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Erik Kiviat



# News from Hudsonia

Volume 36, Number 1

Winter 2021–2022





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Photo on front cover:  
Marshy, low gradient stream on a development  
site in Orange County, New York. A northern  
harrier foraged in the marsh the day photo was  
taken. Photo © Erik Kiviat 2022

In 2021, there was a single issue of NFH, 35(1)

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We are grateful to Qualprint for printing *News From Hudsonia* each year.





# News from Hudsonia

A journal of natural history and environmental issues

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Volume 36, Number 1

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Dear Friends of Hudsonia,

*Anchored by eastern hemlock, interspersed with red-berried elder, and graced by black-throated green warblers, a small, rocky stream flows through a cool ravine. Such habitats may provide succor for species struggling in our changing climate, but they are largely overlooked and unprotected. Only limited portions of this valuable stream system are identified in current maps; a mid-1800s map identifies the stream only when near the sawmills and grist mills it once powered.*

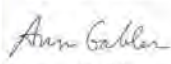
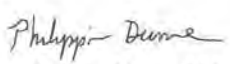

*Federal waterway regulations were originally justified as a protection of commercial interests in navigable waters, leaving most of our headwater streams unprotected. In a recent NYSDEC-sponsored webinar, Hudsonia's Gretchen Stevens explained the first step in crafting local regulations to fill federal and state gaps in protections of those valuable resources.*

*Readily available on our Biodiversity Resources webpage are recordings of webinars and many other educational resources, including Erik Kiviat's presentation at NOAA's conference on rethinking Phragmites ecology and management—all examples of the science we contribute to evidence-based management that directs scarce resources to more viable projects. Please share these links widely.*

*Happily, we open 2022 (our 41<sup>st</sup> year!) with \$30,000 in challenge grants to support our many projects, including critical turtle research, detailed work on tidal wetlands' mitigation of rising waters, and our ongoing technical assistance to public agencies, conservation organizations, citizens' groups, and others.*

*Our goal is to meet the funding challenge by early spring so we can move quickly in our busy year ahead. Please help us get there.*

*Thank you, as always, from the bottom of our hearts, for being our partners in this work.*



  
 Ann Gabler      Philippa Dunne MA      Erik Kiviat PhD  
 Interim Chair,      Coordinator of Outreach      Executive Director  
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\* Nothing is provided in exchange for your donation except the knowledge that you are helping biodiversity survive. Hudsonia only uses funds for the organization's nonprofit purposes. Our most recent nonprofit tax return (Form 990) is available from the Hudsonia office or the NYS Office of Charities Registration.

## REDUCING THE ENVIRONMENTAL IMPACTS OF INFRASTRUCTURE IMPROVEMENT

### PART 1

By Erik Kiviat and Gretchen Stevens\*

The \$1.2 trillion federal infrastructure bill has been signed into law—H.R. 3684, the Investment and Jobs Act. We all need the improvements to bridges, tunnels, roads, trails, railroads, the electric power grid, water supply systems, flood defenses, renewable energy generation, internet access, and the other structures and services we expect from our society. Infrastructure projects generate costs, however, that are both economic and ecological; the former have been debated intensely in the public arena but the latter have received little attention so far. Just as we do on the scale of an individual park or development site, we need to analyze the impacts of new infrastructure nationwide so that improvements can occur without undue harm to the ecosystems that support all human endeavors in essential ways. Let's start by asking a few key questions and suggesting some ideas to be considered. This discussion applies to projects that will be funded by the infrastructure act as well as many that will be funded otherwise.

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\* Erik Kiviat is Hudsonia's executive director. Gretchen Stevens is director of Hudsonia's Biodiversity Resources Center.

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**ROADS.** There are approximately 4.1 million miles (6.6 million kilometers) of paved public roads and streets in the US.<sup>6</sup> Roads affect the environment by covering and fragmenting habitats; concentrating runoff water; polluting with petroleum hydrocarbons, sulfur and nitrogen oxides, deicing compounds, herbicides, and other materials; creating noise and visual disturbance to wildlife; and killing animals. Paving uses large amounts of petroleum or, on some highways, cement. Roadside mowing, although preferable to herbicide control of vegetation, destroys animal habitat and can damage bird nests in shrubs. Close mowing eliminates forbs that provide nectar and pollen to pollinating insects, and seeds to goldfinches, juncos, and other seed-eaters.

