSDEC, was written both for biologists working in the region and for the (usually) non-scientist professionals and community volunteers who make the most consequential land use decisions in Hudson Valley towns.

Using the *Manual* and aided by Hudsonia instructors, participants in the ten-month biodiversity assessment training learn how to con-

duct their own assessments and develop conservation recommendations that can be broadly applied in their own communities. Course participants meet in town halls and libraries for indoor sessions, and also visit nearby natural areas and biodiversity hotspots—such as intermittent woodland pools and calcareous ledges—where they learn to identify indicators of health and signs of trouble, how an action here can create an undesirable reaction there, which greenspaces may be most important to protect, and which areas may be best suited for certain kinds of development.

"The Biodiversity Assessment Manual is an awesome and comprehensive tool kit for planners and activists to use to protect biodiversity and the high natural quality of our Hudson Valley life."

Member, Gardiner Environmental Commission, 2004 Biodiversity Assessment Short Course

THE INTIMATE LANDSCAPE

Driving through the Hudson Valley it's hard to ignore the beauty of the rolling farmland and forests that characterize much of the valley proper, flanked on the west by the wooded, rocky slopes of the Shawangunk and Catskill mountains, on the east by the Taconic Range, and interrupted by the rugged Hudson Highlands running from the New Jersey to the Connecticut borders. But only deep in a forest interior or on your knees in an abandoned meadow can you begin to understand the biological underpinnings of the spectacular landscapes visible through your windshield. The complexity of ecological communities, and the interdependence of organisms with each other and their physical environments, are among the topics discussed in the courses and workshops of Hudsonia's Biodiversity Education program. How far might a wood frog travel from its springtime breeding pool to its summer forest habitat, and how large a forest might a scarlet tanager or red-shouldered hawk need for successful nesting? What are the host plants for the dusted skipper or the Aphrodite fritillary, and how can you maintain a meadow to support those butterflies? Where does the northern copperhead bask and hibernate, and what kinds of shrublands are likely to support the New England cottontail?

"The comprehension of indicator plant species for habitat identification, and the interaction of animal species within and between habitats was a highlight for me."

(Co-Chair, Red Hook Agriculture and Open Space Advisory Committee, 2009 Biodiversity Assessment Training)

THE CHOSEN FEW

The education programs are designed not for the general public, but instead for the very select group of citizens who devote their volunteer and professional time to the work of public agencies and public interest organizations regularly engaged in land use planning, environmental reviews, and decisions about land development and conservation. These are members of town boards, planning boards, and conservation commissions, the staffs of land trusts, watershed councils, and other conservation NGOs, and others in similar policy-making, decision-making, and advisory positions.

The programs seek to build not only participants' knowledge, but also their credibility and effectiveness with peers and with the public.

"The course...helps us to be advocates for the environment using scientific rather than strident language, in a way that can be helpful to educate the town boards and the applicant."

Member, Lewisboro Conservation Advisory Council, 2006 Biodiversity Assessment Short Course

"We have been able to look at [development] applications with new perspectives and have greater confidence in our judgments because of our new experience with habitat analysis. We also can give new information to our planning board and the applicants' engineers and surveyors....I was very pleased that my prediction of bobcat habitat was confirmed by a neighbor's observation!"

Chair, Clinton Conservation Advisory Council, 2001-02 Biodiversity Assessment Training



Meadow assessment with the Village of New Paltz/Town of Lloyd Biodiversity Assessment Training group, 2008. Andrew Meyer © 2012.

Through lectures, map and aerial photo analysis, field visits, and free-wheeling discussions among participants, the programs teach the science and practice of effective biodiversity conservation. We emphasize the importance of bringing sound scientific information to environmental reviews, site assessments, and general planning. And we provide forums for discussions on related topics of general concern, such as methods for effective public education, and how to move ahead with biodiversity conservation when local policy and legislation lag behind.

"This course was absolutely worth three days—I wish it was longer! I learned how to combine a lot of resources I already had to make sense of habitat prediction and identification. The other attendees had great perspectives I wouldn't have otherwise considered, so I appreciated having lots of opportunities to discuss options and ideas with them."

