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News from Hudsonia

Volume 19, Number 1

Spring 2004

INSIDE HUDSONIA

Dear Friends & Colleagues,

With the departure of ice and snow, and the hum of reawakened life in our forests and fields, comes a burst of new activity for field biologists. At Hudsonia we seize on this time of breeding birds, amphibians, and reptiles, and early-blooming wildflowers and sedges, to observe the kinds of fleeting biological events that happen only in the spring.

Even so, the chilly winter months just passed were not a time for slowing down at Hudsonia. Our scientists were busy mapping important habitats in several Dutchess County towns, analyzing data from our Blanding's turtle, phragmites, and Japanese knotweed studies of 2003, training community leaders in techniques for biodiversity assessment and protection, preparing a Harlem Valley and Ridges supplement to the Biodiversity Assessment Manual, and planning our field studies for 2004.

This past winter was also a busy time for members of Hudsonia's Board of Directors—volunteers who give of their time, talents, and resources to help Hudsonia fulfill its mission. Thanks to generous financial support from the Dyson Foundation and the assistance of the Council of Community Services of New York State, the board has begun an intensive development process designed to increase its effectiveness at governance and ensure the vitality of the organization.

Hudsonia is very pleased to welcome seven new members to the board: **Moisha Blechman** (Ancram and NYC), **James Gundell** (Salt Point and NYC), **Belinda Kaye** (Millbrook and NYC), **Cynthia Krimezis-Kalman** (Red Hook), **Judith MacDonald** (Stanfordville and NYC), **William Platt** (Millbrook and NYC), **Henry B. Roberts, Jr.** (Millbrook and Garrison), and returning member **Shawn Borelli Pratt** (Stanfordville).



New member Henry B. Roberts, Jr. (left) and Shawn Borelli Pratt (right) confer with Janeth Thoron (center) at a board development meeting. Photo by Randy Phelps.

On July 24th we will be holding our fifth annual summer benefit. If you haven't attended Hudsonia's summer benefit previously and would like to attend this year, please let us know. We look forward to seeing many of you there.

Erik Kiviat
Executive Director

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Chair, Board of Directors



News from Hudsonia

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EPHEMERALS IN PERIL

By Spider Barbour*

Drawings by Anita F. Barbour*

Early-blooming wildflowers of woodlands and glades are second only to birds as spring harbingers and post-winter inspiration to poets, artists, and lovers. But these plants have become increasingly scarce in the last several decades. The reasons for this decline are multiple; some causes are well documented while others are only suggested by circumstantial or incomplete evidence. Whatever the causes and influences, many species of spring-blooming wildflowers, often called "spring ephemeral herbs" by botanists, are growing harder to find year by year.

To begin to understand the plight of our native woodland wildflowers, it is necessary to understand, in a general way, the delicate ecologies of these herbs. Many species have in common certain ecological features corresponding to observable physical and behavioral characteristics. It may seem strange to speak of plant "behavior," but remember that a plant does different things throughout the growing season, and throughout the course of its life. At the time of this publication, spring ephemeral herbs are in bloom or in fruit, depending upon the exact timing of each species' reproductive cycle.

Many woodland wildflowers produce flowers and set seed in the early part of the growing season, in our region from late March through mid-June. This early blooming and fruiting is advantageous to low plants in forests; tree leaves take several weeks in the spring to fully expand, allowing low plants a short period of full sunlight in which to grow leaves, accumulate sugars through photosynthesis, and produce flowers. Some, like hepatica (*Hepatica nobilis*), raise

flowering stalks in advance of new leaves, which appear after petals have fallen from the flowers. The full sunlight of leafless spring forest canopies favors early-flying pollinators (mostly flies, small bees, and beetles, but also some butterflies and moths) with a layer of sun-warmed air just above the ground. Here the insects can absorb energy and fly vigorously in mild temperatures.

In at least one way the term "ephemeral" is misleading. The flowers themselves are ephemeral, and even the leaves and entire tops of some species wither and die back by midsummer, leaving no trace above ground. But underground roots, stems, bulbs, and tubers of these plants remain alive, ready to grow and bloom again the following spring. Such long-lived perennials, some with life spans rivaling those of trees (tens or even hundreds of years), are the rule, not the exception, among native early-blooming herbs.