**Ideas.** To conserve the petroleum used in black-top, asphalt can be recycled for new surfaces, sometimes combined with particulate waste rubber<sup>17</sup> or oils from waste organic materials.<sup>22</sup> Roadside mowing is much better for the environment than herbicides (herbicides are toxic to animals as well as plants). Operators of *crane mowers* (*boom mowers*) that can reach over guiderails and up or down slopes should “curb” their enthusiasm for cutting or shredding shrubs and low tree branches more than a meter or two from the pavement. Less-frequent mowing allows wildflower meadows to flourish along road verges without creating the visual obstructions posed by taller trees or shrubs. Particular care should be taken in mowing and plowing not to spread knotweed (*Polygonum cuspidatum* s.l.) along roads from which it colonizes streambanks.

**TRAILS.** The COVID-19 pandemic greatly increased outdoor recreation and the use of parks, preserves, and trails. We hope this burgeoning interest translates into greater concern for stewardship of wildlands and greenspaces. Agencies and NGOs are addressing the growing demand by proposing and building new trails that accommodate walkers, cyclists, and wheelchair users. A few newly renovated trail segments we have walked on range from the relatively low-key, 5-ft (1.5-m) wide, crushed stone surfaced foot and wheelchair trail at the Nature Conservancy’s Thompson Pond Preserve to the high-



Perhaps a second meaning of this sign is that we should pay more attention to amphibians in general.  
Photo © Erik Kiviat

way-like, 10.5-ft (3.2 m) wide, asphalted, partly treated-wood fenced, Empire State Trail (EST) at the Tivoli Bays Wildlife Management Area south of Tivoli and a site in East Kingston, all in New York. The EST Design Guide<sup>1</sup> recommends treated wood for fencing; however, some wood treatments still include chromated copper arsenate and other highly toxic materials<sup>19</sup> that can leak into the environment. Fence rails at the Tivoli

location are lumber treated with micronized copper azole; this preservative can leach into the environment and alter microbial communities.<sup>16</sup> Oddly, the EST Design Guide does not mention avoiding sensitive habitats and rare species; a 0.4-mile (0.6-km) completed segment of the EST filled 27 temporary pools used by breeding amphibians, butterflies, a rare clam shrimp, and other wildlife.



Less-aggressive roadside mowing can help to maintain habitat for pollinators and other animals and plants.  
Photo © Erik Kiviat





Boardwalk through peatland, Islay, Hebrides, Scotland, built of wood and recycled plastic lumber. Photo © Erik Kiviat

**Ideas.** Many abandoned railroads and industrial roads, and lightly used maintenance roads can be, and are being, converted to trails. There may be enough length and reach of these disused, linear features to obviate the need for many new trails. Both new trails, and repurposed old roads, can be developed while also preserving the best of the rain pools, bordering wetlands, and rare species of plants and animals. Naturally rot-resistant woods, such as

black locust and eastern red cedar, or recycled plastic lumber, can be used for walkways and fencing to avoid chemical wood preservatives. Keeping trails narrow will reduce the fragmenting effects on habitats while still accommodating cyclists, wheelchair-users, and pedestrians.

**RAILROADS.** We have walked, surveyed birds and plants, and launched canoes for fifty years on the service roads of the Hudson River railroads. Railroads are both barrier and habitat to wildlife and plants. Shorebirds nest in the crushed stone ballast next to the tracks; high densities of songbirds breed in the bordering shrub thickets; turtles lay eggs in contaminated soil and get run over; bald eagles are hit by trains while feeding on train-killed deer; mallard hatchlings get stuck in toxic creosote oozing from new wooden rail ties; and sprayed herbicides drift into tidal marshes affecting plants and almost certainly wildlife. Trash from construction and maintenance of the railroad can be harmful to wildlife. Inevitably railroads will be improved and trains will run faster. Railroads bordering the Hudson River and other estuaries will need to be raised above encroaching sea levels. While railroads exist to move people, we should remember the changes their construction and operation have caused and how they continue to affect the Hudson River and many other aquatic and wetland habitats.



