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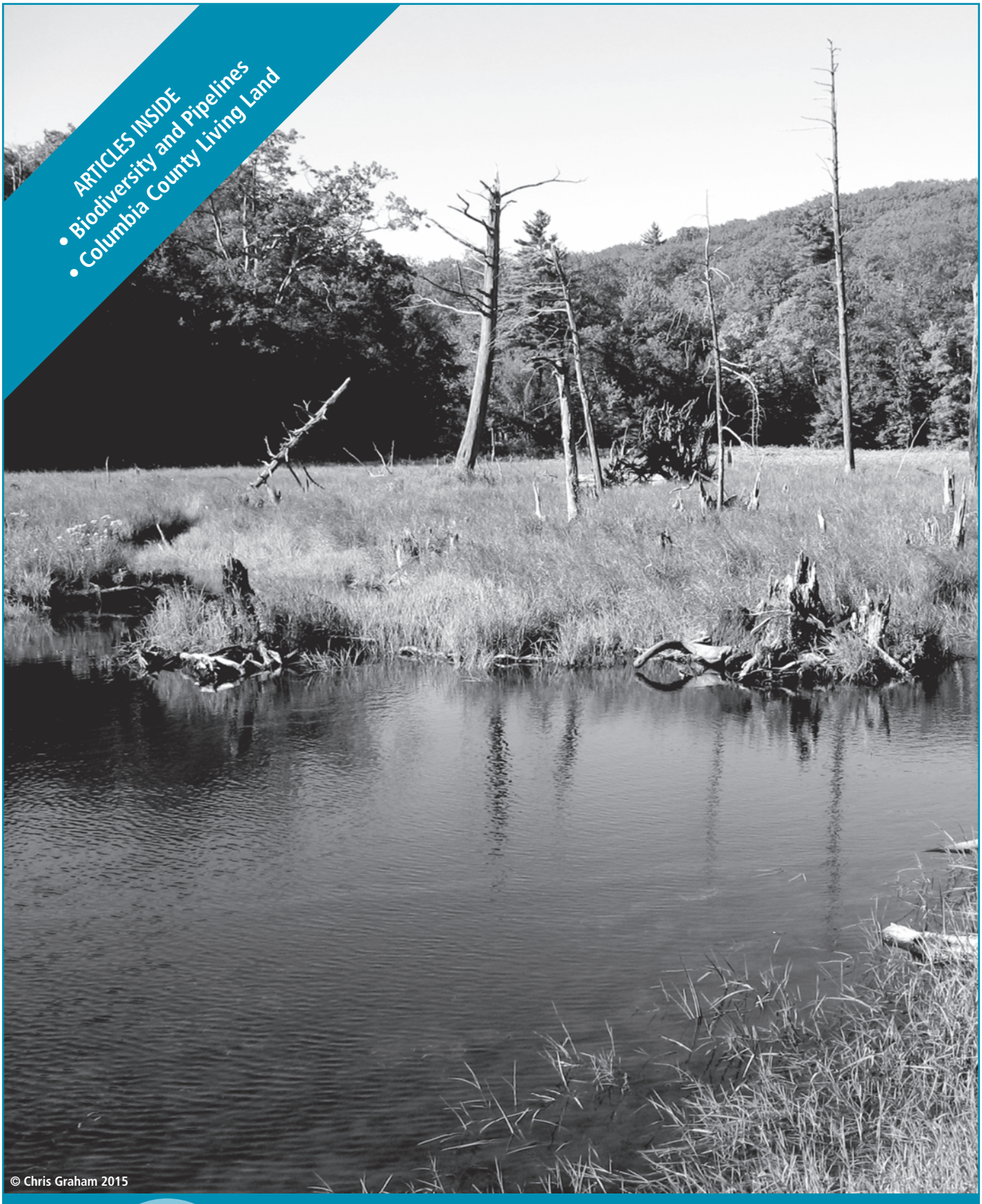

Environmental Research and Education
Science for Conservation

News from Hudsonia

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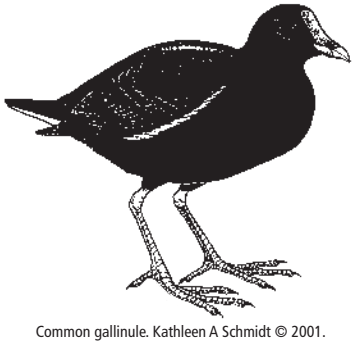
Spring 2015



Common gallinule. Kathleen A Schmidt © 2001.

Cover photo: A beaver-flooded meadow in Beebe Hill State Forest, Austerlitz, NY. Beaver activity has helped to shape many parts of the northeastern landscape, creating ponds, marshes, meadows, and swamps that support a great variety of native plants and animals. Photo © Chris Graham 2015.

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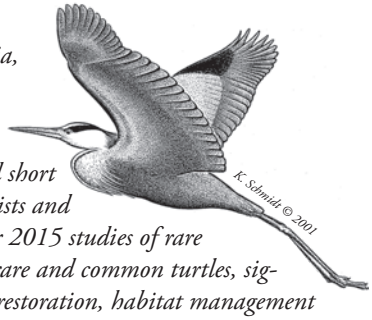
Volume 29, Number 1 Spring 2015

Dear friends of Hudsonia,



As we approach the summer Solstice after the long cold winter and short spring, Hudsonia biologists and interns are deep into our 2015 studies of rare plants, invasive plants, rare and common turtles, significant habitats, forest restoration, habitat management for biodiversity, and conservation priorities (see p. 6 of this issue).