Perennial plants with long reproductive lives tend to produce fewer seeds than short-lived annuals and biennials. Pioneering perennial plants in new locations require supportive and stable conditions of soil, moisture, nutrients, microclimate, and light. Natural and human-caused effects can alter these conditions in ways that make life difficult or impossible for many plant species. Spring ephemeral herbs are especially sensitive and vulnerable to such effects.

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* Spider and Anita Barbour are authors of the biweekly column "Nature Walk" in *The Woodstock Times*, and the book *Wild Flora of the Northeast* (1991, Overlook Press). Spider is also an ecologist on the staff of Hudsonia.

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Ephemerals continued from page 1

For example, tree harvesting, as typically practiced, disrupts forest soils and creates large openings in the canopy, providing opportunities for plant species that require disturbed soil for germination, and light throughout the growing season. Disturbance, especially frequent disturbance, tends to give annuals a competitive edge over perennials, which are adapted to more stable conditions.

Along with human-caused impacts there are natural stresses, such as damage to leaves and flowers by insects, slugs, and fungi, and browsing by herbivorous mammals such as rabbits, mice, and deer. Natural and human-caused threats to woodland wildflowers interact, however, and are not always separable. Some of the most serious threats appear to come directly from nature, but human activities may facilitate these effects. For example, degradation of forest environments from logging and use of all-terrain vehicles exacerbates many stresses widely regarded as natural. Deer, introduced earthworms, and invasive plants all derive advantages from human-induced changes in forest habitats.

DEER

Deer are especially fond of spring wildflowers, which may contain high levels of nutrients and perhaps chemicals that help rid



Round-lobed hepatica (*Hepatica nobilis* var. *obtusata*)
Anita F. Barbour © 2004

deer of internal parasites. Nearly all spring ephemeral herbs, when browsed by deer, fail to regrow until the following spring. Without leaves for photosynthesis, an herb's underground parts may not build up food reserves sufficient to overwinter or to regrow the aerial parts when spring arrives. Though most perennial herbs can withstand the loss of one year's growth, repeated annual browsing can weaken and kill an individual, or an entire stand of plants. As deer populations have increased, patches of spring ephemerals have disappeared from many places in our area.

Deer-proof habitats are uncommon in our region. Some of the best places to find wildflowers in April and May are steep ravines, hazardous talus slopes, and terraces between cliff faces on steep slopes. Deer cannot find adequate footing or easy paths to these rich wildflower habitats.

EARTHWORMS

Perhaps surprisingly, earthworms also present a threat. Few people realize that the earthworms living in the glaciated parts of North America are non-native species. The worms in the glaciated Northeast came mostly from suppliers of bait for fishing, and sellers of garden supplies. (Earthworms are regarded as beneficial for gardens, as compost decomposers and soil aerators.) Native earthworms, found only in areas south of the limits of glacial advance, have made little headway into formerly glaciated terrain.

I have attempted to climb slopes in the Hudson Highlands and Palisades only to find



Dutchman's breeches (*Dicentra cucullaria*)
Anita F. Barbour © 2004

my boots nearly ankle deep in soil composed of worm castings (fecal pellets), making little or no uphill progress with each step, and with dozens of wriggling worms skittering about beneath me. On these slopes I found almost no herbs except for a smattering of garlic-mustard (*Alliaria petiolata*), an invasive annual herb from Europe that normally derives some competitive advantage from worm activity. But here, even this worm-friendly weed was having trouble coping with loose "worm dirt."

Dense populations of worms consume fallen leaves too quickly for other soil organisms to get their share. Consequently, many small arthropods, microorganisms, and fungi decline or disappear where worms are abundant. Larger organisms that depend on slow decomposition of leaf litter also suffer accordingly. These deprived life forms include many native species of trees, shrubs, herbs, vertebrates, and invertebrates. Perhaps no group is more stressed than woodland herbs. With their shallow root systems dislodged by worm activity, and their symbiotic partners (mycorrhizal fungi, small invertebrates, and microorganisms) starved out by the overpopulous burrowers, they decline and vanish. Worms also drive out ants, competing burrowers that carry herb seeds into their underground colonies. There the seeds the ants don't eat germinate under ideal conditions, rejuvenating populations of many species of woodland herbs. Apparently, little

light has been shed on why native predators are ineffective at holding down the numbers of alien earthworms.

