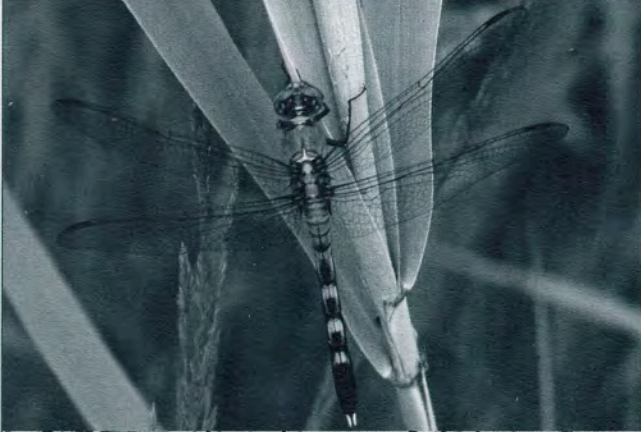
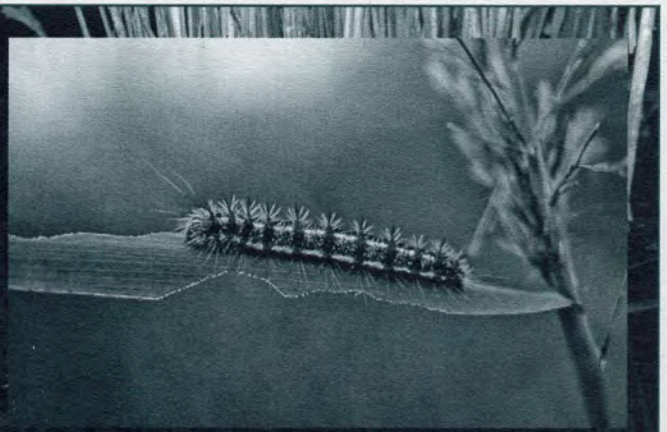


# REED, part 2

Top right: Henry's marsh moth (*Simyra henrici*) larva feeding on common reed (*Phragmites australis*) leaf; Top: Common reed grazed, probably by Canada goose; Center left: eastern pondhawk dragonfly (*Erythemis simplicicollis*) perching on common reed; Center right: Nearly 20-year old wetland mitigation area with smooth cordgrass (*Spartina alterniflora*) remnant in foreground, re-invaded common reed in middle ground, and dredge spoil island dominated by gray birch (*Betula populifolia*) in background; Bottom: Common reed stand. All photographs taken in Hackensack Meadowlands, New Jersey. Photos © 2007 Erik Kiviat.



## News from Hudsonia

Volume 21, Number 1

Spring 2007



# INSIDE HUDSONIA

Dear Friends & Colleagues,

This is a special year for Hudsonia and for Erik Kiviat.

Hudsonia has just completed its 25th year of research and public education at the interface of science and environmental conservation. A quarter-century ago when Hudsonia's founders—Erik Kiviat, Bob Schmidt, and Jim Stapleton—began building an institute that would focus in a politics-neutral manner on the tough questions associated with human influences on the natural environment, they never imagined the organization would become so important to today's planners, policy-makers, and scientists. At Hudsonia we specialize in providing first-rate scientific information to those making crucial land use decisions, including public agencies, NGOs, businesses, and individuals from Albany to New York City, the Catskills to the Taconics, and beyond. We hold to a strict position of non-advocacy, yet do not shy away from direct involvement in the very difficult and contentious issues around land uses and biological conservation.

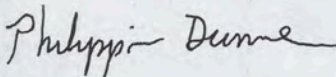
Thanks to our dedicated staff—undaunted by the difficulties of employment in a small, bare-bones, nonprofit organization—and the ongoing support of people like you who recognize the value of our services, Hudsonia has weathered all these years, and indeed has flourished. Thank you all!

This year is also a milestone for Erik, Hudsonia's co-founder and visionary leader, who turns 60 this spring. For 45 of those years he has observed the animals and plants of the Northeast, watching behavior, counting, taking notes, and building a picture of the natural history and biology that has been the starting point for many of Hudsonia's ventures. Erik would like to celebrate his birthday by leading a **special field trip on 19 May** to view the stunning native plant Golden Club in flower. Hudsonia donors who have given \$1000 between January 2006 and May 2007 are invited. If you are not already a member of our "Golden Club," you may pledge by 1 May and take part in this rare opportunity (contact Kate Connor, 845-758-0600, for more information).