We look forward to seeing many of you at the summer and fall workshops on land use planning and conservation on the Rensselaer Plateau, habitats of Columbia County, urban biodiversity, and habitat assessment and conservation for the Hudson Valley (see p. 7 and 11).

Thank you for the success of Hudsonia's 2014 matching funds campaign! Please continue to support this important work that brings innovative conservation science to residents, community leaders, and public agencies in the region. Our wide-ranging research and education programs depend on donations from readers of News from Hudsonia.

Thank you!

Philippa Dunne
Chair

Erik Kiviat
Executive Director

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CONTENTS

IN THE PIPELINE: BIODIVERSITY AND GAS TRANSMISSION

By Erik Kiviat*

Recently the New York State Department of Environmental Conservation decided to prohibit high volume horizontal hydraulic fracturing (HVHHF) in New York, ostensibly on the basis of a public health impacts review. But the issue of HVHHF impacts has not gone away. There are three reasons: 1. The decision could be reversed; 2. HVHHF wastes may be exported from Pennsylvania to New York for disposal; and 3. Gas pipelines are proposed, under construction, or being replaced or expanded to accommodate the transmission of HVHHF gas from Pennsylvania to New York and New England. This article focuses on the impacts of gas transmission pipelines on ecology and biodiversity.

Figure 1 shows a 2009 map of gas pipelines, and many more pipelines have been proposed and constructed in the six years since the map was made. At the end of 2013 there were about 2.5 million kilometers (1.575 million miles) of gas pipelines in the U.S. overall.[28]

Ordinarily the pipes are laid in narrow trenches and backfilled (or mounded over, where some of the older pipelines cross wetlands). Some recently-constructed pipelines have also used a "trenchless" method in which the pipe is installed in a tunnel drilled under a wetland, stream, or other sensitive area.

In forests, a corridor ca. 15-30 m (50–100 ft) wide is cleared and then maintained in herbaceous (non-woody) vegetation for the life of the pipeline to facilitate equipment access and prevent tree roots from disturbing the pipe. Vegetation may be managed by mowing or herbicide application. The pipeline corridor, or right-of-way (ROW),

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* Erik Kiviat is Hudsonia's executive director.

Pipelines continued from page 1

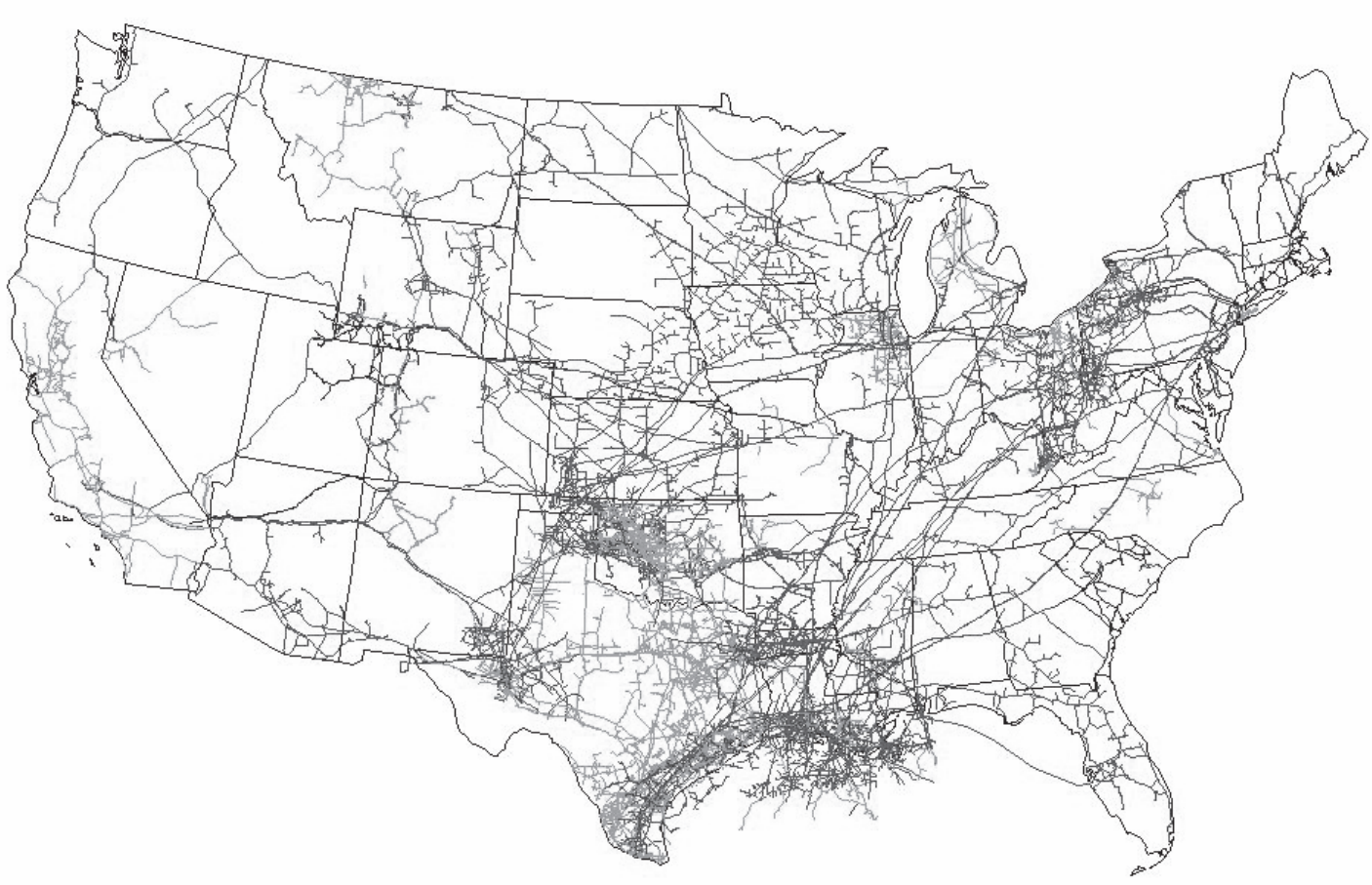

Figure 1. Gas pipelines in the conterminous United States as of 2008. (From the US. Energy Information Administration.)