INVASIVE PLANTS

Hundreds of species of non-native plants, the majority introduced from Europe and Asia, have become naturalized in North America; many have become pests (weeds) in both natural and artificial environments. One of the most aggressive



Miterwort (*Mitella diphylla*)
Anita F. Barbour © 2004



Trout lily (*Erythronium americanum*)
Anita F. Barbour © 2004

and destructive invasive plants in forests is garlic-mustard. Aided by human alteration of forest habitats, garlic-mustard is able to penetrate deeply into wooded areas from open edges where typically it first appears. This relative of garden kale and broccoli can chemically alter the soil to suppress competing native plants. In many disturbed forests, garlic-mustard is almost the only herb to be seen.

Other invasive plants that contribute to the decline of forest wildflowers include Japanese barberry (*Berberis thunbergii*), a prickly, fast-spreading shrub; Japanese honeysuckle (*Lonicera japonica*), a semi-woody vine that can climb trees or shrubs, or trail across the ground, smothering low herbs; and tree-of-heaven (*Ailanthus altissima*), an Asian tree whose seedlings sometimes blanket the ground, and whose roots secrete toxins that may suppress competing plants.

SAFE HAVENS

Despite all these influences in our region, there are places where spring-blooming forest herbs still thrive. Scattered pockets of rich forest habitat have so far escaped or remained immune to the enemies of woodland wildflowers. These include steep, rocky slopes of the Catskills, Taconics, Shawangunks, and Hudson Highlands; ravines and gorges in areas of less-steep terrain; and portions of river floodplains. Rarest of all are patches of undisturbed, mature, or old-growth forest still ecologically intact (such as the Pack Forest in the Town of Warrensburg, Warren County). These habitats appear to be resistant to the

A FEW SPRING WILDFLOWER SITES ON PUBLIC LANDS IN THE AREA:

The sites listed here are open to the public, and support significant communities of spring ephemeral herbs. When visiting these places, always stay on marked trails to avoid trampling plants. Ground that appears bare may have herbs that are dormant and may be damaged by soil compaction.

Pack Forest, about 8 km (5 mi) north of Warrensburg in the southern Adirondacks, is owned by SUNY Syracuse, College of Environmental Science and Forestry. The property includes 1000 ha (2500 ac) of woodlands, a large lake, and many trails leading to mountain vistas, marshes, and the banks of the Hudson River.

State Forest Preserve lands in the Catskills contain excellent wildflower areas along hiking trails, some within 100 m (330 ft) or so of a road. Deep Notch, between Shandaken and Lexington, has a trail on the left side of Rt. 42, about 6.4 km (4 mi) north of Rt. 28. After the trail ascends and crosses a small stream, there is a moist slope with abundant wildflowers, including Dutchman's breeches, squirrel-corn, Canada violet, round-leaf violet, red trillium, and large-flowered bellwort. The Stony Clove notch trail, on the west side of Rt. 214 about 4.8 km (3 mi) south of Rt. 23A, leads to the summit of Hunter Mountain. Just below the summit are open areas with painted trillium, blue-bead lily, and other northern wildflowers.

Joralemon Park in Albany County is on Rt. 143 about 4 km (2.5 mi) west of Rt. 9W. Trails are on the right side of the road across from the parking lot. Limestone bedrock supports spring-blooming herbs, including green dragon, green violet, wild columbine; lyre-leaved rock cress, sharp-lobed hepatica, and may-apple. The park also has 28 species of ferns.

Stony Kill State Environmental Education Center is on Rt. 9D north of Beacon, Town of Fishkill, Dutchess County. Near the headquarters building at the end of the driveway, just east of the parking lot, is a short wildflower walk in a mesophytic hardwood forest. Among the flowers along the trail is state-rare twinleaf, as well as common spring ephemerals such as Jack-in-the-pulpit, bloodroot, and wild ginger.

Black Creek Preserve, east of Rt. 9W in the Town of Esopus, Ulster County, is owned by Scenic Hudson Land Trust. A system of calcareous sandstone ridges along the Hudson River features spectacular vernal pools, and rock-dwelling wildflowers such as early saxifrage, smooth rock cress, wild columbine, and round-leaved hepatica.