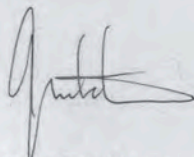
We hope you enjoy this issue of *News from Hudsonia* (now in its 21st year), which includes the second part of Erik's piece on reed ecology and management, and Jenny Tollefson's article about landscape homogenization.

And, of course, we ask you to make a donation (in any amount) to support our singular role in the region. Your contribution will underwrite biodiversity assessment training for practitioners all over the Valley, long-term ecological studies of the threatened Blanding's turtle in created and natural habitats, research on urban biodiversity, preparation of the *Biodiversity Assessment Handbook for New York City*, completion of the *Sourcebook for Common Reed Management*, and our many other programs and projects that help conserve the extraordinary biodiversity of the Northeast. Please be generous; we have a lot of work to do.

All best,



Philippa Dunne  
Chair, Board of Directors



Gretchen Stevens  
Director, Biodiversity Resources Center

"excellent" "influential" "indispensable" "eagle-eyed"

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## WHAT REED (*PHRAGMITES*) ECOLOGY TELLS US ABOUT REED MANAGEMENT

### PART 2. OPTIMIZING REED VALUES

By Erik Kiviat\*

Common reed (*Phragmites australis*) is both an invasive pest—capable of overwhelming native plant communities in certain settings—and a valuable resource, providing ecosystem services, products for human use, and habitat for animals and plants (see *News from Hudsonia* 20[1]). Reedbeds vary in their habitat functions, depending on a number of intrinsic characteristics, environmental factors, and management. In this second part of a two-part article, I review the ways that people use, perceive, and manage reed, and offer an approach to making management decisions that can optimize the benefits of this controversial plant.

#### CONTEMPORARY AND EARLIER USES OF REED

The principal contemporary use of reed in the U.S. is in constructed wetlands for wastewater treatment,<sup>13</sup> a cost-effective technology for nutrient removal or sludge dewatering in use at hundreds of sites around the country. People use reed in dried plant arrangements and occasionally in gardens, and ornamental fencing made of reed culms (aerial stems) is imported from Europe and sold in nurseries. A few artisans practice European-style reed thatching in North America (two examples may be seen on the south side of Route 23 east of Windham in Greene County, New York). Fishing poles are made from reed culms in Florida. Occasionally reed is planted in restoration projects and there is interest in using native genotypes for this purpose.

Reed was prominent among herbaceous (non-woody) plants used by North American Indians, especially in the western states.<sup>10</sup>

Reed use was common during the period of contact with Europeans, and reed artifacts are abundant in many southwestern prehistoric archaeological sites where dry, cool conditions have preserved organic materials in caves. The most common reed products were arrowshafts, pipestems, "cigarettes" (culm sections containing smoking mixtures), sugar, medicines, and boats. Some Native American groups managed reedbeds for harvest.

Europe has traditional and modern reed harvest for thatch, wall construction, paperboard, fuel, fencing, mats, and livestock fodder. Complex systems of reed management maximize quality for thatch or other products while improving habitats for biodiversity.<sup>5</sup> Reed is also used in many other areas of the world.

#### THE COMMON AND LITTLE-KNOWN COMMON REED

Many managers, researchers, sportspeople, and naturalists tend to overlook the ecological values of reed because they have been taught that reedbeds support little biological diversity.<sup>4</sup> Also, field workers who look at reedbeds usually do so during the day, in the springtime, and from outside the bed, because they assume that the

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\* Executive Director, Hudsonia Ltd



bed is uniform and uninteresting. Furthermore, the noise from human movement through reeds often changes the behavior of the animals under observation. One must spend large amounts of time in the interiors of reedbeds, in different places and different habitats, at all seasons of the year and times of day, to find animals and their sign. Most researchers have studied reed in a single geographic area and worked with a single group of organisms and a small set of reedbeds and wetland sites, and the findings are often assumed typical of other reedbeds and other organisms. Most reed workers do not perform extensive literature searches, and most information from reed studies is never disseminated to other workers. Vegetation management in wetlands is expensive, however, and can have undesirable ecological side-effects, so it is advisable to base management decisions on good basic science and natural history.<sup>17</sup>

### REED MANAGEMENT

In the northeastern U.S., reed is often perceived as having (and sometimes does have) negative impacts: providing poor habitat for ducks, breeding birds, and the bog turtle; excluding rare native plants and common native plant communities, and reducing marsh diversity; building up soil levels in tidal marshes thus reducing exchange of water between marshes and estuary and inhibiting use of the marshes by estuarine fishes and



Robust rhizomes (underground stems) of common reed allow formation of dense colonies. Photo © 2007 Erik Kiviat

crustaceans; producing mosquitoes; creating a fire hazard in developed areas; blocking views of open water and other landscape features; and concealing undesirable human activities.