Staff, Winnakee Land Trust, 2012
Biodiversity Assessment Short Course

Even those with long experience using natural resource maps can learn about new ways to interpret maps and aerial photos for identifying important parts of the landscape for biodiversity conservation.

"The Biodiversity Assessment Short Course was a terrific way to get a quick, hands on, direct approach and working knowledge about ... maps and the outdoors to interpret the landscape in regards to biodiversity and habitat. It was a terrific experience and, even though I work with maps and land all the time, I learned a great deal."

Staff, Dutchess Land Conservancy, 2004
Biodiversity Assessment Short Course

"... that was a terrific workshop.... Dense with good information, but not overwhelming.... I can't believe that I never did that kind of map analysis in graduate school. "Up" and "down," yes, but we never cued in to landscape features in the same way. It will be very useful in my own desk reviews here at CLC. It was clear that the entire group was very engaged and focused throughout the day."

Member, Germantown Planning Board, and
staff of Columbia Land Conservancy,
2009 Biodiversity Assessment Workshop

Why this particular audience? In our view, these are the people with the greatest influ-

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"URBAN BIODIVERSITY" IS NOT AN OXYMORON

By Erik Kiviat*

Few people visit urban areas primarily to see rare wildlife and plants, but many naturalists and biologists are realizing that environments of New York City, Long Island, northeastern New Jersey, Westchester and Rockland counties, and the old Hudson River cities such as Haverstraw, Hudson, and Albany support substantial biological diversity, including many species of conservation concern. Conservationists are coming to understand how important it is for urban dwellers to appreciate nearby flora and fauna, and to recognize how human activities in cities affect nature outside the cities—for example, in water supply and waste disposal areas.

Cities make important contributions to native biological diversity and its conservation, and studying urban biodiversity will help us learn how to better conserve those species that survive or thrive in cities and avoid replicating in rural areas the urban mistakes of the past. It will also provide an extreme "reference" condition for studying impacts of energy facilities, resorts, and other land development. In the term "urban" I include those areas that have a dense human population with associated residential structures, and those that have been highly altered due to industrial, commercial, or transportation development.

In 2000 I was invited to comment on the environmental documents for a commercial development project that would have filled 200 acres of one of the highest quality wetlands in the New Jersey Meadowlands. This assignment led to a decade of biodiversity research there. It is hard to find another similar-sized (about 100 square miles) area of the world that has as many inactive garbage landfills, transportation developments, and commercial, industrial, and residential buildings packed together as the Meadowlands. Yet there are more than 15 square miles of freshwater and brackish wetlands, rock outcrops, and parks that have persisted despite centuries of seemingly obsessive destruction of nature. These greenspaces, although fragmented and degraded, support rare flowering plants, mosses, and lichens, breeding marsh birds of conservation concern, a concentration of wintering raptors, a population of the recently discovered and as yet unnamed leopard frog, and a globally rare crustacean. Interestingly, most of this biodiversity is in habitats other than the tidal marshes that have received so much conservation attention.

How about other cities? New York City's Jamaica Bay Wildlife Refuge is a world class magnet for birds and birdwatchers. Many rare plants persist in the city, notably Torrey's mountain-mint on a Staten Island roadside where it has been fenced to prevent harm from dogs and cars. Peregrine falcons nest successfully on tall buildings and bridges where they escape predatory raccoons and great horned owls. Large numbers of migrant songbirds rest and forage in the city. There



Monarch nectaring on thistle at Newtown Creek, Queens, NY. Erik Kiviat © 2012.

are too many other uncommon and rare species in New York City to enumerate here.

California has lost 95% of its historic wetlands. The remaining tidal marshes of San Francisco Bay are the habitat of a charming endangered rodent, the salt marsh harvest mouse, as well as rare plants and many migratory water and marsh birds of conservation concern. In Austin, Texas, an endangered species of crayfish inhabits the limestone formations; it nearly rubs appendages with human bathers in the roped-off periphery of a public swimming area. The Congress Avenue Bridge in Austin is a roost for 1.5 million Mexican free-tailed bats, and tourists watch them emerge in the evening. Remnant salt marshes in San Diego provide habitat for endangered plants and birds. Buildings damaged in wartime London, U.K., support an endangered cliff-nesting songbird, the black redstart. In Prague, Czech Republic, little grebes, sedge warblers, and other wetland birds use the old, reed-fringed, carp-raising ponds scattered through the urban periphery. Matera, a Medieval city in southeastern Italy, hosts a breeding population of the rare lesser kestrel, a small falcon.