Continued on page 5

THE AMERICAN EEL AND THE HUDSON RIVER

By Robert E. Schmidt*

Drawings by Kathleen A. Schmidt*

I've spoken about eels to quite a few people in the Hudson Valley and most respond by mentally or physically recoiling. The concept of eels and the realization that they live in the rivers right here seems to disturb many. Others around the world, however, have quite a different attitude towards eels; they avidly pursue them for food. The populations of all freshwater eel species in the world (family Anguillidae) are declining, primarily due to overharvest. This is also true of the American eel (*Anguilla rostrata*).

Due to high levels of PCB contamination, catching and selling American eel from the Hudson River is illegal. Some people still catch Hudson River eels for personal consumption (a dubious practice given the contaminant levels), but those catches have little effect on the eel population each year. The Hudson may be the only place in North America where one can study the eel population without large commercial harvests interfering with the animals.

The American eel spends only part of its life cycle in the Hudson River. The American eel (and anguillid eels in general) are called "catadromous" fishes, which means that they spawn in the ocean and spend most of their juvenile life in freshwater. This life history is opposite to that of some favorite Hudson River game fishes, American shad and striped bass, which are anadromous—they spawn in freshwater and the young migrate to the ocean to mature. Calling the American eel catadromous,

however, disguises the almost ridiculous extreme to which eels take this behavior.

Very small larval American eels are about 5 mm (0.2 in) long and are found near the ocean's surface south and east of Bermuda in the Sargasso Sea. These larvae look quite different from the eels you are used to seeing. They are transparent, elongate, and very flat. Even though they can swim, the larvae drift in the ocean currents and slowly grow to about 80 mm (3 in) long by the time they reach the waters off the New York shore. A study¹ showed that the eel larvae are about 200 days old when they reach the ocean off the shore of Rhode Island, and one suspects that the larval eels near New York would be about the same age.

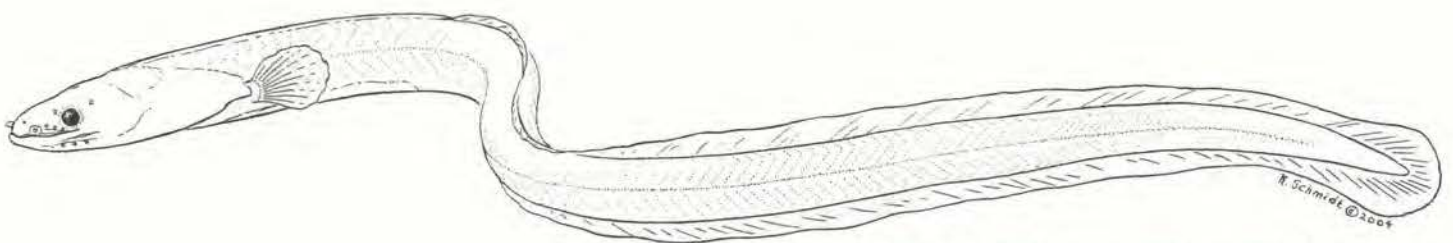
When they reach our coast, the larval eels begin to transform into the next, "glass eel," stage. Glass eels are 50–70 mm (1.9–2.8 in) long versions of adult eels but they are completely transparent. The glass eels swim along the ocean bottom into the coastal waters and eventually into the Hudson River. That part of their trip probably takes about 50 days. Now the eels become vulnerable to human harvest. A clever commercial fisher can place large very-small-mesh traps called "elver fykes" across the migration route and trap tens to hundreds of thousands of glass eels in a night. (An elver is a young eel and a fyke is a conical fish trap.) There is a market for live glass eels in the Far East, where they are

placed in aquaculture facilities and grown to marketable size. Some people eat the glass eels directly, fried and sprinkled over a salad. Elver fykes can be very efficient and many runs of glass eels have been decimated by this practice. Commercial elver fykes are now illegal in New York.

As glass eels slowly move up the Hudson River estuary they seem to segregate by sex, with males staying in the lower estuary and females moving to the upper estuary and into tributaries. During this part of their migration, eels gradually begin to develop dark pigment over their back and sides. When pigmentation begins they are called elvers and when it is complete they are called yellow eels.