Where management of reed is deemed necessary, different management techniques, singly or in combination, may be used on reedbeds depending on environment, bed size, associated biota, and management goals. Techniques include herbicide application, prescribed fire, frequent cutting, cutting under water, "mulching" (i.e., destruction of rhizomes and buds), livestock grazing, raising water levels, lowering bed (soil) levels, increasing tidal flushing by saline water, covering with plastic, and (potentially in the future) biological control.

### Herbicides

Thousands of hectares (1 hectare = 2.47 acres) of reedbeds have been or are being controlled with herbicides or combinations of herbicides and other techniques, in tidal and nontidal marshes of Massachusetts, Connecticut, New York, New Jersey, and Delaware. The herbicide most often used is glyphosate in various formulations (e.g., Roundup® or Rodeo®). Glyphosate, applied properly, kills the underground as well as aboveground parts of reed. Glyphosate is more-or-less toxic to all vascular plants as well as mosses, thus valuable native species or rarities of conservation concern are at risk where they occur in and downwind or down-current of reedbeds being treated. Although glyphosate is reportedly inactivated by binding to soil particles, the toxicity of glyphosate to many common and rare wetland animals has not been investigated. Glyphosate was an endocrine disruptor in cultured mouse cells,<sup>18</sup> thus has the potential to cause reproductive disorders and other hormone-related problems in wild mammals and humans (see additional toxicology information in the *Phragmites Management Sourcebook*<sup>9</sup>). I have seen no data addressing the actual on-site toxicology of glyphosate where used in reed management projects. Because of water movement and the occurrence of many rare plants and animals in tidal wetlands, herbicide may be particularly hazardous there.



Reed roof thatching on house in Greene County, New York. Photo © 2007 Erik Kiviat

Instead of spraying, herbicides can be applied by cutting reed culms and wiping or dripping herbicide onto or into the culm stumps. I will refer to these techniques loosely as "clip-and-drip" to distinguish them from spray application. Clip-and-drip is labor-intensive and can only be used on small reedbeds or small patches of large reedbeds. This approach, however, can greatly reduce the potential to harm non-target organisms because less herbicide is lost into soil, water, or other organisms. Clip-and-drip may be suitable for situations where rare plants are intermingled with reeds. Caution is advised, however, due to reports of clip-and-drip damage to other plants during hot weather.

### Burning, Cutting, Grazing

Cutting or burning common reed during the dormant season produces a temporary "short grass" habitat in spring that attracts migrant birds such as American woodcock and common nighthawk, and breeding birds including certain ducks and shorebirds. Fire also removes the abundant and persistent litter thus opening up space for other organisms and reducing soil build-up. Burning reed on organic soils when water levels are low in summer or during drought can burn off patches of soil and reed rhizomes, creating openings or pools in reedbeds. Frequent cutting reduces the vigor of reedbeds; two or more cuts annually during the growing season for several years may be required. Cut material should be removed from the beds if possible and either used or disposed of where it cannot root. Most livestock readily eat reed, especially the young shoots in spring. Grazing and trampling inhibit or even kill reedbeds but the grazing intensity must be designed to affect the reed without unwanted impacts to soil or other plants. Details on these and other management techniques and



information sources are cited in the *Phragmites Management Sourcebook*.<sup>9</sup> There are many opportunities for innovation and experiments to adapt reed management techniques to the goals and conditions of northeastern sites.