Are these occurrences of rare species just pitiful remnants of once-larger populations, or species using poor quality habitats because nothing better remains? Or are some of the urban species doing well, perhaps even better than in rural areas or wildlands? It helps to view cities as harsh environments with simplified biological communities; that is, places where challenging ecological conditions are tolerated

* Erik Kiviat is Hudsonia's executive director.

only by certain species, much as is true of salt deserts, rock ledges, and wave-swept shores. Species that can tolerate the harsh conditions may find refuge from predators, herbivores, competitors, or diseases that would affect those same species in a milder environment. Cities also have abundances of nutrients and certain kinds of food, and a diversity of habitats. On the other hand, cities may not be good places for fauna and flora that depend on low nutrient environments, native plant communities, free-flowing streams, or uncontaminated soils.

Another way to look at the biota (flora and fauna) of cities is that certain groups of organisms are urban-tolerant, and other groups are urban-sensitive. Urban-tolerant groups have many species that do well in cities; some of these groups are water birds, estuarine fishes, and woody plants. Many cities are well known for large trees of diverse native and nonnative species. On the other hand, urban-sensitive groups—such as orchids, fern allies, lichens, salamanders, and land snails—have few or no native representatives in cities compared to non-urban areas. Urban-sensitive groups seem to be affected by habitat fragmentation, scarcity of natural soils, warm dry microclimates (conditions near the ground), nutrient-enriched wetlands and waters, contaminants, and salinization. Some groups are intermediate; the mosses, butterflies, and dragonflies are good examples. Even in an urban-sensitive group, one or more rare species may occur in an urban area although, overall, there may be few species representing that group.

In many cases, development in cities proceeds without serious consideration of biodiversity either because involved people don't believe the city biota matters, or because biological surveys focus only on the obvious, easy-to-study groups such as birds, fishes, and selected plants. All habitats and many groups need study because much of the diversi-

ty occurs in little known groups such as insects and mosses, and one group may not predict the diversity or occurrence of another. We have to know what's there before we can conserve it. And when we understand the biota better, we may be able to design and implement ecological restoration that benefits rare species as well as other valuable ecosystem services such as stormwater absorption and carbon sequestration.

Even brownfields—contaminated post-industrial areas—can support important biodiversity and these areas should be assessed before remediation and redevelopment are planned. Likewise, abandoned buildings may harbor breeding barn owls and little brown bats. Interesting species show up in unexpected places, such as the purple cliffbrake (*Pellaea atropurpurea*), a regionally-rare fern in the Hudson Valley, growing abundantly on the mortar of an old public building. Although railroads are meccas for nonnative plants, the only site where the rare native plant goldenclub (*Orontium aquaticum*) seems to be increasing on the Hudson River is at a tidal marsh—railroad edge in Columbia County.

Hudsonia always encourages and assists communities in conducting biodiversity assessments and biological surveys in concert with land planning, and we do so in all types of environments—wildland, rural, and urban. Occurrences of rare native species can often be protected without significantly impinging on other human activities, and those species may immeasurably enhance the amenity value and potential uses of nature, and the well-being of the landscape as a whole. Our *Biodiversity Assessment Handbook for New York City*, in the final edit and design phase, will offer an approach to solving these problems in a major urban area. ■



Wild turkey on patio in Rhinebeck.
Julianna Zdunich © 2012.



Cemeteries can provide important resting and foraging habitat for migrating birds and butterflies.
Erik Kiviat © 2012.

