

News from Hudsonia



News from Hudsonia

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ENVIRONMENTAL DETERIORATION OF THE OUTWASH PLAINS: NECROPSY OF A LANDSCAPE

By Erik Kiviat* and Gretchen Stevens**

Imagine a countryside where a domestic well yields 100 gallons of water per minute; extensive wetlands, fields, and forests support waterfowl, wildflowers, and wood turtles; brook trout flourish in cool streams; and numerous farms produce corn, hay, vegetables, fruit, and dairy products. This was the predominant landscape of the outwash plains in Dutchess County, New York, 50–100 years ago, but only remnants survive.

"Necropsy," referred to in the title, is a post-mortem examination. While the outwash plains are, of course, not "dead," human activities have greatly reduced the biological diversity and ecological vitality of these landscapes. Pollution of groundwater, loss of fish and aquatic invertebrate diversity in streams, and dead wood turtles and Blanding's turtles on the roads are all symptoms of the degradation that affects the well-being of wildlife and humans alike. In this article we describe some of the failures of land use decision-making, and other secondary effects of human activities, that have damaged the landscape that supports rare and sensitive plants and animals. Our intention is not to lay blame at the feet of particular persons, agencies, or institutions, but rather to point the way to a better *modus operandi* for land management on our outwash plains—and in other landscapes.

The soils of Dutchess were shaped mostly by glaciation. Much of the county is covered with soils that formed in glacial till, a mixture of different particle sizes ranging from clay, silt, and sand to boulders, carried and deposited by glaciers. In some areas, however, meltwater streams flowing off the glaciers sorted particles and created deposits of gravelly and sandy materials called glacial outwash. These deposits are mostly in valleys, in terrain that includes nearly level floodplains, low knolls and ridges, and gentle areas

reaching to the foot of bordering hills. The productive groundwater aquifers occurring beneath thick outwash deposits are primary public water sources for many municipalities.

The Dutchess County outwash plains contain "kettles" — depressions of variable size left by the melting of stranded ice blocks. Most of the kettles have become groundwater-fed wetlands or ponds, and in the western two-thirds of the county these form the primary habitat of the threatened Blanding's turtle. Kettle wetlands and other types of wetlands on the outwash plains support a variety of other rare, uncommon, or vulnerable animals and plants including breeding American black duck (declining), wood duck (vulnerable), spotted turtle (NYS Special Concern), wood turtle (NYS Special Concern), ribbon snake (scarce), blue-spotted salamander (NYS Special Concern), swamp loosestrife (uncommon), spiny coon-tail (NYS Threatened), and swamp cottonwood (NYS Threatened), organisms attuned to the hydrology, microclimates, and chemistry of the outwash wetlands. Direct groundwater discharge, and outflow from the wetlands, feed cool streams inhabited by wood turtle and brook trout. Nearby dry, gravelly areas provide the terrestrial nesting sites for Blanding's turtle and other turtles, and support eastern box turtle (NYS Special Concern) and five-angled field dodder (NY Natural Heritage Program Watch List).

The Blanding's turtle thus acts as an "umbrella species" whose habitats, some of which are highly specialized, support many other

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* Erik Kiviat is Hudsonia's Executive Director.

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

INSIDE: See page 2 for Grasslands and Biodiversity.

GRASSLANDS AND BIODIVERSITY

By Laura Heady*

It was the end of the workday and I still had a few minutes before the late-November sun would drop behind the Shawangunk ridge. During these busy, short days of winter, it seemed that my experience of the Hudson Valley had been primarily from my desk, looking at maps and aerial photos, or at meetings on biodiversity conservation. This evening, I had time for a walk in the cold air before the drive home in darkness.

I followed a footpath along the Wallkill River, under branches of silver maple, and my mind wandered to thoughts of local biodiversity. I took note of the cornfields adjacent to the opposite bank and longed to see a riparian buffer to protect the river. I scanned the community gardens to see what overwintering birds might still be foraging the remains of the summer harvest. And when I entered a stand of floodplain forest, I was reminded that my winter tree identification skills needed refreshing.

Daylight was fading as I came to the forest edge. I stepped out from the canopy to an expanse of grassland, appearing golden in the setting sunlight. My eyes scanned the clearing and spotted the shape of a large bird flying low above the fields. The evening glow shone on its cinnamon breast, and as the bird tilted I caught a glimpse of a distinct white rump patch. The hawk held its long wings in a shallow "V" as it scanned the tall grasses for prey. I was delighted; it was a juvenile northern harrier. I watched until it flew from sight, and as I turned to head back I celebrated the unexpected moment.