### Classical Biocontrol: A Risky Solution

"Classical" biological control involves importing to the introduced range of a species those insects, fungi, or other organisms that seem to regulate an invasive species in its native range. In theory, many invasive plants become invasive in their introduced ranges because they escape these "natural enemies." These enemies can be identified, tested for their potential to harm nontarget plants (e.g., crop plants or rare native species), and released to control the invasive species; this process is intended to reduce the invasive to levels at which it is no longer a pest. Despite these pre-release precautions, however, imported natural enemies sometimes switch hosts and attack rare native plants or other nontarget species.<sup>12</sup>

Research and development are underway for classical biocontrol of reed in North America.<sup>2</sup> Unfortunately, imported natural enemies are unlikely to stay in a geographic region such as the Northeast, and will not limit their activities to undesirable reedbeds and leave valuable reedbeds alone. It is possible that natural enemies would be found that would attack only the Eurasian form of reed but it cannot be guaranteed that those organisms will not adapt to feeding on native forms of reed. Reedbeds in the northeastern states, many of which are the introduced form, often support rare and uncommon breeding or nonbreeding birds.<sup>7,8</sup> Elsewhere in North America reedbeds support other birds of conservation concern, including several species of nesting ducks in the Delta Marshes of Manitoba<sup>19</sup> and an endangered bird, the Belding's yellowthroat, in Baja California.<sup>14</sup> A common butterfly, the broad-winged skipper (*Poanes viator*), depends largely on reed in the Northeast, and an uncommon and local butterfly, the Yuma skipper (*Ochlodes yuma*), is absolutely dependent on reed in the West. No surveys for reed-dependent invertebrates have been conducted in the West (or on the Gulf Coast, México, etc.). The Seri in Sonora, México, formerly made 25 different products from reed which has a limited occurrence there,<sup>3</sup> and at least two Native American groups still use reed.<sup>1,11</sup> Reed bio-

control could also harm reedbeds constructed for nutrient removal or sludge dewatering in sewage treatment, where many small communities may be unable to afford other techniques.<sup>13</sup> There are treatment reedbeds in the Hudson Valley in Highland, New Paltz, and Tivoli.

### AN APPROACH FOR DECISION-MAKING

The habitats and the surrounding landscapes of reedbeds vary greatly; if we are to manage reedbeds scientifically we have to learn to "read the reeds." To the careful observer, variations in the reedbed and its surroundings will suggest particular management strategies to attain particular goals. For example, if foraging habitat for certain ducks is desired, an extensive dense reedbed might be treated to create large shallow pools within the bed<sup>5</sup> or to reduce culm density.<sup>19</sup> If a small reedbed in a large tidal marsh is important to roosting songbirds, but extensive spread of reed is unwanted, ditches might be dug around the reedbed to contain vegetative extension, or the bed can be allowed to expand until contained by existing tidal creeks. If northern harrier nesting habitat is wanted, extensive reedbeds can be preserved, or moderate-size beds can be expanded, with protection from human intrusion. Impounded or tide-gated, formerly saline, tidal marshes where reed has displaced cordgrasses can be re-opened to saline tides. Prior to embarking on any reed management project, managers should predict the positive and negative ecological effects of the management, design the project to secure the greatest net benefit, and carefully monitor the results. Managers and researchers need a detailed and accurate reedbed taxonomy and language so that reedbed characteristics pertinent to management can be recognized and considered.

Continued on page 4



Beaver lodge in common reed stand in a Hudson River freshwater tidal marsh. Photo © 2007 Erik Kiviat

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The previous issue of *News From Hudsonia* was Vol. 20, No. 1, Spring 2005. *NFH* was not published in 2006.

Hudsonia is an institute for research, education, and technical assistance in the environmental sciences. We conduct pure and applied research in the natural sciences, offer technical assistance to public and private agencies and individuals, and produce educational publications on natural history and conservation topics. Hudsonia is a 501(c)(3) tax exempt, non-advocacy, not-for-profit, public interest organization. Contributions to Hudsonia are fully tax deductible, and are used solely in support of our nonprofit work.