resembles an electric transmission ROW but without the towers, cables, and strong electromagnetic field. Instead, gas (and oil) pipeline ROWs have greater soil disturbance from trenching for, and backfilling over, the pipe. Much of the recent scientific literature on pipeline impacts concerns impacts on large mammals from gas and oil pipelines in the far North. Very little is known about pipeline impacts in the northeastern states, and the effects of pipelines on plants and small animals.

The effects of gas pipelines on biodiversity may be considered in two categories: construction impacts and operating impacts. The construction impacts include direct physical disturbance of soils, bedrock, streams and wetlands, siltation and other pollution, hydrological changes, facilitation of invasive species, mortality of wildlife from vehicles and heavy equipment, wildlife trapped in the pipeline trenches, visual and noise disturbance to wildlife, loss of carbon and other potential pollutants from soil and vegetation, and habitat conversion. The operating impacts include habitat conversion and fragmentation effects on species, noise and air emissions from compressors, herbicide toxicity, and explosions.

The replacement or upgrading of existing pipelines may involve disturbance or loss of plants and animals established on or beneath the ROW, widening of the ROW, siltation and other water pollution, other impacts of construction activities, and release of toxic materials accumulated inside the old pipe. Routine maintenance and cleaning of pipelines can also result in leakage of chemical residues to the environment. Many of these impacts have received little scientific attention. Because pipelines are very long and narrow features, they cross many streams, wetlands, mature forests, and other sensitive habitats. Careful alignment can reduce the numbers of sensitive habitats disturbed but cannot eliminate such disturbance.

DIRECT DISTURBANCE AND HYDROLOGICAL CHANGES

The proposed Constitution Pipeline west of the Hudson River would cross at least 277 waterbodies. Crossings are almost certain to result in pollution of streams and wetlands with sediment, nutrients, and other materials.[25] Because several crossings may all drain into the same stream, cumulative downstream impacts would occur.

Trenching disturbs the existing movement of groundwater, and the backfill material is likely to have different hydraulic conductivity (capacity for water to move through) than the surrounding intact soil. This may result in alterations of groundwater discharge to streams and wetlands. Groundwater itself can support many small animals, most of which are poorly known or unknown to science, and this pertains to subterranean habitats in both non-glaciated and glaciated regions.[26,27]

Among the most sensitive and important

habitats potentially affected by pipeline construction are the wetland habitats of the bog turtle (federally listed as Threatened, and Endangered in New York, Connecticut, New Jersey, and Pennsylvania). These habitats are sensitive to alteration of groundwater flow, siltation, and nutrient inputs. Many bog turtle wetlands in Pennsylvania are affected by existing or proposed pipelines (Jason Tesauro, pers. comm.).

INVASIVE SPECIES

Disturbance to existing soil and vegetation is one of the most important impacts facilitating colonization and spread of nonnative pest plants such as tree-of-heaven, Japanese knotweed, and common reed. Because a pipeline ROW is a long linear feature, it may act as a dispersal pathway for invasive plants, much as do highway verges. Seeds or fragments of weeds that colonize physically disturbed, sunny soil may be spread along pipeline ROWs by construction equipment, wind, or other agency. Weeds may then move into less-disturbed wetlands, forests, or other habitats off the ROW, especially if pipeline construction or operation causes siltation. In Austria, the non-native chufa (*Cyperus esculentus*) was first detected at a gas pipeline ROW and then infested 80 hectares (198 acres) of agricultural land.[20] Soil handling associated with pipeline construction and other energy development in the western US facilitated invasion by downy brome (*Bromus tectorum*), a highly pestiferous species.[10]

Soils and vegetation store large amounts of carbon, retarding its movement into the atmosphere in the form of carbon dioxide or other greenhouse gases (GHGs). When vegetation, especially forest, is cleared, or soils are physically disturbed, carbon in organic matter is released to the air more rapidly than normal. The proposed ROW widening, and replacement of the existing pipe in the Algonquin Pipeline in northern Westchester County[13,14] would result in a substantial release of GHGs.

HABITAT FRAGMENTATION

The very long, linear character of ROWs particularly contributes to habitat fragmentation. Herb and shrub-dominated ROWs in forested regions break extensive forest into smaller blocks. Although pipeline ROWs may only be 15 m (50 ft) wide, they may inhibit dispersal of West Virginia white butterfly, juvenile amphibians, and ground beetles, or disrupt breeding habitat use by certain forest birds, such as the ovenbird, and plants, such as orchids.[12,22] Not only are some species poorly able to cross ROWs, but other forest species are affected by drying and warming of air and soil near the newly-created edges along the ROWs.[12] Improved routing and more sensitive construction methods can reduce damage to important habitats but will not eliminate fragmentation.