NORTHERN HARRIER

The northern harrier (*Circus cyaneus*) or "marsh hawk" is a slender-bodied, medium-sized hawk of open fields, meadows, and marshes. Long tails with conspicuous white uppertail coverts, long legs, and owl-like facial disks are characteristics of both juvenile and adult

northern harriers. These birds are agile flyers, and males perform elaborate aerial courtship maneuvers during breeding season.

Like many other grassland species, northern harriers are at risk due to habitat loss and fragmentation. Currently, their status in NY is "threatened" and they are also on the US Fish & Wildlife Service's list of Migratory Nongame Birds of Management Concern. While they may be observed any time of year in the Hudson Valley, and especially in winter, there has been no recent confirmation of breeding in the region. Historically, harriers were known to nest in Hudson River tidal marshes; today, the harrier's New York breeding range is limited to central, western, and northern portions of upstate, and salt marshes and shrub habitats on Long Island.

DECLINE OF GRASSLAND HABITATS

The term "grasslands" can include not only upland meadows and wet meadows but also marshes dominated by graminoid (grass-like) vegetation. Extensive grasslands were once abundant in the Midwest, and were maintained by periodic natural fires. These habitats were less common in the Northeast, where the best examples of grasslands occurred on sand plains and coastal marshes, and in extensive beaver flowages that created inland marshes and wet meadows. In the 1700s, however, European settlers began to convert eastern forests to large farms, resulting in millions of acres of grassland in the forms of cropland, hayfield, and pasture. With these changes in the landscape, grassland bird species became more common in the Northeast.

Grasslands are now disappearing with the decline of regional agriculture, the conversion of open land to residential and commercial uses, and the transformation of abandoned farm fields to shrubby fields and eventually to forests. Due in part to loss of habitat, grassland birds such as sedge wren, upland sandpiper, vesper sparrow, savannah sparrow, grasshopper sparrow, Henslow's sparrow, bobolink, and

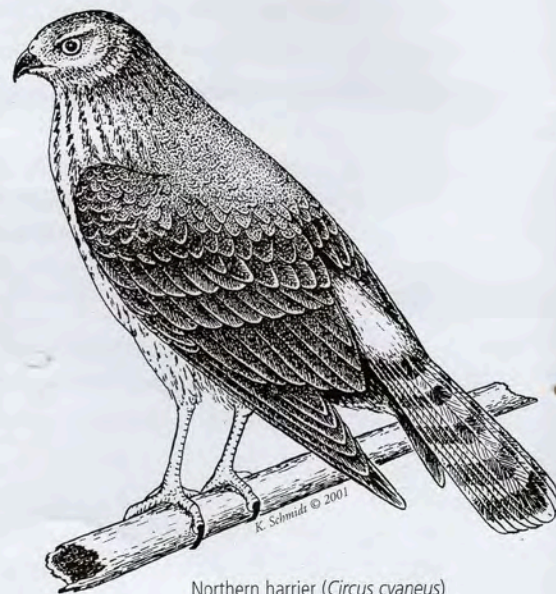
eastern meadowlark are experiencing population declines throughout their ranges.

Their ground-nesting behavior is another factor contributing to the vulnerability of grassland birds. Harriers, for example, build structures of sticks and grass on the ground, on hummocks, or in dense vegetation. Ground-nesting grassland birds have a high risk of nest mortality from mowing activity in the early summer, before the young have fledged. The presence of pesticides may be another factor in the observed declines of grassland species. Harriers may be especially vulnerable to bioaccumulation of toxic chemicals in prey such as insects, small birds, mice, and voles.

CONSERVATION RECOMMENDATIONS

Many grassland bird species require large expanses of meadow and field habitats that provide both breeding and foraging opportunities. Studies have found that patches greater than 100 acres (40 ha) are necessary to support a diversity of breeding grassland birds; considerably larger patches, however, have greater potential for high species diversity and breeding success.^{1,2}

While preserving extensive, unfragmented habitat is an important first step in restoring



Northern harrier (*Circus cyaneus*)

*Hudsonia's Biodiversity Educator

grassland bird populations, this alone will not solve the problem. Conservation of grassland birds also may require manipulation of the landscape to mimic the agricultural countryside of the 18th century. Large farms can be managed to support the varying stages of old field habitats that support grassland birds, including those species that require a shrubby vegetation component. Prescribed burning, carefully-timed mowing, or grazing may be necessary to create and maintain this mosaic. Maintenance activities for conservation and routine agricultural mowing should occur after the young have left the ground nests. The young of many grassland bird species have fledged by mid-August, but harrier nests may still be active in mid-September.