**TABLE 1. Site-specific decision process for common reed (*Phragmites australis*) management.**

STEP	INFORMATION NEEDED	INFORMATION SOURCE
1. Clarify management goals	Desired outcomes of management	Management plan or guidance, scientist opinions, public opinion
2. Observe environment	Soil, hydrology, vegetation, landscape; invasibility factors	Published information, extant data, new observations, new data collection
3. Determine status of reed population	Increasing, stable, or decreasing on site	Historic observations, ground or aerial photos, remnants in soil
4. Observe characteristics of reedbeds	Size, number, shape, proximity, interspersed, density, height, fertility, dominance or admixture (including woody plants) in bed interiors, admixture (including vines) in bed edges, internal waterways & clearings, grazing by muskrat, insects, or livestock, past & present management	Field observations (outside and within beds), etc.
5. Survey associated biota	Presence of other organisms including keystone, rare, economic, or amenity species	Field observations, etc. (skilled volunteer observers may be used)
6. Decide if scientific information supports the combination of goals, environment, and methods	Analysis of existing data on reed habitat functions and other ecosystem services	Literature and researchers analyzing data from research, natural history, and monitoring studies
7. Identify management options (techniques)	Techniques that may be used at site	Financial, regulatory (permits), ethical constraints, public relations, available skills, equipment, funding, nontarget risks
8. Select taxa and abiotic features to monitor, and design monitoring program	Data to assess outcomes specific to management goals, site character, and treatment types	Scientific advice often needed
9. Select and perform management treatments (supervised)	Permits, public announcements, signs, or other arrangements may be needed	
10. Monitor results of treatments	Before and after treatments; adequate sampling procedures	Original data collection and analysis
11. Adapt treatment program to achieve goals ("adaptive management")	Monitoring data	From #10
12. Perform maintenance as needed to sustain desired conditions (reedbed character or alternate community, associated biota)	Observations on managed area to determine status of desired character	Original observations and data collection
13. Disseminate monitoring data with information on goals, techniques, and outcomes		

Management of reedbeds for particular goals can be planned according to a logical process (Table 1). Goal-directed and effective site-specific management depends on clear articulation of goals, conditions, treatments, and outcomes. Interim and final results should be made readily available to practitioners and the public, so that others can learn from each management project. More detail on decision-making and techniques is in the *Phragmites Management Sourcebook*.<sup>9</sup>

**PROSPECT FOR SENSIBLE REED MANAGEMENT**

Introduced and invasive plants are almost everywhere; we cannot set the biogeographic clock back 500 years to a world where the only plant introductions were accomplished by indigenous peoples or migratory animals. We have to choose the "battles" that will yield the best results in biodiversity conservation and maintenance of ecosystem services and amenities, at an affordable cost in dollars and nontarget impacts. Reed is super-successful because it can tolerate human-

altered environments with lowered water tables, increased fertility, and disturbed or contaminated soils. Some reed habitats are in environments that have been so severely degraded by urban or industrial activities that they will not support viable populations of non-invasive native plants such as cattail, cordgrass, or sedge. Some reed-invaded habitats can sustain restoration to native, non-reed vegetation, but many such projects will require expensive maintenance. At some sites, it may be possible to correct underlying ecological problems that have increased invasi-



bility—e.g., altered hydrology, nutrient loading, or population levels of herbivores—and potentially re-create an ecosystem and native plant community that will require minimal maintenance.

Because native forms of reed have been in North America for many thousands of years, both native forms and the similar introduced reed form should be “acceptable” habitat or food to many native organisms that have adapted to reed genetically or otherwise. Such adaptations are not guaranteed, but in some cases appear to be occurring: heron use of reedbeds for nesting is on the increase,<sup>6</sup> and broad-winged skipper is believed to have switched hosts from the declining wild-rice to reed.<sup>16</sup> Well-designed management can make reedbeds better habitat for organisms we wish to foster, and simultaneously conserve the capability of reedbeds to provide ecosystem services such as water quality maintenance and flood buffering. If processes and markets are developed for reed products (thatch, livestock bedding and fodder, biomass energy, industrial feedstocks, medicines, foods), reedbeds can be thinned or fragmented for habitat and the harvested material used. Impacts of harvesting on wetlands would need assessment. Some practitioners argue that non-native stands should be eradicated and native forms should be preserved. This might be beneficial in some areas. However, many thousands of hectares of introduced reed, e.g., in the New York City region, support mammals, birds, insects, human activities (e.g., birdwatching), and even plants that would not thrive otherwise (that is, where native plant communities cannot tolerate the harsh urban conditions). Native reed may be less competitive than introduced reed,<sup>15</sup> thus native reedbeds may be more invasible by introduced reed or other invasive plants.

Are concepts of reed management applicable to other invasive plants? Recently established species should typically be eradicated from a site or region before they become abundant, but long-established and abundant introduced invasive plants and native invasives are better candidates for containment, alteration of stands to optimize impacts, or harvest. A containment, alteration, and harvest strategy should work for purple loosestrife or water-chestnut, with species-specific modifications, but may not be right for Japanese stilt-grass, garlic-mustard, or tree-of-heaven.