This is the stage where a current Hudsonia study begins to look at the eels. The purpose of the study, which is funded by the Hudson River Estuary Program of the New York State Department of Environmental Conservation, is to determine the timing and pattern of immigration of glass eels and elvers into Hudson River tributaries. In 2003 we placed a miniature elver fyke in each of two Hudson River tributaries, Hunters Brook in Wappingers Falls and the Saw Kill in Annandale. The nets were in place from March 15 through June 7 and were checked every day.

We began to catch eels in the first week of April 2003 and caught them fairly consistently through the end of May. Our highest catches began at the new moon and persisted for



"Glass eel" stage of the American eel (*Anguilla rostrata*), 50–70 mm

* Bob Schmidt, co-founder and Associate Director of Hudsonia, is Professor of Zoology at Simon's Rock College of Bard. He teaches organismal and ecological biology, and is active in many aspects of fish research in the Hudson Valley. Kathy Schmidt is Hudsonia's illustrator, and the principal of Natural History Illustration and Design in Hillsdale, New York.

three days (May 1–4). We caught about 1200 glass eels and elvers in 2003 (most released alive), and therefore we estimated that each Hudson River tributary can expect an influx of several thousand young eels each spring. This project will continue for two more springs and we are anxious to see whether this pattern is consistent from year to year.

A second Hudsonia project, shared with Karin Limburg of SUNY Syracuse, College of Environmental Science and Forestry, and funded by the Hudson River Foundation, is looking at yellow eels in Hudson River tributaries and the effects of dams on eel populations. We have found some extremely high densities (13,000/ha) of American eel in the mouths of Hudson River tributaries, higher than any reported elsewhere. We have also observed that, even though eels can surmount or circumvent some large barriers, these barriers are significant obstacles for them and the eel densities decline sharply above dams or waterfalls.

Yellow eels may stay in the Hudson River for 15–25 years. Then they begin the final

transformation into a sexually mature adult, called a “silver eel.” The eel’s color begins to change from yellowish to black and white and the eyes begin to increase in diameter. In 2003 we saw at least two eels in the process of silvering, one a massive 84 cm (33 in) long individual collected near Red Hook. Eventually, the silver eels begin their downstream migration out of the Hudson River estuary and into the ocean. There they disappear from our view but apparently make their way along the sea bottom to the Sargasso Sea, a journey of over 1600 km (1000 mi).

No one has ever observed spawning in this species, partially because the eels spawn in several thousand feet of water. As far as we know, adults do not live beyond spawning.

How can our tributaries support the very high densities of eels that we observed? What effects do dense eel populations have on other fishes that spawn or forage in the tributaries? Glass eels and small elvers appear to have high mortality rates, but what is the source of this mortality? How do eel passage structures (currently there are none in the Hudson Valley) on dams

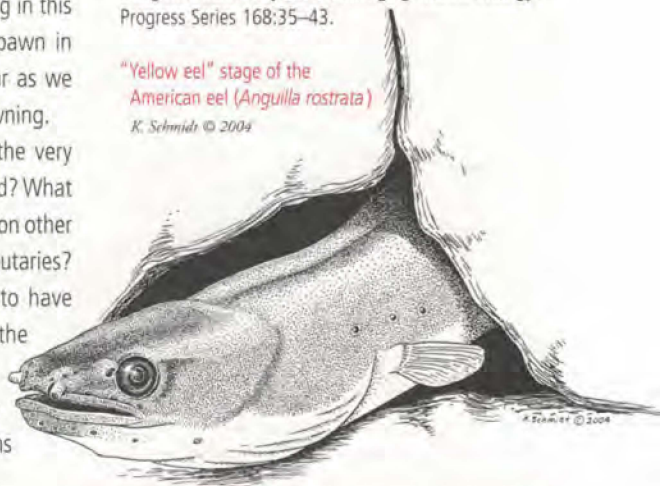
affect eel populations? These are just a few of the questions about American eel ecology that remain unanswered even in the local rivers where we can readily observe the eels. We hope that our current studies are the first of many that will begin to uncover the secrets of this mysterious animal and its role in the Hudson River ecosystem. ■

REFERENCE

Wang, C.H., and W.N. Tzeng. 1988. Interpretation of geographic variation in size of American eel, *Anguilla rostrata*, elvers of the Atlantic coast of North America using their life history and otolith aging. *Marine Ecology Progress Series* 168:35–43.