RESIDUES

Some toxic substances from the natural gas are deposited on the inside of pipelines. Twenty-five polycyclic aromatic hydrocarbons (PAHs) were detected in gas pipeline residue in the Southwest;[3] many PAHs are toxic to humans, other animals, and plants. In wastewater from hydrostatic testing of gas pipelines, Eiceman et al. (1983) found 25-38 mg/L of benzene. In Brazil, radium and lead-210 (both radioactive) were found in residue in a gas pipeline.[7] Residues may be released into the environment when pipelines are tested, cleaned, or replaced. When thin films are cleaned from the insides of gas pipelines over long distances, large quantities of waste are produced.[11]

PITFALL HAZARD

Small animals are easily trapped in the open pipeline trench during construction. Lizards, frogs, and small mammals were trapped in the trench for a gas pipeline in Australia.[30] In another Australian study, 7438 individuals of 103 species of vertebrates, including 14 species of conservation concern, were recovered alive (mostly) and dead from an 800 km gas pipeline trench.[2]

HERBICIDES

Several herbicides are used for vegetation management on pipeline ROWs. The herbicides most widely used are probably formulations of glyphosate. Although these materials are often considered innocuous to animals, much recent research indicates significant toxicity. Toxicity of glyphosate-based herbicides to humans or other animals has been

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COLUMBIA COUNTY LIVING LAND

By Gretchen Stevens

In 2012 Hudsonia and the Columbia Land Conservancy were invited to embark on the Living Land project with the Hawthorne Valley Farmscape Ecology Program (FEP). Our first goal was to find and describe the ecological communities of Columbia County and to study the interactions of people with the land. Now, three years later, we have completed much of the biological and cultural field work and are analyzing data in order to tackle our second goal—publicly sharing our results in an appealing and informative way. Ultimately, the team will produce a "*Field Guide to the Ecology and Culture of Columbia County Habitats*" describing many of the habitats in the county and where to find them, their ecology and conservation needs, and some aspects of human uses and interactions with places, natural communities, and landscapes.

Hudsonia biologists Chris Graham and Gretchen Stevens have been working with FEP biologists Kyle Bradford, Claudia Knab-Vispo, Conrad Vispo, and Otter Vispo, and a changing roster of interns and volunteers on the Living Land biological surveys, which included plants, butterflies, dragonflies and damselflies, ground beetles, and ants, as well as other casual natural history observations. At the same time, the FEP's social anthropologist Anna Duhon has been gathering information on people's perceptions of, attitudes toward, and uses of the land.

The project has given us an excellent excuse to visit lots of wonderful places around the county. We surveyed over 500 sites, sampling limestone ledges, acidic rocky barrens, upland forests of all kinds, little bluestem meadows, hayfields, shrublands, freshwater tidal marshes, forested swamps, kettle wetlands, rich and medium fens, calcareous wet meadows, intermittent woodland pools, and circumneutral bogs to name a few—over 100 different community types in all. We visited not only remote, wild places that have remained substantially unmanipulated by humans over the last century or more, but also some highly altered places such as active and abandoned agricultural lands, gravel pits and rock quarries, utility corridors, cemeteries, and dredge spoil habitats on Hudson River islands and shores. In fact, some of our very interesting finds were in those more disturbed places that are often ignored by biologists and viewed as ecological "wastelands" by others. For example:

- Two ant species—slightly-bearded carpenter ant (*Camponotus subbarbatus*) and Murphy's fuzzy ant (*Lasius murphyi*)—both considered to be southern species, were found in the county; one in a Greenport utility corridor and a Germantown red maple swamp, and the other in a Germantown hayfield. Murphy's fuzzy ant is on the IUCN (International Union for Conservation of Nature) Red List of Threatened Species.
- Shiny *Polyergus* (*Polyergus lucidus*), another ant species on the IUCN Red List, was found in a Philmont cemetery.
- Short-spined ant (*Myrmica brevispinosa*), a species of boreal forests known from Downeast Maine and northern NH, was found in three hardwood swamps in the county.
- Of all the habitat types that we sampled, gravel pits won the prize for the most species-rich flora; at one New Lebanon pit we found over 200 vascular plant species, 73% of which are native to New York.
- Another New Lebanon gravel pit had variegated horsetail (*Equisetum variegatum*), a species that we have seen only rarely in the Hudson Valley, and only in seepage areas of gravel pits of Dutchess, Ulster, Westchester, and now Columbia County.

Beaver meadow in Beebe Hill State Forest, Austerlitz. Chris Graham © 2015.

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

Northern dusky salamander in a small stream at the edge of a utility corridor. Chris Graham © 2015.

- In the dredge spoil forest at Gay's Point we found a 2.4 m (8 ft) tall individual of the regionally rare Sprengel's sedge (*Carex sprengelii*), a species that is ordinarily shorter than 1 m (3 ft).
- In a dredge spoil tidal swamp on Roger's Island we found a single plant of purple-fringed orchid. We found the same orchid in a rich shrub fen in the Taconic State Park, and in a calcareous swamp in Canaan.
- North African grass (*Ventenata dubia*)—a non-native grass that may be new to New York—was found on two different utility corridors eight miles apart.
- One short stretch of a utility corridor in Livingston had three state-listed rare plant species: hairy small-leaved tick-trefoil (*Desmodium ciliare*, NYS Threatened), false pennyroyal (*Trichostema brachiatum*, NYS Rare), and slender knotweed (*Polygonum tenue*, NYS Rare).

(For many ant species there are no generally recognized common names. The somewhat whimsical-sounding common names of ants given here are from *A Field Guide to the Ants of New England*,[1] and based on the etymology of the scientific names.)