GRASSLANDS AND BIODIVERSITY

In the Hudson Valley we have much to gain from protecting grasslands. The habitats used by harrier and bobolink, for example, are shared by overwintering populations of short-eared owl and comprise part of the large habitat complex of bobcat. In the spring and summer, grasslands provide habitat for rare butterflies such as aphrodite fritillary and dusted skipper, and a multitude of other invertebrate species. These pollinating insects, along with berry-eating birds and the seed-eating small mammals of old fields, are essential to maintaining our native plant communities. Protecting grassland habitats will also help preserve the cultural and historic values of old farmlands of the Hudson Valley and maintain the scenic rural character of the landscape.

And without these habitats, some of us will miss the joy of seeing the sunset reflected off the cinnamon feathers of a juvenile northern harrier, searching the grasslands for its next meal. ■

REFERENCES

- 1 Helzer, C.J. and D.E. Jelinski. 1999. The relative importance of patch area and perimeter-area ratio to grassland breeding birds. *Ecological Applications* 9:1448-1458.
- 2 Herkert, J.R. 1991. Prairie birds of Illinois: population response to two centuries of habitat change. *Illinois Natural History Survey Bulletin* 34:393-399.

Necropsy of a Landscape continued from page 1

important and imperiled species. While Blanding's turtles tend to concentrate their foraging, social, and overwintering activities in deep water, shrubby kettle wetlands, they require a whole complex of habitats to meet their needs throughout the year. The habitat complex covers one to several square kilometers and contains not only the primary wetland habitats but also intermittent woodland pools for foraging; permanent ponds or pools for drought refuge; shallow, densely vegetated wetlands for hatchlings and small juveniles; sunny upland sites for nesting; and broad intervening "corridors" for movement among these various habitats. Within this intricate landscape, Blanding's turtles are vulnerable not only to loss or alteration of the wetlands and upland nesting habitats, but also to mortality beneath vehicles, mowers, and farm machinery; entrapment in "pitfalls" such as uncovered window wells or swimming pools; predation on eggs and juveniles by raccoons and skunks; and collecting by uninformed or illegal pet keepers and dealers. These same threats also affect other uncommon (and common) turtle species, snakes, ducklings, ground-nesting birds, and other wildlife. Populations of Blanding's turtles, like those of other late-maturing and long-lived species, depend on very high rates of year-to-year survival of adults; small increments of unnatural mortality can tip the balance from viability to decline.

The Blanding's turtle perfectly illustrates the importance of protecting integrated landscapes instead of focusing on isolated habitats. Blanding's turtles must migrate from wetland to wetland to accommodate seasonal changes in temperatures, water levels, and food supplies; adult females must migrate from wetland to upland nesting area to lay their eggs; and adults must be able to occasionally disperse from one habitat complex to another so local populations can adjust to habitat changes. This dispersal also promotes gene flow between local populations, an important factor in the longterm viability of populations.