2012 PROJECTS UPDATE

HABITAT MAPPING

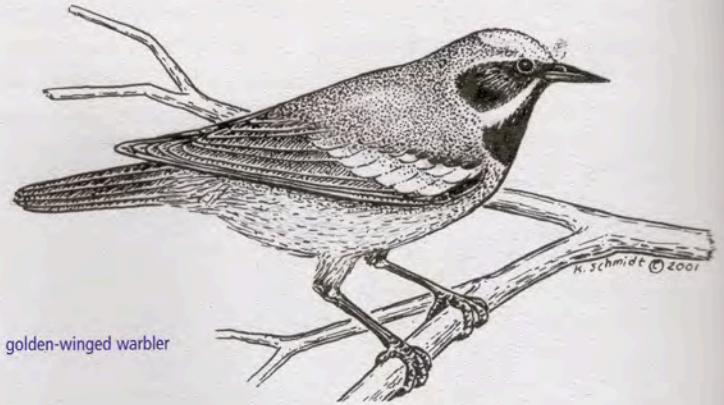
We have just completed identifying and mapping significant habitats throughout the Town of Woodstock (Ulster County), and have nearly completed a similar project for the Town of Clinton (Dutchess County). We are also mapping habitats in a corridor along Catskill Creek in Albany, Greene, and Schoharie counties, and in a corridor along Woodbury Creek in the towns of Cornwall and Woodbury (Orange County). These projects help to inform landowners, developers, and local agencies about ecologically significant habitats, their biodiversity values, and effective measures for conservation. Since 2001 we have mapped significant habitats on over 700 square miles in six counties of the Hudson Valley. The 2012 mapping projects are funded by the Educational Foundation of America, the Hudson River Estuary Program, (through the Cornell Department of Natural Resources and the Town of Clinton), the Millbrook Tribute Garden (through the Dutchess Land Conservancy), the Ashokan Watershed Stream Management Program, the Catskill Watershed Corporation, and the NYSDEC Division of Water (the last three through the Town of Woodstock).

BIODIVERSITY EDUCATION & TECHNICAL ASSISTANCE

In 2012 we held a three-day Biodiversity Assessment Short Course at the Norrie Point Environmental Center (Dutchess County) in September, and will hold one-day biodiversity assessment workshops this fall in Albany, Columbia, and Greene counties. We are also continuing to provide technical assistance to past participants in the Biodiversity Education program, and to towns that have Hudsonia habitat maps. We are now working with the towns of Ancram (Columbia County), Pleasant Valley (Dutchess County), and Bedford (Westchester County), and will expand our assistance to other communities this fall. This work is funded by the Hudson River Estuary Program of NYSDEC.

COLUMBIA COUNTY LIVING LAND

We are working with the Farmscape Ecology Program and the Columbia Land Conservancy on a multi-year project to survey and



golden-winged warbler

describe ecological communities throughout the county, disseminate the results to the public, and study the interactions of people with the land. This year the "Living Land" project is focusing on the eastern part of the county, looking at upland forest, meadow, shrubland, and ledge communities, as well as streams, bogs, swamps, woodland pools, wet meadows, fens, marshes, and circumneutral bog lakes. The project is funded by the T. Backer Foundation, Sven Huseby, Dale McDonald, and the Farmscape Ecology Program.

BOG TURTLE HABITAT MANAGEMENT

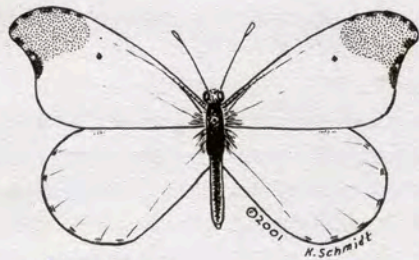
The bog turtle—Endangered in New York—needs low open vegetation in a groundwater-fed calcium-rich wetland. At an eastern Dutchess County site we are collaborating with biologist Jason Tesauro to study and manage a fen wetland that has become overgrown with cattail, shrubs, and other tall vegetation, using dairy cows to graze the fen lightly to remove some of the taller plants. Although this management technique has been used at many other northeastern sites, there have been few detailed studies of how grazing shapes the vegetation and habitat. This project is supported by US Fish and Wildlife Service funding through NYSDEC.