We did not have the luxury of visiting each study site at the optimum time for detecting rare species, nor did we have the time to conduct rare species surveys, but by keeping our eyes open the team nonetheless found a number of other rarities—that is, rare or uncommon county-wide, region-wide, state-wide, or world-wide. For example:

- Other IUCN red-listed ant species (in addition to *Lasius murphyi*, and *Polyergus lucidus* mentioned above) were the wide-footed fuzzy ant (*Lasius latipes*) and American *Protomognathus* (*Protomognathus americanus*). All of the red-listed species were rare in this study, found at just one or two sites.
- Rare butterfly finds included little yellow (a new county record), coral hairstreak, Dion skipper, Aphrodite fritillary, and gray comma.
- Unusual dragonflies included several county records: clamp-tailed emerald, brush-tipped emerald, and Kennedy emerald—the latter was the first confirmed sighting in New York in at least a decade.
- Regionally rare dragonflies included American emerald, twin-spotted spiketail, frosted whiteface, and four-spotted skimmer.
- Initial identifications of ground beetles suggest there may be as many as a dozen new state records; identifications have yet to be confirmed.
- Northern spring salamander was found in a rocky stream on the Taconic Ridge—the second record for this species in Columbia County. Slimy salamander and four-toed salamander were also found at a few sites.
- Eleven species of native orchids, many of them regionally rare, were found in diverse upland and wetland habitats.
- False hop sedge (*Carex lupuliformis*, NYS Threatened), not previously known in the county, was found at four vernal pools and one kettle shrub pool.
- American ginseng (*Panax quinquefolius*) was found at four sites on calcareous ledges and in sugar maple forests.
- Virginia three-seeded mercury (*Acalypha virginica*, NYS Endangered) was found in upland shrubland and red cedar forest on calcareous soils in Greenport.

Over the last five years Claudia has been compiling a checklist for the flora of Columbia County. For comparison, we are lucky to have Rogers McVaugh's *Flora of the Columbia County Area, New York*,[2] a 1958 publication of the New York State Museum that documents his observations of plants and natural communities from surveys conducted in the 1930s. McVaugh's *Flora* has led us to many unusual places that we might not have discovered on our own, and comparison with recent data has alerted us to the disappearances of some species and natural communities, the arrivals of others, and changes in the landscape due to catastrophic natural events and direct and indirect effects of human land uses. Claudia's checklist and the Living Land data will provide a similar benchmark for future biologists and ecologists.

The Farmscape Ecology Program has posted some of the interesting finds of the Living Land project at http://hvfarmscape.org/living-land-updates, and we are now creating "fact sheets" which describe how to recognize each ecological community, list some of the plants and animals of conservation concern that occur in the community, describe some aspects of past and present human interactions, and offer recommendations for effective stewardship. Analysis of an immense volume of plant and animal occurrence data may reveal previously unknown distributions of native and non-native species in the county, northern and southern species range limits, habitat indicators and affinities, and probably some unexpected insights into the relationships of habitats and species with geology, topography, and historic and contemporary human influences.

This year Hudsonia will work with the Columbia Land Conservancy and the Farmscape Ecology Program on a series of presentations and

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HUDSONIA PROJECT UPDATES, 2015

Ancram Natural Resources Conservation Plan

We completed the Ancram Natural Resources Conservation Plan in winter 2015, describing Ancram's natural assets, prioritizing areas for conservation, and recommending measures for protecting water resources, wildlife habitats, farmland, scenic areas, and recreational resources. This spring we have been assisting the Ancram Conservation Advisory Council with completing their **townwide map of ecologically significant habitats**. (The Plan and this phase of habitat mapping have been funded by the Hudson River Valley Greenway, the Hudson River Bank and Trust Foundation, and the Town of Ancram.)

Biodiversity Education

We are collaborating with the Rensselaer Plateau Alliance and the NYSDEC Hudson River Estuary Program to conduct a June workshop for municipal leaders and conservation organizations on using the **Rensselaer Plateau Regional Conservation Plan** for land use planning and decision-making, In late summer we will lead a three-day **Short Course on Habitat Assessment and Conservation**, designed especially for municipal planning boards, environmental commissions, and the staffs of land trusts and other conservation organizations. We continue to provide **technical assistance to past participants** in our biodiversity education programs. (Much of our biodiversity education work is funded by the New York State Environmental Protection Fund through the NYSDEC Hudson River Estuary Program and the Cornell Department of Natural Resources.)

Technical Assistance

We are studying the vegetation of a forest on a private estate in Dutchess County to provide information for **restoring the native plant communities**. We continue to provide technical assistance regarding biodiversity impacts of the proposed expansion of the **Algonquin gas pipeline** in Westchester County. (The pipeline study is funded by Reynolds Hill, Inc., and the Community Watersheds Clean Water Coalition.)

Biological Assessments

We are collaborating with the Hawthorne Valley Farmscape Ecology Program to conduct biological surveys at the **Greenport Public Conservation Area** (Columbia County) for the Columbia Land Conservancy, and will provide recommendations for trail locations and for management of forests and meadows, invasive plants, and deer. We are also identifying habitats and assessing trail locations at the **Stone Church** property in Dover (Dutchess County) to assist the Dutchess Land Conservancy and the Town of Dover as they develop plans for land management and public uses on properties recently added to the natural landmark site.