Hudsonia is always interested in learning about invasive plant management projects, successful or not. Please send your stories of successes or failures, and your observations of invasive plant interactions with other organisms. ■

### Acknowledgments

Many colleagues, collaborators, and confidants have provided information and assistance, and librarians at Bard College and elsewhere have been especially helpful. Preparation of this article was supported by a grant from the Westchester Community Foundation. Hudsonia's work on *Phragmites* has also been funded by the Geraldine R. Dodge Foundation, Hudson River Foundation, Geoffrey C. Hughes Foundation, New York City Environmental Fund, New York State Department of Environmental Conservation Hudson River Estuary Program, Salisbury Association, and Metropolitan Conservation Alliance of the Wildlife Conservation Society.

### REFERENCES CITED

1. Begay, Carl. 2006. Personal communication.
2. Blossey, B., M. Schwarzländer, P. Häfliger, R. Casagrande, and L. Tewksbury. 2002. Common reed. P. 131–138 in R. Van Driesche, et al., eds. *Biological Control of Invasive Plants in the Eastern United States*. U.S. Department of Agriculture Forest Service FHTET-2002–04. 413 p.
3. Felger, R.S. and M.B. Moser. 1985. *People of the desert and sea: Ethnobotany of the Seri Indians*. University of Arizona Press, Tucson. 435 p.
4. Hartwig, T. and E. Kiviat. 2003. A second look at invasives. *Volunteer Monitor* 15(2):13–15.
5. Hawke, C., and P. José. 1996. Reedbed management for commercial and wildlife interests. *Royal Society for the Protection of Birds*, Sandy, England. 212 p.
6. Jenkins, David. 2006. Personal communication.
7. Kane, R. 2001a. *Phragmites* use by birds in New Jersey. *Records of New Jersey Birds* 26:122–124.
8. Kane, R. 2001b. *Phragmites*: A dissenting opinion. *New Jersey Audubon* (Winter 2000–2001):25–26.
9. Kiviat, E. 2006. *Phragmites* management sourcebook for the tidal Hudson River (and beyond). Report to Hudson River Foundation. Hudsonia Ltd., Annandale, NY. 72 p. [http://www.hudsonriver.org/report\\_archives.htm](http://www.hudsonriver.org/report_archives.htm)
10. Kiviat, E. and E. Hamilton. 2001. *Phragmites* use by Native North Americans. *Aquatic Botany* 69 (2–4): 341–357.
11. Long, Jonathan and Mae Burnette. 2006. Personal communication.

12. Louda, S.M., D. Kendall, J. Connor, and D. Simberloff. 1997. Ecological effects of an insect introduced for the biological control of weeds. *Science* 277:1088–1090.
13. Reed, S.C., E.J. Middlebrooks, and R.W. Crites. 1988. *Natural systems for waste management and treatment*. McGraw-Hill Book Co., New York, NY. 308 p.
14. Rodríguez-Estrella, R., L.R. Delgado, E.P.D. de Bonilla, and G. Blanco. 1999. Belding's yellowthroat: Current status, habitat preferences and threats in oases of Baja California, Mexico. *Animal Conservation* 2:77–84.
15. Saltonstall, Kristin. 2005. Personal communication.
16. Shapiro, A.M. 1970. The biology of *Poanes viator*. *Journal of Research on the Lepidoptera*. 9:102–123.
17. Sutherland, W. 2003. Evidence-based conservation. *Conservation in Practice* 4(3):39–41.
18. Walsh, L.P., C. McCormick, C. Martin, and D.M. Stocco. 2000. Roundup inhibits steroidogenesis by disrupting steroidogenic acute regulatory (StAR) protein expression. *Environmental Health Perspectives* 108(8):769–776.
19. Ward, E. 1942. *Phragmites* management. *Transactions of the North American Wildlife Conference* 7:294–298. Wildlife Management Institute, Washington, DC.

### HUDSONIA'S TECHNICAL ASSISTANCE PROGRAM

Hudsonia routinely conducts biodiversity assessments and provides other technical assistance on a fee basis to municipalities, consulting firms, NGOs, and individuals on the bog turtle and Blanding's turtle, other rare animals and plants, wetland ecology, stream ecology, and invasive plants. Contact Erik Kiviat at 845-758-7273 or [kiviat@bard.edu](mailto:kiviat@bard.edu) to make arrangements for these services.

### Operation Habitat

#### The Philip and Amanda Duff Dunne Fund

We regularly receive inquiries from people who want to support our efforts to identify and protect the habitats of rare and endangered species. In response to these inquiries, and to honor her parents and their enthusiasm for protection of imperiled wildlife, Hudsonia Board Chair Philippa Dunne has established **Operation Habitat**, a designated fund within Hudsonia to support our conservation science work.