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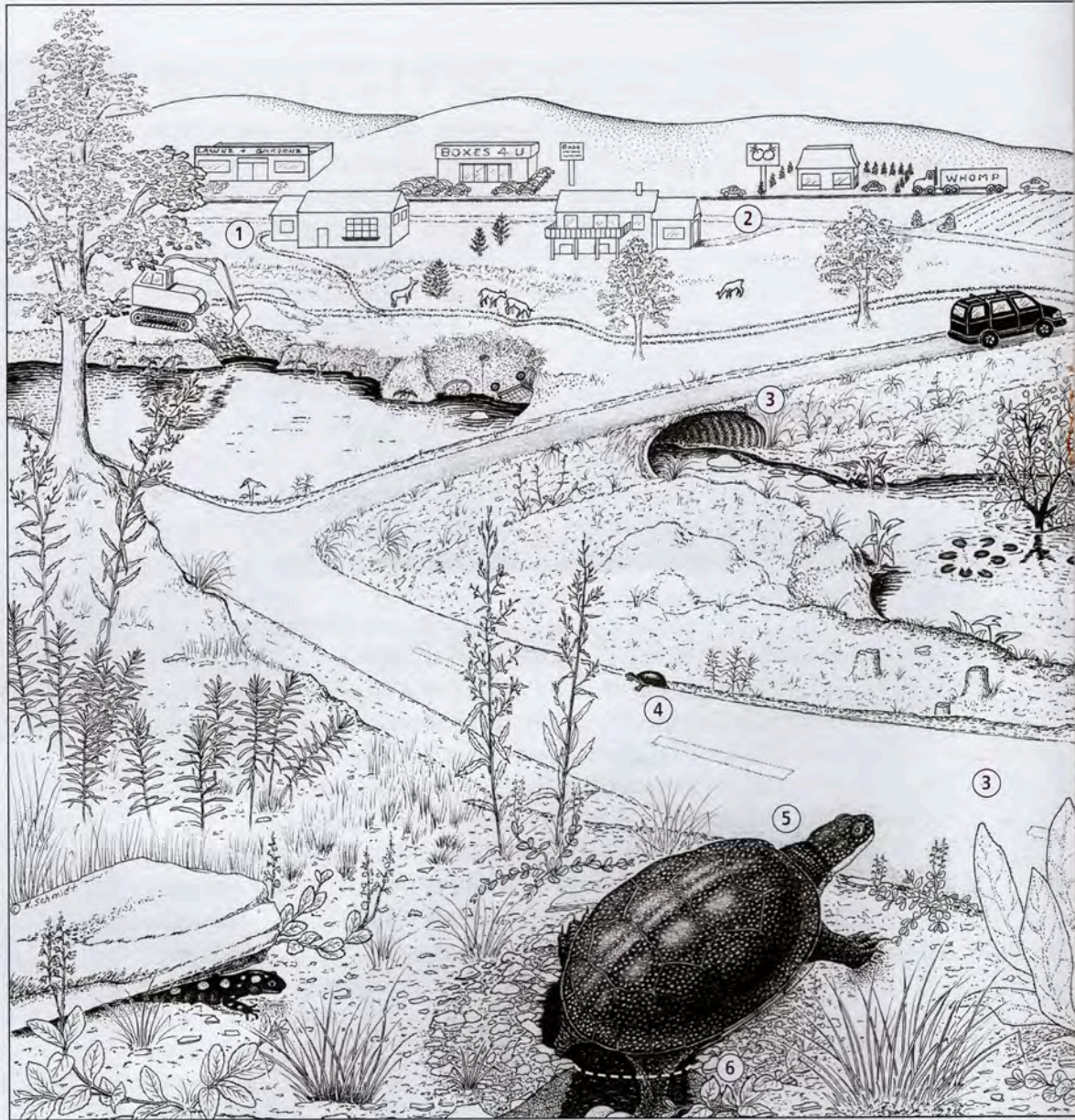
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Necropsy of a Landscape
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Some of the oldest Blanding's turtles and box turtles alive in Dutchess County today undoubtedly hatched 60–75 years ago. We do not have a clear picture of how the outwash landscapes were managed in that first half of the 1900s, but we can tentatively reconstruct some of this activity based on visible remnants, oral history, and knowledge of land use practices elsewhere. Some human activities were damaging to outwash habitats, and some may have been beneficial—depending on the habitat, the species of concern, and the type of change. We know that peat (organic sediment) was mined from wetlands on a small scale, probably for use as a soil amendment in landscaping and gardening. Forests were becoming reestablished after the deforestation and intensive farming of the 1800s. Dairy cattle and sheep drank from and grazed in many of the wetlands. Farmers dug ditches to drain wetlands and to shorten the flooding duration of other floodprone areas. Drainage made wetland soils more available and productive for grazing, haying, and tilling, and helped reduce the abundance of *Anopheles* mosquitoes and the malaria they transmitted. Cattle and sheep grazing kept invasive species such as purple loosestrife and common reed from overtaking large areas. In some cases, cultivation, grazing, gravel mining, and logging near kettles and other wetlands caused siltation and the formation of mineral sediment deposits in portions of the wetlands. Lead arsenate entered wetlands from apple orchards where it was used as an insecticide. Farm refuse, including old machinery and household waste, was frequently dumped in wetlands.

The second half of the 1900s saw an explosion in human population and economic growth in Dutchess County. The Taconic Parkway, constructed about 50 years ago, made the drive between Dutchess County and Westchester or New York City easy and pleasant. This hastened the pace of land conversion, as agricultural and forested lands were transformed into residential, commercial, and industrial developments, accompanied by more infrastructure and services: roads, water supply, sewage treatment, school facilities, municipal buildings, soil mines, landfills, parks, and recreation areas. Traffic volumes and speeds increased. Loss and degradation of habitats led to the displacement of uncommon, rare, or habitat-specialized species by tough, tolerant, habitat- and food-generalist species such as raccoon, green frog, painted turtle, mallard, red-winged blackbird, and purple loosestrife.