Bog Turtle Habitat Connectivity

Continuing our interests in the ecology and management of the endangered **bog turtle**, we are modeling the connectivity of bog turtle habitats (i.e., the ability of the turtles to move from one core habitat to another) using our detailed townwide habitat maps of five contiguous Dutchess County towns. We are also assisting in the completion of **regional action plans for bog turtle conservation**. (Funded by the Geoffrey C. Hughes Foundation, Andrew Sabin Family Foundation, and US Fish and Wildlife Service.)

Bog Turtle Habitat Management

In the first three years of our study of **cattle grazing for management of bog turtle habitat**, the turtles expanded their activities into an area of cattail that was opened up by the cows. This year we are continuing to radio-track the turtles and expect to sample soils to better understand habitat use. (Funded by the US Fish & Wildlife Service via New York State Department of Environmental Conservation.)

Constitution Pipeline

We reviewed aspects of the Final Environmental Impact Statement (FEIS) for the Constitution Pipeline proposed from Susquehanna County, Pennsylvania to Schoharie County, New York, and prepared comments for the Pace Environmental Litigation Clinic. Our review focused on potential impacts of the pipeline to **streams, riparian areas, wetlands, and large habitat areas** in New York, and probable effects of those changes on rare or vulnerable organisms.

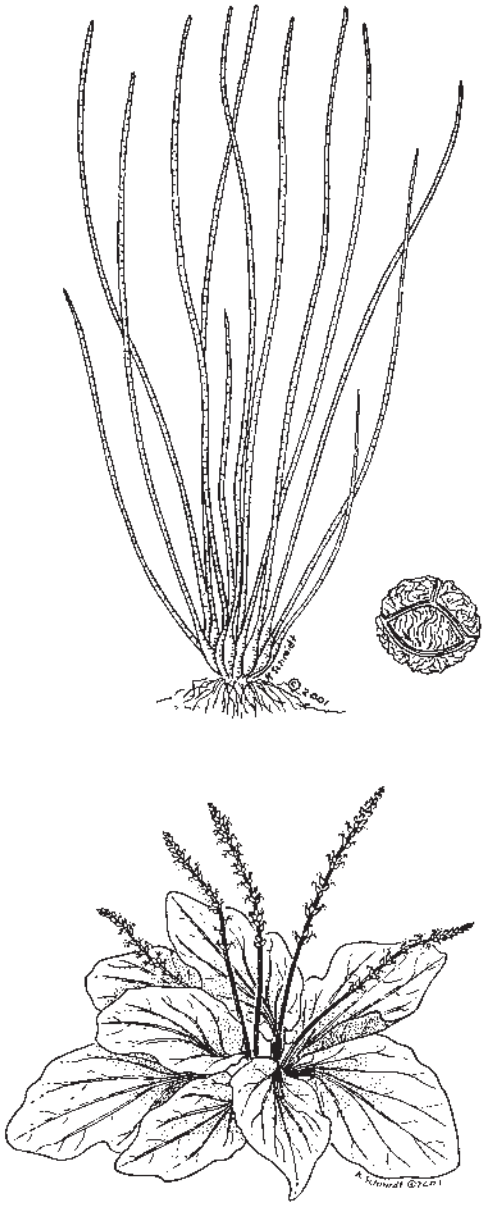
Greene County Conservation Priorities

We are working with the Greene Land Trust, Cornell Cooperative Extension, the Greene County Soil and Water Conservation District, and other partners on a study to identify conservation priorities throughout the county. This year we are gathering information and preparing a series of maps depicting physical, biological, and cultural resources. The maps will help us analyze the landscape and identify the areas that may be most important for maintaining **water supplies, biodiversity, and scenic and recreational resources**. (Funded by a Land Trust Alliance grant to the Greene Land Trust.)

Non-native Weeds

We are examining the impacts of non-native invasive plants on rare native plants of Hudson River tidal marshes. (The project is funded

by the Lower Hudson Partnership in Regional Invasive Species Management [PRISM]). Work also continues on the ecology and management of non-native ***Phragmites***, including participation in panel discussions about managing the impact of *Phragmites* on native plants and plant communities at Piermont Marsh (Hudson River), the feasibility of using *Phragmites* as a feedstock for bioenergy (fuel pellets), and participation in a major international symposium about *Phragmites* at the June conference of the Society of Wetland Scientists. ■



Rare plants of Hudson River tidal habitats—river quillwort (*Isoetes riparia var. canadensis*) and heart-leaved plantain (*Plantago cordata*). Kathleen A Schmidt © 2001.

Columbia County continued from page 5

indoor and outdoor workshops for municipal agencies, conservation organizations, and the general public to introduce habitats of conservation concern, and protective measures that can be incorporated into private land management, town policies, environmental reviews, and recommendations for land-use applicants. Schedules and locations will be listed at hudsonia.org/education/#1, hvfarmscape.org/events, and clctrust.org/events.

In the end we hope that the Living Land project will stimulate new curiosity about and appreciation for the natural world, inspire local exploration, bring better understanding of the reciprocal influences of people and the land, and inform conservation planning and decisions throughout the county.

Spotted coral-root (*Corallorhiza maculata* var. *maculata)*, a saprophytic orchid that relies on fungal mycelium to obtain nutrients, found in a Columbia County deciduous forest. Chris Graham © 2015.