BOG TURTLE HABITAT CONNECTIVITY

Hudsonia's Habitat Connections program, initiated in 2011, is mining the results of our 30+ years of biological research to address larger questions of land use, climate change, and other impacts on biodiversity. For example, biologist Ingrid Haeckel used our habitat maps from two Dutchess County towns—Amenia and North East, approximately 140 km² (87 mi²)—and "least cost path" modeling to identify a network of potential travel corridors for bog turtles between their core wetland habitat areas. Using such methods to identify habitat complexes and corridors for this and other species of conservation concern, we can help to prioritize conservation efforts in anticipation of wildlife movements in a rapidly changing climate. We are seeking grants to



southern bog lemming



falcate orange-tip

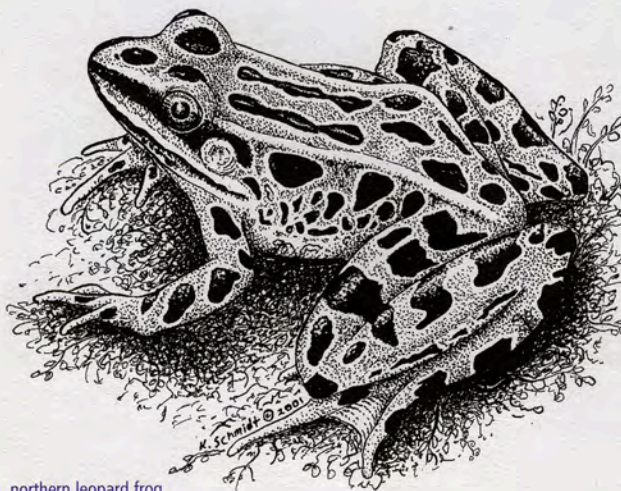
refine and expand the bog turtle study to five contiguous towns, and to explore similar questions for other species of conservation concern.

BIODIVERSITY ASSESSMENT HANDBOOK FOR NEW YORK CITY

Our long awaited handbook is in the final editing and design stages, soon to be posted online. An analog of Hudsonia's highly successful *Biodiversity Assessment Manual for the Hudson River Estuary Corridor*, the New York City Handbook will emphasize management of areas already preserved in addition to the assessment and preservation of other greenspaces. This is a collaboration with Liz Johnson and the Center for Biodiversity and Conservation of the American Museum of Natural History. Hudsonia's work was supported by the New York City Environmental Fund.

FROGGY WENT A-COURTING

Early this year it was announced that the leopard frogs of the New York City region are an undescribed species different from the northern leopard frog or southern leopard frog. In 2006 we had studied what we believed to be "southern" leopard frogs in the New Jersey Meadowlands, and we returned this past spring to seek additional sites for this apparently rare species during the season when leopard frogs can be located and identified by their mating calls. Urban habitats can disappear quickly, so it's noteworthy for conservation that leopard frogs breed in a large complex of freshwater marshes on the Secaucus – Jersey City line. Jeremy Feinberg, a key member of the team of biologists who discovered the "new" frog, assisted Hudsonia's study. This project was funded by the Hudson River Foundation.



northern leopard frog

GOLDENCLUB

Also this past spring, with help from volunteers, we surveyed for a rare plant, goldenclub, at historic localities along the Hudson River from Orange County north to Greene and Columbia counties. Unfortunately, goldenclub appears to have declined at most sites during the past several decades. Past filling of wetlands, sedimentation processes, and unidentified herbivores seem to have caused the declines. Goldenclub is increasing at one urban site in Hudson. This was part of a Hudson River



goldenclub

wetland education project supported by the Hudson River Improvement Fund.

HYDRAULIC FRACTURING

Following our preliminary analyses last year of biodiversity impacts due to fracking for natural gas from the Marcellus shale (*News from Hudsonia*, Fall 2011), we have continued our fracking studies and educational activities. Hudsonia and Hickory Creek Consulting convened a symposium on this subject at the Northeast Natural History Conference in Syracuse (April) and Hudsonia participated in panel discussions in Rhinebeck and Rensselaerville this summer. Two papers on fracking and biodiversity have been submitted to scientific journals, one of them a collaboration with Bard undergrad Jennifer Gillen. In a nutshell, the wide geographic reach and intensive physical and chemical effects of fracking will put many habitats and their rare or specialized flora and fauna at risk. One of the most important effects of fracking, the fragmentation of extensive forests, cannot be avoided.

ence over the direction of land conservation and development for the foreseeable future. They are establishing and carrying out local land use policy in townwide planning, in environmental reviews of development projects, in design of conservation easements, and in acquisition and management of public and privately-held conservation lands. They are "in the trenches," navigating the often sticky public and private politics of rural and suburban towns, and applying their broad and deep local knowledge of land and people to their work.