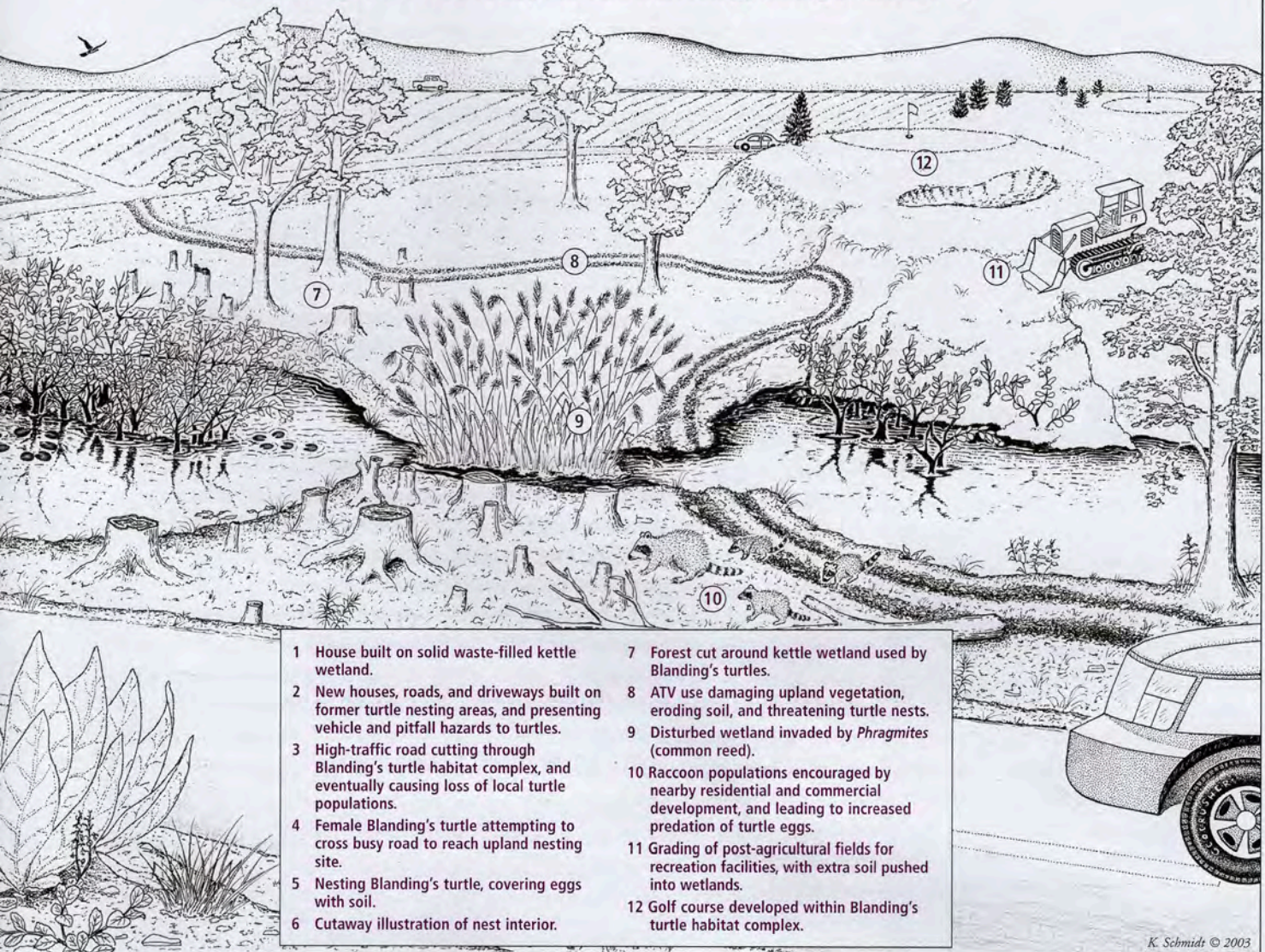


Raccoons and striped skunks, which are the most important predators on turtle eggs, increased with subsidies from garbage and other human activities.