We are grateful to the many landowners who invited us onto their land to conduct the Living Land surveys, and many other individuals for their generous donations of resources and time. We also thank the organizations, agencies, and individuals who have funded the Living Land project to date. Major donors to the Farmscape Ecology Program have included the NoVo Foundation, the Sandy River Charitable Foundation, the Kalliopeia Foundation, the T. Backer Fund, and Dale McDonald. The 2015 workshops will be funded by the New York State Environmental Protection Fund through the Hudson River Estuary Program of the NYS Department of Environmental Conservation and the Cornell Department of Natural Resources. We continue to seek funding to support the completion of the *Field Guide* and other means of acquainting the people of Columbia County with the special habitats, plants, and animals that share this exceptional landscape. ■

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Pipelines continued from page 3

demonstrated in many studies.[8,9,18,29] Pure glyphosate is also toxic albeit with smaller effects than some of the formulations.[17,21] Moreover, herbicides are a threat to rare and uncommon plant species, and plants with economic importance. Regarding fossil fuel development in the West,[5] it was recommended that herbicide application be kept at least 200 m (650 ft) from rare plant occurrences to protect those plants from wind drift.

NOISE

Pipeline construction involves use of chainsaws, backhoes, bulldozers, horizontal drills, and hammering and blasting of bedrock, all of which are noisy and disturb wildlife. Once construction is complete, loud noise is emitted from compressor stations located at intervals along a pipeline. Continued loud noise can have negative physiological impacts on wildlife. Compressor noise has adversely affected bats and certain bird species, although certain other birds were found to benefit from reduced nest predation near compresssors.[12]

LEAKS AND ACCIDENTS

Natural gas from undetected pipeline leaks can reduce soil oxygen and stress plants.[23] Pipeline leaks resulting in fire or explosion are rare but can be catastrophic. Causes include damage from failure of old pipe, unrelated excavation or construction, and ground subsidence. Although I have seen no data on harm to wildlife, people have been killed 200 m (650 ft) away and the ground surface burned up to 730 m (2400 ft) downwind.[16] Depending on pipeline operating pressure, fragments more than 90 cm (35 in) in diameter can be ejected up to 350 m (1150 ft).[16]

CUMULATIVE IMPACTS

Cumulative impacts from pipelines can arise from the construction, operation, or replacement of many different gas pipelines, and from the combined impacts of gas pipelines and other land uses. The U.S. pipeline network shown in Figure 1 illustrates the degree to which pipeline impacts might accumulate, especially in denser areas of the pipeline grid such as western Pennsylvania and West Virginia. This should be kept in mind when assessing the impacts of proposed pipeline construction and renovation projects in New York, New Jersey, and southern New England. The Troy Meadows, an important wetland complex in northeastern New Jersey, in 1968 was already crossed (or proposed to be crossed) by three gas pipelines, two electric transmission lines, a sewer line, and two highways.[19] Many extensive wetlands or forests are affected by cumulative fragmentation from pipeline and powerline ROWs, roads, buildings, farm fields, clearcuts, and well pads. Cumulative impacts particularly threaten a number of animals and plants whose geographic ranges greatly overlap the Marcellus-Utica shale gas region of the eastern U.S.[6] or other regions where intensive land use is widespread.

Bush's sedge (*Carex bushii*), a NYS Rare species found in a wet meadow in the Algonquin Pipeline right-of-way. Erik Kiviat © 2015.

CREATION OF HABITAT

Many gas pipelines in the Northeast were installed about 50-75 years ago. Since then, portions of the ROWs have developed into meadows with diverse mixtures of native and nonnative flora. Two rare sedges were found on the Algonquin Pipeline.[13] In Pennsylvania, two rare plants were found at proposed gas pipeline routes: bearberry (*Arctostaphylos uva-ursi*) on a ledge adjoining a route, and pale vetchling (*Lathyrus ochroleucus*) at road verges on a route; pale vetchling has also been reported on an existing ROW (Jamie Morgan, Kleinfelder, pers. comm.). Some rare plants may have occurred prior to pipeline construction, and persisted on or at the edges of the ROWs. Other rarities may have taken advantage of disturbed soil and the constructed meadows of the ROWs. Powerline ROWs in Sweden had greater abundance of 12 of 26 species of grassland butterflies than semi-natural pastures.[1] Of course, pipeline ROWs have not been, and should not be, created to support rare plants or grassland butterflies, but existing ROWs can be surveyed for rare species and managed to conserve those that do occur.

During replacement of old gas pipelines, basking rocks and winter dens of the threatened timber rattlesnake have been found in rock rubble formerly used for backfill but replaced with fine material. Soper and Schoeberl[24] reported that timber rattlesnakes and a northern copperhead were found in association with large rocks covering a 1950 gas pipeline in New York. The rocks judged most suitable for snake use were moved just off the replacement pipe but in the sunny ROW. At different pipeline sites, Kathy Michell (KT Wildlife, pers. comm.) has developed methods for conservation of existing rattlesnake dens in the old backfill material, or construction of new dens close by. The potential for old, coarse backfill to support overwintering rattlesnakes or other rare fauna (e.g., other snakes, northern cricket frog, long-tailed shrew, small-footed bat) should be considered in planning pipeline replacement.

HOW CAN GAS PIPELINE IMPACTS BE REDUCED?