Rural railroad verges are used by many animals and plants despite noise and contamination from diesel and coal fuels. Photo © Erik Kiviat

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Turtle underpass between wetlands in Dutchess County. Photo © Erik Kiviat

**Ideas.** Collect and properly dispose of trash, old ties and spikes, and other junk left along the rights-of-way or dumped in the wetlands. Move the utility wires underground, relieving the need to spray or cut the woody thickets (this has been done along the Hudson River east shore railroad). Develop visual or acoustic signals that discourage eagles from scavenging along the railroads. Provide clean nesting soils for turtles. Create or maintain trails for walking and wildlife viewing on lightly used railroad service roads.

**BRIDGES AND CULVERTS** have received a great deal of attention in recent years in attempts to facilitate the passage of aquatic and terrestrial animals beneath roads.<sup>5</sup> Poorly-designed bridges and improperly-sized culverts create flood hazards for upstream areas, and poorly installed culverts create barriers to upstream and downstream movement of animals and materials, depleting the overall habitat quality and biodiversity of streams.

**Ideas.** There are detailed design guidelines for culverts that allow passage of fish and other aquatic animals, and these improvements can be implemented whenever new structures are installed and old, unsafe structures are replaced. Where a suspended culvert cannot be replaced (an expensive task!), stone ramps or other retrofits can be installed to improve passage through the culvert for some animals. At least occasionally, however, it may be better for a culvert to remain a barrier, as in one New York stream where there were (native) brook trout above the culvert and (non-native) brown trout below — once the brown trout can pass upstream they likely will out-compete the brook trout except in the smallest headwaters.

**TUNNELS.** The proposed new rail tunnel connecting New Jersey and New York City beneath the Hudson River may begin construction in 2023. The project will generate a huge amount of rock material to be used or disposed of. In the past, such wastes have often been dumped in the Meadowlands or elsewhere where they cover valuable habitat and are unavailable for other human uses.

**Ideas.** Find nearby beneficial uses for the spoils. Rocks have great value for private and public projects, although energy costs for transport are high,

so a “rock bank” could be established to provide a local source for a variety of projects.

**ELECTRIC POWER GRID.** Utility poles and cables are being replaced and upgraded. In 2020, Hudsonia studied wildlife on the electric transmission right-of-way (ROW) that runs through Columbia and Dutchess counties. The ROW supports much biodiversity including rare plants, and a number of birds and reptiles listed as New York Species of Greatest Conservation Need (SGCN). Heavy vehicles drove through wetlands and streams where the ribbon snake (SGCN) basked next to 10-inch (25-cm) deep wheelruts. Shrubs with a maximum potential height of 16 ft (5 m), such as American hazel (*Corylus cornuta*), that could not reach the conductors are nonetheless killed with herbicide. Along our roads, many mature trees have been cut for improvements to electric distribution lines, including some that do not threaten power lines.

**Ideas.** Regulatory agencies should take seriously the threats to SGCN wildlife and rare plants, and make greater efforts to protect them and their habitats on and adjoining ROWs.

**PIPELINES AND STORAGE TANKS.** Water, gas, oil, and sewer pipelines lace the continent, with more than 1.9 million mi (3 million km) of gas and oil pipelines alone.<sup>6</sup> Pipeline crossings damage streams and wetlands, and animals become trapped in the excavations dug for pipeline installation.<sup>10</sup> Old sewer lines leak, polluting wetlands and streams. The eventual decay and rupture of abandoned pipelines are likely to pollute local areas with accumulated toxic residues.<sup>10</sup> Ravens, ospreys, and other large birds sometimes nest on water towers and communications towers, where maintenance during the breeding season can disturb the birds.