Some of the adverse changes to wetlands took place before the promulgation and enforcement of state and federal wetlands regulations. Others have never been prohibited by wetlands laws, or occurred unnoticed by the regulatory agencies. Still others were (and continue to be) permitted by local boards and state or federal agencies without consideration of the species that depend on these habitats. Certain practices are unregulated even though their effects on rare and vulnerable species are far-reaching. For example, the upland nesting areas of the Blanding's turtles (also used by a variety of other turtle species) are entirely unprotected. Despite the threatened status of this species in New York, anyone can legally destroy a Blanding's turtle nesting site as long as that person does not knowingly damage the eggs or turtles themselves.

Figure 1 shows a hypothetical landscape that is a composite of real localities and land uses that we have observed during our studies. The collective outcome of the many small changes to the landscape shown in Figure 1 greatly reduces the sustainability of the Blanding's turtle population and the populations of many other rare, declining, and vulnerable animals and plants that

Figure 1. Composite outwash landscape and Blanding's turtle habitat complex illustrating environmental problems affecting biological diversity.



- 1 House built on solid waste-filled kettle wetland.
- 2 New houses, roads, and driveways built on former turtle nesting areas, and presenting vehicle and pitfall hazards to turtles.
- 3 High-traffic road cutting through Blanding's turtle habitat complex, and eventually causing loss of local turtle populations.
- 4 Female Blanding's turtle attempting to cross busy road to reach upland nesting site.
- 5 Nesting Blanding's turtle, covering eggs with soil.
- 6 Cutaway illustration of nest interior.
- 7 Forest cut around kettle wetland used by Blanding's turtles.
- 8 ATV use damaging upland vegetation, eroding soil, and threatening turtle nests.
- 9 Disturbed wetland invaded by *Phragmites* (common reed).
- 10 Raccoon populations encouraged by nearby residential and commercial development, and leading to increased predation of turtle eggs.
- 11 Grading of post-agricultural fields for recreation facilities, with extra soil pushed into wetlands.
- 12 Golf course developed within Blanding's turtle habitat complex.

K. Schmidt © 2003

depend on these habitats. The Dutchess County Blanding's turtle population is threatened by loss of perhaps half the primary habitat; the cumulative effects of higher mortality of eggs, juveniles, and adults; collecting by humans; and possibly toxic contamination of the wetland and upland habitats.

The deterioration of environmental quality at the local level is closely linked to processes that occur at all spatial scales, including human population growth, overconsumption of resources, and overdevelopment of the land. These processes serve neither the well-being of individuals nor the economic health of the human community as a whole. To help maintain local biodiversity, municipal agencies, consultants, and landowners can learn methods for assessment of biological resources, landscape-scale planning to protect habitats and their connections, and ecological restoration. The impact of land development on biological diversity can be substantially reduced by means of development at an appropriate scale, careful site selection, and ecologically sensitive project design.

Hudsonia is now mapping potential Blanding's turtle habitats in parts of Dutchess County (see p. 6). The maps will be made available to municipal governments and the public to help assess the potential of sites to support the Blanding's turtle and other species of conservation concern associated with

these habitat complexes. Eventually we hope to work with municipal governments, state agencies, land owners, and non-governmental organizations to create a conservation framework for the Blanding's turtle throughout its range in Dutchess County. (This has already been done in Massachusetts.)

For many centuries, the lands and waters of the Hudson Valley have provided bountiful resources to the human community, but the capacity of the land is finite. With the rapid development of the landscape over the last 30 years, some municipalities are beginning to recognize the limitations of water supplies, waste assimilation capacity and air quality; the importance of maintaining biodiversity and other ecological services; the social and economic problems caused or exacerbated by overdevelopment; and the need for realistic limits on growth. Planning where, how, and how much to develop will make the difference between attractive, healthy, and biologically diverse landscapes and landscapes requiring massive, costly restoration or huge infusions of external resources. Western Dutchess County's outwash plains are a microcosm of environmental planning and management in the Hudson Valley and the world. The present challenge to all of us who live and work here is to design our communities and conduct our activities to prevent further losses of biodiversity and environmental quality. ■

NEWS FROM THE BIODIVERSITY RESOURCES CENTER

The Biodiversity Resources Center (BRC) was established in 2002 to administer Hudsonia's biodiversity research, mapping, and education projects. Many Hudson Valley communities have expressed the need for information on local biological resources, and for guidance on conservation. *What areas are most important for conservation and why? How much should be protected? What strategies and measures are most effective for protecting habitats and species?* Hudsonia has begun to help local communities answer these questions through several initiatives, including habitat mapping and biodiversity education.