Much could be written about this topic, but I will stick with a few brief thoughts. Fragmentation impacts may be reduced by reducing the numbers of pipelines and by co-locating pipelines, electric ROWs, and other human-made linear features, but fragmentation cannot be completely

Filter fabric silt fence overtopped by storm runoff, Algonquin Pipeline, Town of Yorktown, Westchester County, New York, 9 July 2014. Erik Kiviat © 2015.

eliminated. A smaller number of pipelines could be shared by different companies for gas transmission. An egregious violation of this principle is that a separate pipeline may be constructed parallel to and just after the proposed Constitution Pipeline.[15] The western portion of the Algonquin Pipeline in the Town of Cortlandt (Westchester County, NY) has doubled segments that could be eliminated. Pipelines could be installed and operated in narrower ROWs so that less soil and vegetation are disturbed. It is claimed that the ROW of the Algonquin Pipeline must be widened to accommodate the larger pipe and heavier installation equipment; a method should be found to renovate within the existing ROW to avoid clearing additional forest.[14]

As with all major construction projects, it is essential that the habitats and biota be identified in detail prior to project design; only with such information can unacceptable impacts on biodiversity be recognized and avoided. Doody et al.[2] recommended trench plugs, that allow animals to climb out of pipeline trenches during construction, every 50-100 m (165–330 ft), or daily removal of animals from the trench. Siltation from disturbed soil into streams, lakes, and wetlands is a serious and underappreciated impact of construction that cannot be completely prevented.[14] This impact began even before construction in the Algonquin Pipeline expansion project (see photo). Improper installation, maintenance, and clean-out of silt fences are typical at construction sites of all kinds, and allow large volumes of sediments to enter streams and wetlands. Even properly operated siltation barriers allow much fine sediment through.

Ultimately, renewable energy from appropriately sited and designed solar arrays and wind farms will be transmitted as electricity (ideally without expanding existing electric transmission ROWs or creating new ones), obviating the need for additional pipelines. We anticipate more distributed generation, especially from small solar panel arrays on roofs, closed garbage landfills, brownfields, and other areas where energy development competes less with biodiversity. Energy conservation in buildings, more efficient vehicles, and more efficient industrial processes will reduce energy needs. We also hope to see more effective methods for surveying biodiversity along pipelines, and construction techniques that have less impact on the environment. ■

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Continued on page 10

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C. Lavett Smith

We lost a long-time friend of Hudsonia's this spring. C. Lavett Smith passed away in February in Fort Collins, Colorado. In his 32-year associaon with Hudsonia he helped us in many ways, first as a Research Associate, then as a Board member, and finally as an Advisory Board member. He was a curator of ichthyology at the American Museum of Natural History, and perhaps is best known for his book, *The Inland Fishes of New York*, now long out of print. The work is invaluable to anyone working with local fishes and it reflects Smitty's desire to inform everyone about his favorite creatures.

On a personal note, I got to know Smitty very well in the course of a Hudsonia project in the 1980s, funded by the Hudson River Foundation, to curate a large collection of Hudson River larval fishes that the American Museum had acquired. I carried out the work in a corner of Smitty's office, so was privy to the day-to-day interactions between him and a wide variety of people. Smitty was always very thoughtful and took all questions seriously. He would spend as much time with a food critic who wanted to be sure that the fish she was served was accurately identified as with a researcher using the collection. I joined him on a field trip to Long Island to verify the presence of brook lampreys and was honored to share a publication with him on that topic. He was a naturalist in an era when naturalists were becoming rare, and he treated everyone with respect and kindness.

Robert E. Schmidt
Associate Director, Hudsonia Ltd.

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UPCOMING EDUCATIONAL EVENTS

Land Use Planning for Rensselaer Plateau Communities

Sand Lake Town Hall
Wednesday, 24 June 2015, 5:00 pm – 9:30pm
A workshop for municipal agencies and conservation NGOs on significant natural areas for forests, water, and wildlife, and how they benefit communities on the plateau. Discussions will include using ecological maps to identify the most important resources, and how those maps and conservation principles can inform municipal policy and planning and site-specific project reviews. Instructors: Gretchen Stevens (Hudsonia) and Ingrid Haeckel (Hudson River Estuary Program). To register, contact Lea Stickle at lstickle@bard.edu or 845-758-7053.

Conservation of Urban Biodiversity

Teatown Lake Reservation, Ossining
Monday, 24 August 2015, 10:00am – 5:00pm
A workshop for consultants, biologists, students, university and high school teachers, environmental professionals, NGO staff, regulators, policy-makers, preserve and park managers, restorationists, and others involved with the study or conservation of urban biodiversity in the northeastern U.S. Instructors: Erik Kiviat PhD, and Kristi MacDonald PhD. For registration and other information, go to http://hudsonia.org/events.

Habitat Assessment and Conservation

NYSDEC Region 3 Office, New Paltz
Thursday–Saturday, 10–12 September 2015, 9:00am – 5:00pm
A three-day short course on recognizing and protecting significant habitats and water resources, especially designed for members of planning boards, town boards, and environmental commissions, and staffs of land trusts and other conservation organizations involved in land use decisions. The course includes finding and using maps and other resources to identify important areas, reviewing site plans, and applying conservation principles to land use planning and policy, environmental reviews, and design of conservation easements. Instructor: Gretchen Stevens. To register, contact Lea Stickle at lstickle@bard.edu or 845-758-7053.

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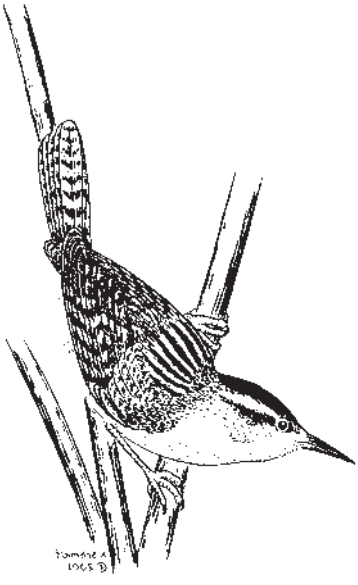

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