**Ideas.** As we shift from fossil fuels to renewable energy sources, oil and gas pipelines should be decommissioned properly to prevent future pollution. When nests are present, routine maintenance of communication towers and other structures should be scheduled to avoid the nesting season for birds of conservation concern.



Broad utility corridors often fragment and degrade the large forests and other habitats that they pass through, but we have nonetheless found that they are used by numerous plant and animal species of conservation concern. Photo © Erik Kiviat





Many airports have been built on wetland fill. At some, the short-mowed vegetation can be managed for rare grassland birds. Photo © Erik Kiviat

**AIRPORTS** were commonly built on flat lands, often by filling extensive wetlands, prior to today's environmental laws. Newark International Airport filled the Newark Meadows (a large wetland area that is part of the greater New Jersey Meadowlands), and another major jetport was almost built on New Jersey's Great Swamp. Many airports are expanding facilities, or clearing forest near the ends of runways.

**Ideas.** The short-mowed grass between existing runways can support breeding grassland birds such as the rare upland sandpiper, and shallow temporary pools can support breeding Atlantic Coast leopard frog or other animals. Minor modifications of airport management can address habitat issues constructively.

**SEED MIXES.** Many solar energy facilities and ecological restoration sites are planted with seed mixes that are intended to provide nectar and pollen for pollinating insects (bees, butterflies, and many others), and in some cases larval host plants for butterflies. Typically these mixes include plant species not native to the region where the mix will be used (e.g., midwestern plants not native to the Hudson Valley), species considered rare in the state, or *cultivars* (cultivated varieties) of native species. Although some nonnatives, such as purple coneflower (*Echinacea purpurea*), may stay put where planted and not become invasive, there is no guarantee of this behavior with, e.g., lance-leaved coreopsis (*Coreopsis lanceolata*) and many other species. Cultivars of native species (*nativars*) have reduced or less-accessible nectar or pollen, so may not be as useful to pollinators as the wild types.<sup>8</sup>

**Ideas.** Avoid seed mixes that contain nonnative (e.g., midwestern) plants, and use seeds or other planting stock that are sourced within a modest distance from the planting site.<sup>20</sup> It may be more important to match habitat types (source and planting site) to obtain genetically-adapted ecotypes that will perform better in plantings. Genetic diversity of planting stock is

also important for long term fitness.<sup>20</sup> While genetic analyses may not be possible for any but the largest planting projects (e.g., large solar installations), regulation or certification of nurseries growing materials for ecological restoration could help ensure the availability of appropriate genotypes. Small projects should consider collecting their own seeds, with supervision from an experienced field botanist.

**SILTATION.** Hundreds of commercial products are available to construction crews for erosion and sediment control.<sup>15</sup> Silt fences (filter fabric siltation barriers) and staked hay bales are among common practices for containing sediment in runoff from construction sites. Fine particles (silt and clay) to a significant extent pass through filter fabric barriers and other common siltation barriers.<sup>2,3,13</sup> Moreover, siltation barriers are often not installed, maintained, and decommissioned properly.<sup>7</sup> The resulting siltation

into streams, wetlands, ponds, lakes, and estuaries can harm or exclude sensitive fishes and invertebrates, and interfere with sight-feeding by other vertebrates. In our experience, inadequate siltation control on construction sites is more the rule than the exception.

A green dye used in *tackifiers* (materials sprayed to bind disturbed soil) was found to be toxic to trout,<sup>15</sup> and some formulations of polyacrilamide tackifiers were also toxic to other aquatic organisms.<sup>21</sup> Plastic mesh materials used for erosion control (and protecting cultivated bush fruits from birds and deer) catch and kill snakes that try to crawl through the mesh.<sup>9,11</sup> Avoid use of all



Goldenrods can be a valuable component of native seed mixes. The plants are important to wildlife not only for the pollen and nectar in summer and fall, but also for the seeds that are consumed by small mammals, songbirds, ruffed grouse, and wild turkey in fall and winter. Photo © Erik Kiviat

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# HUDSONIA PROJECT UPDATES, WINTER 2021-2022

## Special Species and Habitats

**Wood turtle.** We completed our fourth season of study, including three years of radiotracking, at a conventional farm and an organic farm in the Hudson Valley. Our goal is to devise recommendations for reducing the injuries and deaths to the turtles caused by farm equipment. We are analyzing turtle movement data to understand what environmental factors push turtles out of the riparian buffers and into farm fields. (Funded by Hudson Valley Farm Hub.)