“Yellow eel” stage of the American eel (*Anguilla rostrata*)

K. Schmidt © 2004



threats that have degraded most of our forests.

Moist, rocky slopes with deep pockets of soil often support large assemblages of spring wildflowers, including trilliums (*Trillium* spp.), bellworts (*Uvularia* spp.), violets (*Viola* spp.), blood-root (*Sanguinaria canadensis*), trout lily (*Erythronium americanum*), Jack-in-the-pulpit (*Arisaema triphyllum*), and Dutchman’s breeches (*Dicentra cucullaria*). Rocky woodlands, especially those on calcareous substrates such as limestone, dolomite, marble, or calcareous shale, are home to sharp-lobed hepatica (*Hepatica nobilis* var. *acuta*), wild columbine (*Aquilegia canadensis*), early saxifrage (*Saxifraga virginica*), and rock cresses (*Arabis* spp.). Springy, braided stream systems of mountain terraces support toothwort (*Cardamine diphylla*), Pennsylvania saxifrage (*Saxifraga pennsylvanica*), miterwort (*Mitella diphylla*), and foamflower (*Tiarella cordifolia*). High mountain forests in the Catskills may have northern herbs such as rose twisted-stalk (*Streptopus roseus*), bluebead lily (*Clintonia borealis*), painted trillium (*Trillium undulatum*), and mountain wood-sorrel (*Oxalis montana*). Rich, rocky slopes in the Hudson Highlands support

a distinctive array of spring herbs, including small-flowered bittercress (*Cardamine parviflora*), yellow harlequin (*Corydalis flavula*), and two state rarities—small-flowered crowfoot (*Ranunculus micranthus*) and violet wood-sorrel (*Oxalis violacea*).

With spring ephemerals in decline, the need is greater than ever to protect the remaining areas where these herbs still flourish. Protecting lands with good wildflower habitat through acquisition or conservation easements likely will not be enough to stop the decline of spring ephemerals. Research is needed to understand the intricate dynamics of threats such as earthworms, invasive plants, and soil acidification. Understanding these and other ecological factors affecting forest herbs will help to ensure their future. ■

We thank Dennis Whigham for reviewing this article.



Jack-in-the-pulpit (*Arisaema triphyllum*)

Anita F. Barbour © 2004

HUDSONIA'S BIODIVERSITY EDUCATION PROGRAM: Short Course Engages More Hudson Valley Community Leaders

By Laura T. Heady*

Hudsonia's Biodiversity Resources Center (BRC) oversees several programs related to identification and protection of native biological diversity in the region. One of our goals is to place biological resource information in the hands of agencies and organizations whose land use decisions profoundly affect the viability of biological communities, habitats, and ecosystems. The Biodiversity Mapping Program, for example, provides townwide habitat maps to municipal agencies for use in comprehensive planning and environmental reviews of proposed development projects. The article below describes the Biodiversity Education Program, which trains community leaders in techniques for identifying and protecting important habitats. We hope to expand these programs to reach even more Hudson Valley communities concerned about protecting regional biodiversity.

—Gretchen Stevens, BRC Director

The importance of land use issues to residents of the Hudson Valley was apparent after last year's elections, with many local decisions reflecting citizens' concerns about clean water, open space, and natural resource protection. Controversial land use decisions continue to make headlines in local papers, as municipalities grapple with housing needs, watershed protection, and a host of other planning and conservation concerns.

In our continuing efforts to help local community leaders respond to these concerns, Hudsonia launched a new three-day Biodiversity Assessment Short Course last November. Modeled after our 10-month training, the course was created to engage even more land

use decision-makers in considering biological resources when planning for future development in the Hudson Valley. The project is a partnership effort with the New York State Department of Environmental Conservation's Hudson River Estuary Program, which engaged Hudsonia to develop and implement the course. The Dutchess County Environmental Management Council and the Institute of Ecosystem Studies (IES) provided wonderful indoor and outdoor "classrooms."