But despite their important roles and (often) strong interest in conservation, they ordinarily have little information to work with when it comes to biological resources. Most places have never been surveyed by biologists, so when new land use questions arise, site-specific information about plants, animals, habitats, and how they might be affected is usually lacking, and the materials provided by applicants are often superficial and inadequate.

The Biodiversity Education program tries to fill that void by providing not only basic information that is otherwise hard to find, but also techniques for conducting remote and onsite assessments that can be carried out by biologists and non-biologists alike.

"Great instruction on a sound method of rapid habitat assessment that can be conducted by non-wildlife professionals!"

Member, Philipstown Conservation Advisory Council, 2007 Biodiversity Assessment Short Course

Participants in the programs are active volunteers, professionals, public office-holders, and other community leaders—and we could not have chosen better. They have gone on to expand habitat mapping in their own communities; use habitat information to design management plans for preserves and public lands; incorporate biodiversity protection into their municipal comprehensive plans, open space plans, and zoning ordinances; establish local wetland and stream protection legislation that encompasses many of the small, isolated wetlands and intermittent streams so important to the larger ecosystem; establish standards and procedures for considering natural resources in routine environmental reviews of land development projects; and include biodiversity

protection as a prime factor in the design of conservation easements and in decisions about land acquisition for conservation.

TOO MUCH WILDLIFE?

Those who see the ravages that an overpopulation of white-tailed deer can wreak on forests and gardens, and witness the predatory raids of striped skunks on songbird and turtle nests, or of raccoons on our garbage cans, may wonder about the advisability of protecting natural habitats for such species. Wouldn't our lives be better with less wildlife instead of more?

Conservation biologists certainly acknowledge the ecological and cultural problems caused by these human-subsidized wildlife species



Examining an anise-scented millipede at a limestone ledge, Biodiversity Assessment Short Course, 2004. Laura Heady © 2012.



Predicting significant habitats through map analysis, Saugerties Biodiversity Assessment Training, 2007. Andrew Meyer © 2012.

whose populations often increase dramatically in human-settled landscapes. But our conservation concerns are usually for the more sensitive and uncommon species—such as Acadian flycatcher, bog turtle, and New England cottontail—that are habitat-specialized and much less tolerant of human-altered environments. These are the kinds of species whose decline and disappearance often accompany intensive land uses and suburbanization of the landscape—where large, contiguous habitat areas are broken up into smaller and smaller patches by roads, driveways, lawns, and other developed features. The fragmentation effects are apparent not just near population centers, but also—and perhaps more importantly—in the rural areas that characterize much of the Hudson Valley.

CONSERVATION PRINCIPLES

Native biological diversity is at the foundation of the ecosystems that we all depend on to maintain ample supplies of clean drinking water, to develop fertile soils and support insect pollinators for our food crops, to moderate air temperatures and other aspects of the local and regional climate, and to provide thousands of other seen and unseen services that make our world habitable. Moreover, our native communities help to distinguish this part of the world from all others. Hence, we find species of turtles, salamanders, butterflies, and ferns here that we would not find in western Massachusetts, southern New Jersey, or Alabama.

Native biodiversity includes everything from bacteria, slime molds, and ground beetles to sycamores, river otters, and bald eagles, as well as the habitat complexes that support them. The best—perhaps the only—way to protect and maintain this diversity is to protect intact the array of natural habitats that have developed here over millennia. To do this we cannot just rely on the lands contained in national and state parks or held in trust by conservation organizations. Indeed, because most of our land is privately-held, the most important conservation efforts must happen on private lands such as the few acres owned by you and me, or the 50 acres owned by our neighbors, or the 200 acres where the next development is slated to occur.

To be clear, though, protecting native biological diversity does not require protecting every square inch of natural habitat in the region. It does require, however, consideration of the larger landscape before deciding on the location and design of new land uses. In our programs we discuss the principles of landscape conservation that argue against designing a new driveway that winds deep into the forest interior, or that splits a hayfield into small relict meadows. Such actions can have far-reaching effects on habitat viability that may be obscure to most landowners. In the Biodiversity Education program we explore these consequences and promote what we call the Five Major Rules for locating and designing land development projects:

- Avoid or minimize habitat fragmentation.
- Maintain and restore links between significant habitat patches.
- Establish and maintain broad buffer zones around sensitive areas.
- Maintain natural disturbance processes (such as seasonal draw-downs of surface water, flooding, wind forces, landslides, wild fires).
- Create no additional runoff of rainwater or snowmelt (and minimize impervious surfaces).