In spring and summer 2021 we surveyed macroinvertebrates and water quality in 20 **temporary pools** from Minnewaska State Park to the Sloan



Temporary pools like these, even pools as small as those wheel ruts, can support surprising invertebrate diversity, including some rare species with special adaptations to the drying environment. Photo © Erik Kiviat

Gorge Preserve in Woodstock to Bristol Beach State Park, all in Ulster County. Most of the specimens have been identified, to well over 100 different taxa! We were interested to find that there is greater mosquito diversity in smaller pools, greater invertebrate diversity in pools with organic rather than mineral soil, and fewer mollusk species in pools with higher iron levels in the water. In a farm road pool, we found an unfamiliar clam shrimp species that may be a state record. (With Bob Schmidt, Emily White, and volunteers. Supported by Will Nixon.)

Trees, shrubs, woody vines, and herbs were sampled in late summer in the Montgomery Place South Woods of Bard College in Annandale, New York. We are comparing the vegetation in this **300-year-old forest** across the hemlock decline from before, during decline, and eventually after. The hemlocks, once two-thirds of the live tree stems > 2.5 cm in diameter, are now dead or in poor condition due to attack by the hemlock woolly adelgid and elongate hemlock scale. Black birch, striped maple, wineberry, and other mostly native plants are thriving. There are hundreds of small white oak seedlings that probably started during a period of deer management for orchard protection before a decade ago. (With Eric Keeling of SUNY New Paltz and interns.)

## Urban Biodiversity

The first of two books about **urban biodiversity in the New Jersey Meadowlands** has gone to the publisher for copyediting. Our current interest is in continuing the survey of macrofungi. This involves photographing, collecting specimens, taking notes, and engaging with experts for help identifying species. As with other groups of organisms, we're interested in knowing which groups of fungi do well or not in the urban-industrial environment. Conservation of fungi and conservation of urban biodiversity are emerging concerns for American ecologists.

In summer 2021 we mapped habitats and surveyed flora along the proposed **Hudson Highlands Fjord Trail** route from Dockside Park in Cold Spring north to Breakneck Point (Putnam and Dutchess counties). Although this stretch of Hudson River shore has been highly altered by the railroad, historic mining, and outdoor recreation, it supports a number of rare plants and animals. We were excited to see four different five-lined skinks, an uncommon reptile in New York, on warm shoreline habitats in just a few days of field work. (Funded by the Hudson Highlands Fjord Trail.)

## Nonnative Weeds

One of our current studies examines the **relationships between knotweed and nesting birds** in North America and Eurasia. The large and rapidly growing nonnative knotweed has been considered of minimal use to our native wildlife. We have discovered that songbirds often build nests in knotweed, apparently perceiving it as shrub thicket. We are recommending that managers who are treating knotweed with herbicide, cutting, or



other technique wait until late summer when most birds are done nesting. Erik welcomes reports of nests and can provide more information for those interested in helping with this study.



In a biodiversity assessment at a Hudson Valley site Erik Kiviat and Chris Graham found ten state-listed or regionally rare plants, including eastern prickly-pear (regionally rare), shown here. Photos © Chris Graham



Adult feather-legged fly (*Trichopoda pennipes*) nectaring on knotweed flowers. This fly is a native parasitoid on several species of bugs that are considered to be agricultural pests. Photo © Erik Kiviat

Erik presented about habitat functions for various organisms, and participated in a panel discussion with other experts, in a well attended National Oceanic and Atmospheric Administration (NOAA) webinar series "**Rethinking the Common Reed Grass – *Phragmites*.**"

It appears that the results of recent research on this species are beginning to get the attention of managers and policy makers. Erik is also collaborating with Tom Mozdzer and students at Bryn Mawr College on a wide-ranging analysis of published research about ecosystem services provided by *Phragmites* in East Coast wetlands. Overall, *Phragmites* provides services similar to alternate plants (mostly cordgrasses). Among significant services are carbon sequestration and protection of shorelines from erosion.