Please visit our website to make your tax-deductible contribution to Operation Habitat. [www.hudsonia.org](http://www.hudsonia.org)



# STRANGELY FAMILIAR: The Ecological Homogenization of American Landscapes

By Jenny Tollefson\*

A new strip mall opened recently near my house featuring Barnes and Noble, Pier 1 Imports, Bed, Bath, & Beyond, and other familiar chain stores. Although a few of my friends and neighbors admitted to being excited about the new, convenient shopping opportunities, we all agreed on one thing: cookie-cutter retail developments like this one diminish the local character that makes cities and towns unique. When our landmarks are big-name, big-box stores and fast-food restaurants, we could just as easily be in Kingston, New York as Puyallup, Washington or Tuscaloosa, Alabama.

A similar phenomenon is occurring in natural landscapes across the country. Under natural con-

**A diverse patchwork of habitats creates a unique signature that sets one place apart from another.**

ditions, landscapes are made up of unique aggregations of habitats that are determined by the combined influences of local climate, geology, hydrology, and other site-specific physical and chemical conditions. Each habitat is used by specific assemblages of plants and animals that are adapted to those conditions. Some of these habitats are common and support common, widespread species, while others are rare and support species with narrow geographic ranges and specialized habitat requirements. Combined, this diverse patchwork of habitats creates a unique signature that sets one place apart from another. This is how we know when we are in the Great Plains, the Great Basin, or the Great Smoky Mountains.

In the process of altering landscapes to accommodate human needs and desires, however, natural habitats are altered or lost. As a result, ecologically complex landscapes become increasingly homogeneous. When an area is developed, for example, habitats are fragmented into smaller pieces. Wildlife species that require large, contiguous habitat areas for foraging, dispersal, reproduction, and protection from predators are displaced by generalist species that can

thrive in small habitat patches, along habitat edges, and in cultural landscapes such as lawns and gardens. Bears and bobcats become scarce, while skunk, raccoon, and opossum populations soar. In addition to loss of native species, the ecological processes that sustain natural habitats are often compromised when a landscape is fragmented. A small patch of trees surrounded by development may still look like a forest, but it lacks the complex array of native species and finely-tuned hydrologic and nutrient regimes that allow it to function like an intact forest.

The spread of non-native and invasive species also contributes to the homogenization of landscapes. In recent decades, non-native plants have spread along corridors of human travel and development, proliferating in previously undisturbed habitats that supported diverse native species. Oriental bittersweet, multiflora rose, and Japanese barberry have penetrated forest habitats by way of the abrupt edges that are created when a forested area is developed. Purple loosestrife and common reed have invaded marshes, wet meadows, and swamps in our region, displacing native plant communities and associated vertebrate and invertebrate fauna. Invasive plants are often well equipped to outcompete native plants for water, light, and nutrients, and many can tolerate the often harsh, degraded, or radically altered environments associated with human land uses.

A less obvious but significant cause of landscape homogenization is the intentional conversion of natural habitats to artificial habitats. Many of us feel an irresistible urge to tame the wild land that surrounds us by creating lawns, gardens, and other manicured settings in place of natural, undisturbed habitats. Lawns are, in fact, a fixture of the American landscape. In an urban area, a lawn may provide important habitat when little other natural land cover remains. In suburban and rural areas, however, lawns displace forest, meadow, and other natural communities. An unmanaged meadow can support diverse communities of grasses, forbs, shrubs, invertebrates, reptiles, mammals, and birds. Grassland breeding birds such as grasshopper

sparrow, vesper sparrow, bobolink, and upland sandpiper use large meadows for nesting and foraging. Butterflies can be abundant and diverse in undisturbed meadows that support their host plants. Blanding's turtle, wood turtle, spotted turtle, box turtle, painted turtle, and snapping turtle all use upland meadows for nesting. In comparison, the ecological value of a bluegrass or fescue monoculture that is mowed regularly and treated with pesticides and fertilizers is negligible.

Artificial ponds are another striking example. In a recent study of habitats in the Town of Washington, Dutchess County, Hudsonia found that approximately 95% of open water bodies were constructed (Tollefson and Stevens 2004). These included water bodies that had been excavated or dammed by humans, either in existing wetlands or streambeds or in upland terrain. Across the country, scores of wetlands have been dammed or excavated to create open water habitat for waterfowl—projects that are often supported by federal and state wildlife habitat improvement grants. Open water does provide useful wildlife habitat, but the species most likely to benefit from it, such as Canada goose and mallard, already have stable, if not booming, populations. Although the intent is to improve wildlife habitat, these types of projects are misguided when the original habitat already supports a diverse natural community.