HABITAT MAPPING

Our first large-scale habitat mapping project, completed last year, identified ecologically significant habitats throughout the **Town of East Fishkill** (Dutchess County). We understand that the town has been using the resulting map and report to help update their Comprehensive Plan, and to help with reviews of land use proposals. In a second project, the Conservation Advisory Council of the **Town of Pleasant Valley** is working with Hudsonia to identify and map a selected group of habitats of special conservation importance, such as kettle wetlands, large forests, and calcareous meadows.

With the welcome support of conservation organizations and town and state agencies, the habitat mapping program has now expanded to include **eight more Dutchess County towns** over the next five years. Starting with the **Town of Washington**, we will identify and map the ecologically significant habitats in each town, and produce a report describing those habitats, the plant and animal species of conservation concern they may support, and some measures that will help to protect the habitats and species. We hope that the maps and reports will raise the profile of biodiversity concerns for landowners and municipal agencies routinely engaged in land use planning and decision-making.

Biodiversity Mapping Coordinator Jenny Tollefson, M.S., has a leading role in the expanded mapping program. Jenny came to us in February from northern New Hampshire, where she had been identifying and mapping ecological communities for The Nature Conservancy.

We are well along on another project to identify and map the **potential Blanding's turtle habitat complexes** in six towns in southern Dutchess County: **Beekman, Fishkill, La Grange, Poughkeepsie, Union Vale, and Wappingers**. Research Assistant Tanessa Hartwig has been conducting much of the map analysis and field work on this project. For each town, we will produce a map showing where the complexes of suitable upland and wetland habitats occur on the landscape, and a report explaining how to protect and manage those complexes so that the Blanding's turtle can survive and even thrive in Dutchess County.

We are grateful to the Dyson Foundation, the Hudson River Estuary Program of the New York State Department of Environmental Conservation (NYSDEC), the Millbrook Tribute Garden (through the Dutchess Land Conservancy), the Marilyn Milton Simpson Charitable

Trusts, and the Town of Pleasant Valley for funding the current biodiversity mapping projects.

BIODIVERSITY EDUCATION

Another landmark BRC project is the Biodiversity Education Program, now in its second year. In partnership with the Hudson River Estuary Program (of NYSDEC), we are training representatives of **25 public agencies, land trusts, and watershed councils in six counties** (see list below) to conduct biodiversity assessments, to incorporate biodiversity protection into the design of Master Plans, open space plans, zoning ordinances, and conservation easements, and to bring biodiversity concerns to environmental reviews of land use proposals.

Participants learn to predict the occurrence of important habitats using map analysis and aerial photo interpretation, and to verify the presence of those habitats in the field. They learn about the kinds of habitats used by rare and declining species of plants and animals, the importance of spatial relationships among habitats in the landscape, and how best to protect habitat complexes that support local biological diversity. We are concerned with a broad array of common and rare habitats important to biodiversity such as upland meadows, upland forests, fens, kettles, and carbonate crests. All are described in Hudsonia's *Biodiversity Assessment Manual for the Hudson River Estuary Corridor* (published by NYSDEC), the primary reference for the training.

Representatives of these public and private agencies are now participating in the Biodiversity Education Program.

Columbia County: Ancram Planning Board ■ Ancram Zoning Board of Appeals ■ **Dutchess County:** Clinton Conservation Advisory Council ■ Dutchess County Environmental Management Council* ■ Pleasant Valley Conservation Advisory Council* ■ Red Hook Conservation Advisory Council* ■ Rhinebeck Conservation Advisory Council* ■ Winnakee Land Trust* ■ **Orange County:** Orange County Land Trust ■ **Putnam County:** Hudson Highlands Land Trust* ■ Phillipstown Conservation Advisory Council* ■ Phillipstown Wetlands Advisory Board* ■ Putnam County Environmental Management Council* ■ Putnam County Soil and Water Conservation District* ■ **Ulster County:** Sawkill Watershed Alliance* ■ Wallkill River Task Force ■ Woodstock Environmental Commission* ■ Woodstock Land Conservancy* ■ **Westchester County:** Cortlandt Conservation Advisory Council* ■ Cortlandt Planning Department* ■ Cortlandt Town Board* ■ Yorktown Conservation Board* ■ Yorktown Land Trust* ■ Yorktown Planning Board* ■ Yorktown Town Board* ■ *Organizations with an asterisk are in the current training program; others were in last year's program and receive continued technical assistance from Hudsonia.