### **Habitat Mapping**

After completing the townwide habitat map for the **Town of Pound Ridge** (Westchester County) earlier in 2021, in the fall we gave presentations to the Town Board, the Planning Board, and the public about how to use the habitat information for townwide planning and policy-making, site-specific environmental reviews, design of conservation easements, and land management to sustain and promote native biodiversity and high-quality water resources. (Funded by the NYS Environmental Protection Fund through the NYSDEC Hudson River Estuary Program, the Westchester Community Foundation, the Town of Pound Ridge, and many individual and organization donors.)

### **Biodiversity Education**

We continued our work with volunteers in the towns of **Montgomery, New Lebanon, and Woodstock** (Orange, Columbia, and Ulster counties) to identify candidate areas for **Critical Environmental Areas**, to draw attention to important aquifers, cool ravines, a warm spring, large forests, and other natural resources that are vulnerable to adverse impacts from

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We mapped a combined length of 50 miles (80 km) of intermittent streams in Pound Ridge. These streams provide valuable habitat themselves and are important contributors to the water quality and habitat quality of the larger streams, ponds, and lakes that they feed. Photo © Lea Stickle



An outdoor Recognizing Habitats workshop at the Comeau Property in Woodstock. Photo © Nate Nardi-Cyrus

human activities. We held a field workshop on **Recognizing Habitats** in the Town of Woodstock to view meadows, forests, wetlands, and streams, and discuss their ecological attributes and the implications for land development and conservation. We held a three-part webinar series on **Headwater Streams: Identification and Protection of an Essential Resource**, and provided technical assistance to the Conservation Advisory Councils of several municipalities in Dutchess, Ulster, and Westchester counties to help them gather natural resource information, revise local legislation, and improve environmental reviews of development projects. (Conducted in partnership with Cornell University and the Hudson River Estuary Program, and funded by the NYS Environmental Protection Fund.)

### **Technical Assistance**

Hudsonia performed other **biodiversity assessments, habitat mapping, and other analyses and surveys** on development sites, public parks, private reserves and estates, and a solar energy site in Ulster, Columbia, Dutchess, Putnam, and Sullivan counties. We assisted municipal agencies with zoning revisions, and conservation organizations and citizens' groups with environmental reviews of commercial and residential projects.

Erik and colleagues are collaborating with researchers at other institutions preparing papers for publication about the Atlantic Coast leopard frog and estuarine flooding in New Jersey, Blanding's turtle and wetland hydrology in New York, and *Phragmites* ecology everywhere.

Hudsonia staff also provided assistance to Bard College students, faculty, staff, and graduates, training interns and volunteers, speaking to classes, and discussing vegetation and water management on the campus in Annandale. ■

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plastic with square mesh sizes approximately 1-6 cm lying on or touching the ground. Filter fabric silt fencing should not have a mesh backing.

**Ideas.** Preventing siltation is not a “cookbook” issue; practices must be tailored to the soils, topography, construction activities, biology, and receiving waters at a site. The best practice is to minimize soil disturbance, thus generating less suspended sediment in stormwater. Energy of stormwater flows can also be reduced. Disturbed soils can be covered promptly with natural fiber matting, straw, or living or dead plant materials<sup>18</sup> without synthetic chemical tackifiers. Stormwater ponds, rain gardens, vegetated swales, and other stormwater management features can be combined with silt fences as appropriate for a site. All told, stormwater management and prevention of siltation are complex and often refractory problems. A non-toxic tackifier, such as psyllium, combined with propagules of soil cyanobacteria or common dryland mosses, may help establish biological soil crusts that stabilize soils against erosion.<sup>4,12</sup> If mesh fencing around valuable plants is consistently elevated 10-15 cm above the soil it should be possible for snakes to pass beneath. Larger mesh sizes, and natural fiber matting without plastic mesh, should be safe for snakes but it is unclear if other



Failing or inadequate silt fences are common on construction sites, and lead to much siltation damage of streams, wetlands, and other habitats. Photo © Erik Kiviat

animals such as hatchling turtles or large adult snapping turtles can be trapped in these materials. All such materials should be monitored after installation and their use discontinued if they are found to be hazardous.