Although some ponds are created for utilitarian purposes, such as watering livestock and irrigation, many are created for purely aesthetic purposes. Like manicured lawns, ornamental ponds are created by landowners attempting to

**By understanding some of the ecological consequences of habitat alteration landowners may choose to maintain natural habitats over artificial alternatives.**

engineer a more aesthetically pleasing landscape. Although these ponds may have some intrinsic ecological value, such as providing refuge for turtles and other wildlife during times of drought, their value rarely exceeds that of the habitats that existed prior to impoundment or

\* Jenny Tollefson, a former Hudsonia biologist, now writes about fire ecology for the US Forest Service Fire Sciences Laboratory in Missoula, Montana.



excavation. In many cases, they replace high-quality natural habitats, such as wet meadows, springs, marshes, and swamps. They may also replace rare habitats, such as fens or kettle shrub pools, that are critical habitat for rare or declining species. Ornamental ponds are subject to a range of adverse human impacts that further compromise their ecological integrity, such as shoreline development, dredging, chemical or mechanical control of aquatic weeds, fish stocking, and pesticide and fertilizer runoff from roads and private yards.

Intentional alteration of a natural landscape does not necessarily constitute deliberate destruction of valuable habitat. Many landowners, in fact, care deeply about creating or improving wildlife habitat. On a large scale, however, the ecological heterogeneity that sets one place apart from another is diminished when a landscape is developed. In many suburban areas, forest fragments, manicured lawns, ornamental ponds, and other cultural habitats have become as ubiquitous as Target and Starbucks, and like the strip mall, the landscapes they occupy could be Anywhere, USA. By understanding some of the ecological consequences of habitat alteration and homogenization, landowners may choose to maintain natural habitats instead of replacing them with artificial alternatives. Over the long-term, maintaining local landscape diversity amidst human development will be critical for maintaining local and regional biological diversity. ■

#### REFERENCES CITED

1. Tabak, N., K. Bell, and G. Stevens. 2006. Significant habitats in the Town of Amenia, Dutchess County, New York. Report to the Town of Amenia, the Millbrook Tribute Garden, the Dyson Foundation, and the Dutchess Land Conservancy. Hudsonia Ltd., Annandale, NY 12504. 133 p.

#### EVENTS

**Blanding's Turtle Field Trip:**  
for donors, board members, and guests  
Saturday July 21, 2007

**Reed Management Seminar:**  
for professionals (fee)  
Tentative date Tuesday August 14, 2007  
(see website for updates)

**Blanding's Turtle Seminar:**  
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For more information on field trips and seminar, contact Kate Connor at 845-758-0600, or [connor@bard.edu](mailto:connor@bard.edu).

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## BIODIVERSITY ASSESSMENT SHORT COURSE

22–24 May and 7–9 August

Hudsonia will be holding two sessions of our short course in biodiversity assessment. Through a partnership with the Hudson River Estuary Program, we offer this intensive three-day course to land use decision-makers throughout the ten-county Hudson River estuary corridor, especially members of town boards, planning boards, and conservation advisory councils; staff of land trusts; and municipal representatives directly involved in environmental reviews and land use planning. Through hands-on exercises in remote sensing, participants learn to interpret topographic, geologic, and wetland maps, soil surveys, and aerial photos to predict the presence of ecologically significant habitats in the landscape. Outdoor exercises help participants learn field indicators of habitats that may support rare species or are otherwise ecologically important. We discuss methods for using habitat information and landscape conservation concepts in land use planning and decision-making. For more information, contact Steve Posner, Biodiversity Educator, at 845-758-0600, or [posner@bard.edu](mailto:posner@bard.edu).

## SPECIAL THANKS TO:

- The anonymous donor of \$10,000 in securities in December 2006.
- small packages, inc. who designed our website, has provided much technical assistance, and has hosted the website free-of-charge since its creation.
- All the landowners in the towns of Amenia, Marletown, Rhinebeck, and Stanford who have given us walking access to their property for our habitat mapping projects.
- All the landowners in the towns of Clinton and Milan who allowed property access for our Blanding's turtle research.
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