Adherence to these simple rules—whether designing a single house on a single lot or a 200-lot residential subdivision—would go a long way toward maintaining and protecting the habitats and interactions that are crucial to intact ecosystems. The stresses imposed by climate change only magnify the importance of maintaining large contiguous habitat areas and broad and safe travelways between habitat patches that may allow animals to adapt to a changing environment.

A NEW CONVERSATION

One very important outcome of the Biodiversity Education program is the changed conversation in the region. Up and down the estuary corridor—the ten counties from Albany and Rensselaer to Rockland and Westchester—no longer are planning boards just discussing engineering specifications for curb cuts, and rote compliance with siting standards for septic leachfields. Now, biological diversity and ecosystem integrity are on the table and part of the routine discussion in reviews and approvals for new land development projects. Of course, the Hudsonia program cannot take credit for all these changes, but we are glad to play a role in the larger trend toward science-based decision-making around development and conservation—a trend fueled in part by the many initiatives of the Hudson River Estuary Program, for which biodiversity conservation is a major focus.

"I wish every planning board and town board member could attend this course. It conveys an enormous amount of information quickly and efficiently that every board member needs to know..."

Attorney for municipal planning boards,
2012 Biodiversity Assessment Short Course

"Excellent information was presented. I will use the workshop info to assess biodiversity or to encourage assessment early on in the review process, and to also consider the areas beyond parcel boundaries."

Member, Clinton Conservation Advisory Council,
2009 Biodiversity Assessment Workshop

"I found this program to be very rewarding and enlightening and it will be applied in my role as a ... land planning participant. It has provided me a whole host of science-based tools that I can apply in environmentally "smart" planning practices and disciplines."

Chair, Ulster Planning Board,
2009 Biodiversity Assessment Training

"The training sparked my sense of urgency about responsible, informed planning. I was reminded that we can't just sit back and wait for others to do it."

Chair, Red Hook Tree Preservation Committee,
2009 Biodiversity Assessment Training

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After members of the Pleasant Valley, Rhinebeck, and Beekman conservation commissions attended biodiversity assessment courses, they instituted innovative procedures for gathering and presenting natural resource information to their planning boards. For each new land development proposal that comes before the town, the commission prepares a customized, site-specific series of maps illustrating features—such as ecologically significant habitats, streams, steep slopes, farmland soils, aquifers, jurisdictional wetlands and buffer zones, and priority conservation areas—that may be pertinent to the environmental review. The customized map helps to ensure that resources of importance to the town are not overlooked, and helps the planning board and the applicant consider potential effects on habitats and biota as the review proceeds.