**A FINAL NOTE OF CONCERN.** There are many other environmental impacts of infrastructure development and maintenance, among them habitat fragmentation, diverse kinds of pollution, dumping, loss of mature trees and forests, inhibition of rare species.... There are also benefits to biodiversity that can result from land development, although these are often not understood, tested, or monitored. Infrastructure design, construction, and operation will have site-specific impacts on biodiversity, so design should be based on up-to-date scientific knowledge of ecological conditions and biotas at

project locations. As for all nature management, we recommend that the landscaping, mitigation, restoration, and vegetation management associated with infrastructure development be guided by three principles: 1. Design and planning should be *site-specific* because each site is different ecologically; 2. Nature management, whether via vegetation or another component, should be *goal-directed* with specific, achievable, sustainable aims; and 3. Everyone should avail themselves of up-to-date scientific information about the habitats and species involved, both those to be introduced to the site and those that are, or may be, already present. The best way to adhere to these principles is with collaboration of diverse professions and experience, and involving regional ecologists throughout a project in the design, implementation, and maintenance term.

Funding and planning for infrastructure development do not account for the *natural capital*, that is, the biota, soils, ecosystems, and more that provide the ecosystem services on which human life, and quality of life, depend.<sup>14</sup> Loss and degradation of natural capital inevitably reduce the services provided by nature, resulting either in deterioration of air, water, soil, and biota where we all live, work, and play, or incur large financial costs to restore ecosystem services in projects that are often unsuccessful. In this article we have highlighted a few concerns about infrastructure impacts on habitats and species. For the next infrastructure improvement proposal that comes to your neighborhood, you and your fellow citizens and professionals should use your skills and imagination to predict and address potential impacts so that harm to ecosystems is minimized in the course of upgrading the services that improve your quality of life.

The next issue of *News from Hudsonia* will have Part 2 of this article, looking at ways to reduce the environmental impacts of improvements to other kinds of infrastructure, such as sewage treatment, solid waste and recycling, renewable energy facilities, flood protection, and mine reclamation.

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### UPCOMING EDUCATIONAL EVENTS

Keep your eye on Hudsonia's Biodiversity Education web page for the 2022 webinar schedule: (<https://hudsonia.org/programs/biodiversity-resources-center/education/#1>).

#### Dutchess County Habitat Maps webinars

Two webinars will introduce the habitat maps for Dutchess County towns (Amenia, Beekman, Clinton, Dover, East Fishkill, Hyde Park, North East, Pine Plains, Poughkeepsie, Rhinebeck, Stanford, Washington), and the online map application developed by Don Meltz and his students at Marist College. The webinar will explain how to use the interactive web map and the habitat information for townwide and site-specific planning, policy-making, and environmental reviews

#### Habitat Assessment Guidelines webinar and field workshop

A 1.5-hour webinar will introduce model Habitat Assessment Guidelines—a tool to help planning boards and others obtain natural resource information for environmental reviews of land development projects. Adoption and use of the guidelines will help insure that good information about habitats and water resources accompanies subdivision plats, site plans, and other land use applications seeking municipal approvals. The program will include one or two field sessions to demonstrate use of the guidelines.

These programs are free-of-charge and open to all, but registration is required. The programs are especially designed for municipal officials, conservation NGOs, and others who are regularly engaged in policy-making, environmental reviews, and issues related to land development and conservation. Certificates for municipal training credit will be available to attendees.

The Biodiversity Education program is conducted in partnership with Cornell University and the NYSDEC Hudson River Estuary Program, and funded by the NYS Environmental Protection Fund.

Join the email list at <http://hudsonia.org/maillinglist/> to learn more about additional events as soon as they are scheduled.

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Please let us know soon if you want single or multiple copies of any of these issues.



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