PUTTING BIODIVERSITY ON THE MAP

Sixteen attendees spent three days with Hudsonia staff, learning how to identify and protect ecologically important habitats. We focused especially on habitats that may be rare themselves, may support rare species, may provide essential ecological services to other landscape components, or may be especially high quality examples of common habitat types.

Participants in the short course were policy- and decision-makers from local and county

agencies, land trusts, and conservation organizations whose day-to-day planning, regulatory, and conservation actions play a prominent role in determining the fate of our ecological resources.

The short course addressed how geology, soils, surface water, and topography shape the habitats we see on the landscape, and the biological diversity that they support. Using a study area at IES, participants analyzed maps and aerial photos to predict the locations of habitats of ecological significance, including hardwood swamps, calcareous wet meadows, woodland pools, and rocky crests. Participants then took their preliminary habitat maps into the field to confirm the predictions, and learn about indicators of habitat quality and suitability for supporting plants and animals of conservation concern.

"This is a terrific addition to my understanding of ecosystems," said Linda Gette, Director of Development at Orange County Land Trust. "I'm thrilled to have overcome my fear of soil and bedrock maps."



Marcus Mello, Rhinebeck Conservation Advisory Council (CAC) member, and Nancy Swanson, La Grange CAC member, learned stereoscopic aerial photo interpretation at Hudsonia's short course in biodiversity assessment. *The Biodiversity Assessment Short Course will be offered twice this year, May 18–20 and September 21–23; contact Laura Heady at 845-876-7200 or heady@bard.edu for more information. Photo by Laura T. Heady.*

* Laura Heady is Hudsonia's Biodiversity Educator.

CONSERVATION PLANNING

We discussed how to apply participants' findings to actual land-use planning situations. Practices such as protecting contiguous, unaltered tracts of land and preserving links between habitats were encouraged.

"As a landscape consultant to municipal planning boards, I am using the better understanding I now have of natural habitats to help guide growth in a manner that considers the possible impact of a change to the land on biodiversity," said Al Wegener, Project Manager of the Shawangunk Mountains Scenic Byway. "Since taking the short course, 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," said Manna Jo Greene, Deputy Chair of the Rosendale Environmental Commission and Environmental Action Director of Hudson River Sloop Clearwater.

MANY NEW COMMUNITIES AND ORGANIZATIONS JOIN TRAINING

"I was so inspired 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, including Joppenberg Mountain and the Binnewater Lakes," added Greene.

Along with the Town of Rosendale in Ulster County, participants from 19 agencies in Rockland and Greene counties are enrolled in the full 10-month training program this year. Two Rockland groups are mapping and assessing habitats along the Hudson River shoreline and in the Torne Valley. The Greene County group is looking at habitats along the Route 9W corridor, where there is a great deal of development pressure on important grasslands and wetlands.

Now that Hudsonia's Biodiversity Education Program is in its third year, we're continuing to assist past participants, and learning how they have applied their biodiversity assessment skills to conservation efforts in their own communities. Check future issues of *News from Hudsonia* for their stories of local challenges and innovative approaches to biodiversity conservation. ■

The Biodiversity Education Program is conducted in partnership with the Hudson River Estuary Program, and with funding from the Estuary Program and the Geoffrey C. Hughes Foundation.

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BIODIVERSITY ASSESSMENT MANUAL

Hudsonia's *Biodiversity Assessment Manual for the Hudson River Estuary Corridor*—a guide to the identification and protection of Hudson Valley habitats of special ecological importance—covers the area from Rockland and Westchester counties north to the Troy Dam, and is especially useful for local planners, municipal agencies, environmental consultants, and biologists. To order a copy, send a check or money order for \$100, payable to Hudsonia Ltd., to:

Carol Cadmus, Hudsonia Ltd.
PO Box 5000
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An important collection of papers on the conservation of eastern U.S. turtles, co-edited by Hudsonia Executive Director Erik Kiviat, will soon be published. Contact the publisher at their website, www.bibliomania.com, to view or obtain a copy of:

Swarth C., W. Roosenberg, and E. Kiviat, eds.
In press. Conservation and ecology of turtles of the Mid-Atlantic region: a symposium.
Salt Lake City: Bibliomania.

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