Members of the Woodstock biodiversity assessment training group check their habitat predictions during a December workshop. Shown from left to right are Jim Davis, Cliff Lamm (both Woodstock Environmental Commission), Jeff Davis (Woodstock citizen), Mary McNamara (Sawkill Watershed Alliance), Karen Strong (NYSDEC), Peter Koch (Woodstock Land Conservancy), Gretchen Stevens (Hudsonia Ltd.). Photo by Laura Heady.

"The most important result of this study is that we learned how to observe the town from a different perspective," said one participant. "Areas that we had driven by without noticing are now old friends and we better understand their importance to the town." "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," said another. "We can also give new information to our planning board and the applicants' engineers and surveyors. . . ."

The Biodiversity Education Program is funded by the Hudson River Estuary Program of NYSDEC and by the Geoffrey C. Hughes Foundation. This year we hope to expand the training program to Albany, Greene, Rensselaer, and Rockland counties. For more information, contact Hudsonia's Biodiversity Educator **Laura Heady** at **845-876-7200**, or at **heady@bard.edu**. For information about the other biodiversity initiatives of the NYSDEC Hudson River Estuary Program, contact Fran Dunwell (845-256-3016) or Karen Strong (845-256-3061).

Hudsonia also conducts, on a fee basis, field surveys and assessments of specific sites throughout the Hudson Valley and neighboring regions.

All BRC projects are designed to advance local knowledge of biological resources and to enable citizens and local officials to stem the rapid loss of native biodiversity in the Hudson Valley.

—Gretchen Stevens
BRC Director

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Marta Nottebohm from Wassaic, NY, and Patricia Stensrud from Clinton Corners, NY, joined Hudsonia's Board of Directors in January.

... AND NEW STAFF

Jenny Tollefson and Laurie Rubin. Jenny is our Biodiversity Mapping Coordinator. Laurie is Hudsonia's new Director of Development. Both Laurie and Jenny work at the Rhinebeck office.

ABOUT THE ARTIST

A peaceful green-gold woodland pool graced the cover of the fall 2002 issue of *News from Hudsonia*. We would like to give special recognition to the artist, Laura Hammond Toonkel, and her exquisite paintings of Hudson Valley landscapes. The original painting, *Vernal Pool, Sisterhill Rock, Summer* (acrylic 40"x60"), is from the *Wappinger Creek Watershed Series*.

Ms. Toonkel is currently an adjunct instructor at Marist College. She is the recipient of numerous awards including the Dutchess County Individual Artist Fellowship, and Catskill Center Artist in Residence. Her work is included in many private and public collections including Morgan Guaranty Trust Company and Dutchess Community College. Her paintings and works on paper reflect the changing compositional qualities of the Hudson Valley landscape, both visually and ecologically.

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If your gift to Hudsonia has not been properly recognized, please contact Laurie Rubin at development@hudsonia.org.

VOLUNTEER RECOGNITION LUNCHEON



Hudsonia volunteers displaying tins of turtle chocolates (created by Krause's Candy) and volunteer certificates. From left to right: Amie Worley, Lin Fagan, Mary Burns, Janet Allison, Dan Miller, and Christine Lucas.

Hudsonia staff hosted a luncheon on January 13 to recognize and applaud our recent and current volunteers. Lin Fagan of Kingston, NY, received special recognition for nearly a decade of volunteer service. Lin, an accomplished birder and world traveler, has contributed hundreds of hours of field, laboratory and office work. Janet Allison (Stanford) and Mary Burns (Rhinebeck) were recognized for their ongoing curation of invertebrate specimens. Dan Miller (Milan), Mary, and Lin spent many hours helping to collate the *Biodiversity Assessment Manual*. Amie Worley (Bronx) and Janet have given us invaluable help with field monitoring of Blanding's turtles during the nesting season. Christine Lucas (Framingham, MA) spent January 2003 working on a special *Phragmites* literature research project.

Volunteers unable to attend the luncheon include: Erik Bedan (Hyde Park), Russ Immarigeon (Hillsdale), Natalie Kelly (Accord), John Licitra (Milan), Cathy McGlynn (Red Hook), Ellen Petersen (Stanford), and Samantha Schock (Rhinebeck). Erik, Russ, Natalie, and Cathy were esteemed members of the *Manual* collating team. Ellen has been the mainstay of herbarium curation for the past three years. John and Samantha conducted a variety of field, laboratory, and library tasks during summer internships with Hudsonia.

Through all of our 22 years, Hudsonia has benefited from an extraordinarily diverse, capable, and dedicated group of volunteers on whom we depend to carry out projects and tasks that are unsupported (or under supported) by grants and other funds. We greatly appreciate their contributions of time and skills to Hudsonia's work.

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