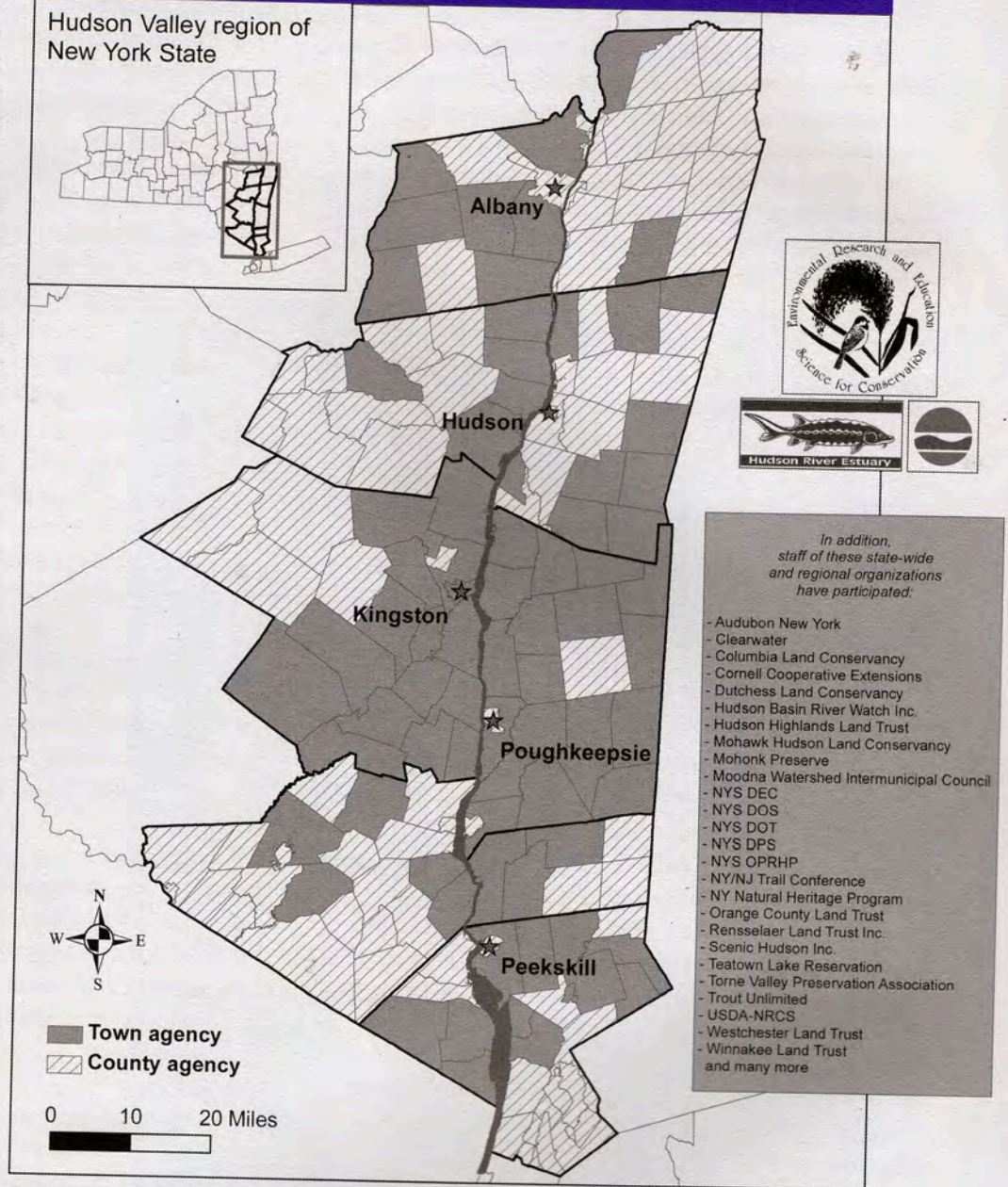
It may seem like a tall order, but we believe that educating this very important sector is the best way to ensure the golden-winged warbler, wood turtle, and white-fringed orchis will survive and thrive in this region long into the future. Participants in the biodiversity education program have the influence, local knowledge, and commitment to their home communities that enable them to use the biodiversity assessment techniques immediately for protecting important resources.

This year's program includes a three-day Short Course in Dutchess County (held in September), and several one-day workshops on biodiversity assessment to be held this fall in Albany, Columbia, and Greene counties. In 2013 we will conduct other courses and workshops on topics related to identifying and protecting biological resources. Visit the webpage of Hudsonia's Biodiversity Resources Center (hudsonia.org/programs/biodiversity-resources-center/) for updates on the schedule, application forms, and other information on these programs.

Hudsonia's courses and workshops have been funded primarily by the Hudson River Estuary Program, and are designed to advance one

of the Estuary Program's goals—outlined in the Estuary Action Agenda—of conserving the plants, animals, and habitats of the Hudson River Valley. Other important funders through current and past programmatic grants are the Educational Foundation of America and the Geoffrey C. Hughes Foundation. And, of course, the support of project-specific funders and hundreds of individual donors to Hudsonia enables us to continue the scientific research that informs our instruction. ■

BIODIVERSITY EDUCATION PROGRAM PARTICIPANTS 2001-2012



Towns and counties whose agencies have participated in Hudsonia's ten-month, three-day, and one-day Biodiversity Education programs, 2001-2012.

Since 2001 Hudsonia's Biodiversity Education program has served over 500 participants representing over 230 agencies and organizations throughout the ten-county region of the estuary corridor.